Planning Proposal to Amend Development Standard

PLt 627, DP1163903, Currans Hill, NSW

80219016

Prepared for

Wolin Investments Pty Ltd and Landco (NSW) Pty Ltd

02 December 2019

Cardno

Contact Information

Cardno (NSW/ACT) Pty Ltd
ABN 95 001 145 035

Level 9 - The Forum
203 Pacific Highway
St Leonards NSW 2065
Australia

www.cardno.com
Phone +61 2 9496 7700
Fax +61 2 9439 5170

Document Information

Prepared for	Wolin Investments Pty Ltd and Landco (NSW) Pty Ltd
Project Name	PLt 627, DP1163903, Currans Hill, NSW
File Reference	Document2
Job Reference	80219016
Date	1 November 2019
Version Number	3

Author(s):

Name: Katrina Magee
Senior Urban Planner

Effective Date 2/12/2019

Approved By:

Name: John O'Grady
Principal Planner

Date Approved 2/12/2019

Document History

Version	Effective Date	Description of Revision	Prepared by	Reviewed by
1		Working Draft	Katrina Magee/John O'Grady	
2	29/10/19	Updated working draft	Katrina Magee	John O'Grady
3	1/11/19	Final	Katrina Magee	John O'Grady
4	2/12/2019	Final	Katrina Magee/Gilead Chen	John O'Grady

EXECUTIVE SUMMARY

This Planning Proposal (**PP**) applies to a portion of land within the existing residential suburb of Currans Hill. The land is a portion of a large allotment known as Lot 627, DP1163903, Currans Hill. It has a total area of approximately 1.4ha.

The PP is to amend the current Minimum Lot Size Development Standard that applies to the subject site to a minimum 500m^2.

The PP is considered justified for the following reasons:

- It will allow for a more locally appropriate development form on the land where dwellings would address the adjoining open space and a perimeter road would improve public access to open space.
- It will address local bushfire risk by including a ring road with a dual function of providing access for fire fighting and an Asset Protection Zone.
- It will result in a modest increase in housing numbers in an area that is suited to additional housing due to its adjacency to local open space.
- The increased housing numbers would have minimal impacts on the local road system and there are adequate local transport, retail and community services to service the small increase in population.

For these reasons, detailed in the PP below, it is our opinion that the Proposal should be progressed to Gateway for further consideration.

Table of Contents

Appendices

1 Introduction

This Planning Proposal (PP) has been prepared by Cardno (NSW/ACT) Pty Ltd on behalf of the landowners, being a joint venture between Wolin Investments Pty Ltd and Landco (NSW) Pty Ltd.

The PP seeks an amendment to the *Camden Local Environmental Plan, 2010* (CLEP) in relation to land which is part of Lot 627 DP 1163903, Currans Hill. The proposed amendment pertains to a 1.4ha portion of land located in the north western corner of Lot 627, adjacent to Caulfield Close. (Figure 1-1)

The Proposed amendment to the Development Standards pertaining to this portion of land is to Amend the minimum lot size requirement from 900m2 and 1,500m2 to 500m2.

The PP has been prepared in accordance with Section 3.33 of the *Environmental Planning and Assessment Act 1979 (EP&A Act)* and in accordance with the document *'Planning Proposals - A Guide to Preparing Planning Proposals',* (NSW Department of Planning, Industry and Environment).

Cardno requests that Council forwards the PP to the Minister for Planning (or delegate) for a 'Gateway Determination' in accordance with Section 3.34 of the EP&A Act.

2 The Site

The site that is the subject of this Planning Proposal is a parcel of land approximately 14,000m^2 in area located at the current eastern extremity of Caulfield Close, Currans Hill (Figure 1-1). For the purposes of this Planning Proposal, this land parcel is referred to as **the subject site**.

Legally, the site is part of a much larger land parcel known as Lot 627 DP 1163903 (No.207B) Turner Road, Currans Hill (Figure 1-2). This larger land parcel has a total area of approximately 343,380m² and is referred to in this PP as **the greater site**.

2.1 Site Description

Subject site

The subject site is roughly triangular in shape and is accessed via Caulfield Close. It has frontages to Caulfield Close and adjoining residential land to the north, Caulfield Reserve, a local drainage / open space corridor, to the west and south west and undeveloped land to the east. Immediately to the east, the Subject Site is adjoined by a 60m TransGrid electrical easement which runs north-south along the length of the greater site.

The subject site is generally cleared of vegetation apart from a very small portion of remnant Cumberland Plain Woodland in its south western corner adjacent to Caulfield Reserve and a further area of Cumberland Plain Woodland Derived Grassland further to the north east. The land falls gradually from north to south in the general direction of Caulfield Reserve at an average gradient of approximately 1 in 12 (Figure 2-2).

The Greater Site

The greater site is currently undeveloped and was historically used for cattle grazing. Consistent with its former uses the greater site is currently vegetated with a mix of grasslands and woodlands. There is a substantial remnant of Cumberland Plain Woodland in the south east portion of the Lot.

Topographically the greater site rises gently from a low point of 105 metres above sea level at the south of the site to a high point of 145 metres at its northern edge. A small hill lies at the northern end of the lot, with the gradient of the slope rising up to the peak, measuring an incline greater than 16% in certain areas.

The State Heritage Listed Sydney Water Upper Canal System traverses the eastern part of the greater site. The northern highest point of the greater site supports a recently constructed Sydney Water reservoir tank.

Figure 2-1 The Subject Site (Portion of Lot 627 DP1163903)

Source: Google Maps

Figure 2-2 Site and Contour Map

Source: Cardno GIS

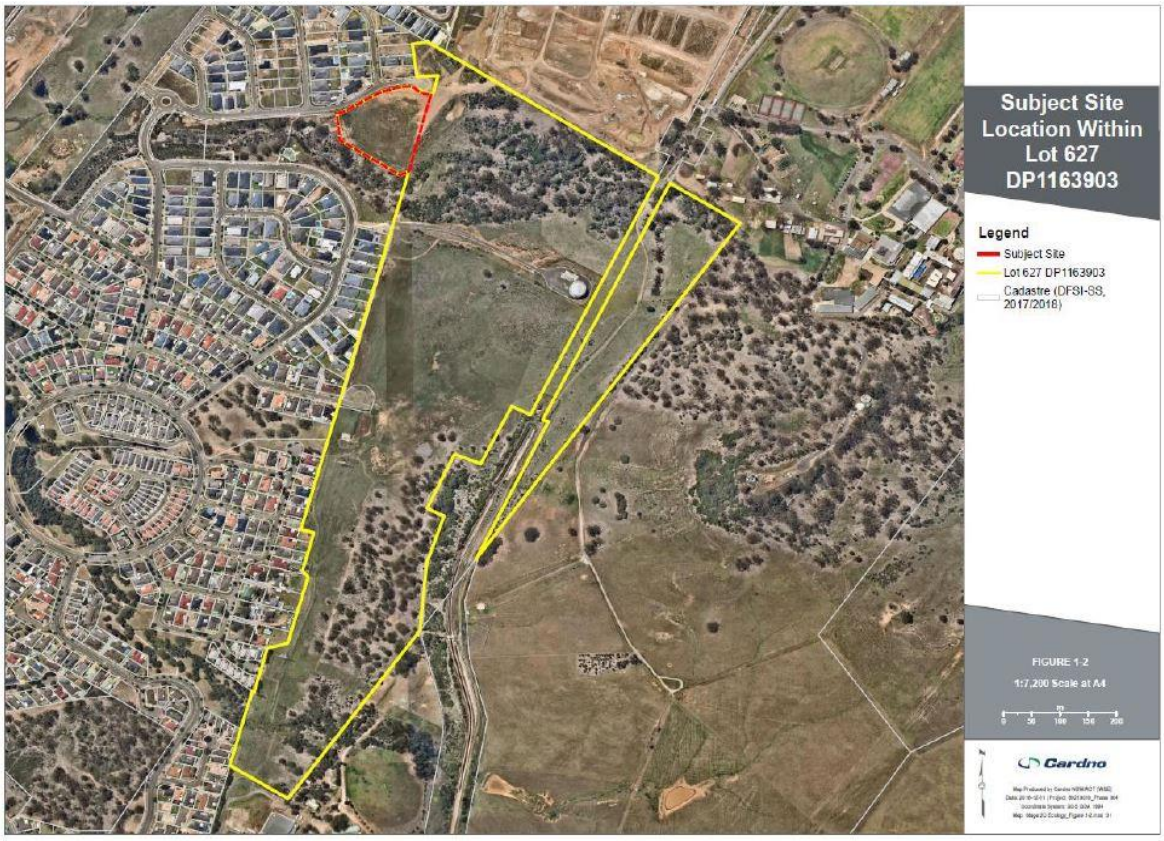


Figure 2-3 Subject site (outlined red) within the context of the Greater Site (Lot 627 DP1163903)

Source: Cardno GIS

2.2 Site Context

Currans Hill is located approximately 60 km south-west of the Sydney Central Business District (CBD). The suburb adjoins Gregory Hills to the north, a developing residential community which is part of the Turner Road Precinct within the South West Growth Centre.

Although not part of the Growth Centre, Currans Hill enjoys the same strategic advantages. The following commercial / retail centres are located within a 5km radius:

- Mount Annan Neighbourhood Centre (3km distant)
- Campbelltown City Centre and Macarthur Town Centre (5.5kms to the north west)

The Subject Site is connected to others area of Sydney via existing major road networks such as:

- Narellan Road, an arterial road connects with the Hume Motorway to the south-east and Camden Valley Way to the north-west; and
- Hume Motorway connects with the Westlink M7 Motorway and the M5 Motorway further north at the Sir Roden Cutler Interchange.

The proposed Western Sydney Airport and Aerotropolis is 20 km north of the site at Badgerys Creek.

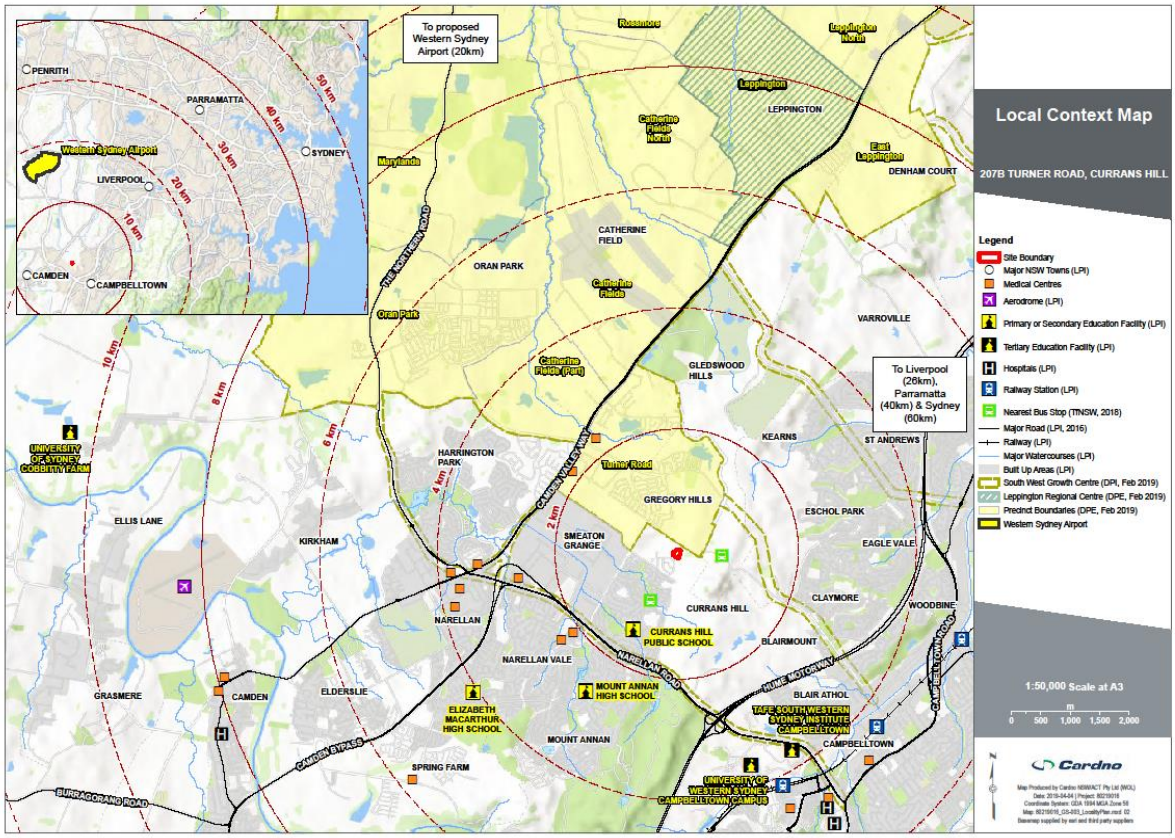


Figure 2-4 Local Context Map

Source: Cardno GIS

3 Planning Background

3.1 Statutory and Strategic Planning History

Development Approvals

- On 26 November 2014, Camden Council approved DA 2014/560/1 for the subdivision of the subject site into 9 lots, ranging in size from 995.6m^2 to 2,135m^2 and 1 residual lot. The Consent was not enacted.
- On 27th February 2015. Council approved DA 2014/597 for "Staged subdivision of land to create 23 residential lots, 2 public reserve lots and 2 residue lots and the provision of drainage, landscaping and associated works". This Consent applied to land within the Greater Site. The Consent was not enacted.
- On 24th May 2016, Council issued an Engineering Construction Certificate (EngCC/2014/597/1) to DA 2014/597 for Stage 3 Bulk Earthworks (Early Works) - "Bulk earthworks, sediment basin, tree removal, sediment and erosion control measures and erection of temporary fencing".

Planning Proposals

A number of Planning Proposals pertaining to the greater site and the subject site have been submitted to Camden Council by the Landco / Wolin Joint Venture since July 2017.

Proposals submitted in July 2017 and April 2019 sought zoning changes to the greater site in order to permit a mix of residential development, Environmental Living and Environmental Protection on the land. Neither of these PPs were supported by Council or the Sydney North Planning Panel. The reasons for decisions not to support the PP's included, in summary:

- Insufficient demonstrated strategic and site specific merit for rezoning land outside the Growth Centre to higher density
- Camden Council staff reporting that it does not require zoning changes to achieve its housing targets in the South West Growth Area
- Advantages of preserving the current E4 zoning at least in part to allow a meaningful transition between the metropolitan density of the existing Currans Hill subdivision and the adjacent rural lands
- Existing approved subdivision would allow for 23 environmental living lots (DA 2014/597).
- Objective of supplying 'housing choice' within the Camden LGA would be better supported by the provision of the increasingly scarce 'environmental living' stock, to supplement the denser offerings already existing in Currans Hill.
- Removal of vegetation including Cumberland Plain Woodland
- Difficulty in accessing the development from the existing subdivision
- Land slope producing challenges to orderly residential subdivision and civil engineering
- No proposal for maximum building height, FSR or lot size.
- Potential for out of scale / character development due to the range of uses permissible in the R1 Residential zoning.
- Lack of access to amenities and public transport
- Inconsistency with the following Planning Priorities:
  - W14 'Protecting and Enhancing bushland and biodiversity'
  - W15 'increasing urban tree canopy cover and delivering Green Grid connections'
  - W16 'Protecting and enhancing rural landscapes'

In late 2018, a further Planning Proposal was submitted pertaining to the subject site, being the land which is the subject of this PP. This PP sought to amend the Camden LEP 2010 in relation to the land via:

- Rezoning the land from E4 and E2 to R1;
- Amending the minimum lot size from 900m2 / 1500m2 to 450m2; and
- Establishing a maximum building height of 9.5m.

The Camden Planning Panel considered the draft PP and provided the following comments:

"The Camden Local Planning Panel has considered the draft Planning Proposal and is of the view that the proposal should not proceed to Gateway Determination as it fails to demonstrate strategic merit for the following reasons:

- *It doesn't provide a diversity of lot sizes consistent with the planning of the surrounding area.*
- *The current zoning provides an appropriate transition to the immediately adjoining E2 zoned land containing Cumberland Plain Woodland.*
- *The existing E2 Environmental Conservation zone should be retained, as CPW vegetation has been identified on the E2 zoned land."*

In response to these comments and advice from Council, the Proponent has elected to prepare this amended Planning Proposal that pertains to the subject site. The PP proposes retention of the existing land zoning and facilitates an improved planning and urban design outcome via amendments to the Development Standard for minimum lot size and to correct an anomaly to the building height development standard applies to the subject site.

The following table provides an overview of issues raised by the Planning Panel and how the current PP aims to address each of them.

Reason for Decision	Comment
"*while there is scope within the planning proposal process for increased denity to be permitted on sites which demonstrate sufficient strategic and site-specific merit, that does not mean that any site which is located*	This PP seeks to increase the minimum lot size whilst maintaining the current site zoning. A minimum lot size of 500m2 is considered appropriate at the Subject Site in

outside the edge of the growth centre area that can be built upon should be rezoned for higher density"	context to the size of surrounding established residential lots within Currans Hill. It is also argued that densities permitted within the adjoining Growth Centre are relevant to the Subject site and should be taken into consideration as part as a holistic approach to planning for the area rather than looking at each 'estate' or community in isolation. This approach aims to promote integration and social cohesion, as well as positive urban design outcomes across the locality into the future.
"Camden Council report that they are well placed to meet and exceed its housing targets, particularly in the South West Growth Area. With a target for the LGA of 11,800 for the current planning period, the Council reports 7,000 dwellings constructed or under construction and 7,500 additional approvals"	According to Profile ID the population of Camden LGA is forcast to grow to 233,299 by 2036, which represents a 118.03% change. Accordingly, additional housing at the Subject site will benefit the local housing market and community through increased availability and choice. Further, additional lots at the Subject site are not likely to undermine housing targets set for the South West Growth Area, but rather maximises the economic potential of this land without compromising environmental or planning considerations as demonstrated by this PP.
"This site is outside the southnmost extremity of the growth area. It is not close to town community facilities and is remote from pubilc transport. While the site offers the advantage of connection to an existing suburban development, there are also significant advantages of preserving the current E4 zoning at least in part to allow a meaningful transition between the metropolitan density of the existing Currans Hill subdivision and the adjacent rural lands. That is particularly so given the significant contribution that the nationally listed critally endangered remnant Cumberland Plain woodland makes to the visual and ecological catchement. The transition will also increase the amenity and desirability of the areas where increased densities have been permitted."	This proposal seeks to retain the current zoning provisions at the site. The proposed minimum lot size aims to allow a greater number of lots whilist maintaining a transition between existing smaller lots within Currans Hill and adjcaent rural lands. The distance to community facilities and public transport is consistent with other lots adjoining the site within Currans Hill. These existing issues should be addressed by the relevant local or State Government authorities.
"The objective of supplying 'housing choice within the Camden LGA' would be better supported by the provision of the increased scarc 'environmental living' stock, to supplement the denser offerings already existing in Currans Hill."	Again, given the proposal seeks to retain the current E2 and E4 zones at the site, current permitted land uses will remain unchanged. The proposed minimum lot size of 500m2 will accommodate single dwellings that allow for transition into adjoining rural lands and will provide increased density adjacent to public open space.
"The panel considers the proposal inconsistent with the following Planning Priorities: ▪ W14 'Protecting and Enhancing bushland and biodiversity' ▪ W15 'increasing urban tree canopy cover and delivering Green Grid connections' ▪ W16 'Protecting and enhancing rural landscapes'"	Maintaining the current E2 and E4 zoning at the site will ensure future development of this land is consistent with the relevant objectives and permitted land uses under Camden LEP, 2010. The potential loss of the very small area of CPW on the subject site is supported by the Flora and Fauna Assessment, and is therefore considered consistent with the subject planning priorities. Because the Environmental zoning is proposed to remain, the vegetation on the site would be subject to detailed assessment as part of any future development application pertaining to the land. Within the bounds of bushfire controls, the perimeter road that would be the likely outcome of the PP would provide increased opportunities for street trees and potentially increased urban tree canopy. Rural landscapes would not be impacted by the PP and the proposed height standard would contribute to protection of any possible views towards rural landscapes.

3.2 Current Relevant Planning Controls – Camden Local Environmental Plan, 2010

Zoning

The extract from the Camden Local Environmental Plan, 2010 at Figures 3-1 indicates that the greater site is zoned E2 Environmental Conservation, E4 Environmental Living and RU2 Rural Landscape. The subject site associated with this PP is zoned E4 Environmental Living and E2 Environmental Conservation and has an area in the order of 1.4ha.

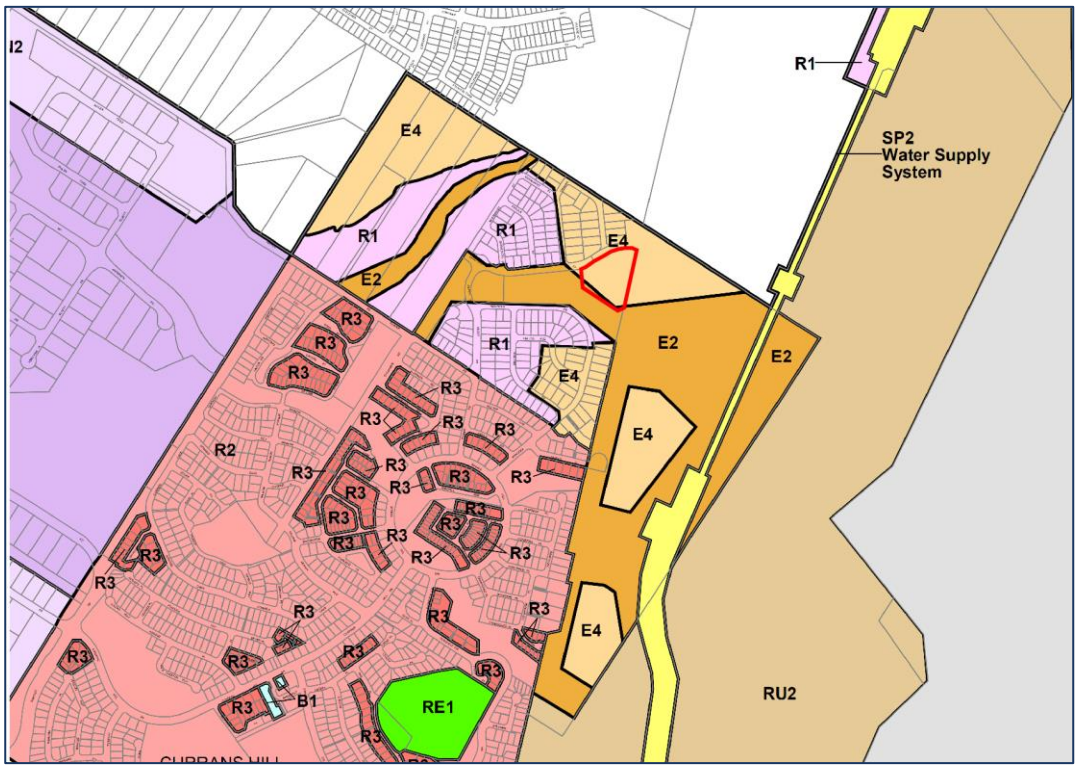


Figure 3-1 Camden LEP Zoning Map – subject site (edged red)

Source: Camden LEP 2010

Height of Buildings

Figure 3-2 (extract from Camden LEP Height of Building Map) indicates that a maximum Height of Building Development Standard of 9.5m currently applies to the majority of the subject site, apart from a small portion of land on its southern edge that is currently zoned E2-Environmental Conservation and is not subject to the Height of Building Development Standard.

Figure 3-2 Height of Buildings Map - Sheet HOB_017 (subject site edged red)
Source: NSW Legislation

Floor Space Ratio

No Floor Space Ratio Standard is currently applicable to the subject site or to other land within Currans Hill. Development density is controlled via relevant development controls in the Camden Development Control Plan, 2012 including building height, boundary setbacks, private open space percentages and the like.

Minimum Allotment Size

Figure 3-3 (extract from Camden LEP, 2010, illustrates that minimum allotment size Standards of 900m^2 and 1,500m^2 apply to the subject site.

The existing minimum allotment size of 900m^2 is inconsistent with other E4 zoned land located within Currans Hill. As illustrated in Figure 3-3, a minimum lot size of 500m^2 has been applied to a parcel of E4 zoned land (adjacent to Apollo Explorer Street) situated to the north-west of the Subject Site.

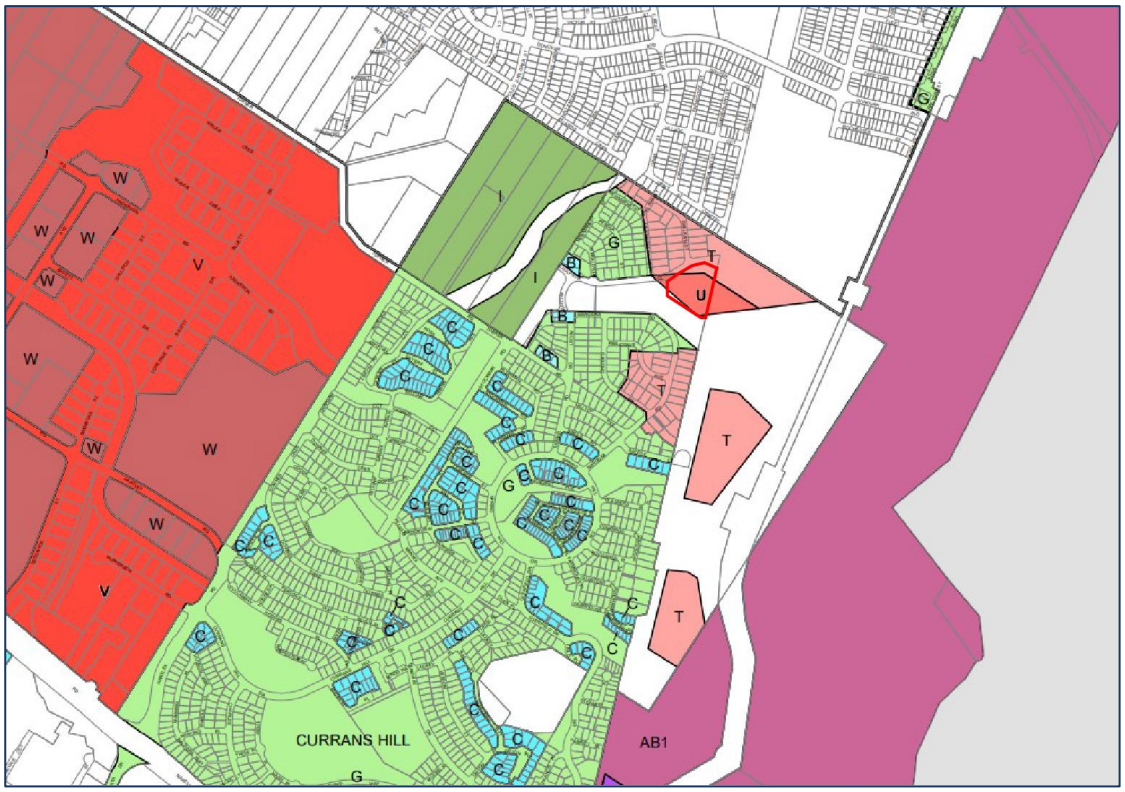


Figure 3-3 Lot Size Map - Sheet HOB_017 (subject site edged red)

Source: NSW Legislation

4 Proposed Amendments to Development Standards

The PP is to make the following amendments to Development Standards in the CLEP, 2010:

- Amending the minimum lot size from 900m2 / 1500m2 to 500m2.

The following maps have been generated to show the proposed changes subject to this PP.

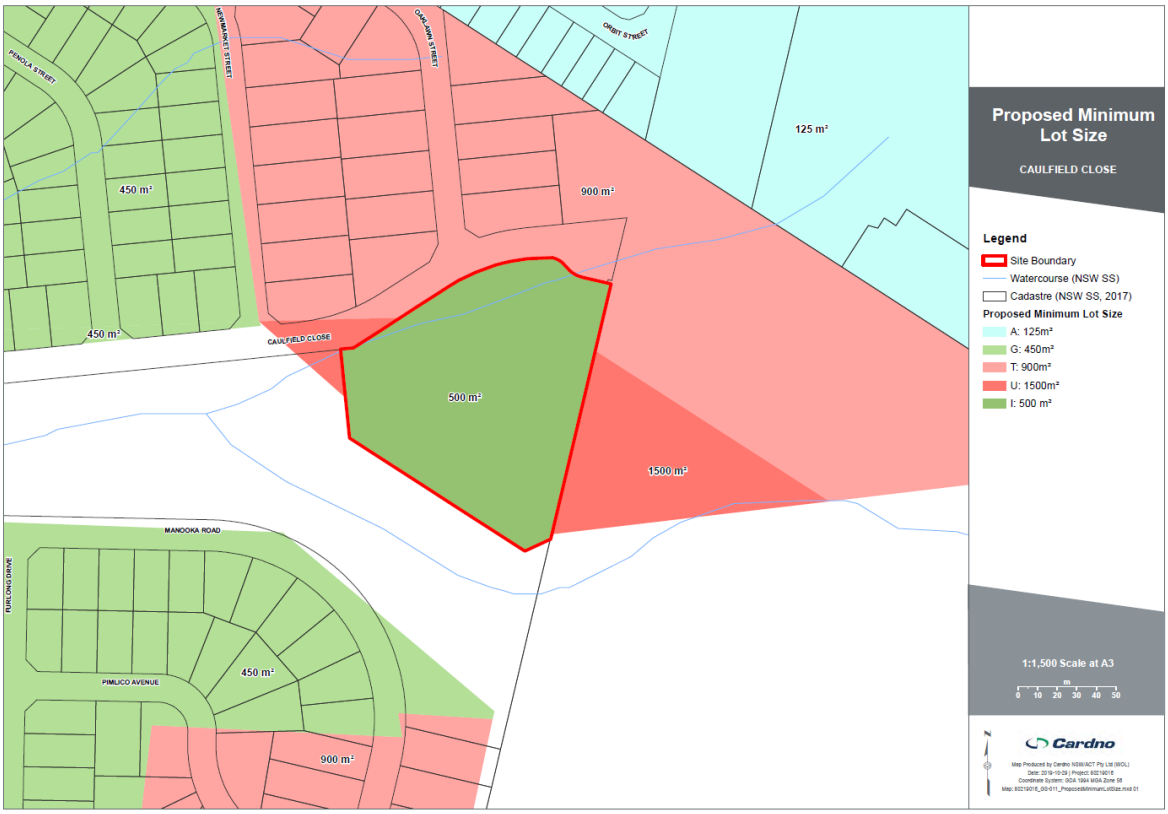


Figure 4-1 Minimum Lot Size Map – Sheet LSZ_17 (Proposed)

5 Justification for the Planning Proposal

Under Section 3.33(2) of the *Environmental Planning and Assessment Act*, justification for making the proposed LEP must be provided in accordance with Part 3 of *'A Guide to Preparing Planning Proposals'.*

For the purposes of Gateway consideration, the overarching principles that guide the preparation of planning proposals are:

- *the level of justification should be proportionate to the impact the planning proposal will have*
- *it is not necessary to address a question of this guide if it is not considered relevant to the planning proposal. In such cases the reason why it is not relevant should be briefly explained, and*
- *the level of justification should be sufficient to allow a Gateway determination to be made with the confidence that the LEP can be finalised within the time-frame proposed.*

The questions to consider when demonstrating the justification in accordance with the Guide have been addressed under the relevant headings outlined below.

5.1 Section A – Need for Planning Proposal

Question 1. "Is the planning proposal a result of any strategic study or report?"

The PP to amend the minimum lot size Development Standard as it applies to the extent of the Subject Site is not a direct result of a strategic study or report. It is, however, informed by the Western Sydney District Plan (March 2018) which identifies the lot that comprises the Greater Site and the Subject Site within the Metropolitan Urban Area (Figure 5-1).

Inclusion of the land within an identified urban area would imply, in our opinion, a strategic planning intention that the land would be developed for urban purposes. Given that the portion of the land subject to this Planning Proposal is a small land parcel that extends west of the greater site into the existing Currans Hill urban lands, it effectively is an infill site which would provide greater support for a denser form of residential development that currently is permitted.

Figure 5-1 Excerpt from the Structure Plan, Western Sydney District Plan – prepared by Cardno

Question 2. "Is the Planning Proposal the best means of achieving the objectives or intended outcomes, or is there a better way?"

The intended outcome of the PP is to reduce the minimum lot size across the subject site from 900m^2-1,500m^2 to 500m^2.The best means of achieving this change is through the preparation of a PP to amend the relevant Development Standard to the subject site under CLEP 2010.

No change to current zoning provisions are proposed and consequently permissible land uses at the subject site would remain unchanged. Amending the minimum lot size only is considered the most effective way of increasing density at the site and improving amenity and risk management outcomes without compromising the environmental value of the site or its role in providing a transition between residential and rural lands within Currans Hill.

5.2 Section B – Relationship to Strategic Planning Framework

Question 3. "Will the planning proposal give effect to the objectives and actions of the applicable regional, or district plan or strategy (including any exhibited draft plans or strategies)?"

The PP will give effect to the *Greater Sydney Regional Plan: A Metropolis of Three Cities – Connecting People (2018)* and *Our Greater Sydney 2056: Western City District Plan – Connecting Communities (2018)* as demonstrated below.

Greater Sydney Regional Plan: A Metropolis of Three Cities – Connecting People (2018)

On 18 March 2018, the Greater Sydney Commission (GSC) released the *Greater Sydney Regional Plan: A Metropolis of Three Cities – Connecting People* (the Plan) to guide development and establish the aspirations for the Greater Sydney over the next 40 years. The Plan consists of a vision, objectives, and actions for managing growth within Greater Sydney.

Following is an overview and commentary on the applicable planning priorities and objectives contained in the Plan that are of direct relevance to the intent of this PP:

Planning Priorities and Objectives	Comment
Objective 10: Greater housing supply	The PP will enable a modest number of additional dwellings to be provided on the subject site and contribute to the Western City housing target identified by the NSW Government. The site is specifically suitable to the provision of additional housing due to its adjacency and potential to provide increased public access to existing open space.
Objective 11: Housing is more diverse and affordable	The proposal would potentially enable a greater choice of allotment sizes and housing forms to cater to different needs and lifestyles. It is likely that the proposal will improve housing availability within the locality and will allow for increased housing directly addressing local open space.
Objective 27: Biodiversity is protected, urban bushland and remnant vegetation is enhanced	As illustrated from the subdivision plan, no Cumberland Woodland (CPW) is proposed to be removed with the exception of 0.05ha of Cumberland Woodland Derived (CPW) Grassland. The removal of CPW Grassland is required to enable the subdivision and development of the subject site. The retention of the CPW Glassland will reduce the subdivision by 5 lots and making the development financially unviable. Furthermore, a Flora and Fauna assessment has been undertaken by Cardno, which indicates that: ▪ *The projected removal of TEC and threatened fauna habitat from the Subject Site is not considered a significant reduction of the resources in the locality. Large areas of CPW Derived Grassland and habitat for the threatened fauna species are present on the remainder of Lot 627 DP1163903 to the east and in Manooka Reserve to the south. Development of the Subject Site would not create a barrier to fauna dispersal across the landscape.* ▪ *The development avoids the majority of high value native vegetation and fauna habitat present in Lot 627 DP1163903. The small amount of TEC and potential threatened fauna habitat to be removed from the Subject Site is not considered to represent a significant loss of these resources in the locality.* ▪ *It is recommended that the E2 zoned lands elsewhere in Lot 627 DP1163903 are managed for conservation purposes. This would more than compensate for the small amount of TEC and potential threatened fauna*

	habitat which would be lost through future development of the Subject site. In summary, the PP is not likely to impact on existing urban bushland and remnant vegetation located within the Greater Site.
Objective 28: Scenic and cultural landscapes are protected	The scenic landscape of Camden will be protected as the PP involves only a small area of the Greater site, which has defined ecological values and outlooks to the Scenic Hills. The building height control will ensure that consequent housing will not impact on views towards local scenic and cultural landscapes. Existing E2 and E4 zoning provisions will remain applicable to the site to provide a transition to the rural land use and Scenic Hills located to the east of the Site.
Objective 29: Environmental, social and economic values in rural areas are protected and enhanced	Future uses at the site are limited to those permitted under the current E2 and E4 environmental zones. Further, the proposed minimum lot size will provide a transition between existing smaller lots within Currans Hill and adjoining rural lands. The PP will facilitate a subdivision form that will enhance access to local open space, consistent with locally relevant environmental and social values and provide opportunities for additional housing that would contribute to the local economy.

Table 5.1 Applicable Planning Priorities and Objectives from A Metropolis of Three Cities

Our Greater Sydney 2056: Western City District Plan – Connecting Communities (2018)

On 18 March 2018, the GSC released the Western City District Plan (the District Plan) to guide development in the Greater Sydney Western District over a 20 year timeframe. The District Plan will inform a local strategic planning statement and local environmental plans, the assessment of planning proposals, and community strategic plans and policies.

The South West District is Sydney's fastest growing District with plans for an estimated 39,850 additional residential dwellings. In particular, a housing target of 11,800 dwellings has been identified for Camden Council by 2021 and 184,500 additional dwellings are to be provided within the Western District by 2036, equivalent to an average annual supply of 9,225 dwellings over 20 years.

Following is an overview and commentary on the priorities and objectives in the District Plan that are of direct relevance to the intent of this PP:

Planning Priorities and Objectives	Comment
Planning Priority W5 – Providing housing supply, choice and affordability with access to jobs, services and public transport	The proposal will enable additional dwellings to be provided on a site that is specifically suited to increased density due to its adjacency to local open space. The modest number of additional dwellings in this suitable location will contribute toward the Western City housing target identified by the NSW Government.
Planning Priority W6 – Creating and renewing great places and local centres and respecting the District's heritage	The form of development that would be facilitated by the Planning Proposal would contribute positively to placemaking by improving access to open space and allowing houses to address the street and adjacent open space. Sydney Water Upper Canal System is a state heritage item and bisects the greater site. The proposal will have no impacts to the canal system as the proposed amendments are located 500m from the canal.
Planning Priority W12 – Protecting and improvement the health and enjoyment of the District's waterways	The broader site contains three watercourses of Kenny Creek which are zoned E2 Environmental Conservation and E4 Environmental Living. The proposal will retain the E2 Environmental Conservation and E4 Environmental Living for the watercourses.

Planning Priority W14 – Protecting and enhancing bushland and biodiversity	Current E2 Environmental Conservation and E4 Environment Living zoning provisions will remain applicable to the site. Further, a Flora and Fauna Assessment supports the potential removal of a very small portion of CPW located with the subject site for the following reasons: The development avoids the majority of high value native vegetation and fauna habitat present in Lot 627 DP1163903. The small amount of TEC and potential threatened fauna habitat to be removed from the Subject site is not considered to represent a significant loss of these resources in the locality. It is recommended that the E2 zoned lands elsewhere in Lot 627 DP1163903 are managed for conservation purposes. This would more than compensate for the small amount of TEC and potential threatened fauna habitat which would be lost through future development of the Subject site.
Planning Priority W15 – Increasing urban tree canopy cover and delivering Green Grid connections	Urban tree canopy of the site will remain unchanged as no trees are proposed to be removed as part of the Planning Proposal. The provision of a new street that would potentially result from the PP would increase opportunities for street tree planting, contributing to the urban tree canopy.
Planning Priority W16: Protecting and enhancing scenic and cultural landscapes	The retention of the E2 Environmental Conservation and E4 Environment Living zones will provide a transition to the adjoining rural land and Scenic Hills. The existing Cumberland Plain Woodland located to the east of the proposal will partially screen the residential development when viewed from the nearby rural lands and Scenic Hills. This ensures that the scenic quality of the area is retained. The existing Maximum Height of Building development Standard along with existing controls in the Camden Development Control Plan will further protect local views.
Planning Priority W17 – Better managing rural areas	The site is identified as 'metropolitan urban area' and located adjacent to the 'metropolitan rural area' identified in the Western City District Plan. The PP will preserve the metropolitan rural area and rural setting by retaining the E2 and E4 zone provisions. The existing Cumberland Plain Woodland located to the east of the site will provide a transition to the neighbouring rural land and Scenic Hills.
Planning Priority W20 – Adapting to the impacts of urban and natural hazards and climate change	The site is identified as bushfire-prone land. Any future development on the subject site is required to comply with Planning for Bushfire Protection 2006 and referred to Rural Fire Service (RFS) for comments. Further, the future subdivision of the subject site is likely to include a new perimeter road that would facilitate a permanent Asset Protection Zone adjacent to existing bushland and improve access for fire fighting.

Table 5.2 Applicable Planning Priorities and Objectives from Western City District Plan

Question 4. "Will the planning proposal give effect to a council's endorsed local strategic planning statement, or another local strategy or strategic plan?"

No site specific relevant local strategy has been endorsed by the Department that can be relied on to establish strategic merit. However, consideration has been given to the Community Strategic Plan – Shaping the Camden Local Government Area adopted by Council on 27 June 2017.

Community Strategic Plan – Shaping the Camden Local Government Area (2017)

The Community Strategic Plan (CSP) identifies the community's main priorities and aspirations for the Camden LGA for the future and plans and strategies for achieving these goals.

The CSP is an update to the Camden 2040 and retains the vision of A Sustainable Camden LGA by 2040. Following is an overview and commentary on the applicable directions, objectives and strategies in the CSP that are of direct relevance to the intent of this PP:

Directions, Objectives and Strategies	Comment
1.2 Rural land is adequately administered *Maintain and protect Camden LGA's rural lands.* *Retain Camden LGA's valued heritage sites, scenic vistas and cultural landscape.*	The proposal will not result in a reduction of rural lands within the Camden LGA and will retain current E2 and E4 zoned land within Currans Hill. The retention of the E2 Environmental Conservation and E4 Environment Living zones will provide a transition and visual buffer to the neighbouring rural/scenic protection areas and Scenic Hills. Development of the subject site subsequent to amendment to the Minimum Lot Size standard would not encroach on any significant view corridors or compromise any heritage sites.
2.1 Caring for urban and natural environment including heritage sites *Maintain biodiversity, natural reserves, streetscapes and open spaces*	The PP applies to a parcel of vacant E2 Environmental Conservation and E4 Environmental Living zones lands within Currans Hill. Future subdivision of the land may require removal of a small proportion of regrowth CPW from the Subject site. The CPW represents less than 1% of this community present in the entirety of Lot 627 DP 1163903. A Flora and Fauna assessment has been undertaken Cardno which supports the proposal as follows: ▪ *The development avoids the majority of high value native vegetation and fauna habitat present in Lot 627 DP1163903. The small amount of TEC and potential threatened fauna habitat to be removed from the Subject site is not considered to represent a significant loss of these resources in the locality.* ▪ *It is recommended that the E2 zoned lands elsewhere in Lot 627 DP1163903 are managed for conservation purposes. This would more than compensate for the small amount of TEC and potential threatened fauna habitat which would be lost through future development of the Subject site.*

Table 5.3 Applicable Key Directions, Objectives and Strategies from Community Strategic Plan

Question 5. "Is the planning proposal consistent with applicable State Environmental Planning Policies?"

The following SEPPs are potentially of relevance to the land that is the subject of this Planning Proposal:

- *State Environmental Planning Policy No 19—Bushland in Urban Areas*
- *State Environmental Planning Policy No 55—Remediation of Land*
- *State Environmental Planning Policy No 44—Koala Habitat Protection*
- *State Environmental Planning Policy (Vegetation in Non-Rural Areas) 2017*

The intention of the PP to amend the Minimum Lot Size Development Standard that currently applies to the land would not be affected by either or any of these SEPPs. Assessment under the SEPPs would be triggered by any Development Application that applies to the land, whether or not the PP proceeds to gazettal.

A table indicating compliance of the PP with all relevant SEPPs is at **Appendix F**.

Question 6. "Is the PP consistent with the applicable Ministerial directions (s.9.1 directions)?"

Following is an assessment of the PP against the relevant Ministerial Directions.

S.117 Direction Title	Consistency	Comment
Employment and Resources		
1.1 Business and Industrial Zones	N/A	The PP does not apply to land in Business or Industrial zones.
1.2 Rural Zones	N/A	This direction does not apply as the Planning Proposal does not affect land within an existing or proposed rural zone.
1.3 Mining, Petroleum Production and Extractive Industries	N/A	This direction does not apply as the Planning Proposal does not affect land containing mining, petroleum production and extractive industries.
1.4 Oyster Aquaculture	N/A	This direction does not apply as the Planning Proposal does affect land impacted with oyster aquaculture.
1.5 Rural Lands	N/A	This direction does not apply to the Camden LGA.
Environment and Heritage		
2.1 Environment Protection Zones	The PP is consistent with this direction	The PP seeks to amend a Development Standard applying to land zoned E2 and E4. Existing Cumberland Plain Woodland will be protected via the retention of the existing E2 and E4 zones. Hence, the PP will not reduce the environment protection standards that apply to the land or reduce the environmentally sensitive areas at Currans Hill. A Flora and Fauna Assessment (**Appendix C**) prepared by Cardno has been submitted as part of the PP. The assessment outlines the effects of this PP and future development in the Greater Site. Based on the above reasons and evidence, the PP is not inconsistent with the objectives of Direction 2.1.
2.2 Coastal Protection	N/A	This direction does not apply as the Planning Proposal as it is not located near the coast.
2.3 Heritage Conservation	N/A	This direction does not apply as the Planning Proposal is not located within a Heritage Conservation area. **Note:** The Sydney Water Upper Canal System is a State Heritage Item and bisects the Greater Site. However, the PP will not impact on the canal system as it is located approximately 500m from the Subject Site. The zoning for the canal system will remain unchanged.
2.4 Recreation Vehicle Areas	N/A	This direction does not apply as the Planning Proposal is not located within a Recreational Vehicle area.
2.5 Application of E2 and E3 Zones and Environmental Overlays in Far North Coast LEPs	N/A	This direction does not apply as the Planning Proposal is not located at the Far North Coast of NSW.
Housing, Infrastructure and Urban Development		

S.117 Direction Title	Consistency	Comment
3.1 Residential Zones	The PP is consistent with this direction.	The PP is consistent with the objectives of Direction 3.1 for the following reasons: • The PP could potentially result in an additional 10 dwellings on the subject site (over and above the current development approval for 9 lots that applies to the site). These additional dwellings will have enhanced access to existing recreational land and development would potentially also improve public access to the recreational areas. • The subject site will have appropriate access to existing infrastructure and services. • The PP will have no impacts on the environment and resources.
3.2 Caravan Parks and Manufactured Home Estates	N/A	This direction does not apply as the Planning Proposal is not impacted by Caravan Parks or Manufactured Home Estates.
3.3 Home Occupations	N/A	This direction does not apply as the Planning Proposal is not considering Home Occupations.
3.4 Integrating Land Use and Transport	The PP is consistent with this direction.	The PP is consistent with the objectives of Direction 3.4 for the following reasons: • The additional housing is located within the vicinity of the following bus routes: o 890 – Campbelltown to Harrington Park via Narellan; o 891 – Mount Anna to Campbelltown via Currans Hill, and o 896 – Campbelltown to Oran Park via Gregory Hills. Bus stops located on Narellan Road, approximately 750 m south of the site, provide access to Camden, Campbelltown, Spring Farm, and Picton. Other bus routes from Campbelltown and Camden provide access to various regional areas of Sydney and NSW. • The Turner Road Growth Centre Precincts Development Control Plan indicates that bus routes connecting Gregory Hills to Currans Hill (via Currans Hill) have been proposed. The proposed bus routes would provide services to Oran Park, Harrington Park, and Campbelltown/Macarthur. The final location of the bus stops will be determined in the future. • The PP will provide additional housing and choice in a location with good access to nearby major employment, strategic and local centres such as Campbelltown Town Centre and Macarthur Town Centre (5km), Mount Annan Neighbourhood Centre (3km) and Curran Hills Local Centre (1.5km).

S.117 Direction Title	Consistency	Comment
3.5 Development Near Regulated Airports and Defence Airfields	N/A	This direction does not apply as the Planning Proposal is not near a licensed aerodrome.
3.6 Shooting Ranges	N/A	This direction does not apply as the Planning Proposal is not located near any shooting ranges.
Hazard and Risk		
4.1 Acid Sulphate Soils	N/A	This direction does not apply as the Planning Proposal is not situated on land with acid sulfate soils.
4.2 Mine Subsidence and Unstable Land	N/A	This direction does not apply as the Planning Proposal is not within a mine subsidence or unstable land area
4.3 Flood Prone Land	N/A	This direction does not apply as the Planning Proposal is not within a flood prone area.
4.4 Planning for Bushfire Protection	The PP is consistent with this direction	The site is located on Bush Fire Prone Land Vegetation Category 2 and Vegetation Buffer 100m & 30m. A detailed Bushfire Assessment Report has been prepared by Travers Bushfire and Ecology detailing the required measures that will enable sound management of bushfire prone areas. The Bushfire Assessment Report is attached to the PP at **Appendix E.** The amendment to minimum lot sizes has the potential to allow for a new ring road that would improve access for fire fighting and perform a dual role as a permanent Asset Protection Zone
Regional Planning		
5.1 Implementation of Regional Strategies	N/A	This direction does not apply as the Planning Proposal is not within areas to which the relevant regional strategies apply.
5.2 Sydney Drinking Water Catchments	N/A	This direction does not apply as the Planning Proposal is not within Sydney drinking water catchment areas.
5.3 Farmland of State and regional Significance on the NSW Far North Coast	N/A	This direction does not apply as the Planning Proposal is not within significant farmland in the stated locality.
5.4 Commercial and Retail Development along the Pacific Highway, North Coast	N/A	This direction does not apply as the Planning Proposal is not within the relevant location.
5.9 North West Rail Link Corridor Strategy	N/A	This direction does not apply as the Planning Proposal is not within the affected Local Government Areas.
5.10 Implementation of Regional Plans	N/A	This direction does not apply to the Subject Site.
Local Plan Making		
6.1 Approval and Referral Requirements	N/A	This direction does not apply to the Subject Site.
6.2 Reserving Land for Public Purposes	N/A	This direction does not apply as the Planning Proposal is not within land that is reserved for Public Purpose.
6.3 Site Specific Provisions	Yes	The objective of the direction is to discourage unnecessarily restrictive site-specific planning controls and facilitate development of the subject site that is consistent with best practices in urban design by allowing future dwellings to address local public open space. The PP seeks to reduce the minimum allotment size from 1,500m^2 to 500m^2.

S.117 Direction Title	Consistency	Comment
		The proposed development standards are consistent with the existing development standards applying to E4 – Environmental Living land within the vicinity of the site.
Metropolitan Planning		
7.1 Implementation of A Metropolis of Three Cities	The PP is consistent with this direction.	The PP has considered and is consistent with the NSW Government's *A Metropolis of Three Cities* as detailed in the PP report.
7.2 Implementation of Greater Macarthur Land Release Investigation	N/A	This direction does not apply as the Planning Proposal is not within the relevant Local Government Areas.
7.3 Parramatta Road Corridor Urban Transformation Strategy	N/A	This direction does not apply as the Planning Proposal is not within the relevant Local Government Areas.
7.4 Implementation of North West Priority Growth Area Land Use and Infrastructure Implementation Plan	N/A	This direction does not apply as the Planning Proposal is not within the North West Priority Growth Area.
7.5 Implementation of Greater Parramatta Priority Growth Area Interim Land Use and Infrastructure Implementation Plan	N/A	This direction does not apply as the Planning Proposal is not within the Greater Parramatta Priority Growth Area.
7.6 Implementation of Wilton Priority Growth Area Interim Land Use and Infrastructure Implementation Plan	N/A	This direction does not apply as the Planning Proposal is not within the Wilton Priority Growth Area.
7.7 Implementation of Glenfield to Macarthur Urban Renewal Corridor	N/A	This direction does not apply as the Planning Proposal is not within the Glenfield to Macarthur Urban Renewal Corridor.
7.8 Implementation of Western Sydney Aerotropolis Interim Land Use and Infrastructure Implementation Plan	N/A	This direction does not apply as the Planning Proposal is not within the Western Sydney Aerotropolis.
7.9 Implementation of Bayside West Precincts 2036 Plan	N/A	This direction does not apply as the Planning Proposal is not within the Bayside West Precincts.
7.10 Implementation of Planning Principles for the Cooks Cove Precinct	N/A	This direction does not apply as the Planning Proposal is not within the Cooks Cove Precinct.

Evidenced by this assessment, it is considered that the PP is consistent with the relevant Ministerial Directions issued under Section 9.1(2) of the EP&A Act.

5.3 Section C - Environmental, Social and Economic Impact

Question 7 ***"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?***

A Flora and Fauna Assessment (**FFA)** for the site has been prepared by Cardno which identifies matters for consideration for the PP. Surveys conducted as part of this FFA concluded that the Subject site has been highly modified through recent clearing and is dominated by exposed soil and exotic grasslands. However, a small portion of the TEC Cumberland Plain Woodland (CPW) is present in the south-west as an extension of CPW vegetation in the adjacent Caulfield Reserve. In addition, a portion of the regenerating grasslands of the Subject site were identified as most closely conforming to CPW derived grasslands. CPW is listed as a critically endangered TEC under the TSC Act and EPBC Act. As illustrated in the indicative layout plan, 0.05ha of CPW Glassland be impacted by the subdivision. It should be noted that the existing CPW will be retained and located adjacent to the extension of Caulfield Close.

No threatened flora species were encountered during the survey and none are considered likely to occur. Significant fauna habitat was observed including a single mature eucalypt and small vegetated pond are present in the south-west of the Subject Site. No threatened fauna species were detected during survey,

however, two were considered likely to occur based on the presence of suitable habitat and recent occurrence records from within 5 km:

- Cumberland Plain Land Snail (*Meridolum corneovirens*) – listed as endangered under the TSC Act; and
- Green and Golden Bell Frog (*Litoria aurea*) – listed as endangered under the TSC Act and vulnerable under the EPBC Act.

Assessments of the above TEC and threatened species were conducted under the seven-part test methodology (EP&A Act) and/or tests of significance (EPBC Act). These tests concluded that although future development of the Subject site would result in the removal of the whole occurrence of TEC and threatened fauna habitat from the Subject site, the level of impact is not considered to be significant. The CPW present on the Subject site represents less than 1 % of this community present in the entirety of Lot 627 DP1163903 and the fauna habitat values present are not limited in the local area. Similar vegetation and fauna habitat are also present within the Caulfield Reserve, which is located to the immediate south of the Subject site.

Based on this assessment, no significant impact on any listed entity under the TSC Act and/or EPBC Act is considered likely as a result of future development of the Subject site and further assessment through a SIS (NSW) or a referral to the federal Minister of the Environment (Commonwealth) would be required to support a future DA.

Based on the results of this assessment, reducing the minimum lot size at the subject site is supported. This approach would avoid the majority of high value native vegetation and fauna habitat present in Lot 627 DP1163903. The small amount of TEC and potential threatened fauna habitat to be removed from the subject site is not considered to represent a significant loss of these resources in the locality.

The FFS recommends that the E2 zoned lands elsewhere in Lot 627 DP1163903 are managed for conservation purposes. This would more than compensate for the small amount of TEC and potential threatened fauna habitat which would be lost through future development of the subject site.

Question 8. "Are there any other likely environmental effects as a result of the planning proposal and how are they proposed to be managed?"

No other likely environmental effects resulting from implementation of this PP have been identified. Specialist studies concerning bushfire and contamination have been undertaken and discussed below. Other investigations have found that the Subject site is not impacted by flooding, acid sulfate soil or landslip.

Bushfire

The Subject site is located on Bush Fire Prone Land Vegetation Category 2 and Vegetation Buffer 100m & 30m. A Bushfire Protection Assessment has been prepared by Travers Bushfire & Ecology which identifies matters for consideration for the PP and to highlight the required bushfire protection measures for the site.

The assessment found that bushfire can potentially affect the site from the woodland vegetation associated with the riparian corridor to the south and west and the woodland extending beyond the electrical easement to the east resulting in possible ember attack and radiant heat attack.

The bushfire risk posed to the Planning Proposal can be mitigated if appropriate bushfire protection measures (including APZs) are put in place and managed in perpetuity.

Future development on site is to comply with the following key recommendations as proposed by *Travers Bushfire and Ecology.*

- A perimeter road (8m carriageway width) is to be provided adjacent to all bushland areas and
- APZs have been recommended in compliance with BAL29. APZs are to be measured from the exposed wall of any dwelling toward the hazardous vegetation. The minimum APZ must be achievable within all lots fronting the bushfire hazard.
- Fuel management within the APZs is to be maintained by regular maintenance of the landscaped areas, mowing of lawns in accordance with the guidelines provided by the RFS.
- Building construction standards are to be applied for future residential dwellings in accordance with Australian Standard AS3959 Construction of buildings in bushfire-prone areas (2009).

The majority of the developable area is located outside of the APZ which is consistent with the recommendations. Dwellings fronting Caulfield Reserve and transmission easement will be outside of the

APZ as a front setback requirement of 4.5m applies to the subject lots. Refer to **Appendix E** for the Bushfire Assessment Report.

Cardno has prepared an indicative subdivision plan to illustrate the potential benefits of the proposed changes to the existing lot size and building height Development Standards (**Appendix G**). The indicative layout is provided as one possible development scenario. Numerous other options may apply and any of these would be subject to the Development Approval process. The indicative plan includes a new perimeter road consistent with the bushfire consultant's recommendations. It is notable that the commercial viability of construction of this perimeter road would be likely contingent on achieving lot yields that would not be possible under the current permissible minimum lot size.

Contamination

As part of DA2014/560-1, a contamination assessment of the entire site was undertaken by GeoEnviro Consultancy in June 2014. The key findings of this report are as follows:

- The test pit investigation indicates the site to be predominantly underlain by natural ground comprising topsoil and topsoil/fill up to about 300mm thick overlying natural medium to high plasticity Silty Clay overlying shale at depths up to about 2.3m below existing ground surface.
- The laboratory test results indicate concentrations of contaminants of concern to be within the acceptable levels. Elevated concentrations of Manganese were detected however the Manganese was found to be naturally occurring as background levels and therefore considered acceptable.
- The report concluded that the likelihood of gross ground chemical contamination on the site was considered low.
- As the site was not subjected to any recent activities that may have resulted in contamination, GeoEnviro were of the opinion that the contamination status of the site remains unchanged and therefore the site is suitable for the proposed residential subdivision and development subject to removal of surface and buried rubbish fill as had been previously recommended, and which is proposed.

Camden Council granted development consent for DA/2014/560/1 on 24 November 2014. However, the approval was never enacted.

The site is not identified as contaminated land by the NSW Environment Protection Authority (EPA) contamination register. Also, low and medium density residential developments are located to north and west of the Subject site. Therefore, the Subject site is unlikely to be contaminated.

Question 9. Has the planning proposal adequately addressed any social and economic effects?

Implementation of the Planning Proposal is considered unlikely to result in any specific negative social or economic effects. Heritage significance, social and economic benefits associated with the proposal are discussed below:

European or Aboriginal Cultural Heritage

The Subject site does not contain any heritage items. However, the Greater site is bisected by the Sydney Water Upper Canal Corridor (Item No: I122) which is identified as a State Heritage Item. The proposal would have no impacts to the Upper Canal as no amendment is sought for this portion of the site and the proposed amendments are located 1km (approx.) from the canal. The subject site is located adjacent to other residential developments located to the north, south and west.

European or Aboriginal Cultural Heritage issues were not identified by Camden Council as part of the development consent for DA/2014/560/1.

If deemed appropriate by Council and/or Department of Planning and Environment, a condition can be incorporated into the Gateway Determination requiring a heritage impact assessment to be prepared prior to the agencies and community consultation. Additionally, it is recommended that Office of Environment and Heritage be consulted during government agency consultation.

Social benefits

The PP is considered appropriate in context to minimum lot sizes permitted on adjoining lots within Currans Hill and the adjoining suburb of Gregory Hills within the Growth Centre Growth Centre. The modest

increase to housing as a result of the proposal is unlikely to place significant pressure on existing and planned community facilities within the LGA.

Specific social benefits arising from an increase in permissible density on this subject site come from the adjacency of the Subject site to Caulfield Reserve, a public park area that has already been developed and is suitable for use by the residents. The decreased lot size and the inclusion of a perimeter road would:

- provide increased public access to local open space, specifically Caulfield Reserve;
- allow increased numbers of houses close to and directly addressing the open space;
- improve the quality of views from the Reserve towards its residential surroundings; and
- contribute to community safety by facilitating passive surveillance from the street and the new houses.

Moreover, the proposal would facilitate a road edge to Caulfield Close consistent with the remainder of its northern and southern boundaries.

The proposal is likely to provide a positive impact for the community as it offers greater housing choice and diversity to meet the anticipated population growth of the Camden LGA on a site that has specific qualities that maximise these benefits. Additionally, the site is located within the vicinity of community facilities, public open space and services such as Currans Hill Community Centre, Narellan Library and Caulfield Reserve.

Economic benefits

The PP will provide additional housing and choice in a location with good access to nearby major employment, strategic and local centres.

5.4 Section D - State and Commonwealth Interests

Question 10. "Is there adequate public infrastructure for the planning proposal?"

The PP aims to reduce the current permitted minimum lot size across the subject site to 500m^2, which will allow for its subdivision into approximately 17 residential lots under the existing E2 and E4 zoning provisions. This yield would represent a modest increase in lot yield in comparison to the currently approved subdivision of 10 lots, including 1 residual lot.

It is not anticipated that the proposal will place significant pressure or demand on existing public infrastructure. Additionally, the site is located adjacent to other residential development which is serviced by utilities and essential services.

Utility providers would be consulted as part of any Gateway Determination to determine the existing and future capacity of the site.

In terms of traffic, the Traffic Impact Assessment Report prepared for the PP concludes the following:

- *"It is anticipated that Spring Farm Parkway Extension will alleviate the traffic issues on Narellan Road.*
- *Nearest bus stop is approximately 1km from the subject site with a bus service to Campbelltown running every 30 minutes during peak hours.*
- *The proposed increase of 10 dwellings would equate to 1 vehicle movement every 5 minutes which would have a negligible impact on the surrounding local road network and not be of a noticeable difference to the existing neighbourhood.*
- *Assessment done on Currans Hill Drive / Spring Hill Circle indicate that no significant impact on the road network will be caused by the proposed development.*
- *Assessment done on Glenfield Drive / Spring Hill Circle indicate that no significant impact on the road network will be caused by the proposed development".*

Refer to **Appendix D** for the Traffic Impact Assessment Report

Question 11. "What are the views of State and Commonwealth public authorities consulted in accordance with the Gateway determination?"

The Gateway Determination will identify the relevant State and Commonwealth public authorities to be consulted as part of the PP. Consultation with the following departments and agencies should be considered:

- Transport for NSW

- Rural Fire Service
- Office of Environment and Heritage
- Sydney Water
- Endeavour Energy
- Jemena Gas
- Transgrid

These agencies will be consulted during the Gateway process as per the Regulations.

6 Mapping

In accordance with Part 4 of 'A guide to preparing Planning Proposals' PP should be supported by appropriate mapping.

The specific amendments to the LEP maps are attached to this report at **Appendix H.** A summary of the maps to be amended under this proposal are outlined below:

- Site Plan; and
- Minimum Lot Size Map

7 Community Consultation

The public exhibition period and the requirements for the PP will be outlined in the Gateway Determination. It is recommended that the PP is exhibited for 14 days as the proposal would have a low impact on the surrounding land uses and environment.

The community will be notified of the commencement of the exhibition period via a notice in a local newspaper and via a notice on Camden Council's website. The notice will:

- Give a brief description of the objectives or intended outcomes of the PP;
- Indicate the land affected by the PP;
- State where and when the PP can be inspected;
- Give the name and address of the Planning Proposal Authority (PPA) for the receipt of any submissions; and
- Indicate the last date for submissions.

During the exhibition period, the following material will be made available for inspection: -

- The PP, in the form approved for community consultation by the Secretary of Planning and Environment;
- The Gateway determination; and
- Any studies relied upon by the PP.

8 Project Timeline

The anticipated timeframe for the completion of the PP will depend on the complexity of the matters, the nature of any additional information that may be required and the need for agency and community consultation.

Task	Timeline
Commencement date (date of Gateway determination)	
Anticipated timeframe for the completion of required technical information	
Timeframe for government agency consultation (pre and post exhibition as required by Gateway determination)	
Commencement and completion dates for public exhibition period	
Dates for public hearing (if required)	
Timeframe for consideration of submissions	
Timeframe for the consideration of a proposal post exhibition	
Date of submission to the department to finalise the LEP	
Anticipated date RPA will make the plan (if delegated)	
Anticipated date RPA will forward to the department for notification	

Table 8-1 Project Timeline

APPENDIX

A

DA CONSENT

MANOOKA VALLEY
STAGE 2C
DEVELOPMENT APPLICATION
CAMDEN COUNCIL DEVELOPMENT CONSENT

LOCALITY PLAN
SCALE: N.T.S.

NORTH

DRAWING LIST

294099-2C-000	TITLE SHEET, DRAWING LIST & LOCALITY PLAN
294099-2C-001	NOTES AND LEGENDS
294099-2C-005	GENERAL ARRANGEMENT PLAN
294099-2C-010	CUT AND FILL PLAN
294099-2C-020	BULK EARTHWORKS, SEDIMENT AND EROSION CONTROL PLAN
294099-2C-030	SITEWORKS AND STORMWATER DRAINAGE PLAN SHEET 1
294099-2C-031	SITEWORKS AND STORMWATER DRAINAGE PLAN SHEET 2
294099-2C-032	SITEWORKS AND STORMWATER DRAINAGE PLAN SHEET 3
294099-2C-040	PROPERTY ACCESS DRIVEWAY PLANS AND TYPICAL SECTIONS
294099-2C-050	CATCHMENT PLAN
294099-2C-060	STORMWATER LONGITUDINAL SECTIONS
294099-2C-070	ROADWORKS AND STORMWATER DETAILS SHEET 1
294099-2C-071	ROADWORKS AND STORMWATER DETAILS SHEET 2
294099-2C-080	TRAFFIC CONTROL PLAN

Cardno
Shaping the Future

Manooka Valley
AT SPRING HILL

CAMDEN COUNCIL
Approved by the Council of Camden under the provisions of the Environment Planning and Assessment Act 1979
APPROVAL

26/11/2014

DEVELOPMENT APPLICATION

DA 560/2014

DRAWING No. 294099-2C-000 REV 01

GENERAL

1. ALL WORKS TO BE CONSTRUCTED IN ACCORDANCE WITH CAMDEN COUNCIL STANDARDS (ENGINEERING CONSTRUCTION SPECIFICATIONS, ADOPTED 10 FEBRUARY 2009)

2. CAMDEN COUNCIL STANDARD DETAILS TO BE USED WHERE POSSIBLE.

3. UTILITY ADJUSTMENTS AT DEVELOPERS EXPENSE.

4. CONDUITS TO BE PLACED WHERE REQUIRED BY THE LOCAL RELEVANT AUTHORITIES.

5. SUBSOIL DRAINAGE LINES TO BE PLACED AS INDICATED ON DRAWINGS.

KERBING NOTES

1. ALL CONCRETE TO HAVE A MINIMUM COMPRESSIVE STRENGTH OF 25 MPa U.N.O IN REINFORCED CONCRETE NOTES.

2. ALL KERBS, GUTTERS, DISH DRAINS AND CROSSINGS TO BE CONSTRUCTED ON 175mm GRANULAR BASECOURSE COMPACTED TO MINIMUM 98% MODIFIED DRY DENSITY (AS 1289 5.2.1).

3. EXPANSION JOINTS (E.J) TO BE FORMED FROM 10mm COMPRESSIBLE CORK FILLER BOARD FOR THE FULL DEPTH OF THE SECTION AND CUT TO PROFILE. EXPANSION JOINTS TO BE LOCATED AT DRAINAGE PITS, ON TANGENT POINTS OF CURVES AND ELSEWHERE AT MAX 12m CENTRES EXCEPT FOR INTEGRAL KERBS WHERE THE EXPANSION JOINTS ARE TO MATCH THE JOINT LOCATIONS IN THE SLABS.

4. WEAKENED PLANE JOINTS TO BE MIN 3mm WIDE AND LOCATED AT 3m CENTRES EXCEPT FOR INTEGRAL KERBS WHERE THE WEAKENED PLANE JOINTS ARE TO MATCH THE JOINT LOCATIONS IN THE SLABS.

5. BROOMED FINISH TO ALL RAMPED AND VEHICULAR CROSSINGS. ALL OTHER KERBING OR DISH DRAINS TO BE STEEL FLOAT FINISHED.

6. IN THE REPLACEMENT OF KERB AND GUTTER :–
EXISTING ROAD PAVEMENT IS TO BE SAWCUT 900mm U.N.O FROM THE LIP OF GUTTER. UPON COMPLETION OF THE NEW KERB AND GUTTER NEW BASECOURSE AND SURFACE TO BE LAID 900mm WIDE U.N.O.

7. EXISTING KERB AND GUTTER IS TO BE COMPLETELY REMOVED WHERE NEW KERB AND GUTTER IS SHOWN.

JOINT NOTES

PEDESTRIAN PAVEMENT JOINTS

1. TRANSVERSE JOINTS SHALL BE STRUCK IN THE FOOTPATH TO MATCH THE FOOTPATH WIDTH.

2. EXPANSION JOINTS SHALL BE CONSTRUCTED AT MAX 5m IN CYCLEWAY'S AND 6m IN FOOTPATHS. A MANUFACTURED HINGE JOINT SYSTEM SHALL BE PROVIDED AT ALL EXPANSION JOINTS AND ADJACENT TO TREE LOCATIONS.

3. ALL JOINTS TO BE IN ACCORDANCE WITH CAMDEN COUNCIL ENGINEERING CONSTRUCTION SPECIFICATION, SECTION 6.16.2.

BULK EARTHWORKS NOTES

1. ORIGIN OF LEVELS: REFER SURVEY NOTES.

2. STRIP ALL TOPSOIL/ORGANIC MATERIAL FROM CONSTRUCTION AREA AND REMOVE FROM SITE OR STOCK PILE AS DIRECTED BY SUPERINTENDENT.

3. EXCAVATED MATERIAL TO BE USED AS STRUCTURAL FILL PROVIDED THE PLACEMENT MOISTURE CONTENT OF THE MATERIAL IS +/- 2% OF THE OPTIMUM MOISTURE CONTENT.

4. COMPACT FILL AREAS AND SUBGRADE TO NOT LESS THAN:

LOCATION	STANDARD DRY DENSITY (AS 1289 E 5.1.1.)
UNDER ROADS	100%
LOTS UNLESS NOTED OTHERWISE	95%

5. FOR NON COHESIVE MATERIAL, COMPACT TO NOT LESS THAN
UNDER ROAD 80% DENSITY
OTHER AREA 65% DENSITY

6. BEFORE PLACING FILL, PROOF ROLL EXPOSED SUBGRADE WITH AN 8 TONNE (MIN) DEADWEIGHT SMOOTH DRUM VIBRATORY ROLLER TO DETECT THEN REMOVE SOFT SPOTS (AREAS WITH MORE THAN 2mm MOVEMENT UNDER ROLLER).

7. EARTHWORKS ARE TO BE INSPECTED AND TESTED BY AN INDEPENDENT GEOTECHNICAL TESTING AUTHORITY TO LEVEL 1 RESPONSIBILITY OF GEOTECHNICAL ENGINEER AS DEFINED IN AS 3798.

8. FILLING TO BE PLACED IN MAXIMUM 250mm – LOOSE LAYERS AND COMPACTED AS SPECIFIED

9. NO FILLING SHALL TAKE PLACE TO EXPOSED SUBGRADE UNTIL THE AREA HAS BEEN PROOF ROLLED IN THE PRESENCE OF GEOTECHNICAL ENGINEER AND APPROVAL GIVEN IN WRITING THAT FILLING CAN PROCEED.

EROSION AND SEDIMENT CONTROL NOTES

GENERAL INSTRUCTIONS

1. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR THE CONTROL OF EROSION AND SEDIMENTATION TO THE SATISFACTION OF COUNCIL, NSW OFFICE OF WATER, SYDNEY WATER, OFFICE OF ENVIRONMENT AND HERITAGE (OEH), AND LANDCO WOLIN JOINT VENTURE REPRESENTATIVE. TO THIS END, THE EROSION AND SEDIMENTATION CONTROLS SHOWN ON THE DRAWINGS SHALL ONLY BE USED AS A GUIDE BY THE CONTRACTOR, AND SHALL REPRESENT THE MINIMUM REQUIREMENT ONLY.

2. THE CONTRACTOR SHALL ENSURE THAT ALL SOIL AND WATER MANAGEMENT WORKS ARE LOCATED AS DOCUMENTED OR AS OTHERWISE DIRECTED BY THE SUPERINTENDENT.

3. ALL WORK SHALL BE GENERALLY CARRIED OUT IN ACCORDANCE WITH
a. LOCAL AUTHORITY REQUIREMENTS
b. EPA REQUIREMENTS
c. NSW DEPARTMENT OF HOUSING MANUAL "MANAGING URBAN STORMWATER, SOILS AND CONSTRUCTION", 4th EDITION, MARCH 2004.

4. MAINTAIN THE EROSION CONTROL DEVICES TO THE SATISFACTION OF THE SUPERINTENDENT AND THE LOCAL AUTHORITY.

5. WHEN STORMWATER PITS ARE CONSTRUCTED, PREVENT SITE RUNOFF ENTERING UNLESS SEDIMENT FENCES ARE ERECTED AROUND PITS.

6. CONTRACTOR IS TO ENSURE ALL EROSION & SEDIMENT CONTROL DEVICES ARE MAINTAINED IN GOOD WORKING ORDER AND OPERATE EFFECTIVELY. REPAIRS AND OR MAINTENANCE SHALL BE UNDERTAKEN AS REQUIRED, PARTICULARLY FOLLOWING STORM EVENTS.

LAND DISTURBANCE

7. WHERE PRACTICAL, THE SOIL EROSION HAZARD ON THE SITE WILL BE KEPT AS LOW AS POSSIBLE. TO THIS END, WORKS SHOULD BE UNDERTAKEN IN THE FOLLOWING SEQUENCE:

(A) INSTALL A SEDIMENT FENCE ALONG THE BOUNDARIES AS SHOWN ON PLAN. REFER DETAIL.

(B) CONSTRUCT STABILISED CONSTRUCTION ENTRANCE TO LOCATION AS DETERMINED BY SUPERINTENDENT/ENGINEER. REFER DETAIL.

(C) INSTALL SEDIMENT BASINS AS SHOWN ON PLAN

(D) INSTALL SEDIMENT TRAPS AS SHOWN ON PLAN.

(E) UNDERTAKE SITE DEVELOPMENT WORKS IN ACCORDANCE WITH THE ENGINEERING PLANS. WHERE POSSIBLE, PHASE DEVELOPMENT SO THAT LAND DISTURBANCE IS CONFINED TO AREAS OF WORKABLE SIZE.

EROSION CONTROL

8. DURING WINDY WEATHER, LARGE, UNPROTECTED AREAS WILL BE KEPT MOIST (NOT WET) BY SPRINKLING WITH WATER TO KEEP DUST UNDER CONTROL.

9. FINAL SITE LANDSCAPING WILL BE UNDERTAKEN AS SOON AS POSSIBLE AND WITHIN 14 WORKING DAYS FROM COMPLETION OF CONSTRUCTION ACTIVITIES.

SEDIMENT CONTROL

10. STOCKPILES WILL NOT BE LOCATED WITHIN 2 METRES OF HAZARD AREAS, INCLUDING LIKELY AREAS OF CONCENTRATED OR HIGH VELOCITY FLOWS SUCH AS WATERWAYS. WHERE THEY ARE BETWEEN 2 AND 5 METRES FROM SUCH AREAS, SPECIAL SEDIMENT CONTROL MEASURES SHOULD BE TAKEN TO MINIMISE POSSIBLE POLLUTION TO DOWNSLOPE WATERS, E.G. THROUGH INSTALLATION OF SEDIMENT FENCING.

11. ANY SAND USED IN THE CONCRETE CURING PROCESS (SPREAD OVER THE SURFACE) WILL BE REMOVED AS SOON AS POSSIBLE AND WITHIN 10 WORKING DAYS FROM PLACEMENT.

12. WATER WILL BE PREVENTED FROM ENTERING THE PERMANENT DRAINAGE SYSTEM UNLESS IT IS RELATIVELY SEDIMENT FREE, I.E. THE CATCHMENT AREA HAS BEEN PERMANENTLY LANDSCAPED AND/OR ANY LIKELY SEDIMENT HAS BEEN FILTERED THROUGH AN APPROVED STRUCTURE.

13. TEMPORARY SOIL AND WATER MANAGEMENT STRUCTURES WILL BE REMOVED ONLY AFTER THE LANDS THEY ARE PROTECTING ARE REHABILITATED.

OTHER MATTERS

14. ACCEPTABLE RECEPTORS WILL BE PROVIDED FOR CONCRETE AND MORTAR SLURRIES, PAINTS, ACID WASHINGS, LIGHT-WEIGHT WASTE MATERIALS AND LITTER.

15. ANY EXISTING TREES WHICH FORM PART OF THE FINAL LANDSCAPING PLAN WILL BE PROTECTED FROM CONSTRUCTION ACTIVITIES BY:
(A) PROTECTING THEM WITH BARRIER FENCING OR SIMILAR MATERIALS INSTALLED OUTSIDE THE DRIP LINE
(B) ENSURING THAT NOTHING IS NAILED TO THEM
(C) PROHIBITING PAVING, GRADING, SEDIMENT WASH OR PLACING OF STOCKPILES WITHIN THE DRIP LINE EXCEPT UNDER THE FOLLOWING CONDITIONS.
(I) ENCROACHMENT ONLY OCCURS ON ONE SIDE AND NO CLOSER TO THE TRUNK THAN EITHER 1.5 METRES OR HALF THE DISTANCE BETWEEN THE OUTER EDGE OF THE DRIP LINE AND THE TRUNK, WHICH EVER IS THE GREATER
(II) A DRAINAGE SYSTEM THAT ALLOWS AIR AND WATER TO CIRCULATE THROUGH THE ROOT ZONE (E.G. A GRAVEL BED) IS PLACED UNDER ALL FILL LAYERS OF MORE THAN 300 MILLIMETRES DEPTH
(III) CARE IS TAKEN NOT TO CUT ROOTS UNNECESSARILY NOR TO COMPACT THE SOIL AROUND THEM.

CONCRETE NOTES

1. ALL WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH AS 3600 CURRENT EDITION WITH AMENDMENTS, EXCEPT WHERE VARIED BY THE CONTRACT DOCUMENTS.

2. CONCRETE QUALITY
ALL REQUIREMENTS OF THE CURRENT ACSE CONCRETE SPECIFICATION DOCUMENT 1 SHALL APPLY TO THE FORMWORK, REINFORCEMENT AND CONCRETE UNLESS NOTED OTHERWISE.

ELEMENT	AS 3600 F'c MPa AT 28 DAYS	SPECIFIED SLUMP	NOMINAL AGG. SIZE
KERBS AND PATHS	25	80	20
PITS	32	80	20

– CEMENT TYPE SHALL BE (ACSE SPECIFICATION) TYPE SL
– PROJECT CONTROL TESTING SHALL BE CARRIED OUT IN ACCORDANCE WITH AS 1379.

3. NO ADMIXTURES SHALL BE USED IN CONCRETE UNLESS APPROVED IN WRITING BY CARDNO.

4. CLEAR CONCRETE COVER TO ALL REINFORCEMENT FOR DURABILITY SHALL BE 40mm TOP AND 70mm FOR EXTERNAL EDGES UNLESS NOTED OTHERWISE.

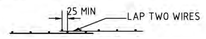
5. ALL REINFORCEMENT SHALL BE FIRMLY SUPPORTED ON MILD STEEL PLASTIC TIPPED CHAIRS, PLASTIC CHAIRS OR CONCRETE CHAIRS AT NOT GREATER THAN 1m CENTRES BOTH WAYS. BARS SHALL BE TIED AT ALTERNATE INTERSECTIONS.

6. THE FINISHED CONCRETE SHALL BE A DENSE HOMOGENEOUS MASS, COMPLETELY FILLING THE FORMWORK, THOROUGHLY EMBEDDING THE REINFORCEMENT AND FREE OF STONE POCKETS. ALL CONCRETE INCLUDING SLABS ON GROUND AND FOOTINGS SHALL BE COMPACTED AND CURED IN ACCORDANCE WITH R.T.A. SPECIFICATION R83.

7. REINFORCEMENT SYMBOLS:
N DENOTES GRADE 450 N BARS TO AS 1302 GRADE N
R DENOTES 230 R HOT ROLLED PLAIN BARS TO AS 1302
SL DENOTES HARD-DRAWN WIRE REINFORCING FABRIC TO AS 1304
NUMBER OF BARS IN GROUP — BAR GRADE AND TYPE
17 N 20 250
NOMINAL BAR SIZE IN mm — SPACING IN mm THE FIGURE

FOLLOWING THE FABRIC SYMBOL SL IS THE REFERANCE NUMBER FOR FABRIC TO AS 1304.

8. FABRIC SHALL BE LAPPED IN ACCORDANCE WITH THE FOLLOWING DETAIL:



SURVEY NOTES

THE EXISTING SITE CONDITIONS SHOWN ON THE FOLLOWING DRAWINGS HAVE BEEN INVESTIGATED BY CARDNO, BEING REGISTERED SURVEYORS. THE INFORMATION IS SHOWN TO PROVIDE A BASIS FOR DESIGN.

SHOULD DISCREPANCIES BE ENCOUNTERED DURING CONSTRUCTION BETWEEN THE SURVEY DATA AND ACTUAL FIELD DATA, CONTACT CARDNO.

NOTES:

1. ORIGIN OF LEVELS – PM46777
2. NO BOUNDARY SURVEY HAS BEEN UNDERTAKEN.
3. THIS DETAIL SURVEY IS NOT A "SURVEY" AS DEFINED BY THE SURVEYORS ACT 2002. IF ANY CONSTRUCTION IS PLANNED IT WOULD BE ADVISABLE TO CARRY OUT FURTHER SURVEY WORK TO DETERMINE THE BOUNDARY DIMENSIONS AVAILABLE.
4. DIMENSIONS AND AREAS SHOWN ON THIS PLAN HAVE BEEN COMPILED FROM DEPOSITED PLANS REGISTERED AT THE DEPARTMENT OF LAND AND PROPERTY INFORMATION AND ARE SUBJECT TO FINAL SURVEY.
5. THE RELATIONSHIP OF IMPROVEMENTS TO BOUNDARIES ARE DIAGRAMMATIC ONLY. WHERE DISTANCES TO BOUNDARIES ARE CRITICAL THEY SHOULD BE CONFIRMED ON SITE PRIOR TO CONSTRUCTION BY FURTHER SURVEY.
6. THE LOCATION OF RIDGE LINES ARE DIAGRAMMATIC ONLY.
7. THE SPREAD OF TREES SHOWN HEREON ARE DIAGRAMMATIC ONLY AND MAY NOT BE SYMMETRICAL. THE DIAMETER, HEIGHT AND SPREAD OF THE CANOPY OF THE TREES ARE BY ESTIMATION ONLY.
8. NO INVESTIGATION OF UNDERGROUND SERVICES HAVE BEEN MADE. ONLY THOSE SERVICES THAT ARE VISIBLE AND ACCESSIBLE AT THEIR DATE OF SURVEY HAVE BEEN SHOWN HEREON.
9. PRIOR TO ANY DEMOLITION, EXCAVATION OR CONSTRUCTION A THOROUGH SEARCH OF ALL SERVICE AUTHORITIES SHOULD BE MADE TO DETERMINE THE POSSIBLE LOCATION OF ANY FURTHER UNDERGROUND SERVICES.
10. CONTOURS SHOWN HEREON ARE INDICATIVE ONLY AND ARE SUTIABLE FOR MAPPING AT A SCALE OF 1 : 200 OR SMALLER, PREFERENCE SHOULD BE GIVEN TO SPOT HEIGHTS AS SHOWN.

SITEWORKS NOTES

1. ORIGIN OF LEVELS:– REFER SURVEY NOTES.

2. CONTRACTOR MUST VERIFY ALL DIMENSIONS AND EXISTING LEVELS ON SITE PRIOR TO COMMENCEMENT OF WORK. ANY DISCREPANCIES TO BE REPORTED TO CARDNO.

3. MAKE SMOOTH CONNECTION WITH EXISTING WORKS.

4. ALL TRENCH BACKFILL MATERIAL SHALL BE COMPACTED TO THE SAME DENSITY AS THE ADJACENT MATERIAL.

5. ALL SERVICE TRENCHES UNDER VEHICULAR PAVEMENTS SHALL BE BACKFILLED WITH SAND TO 300mm ABOVE PIPE. WHERE PIPE IS UNDER PAVEMENTS BACKFILL REMAINDER OF TRENCH TO UNDERSIDE OF PAVEMENT WITH SAND OR APPROVED GRANULAR MATERIAL COMPACTED IN 150mm LAYERS TO MINIMUM 98% MODIFIED MAXIMUM DRY DENSITY IN ACCORDANCE WITH AS 1289 5.2.1. (OR A DENSITY INDEX OF NOT LESS THAN 75)

6. PROVIDE 10mm WIDE EXPANSION JOINTS BETWEEN BUILDINGS AND ALL CONCRETE OR UNIT PAVEMENTS.

7. ASPHALTIC CONCRETE SHALL CONFORM TO R.T.A. SPECIFICATION R116.

8. ALL BASECOURSE MATERIAL SHALL BE IGNEOUS ROCK QUARRIED MATERIAL TO COMPLY WITH R.T.A. FORM 3051 (UNBOUND), R.T.A. FORM 3052 (BOUND) COMPACTED TO MINIMUM 98% MODIFIED DENSITY IN ACCORDANCE WITH AS 1289 5.2.1

9. ALL SUB-BASE COURSE MATERIAL SHALL BE IGNEOUS ROCK QUARRIED MATERIAL TO COMPLY WITH R.T.A. FORM 3051, 3051.1 AND COMPACTED TO MINIMUM 95% MODIFIED DENSITY IN ACCORDANCE WITH A.S. 1289 5.2.1

10. AS AN ALTERNATIVE TO THE USE OF IGNEOUS ROCK AS A SUB-BASE MATERIAL IN (9) A CERTIFIED RECYCLED CONCRETE MATERIAL COMPLYING WITH R.T.A. FORM 3051 AND 3051.1 WILL BE CONSIDERED. SUBJECT TO MATERIAL SAMPLES AND APPROPRIATE CERTIFICATIONS BEING PROVIDED TO THE SATISFACTION OF CARDNO.

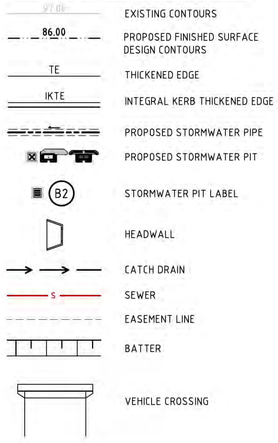
11. SHOULD THE CONTRACTOR WISH TO USE A RECYCLED PRODUCT THIS SHALL BE CLEARLY INDICATED IN THEIR TENDER AND THE PRICE DIFFERENCE BETWEEN AN IGNEOUS PRODUCT AND A RECYCLED PRODUCT SHALL BE CLEARLY INDICATED.

12. WHERE NOTED ON THE DRAWINGS THAT WORKS ARE TO BE CARRIED OUT BY OTHERS, (eg. ADJUSTMENT OF SERVICES), THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE CO-ORDINATION OF THESE WORKS.

13. EACH REMAINING PRECINCT/STAGES TO BE FENCED AT COMPLETION OF EACH PRECINCTS/STAGES.

14. PROVIDE 200mm TOPSOIL TO ALL SITE REGARDING AREAS AND HYDROMULCH OR HYDROSEED.

PROPOSED WORKS LEGEND



STORMWATER DRAINAGE NOTES

1. STORMWATER DESIGN CRITERIA:
(A) AVERAGE RECURRENCE INTERVAL:
1:100 YEARS ROOFED AREAS TO SURCHARGE PIT
1:5 YEARS EXTERNAL PAVEMENTS
(B) RAINFALL INTENSITIES: TIME OF CONCENTRATION:
5 MINUTES
1:100 YEARS= 218.9mm/hr
1:5 YEARS= 128.3mm/hr
(C) RUNOFF COEFFICIENTS:
ROOF AREAS: C 100 =1.0
EXTERNAL PAVEMENTS: C 5 =1.0

2. PIPES 300 DIA. AND LARGER TO BE REINFORCED CONCRETE CLASS '2' APPROVED SPIGOT AND SOCKET WITH RUBBER RING JOINTS. U.N.O.

3. PIPES UP TO 300 DIA SHALL BE SEWER GRADE uPVC WITH SOLVENT WELDED JOINTS.

4. EQUIVALENT STRENGTH FRC PIPES MAY BE USED.

5. PIPES TO BE INSTALLED TO TYPE HS1 SUPPORT IN ACCORDANCE WITH AS 3725 (1989) IN ALL CASES BACKFILL TRENCH WITH SAND TO 300mm ABOVE PIPE. WHERE PIPE IS UNDER PAVEMENTS BACKFILL REMAINDER OF TRENCH TO UNDERSIDE OF PAVEMENT WITH SAND OR APPROVED GRANULAR MATERIAL COMPACTED IN 150mm LAYERS TO MINIMUM 98% STANDARD MAXIMUM DRY DENSITY IN ACCORDANCE WITH AS 1289 5.2.1. (OR A DENSITY INDEX OF NOT LESS THAN 75)

6. ALL INTERNAL WORKS WITHIN PROPERTY BOUNDARIES ARE TO COMPLY WITH THE REQUIREMENTS OF AS 3500 3.1 (1998) AND AS/NZS 3500 3.2 (1998).

7. PRECAST PITS MAY BE USED EXTERNAL TO THE BUILDING SUBJECT TO APPROVAL BY CARDNO.

8. ENLARGERS, CONNECTIONS AND JUNCTIONS TO BE PREFABRICATED FITTINGS WHERE PIPES ARE LESS THAN 300 DIA.

9. WHERE SUBSOIL DRAINS PASS UNDER FLOOR SLABS AND VEHICULAR PAVEMENTS, UNSLOTTED uPVC SEWER GRADE PIPE IS TO BE USED.

10. CARE IS TO BE TAKEN WITH LEVELS OF STORMWATER LINES. GRADES SHOWN ARE NOT TO BE REDUCED WITHOUT APPROVAL.

11. GRATES AND COVERS SHALL CONFORM TO AS 3996.

12. AT ALL TIMES DURING CONSTRUCTION OF STORMWATER PITS, ADEQUATE SAFETY PROCEDURES SHALL BE TAKEN TO ENSURE AGAINST THE POSSIBILITY OF PERSONNEL FALLING DOWN PITS.

13. ALL EXISTING STORMWATER DRAINAGE LINES AND PITS THAT ARE TO REMAIN ARE TO BE INSPECTED AND CLEANED. DURING THIS PROCESS ANY PART OF THE STORMWATER DRAINAGE SYSTEM THAT WARRANTS REPAIR SHALL BE REPORTED TO THE SUPERINTENDENT/ENGINEER FOR FURTHER DIRECTIONS.

14. PIT LINTELS MUST BE LABELLED WITH PERMANENT STENCILED SIGNS TO IDENTIFY THE WATERCOURSE INTO WHICH THE PIT DRAINS SUBJECT TO CAMDEN COUNCIL STANDARDS.

CAMDEN COUNCIL
Approved by the Council of Camden under the provisions of the Environment Planning and Assessment Act 1979
APPROVAL
26/11/2014
DEVELOPMENT APPLICATION
DA 560/2014

Rev	Date	Description	Drawn	Appr.
01	11.07.14	ISSUE FOR DEVELOPMENT APPLICATION	AE	CV

Cardno
Shaping the Future
Cardno (NSW/ACT) Pty Ltd | ABN 95 001 145 035
Level 9, The Forum, 203 Pacific Highway
St. Leonards, NSW 2065
Tel: 02 9496 7700 Fax: 02 9439 5170
Web: www.cardno.com.au

Drawn AE	Date MAY'14		
Checked PD	Date MAY'14		
Designed PD	Date MAY'14		
Verified CO	Date JULY'14		
Approved CV	Date JULY'14		

Client: LANDCO WOLIN JOINT VENTURE

MANOOKA VALLEY, SPRING HILL
STAGE 2C

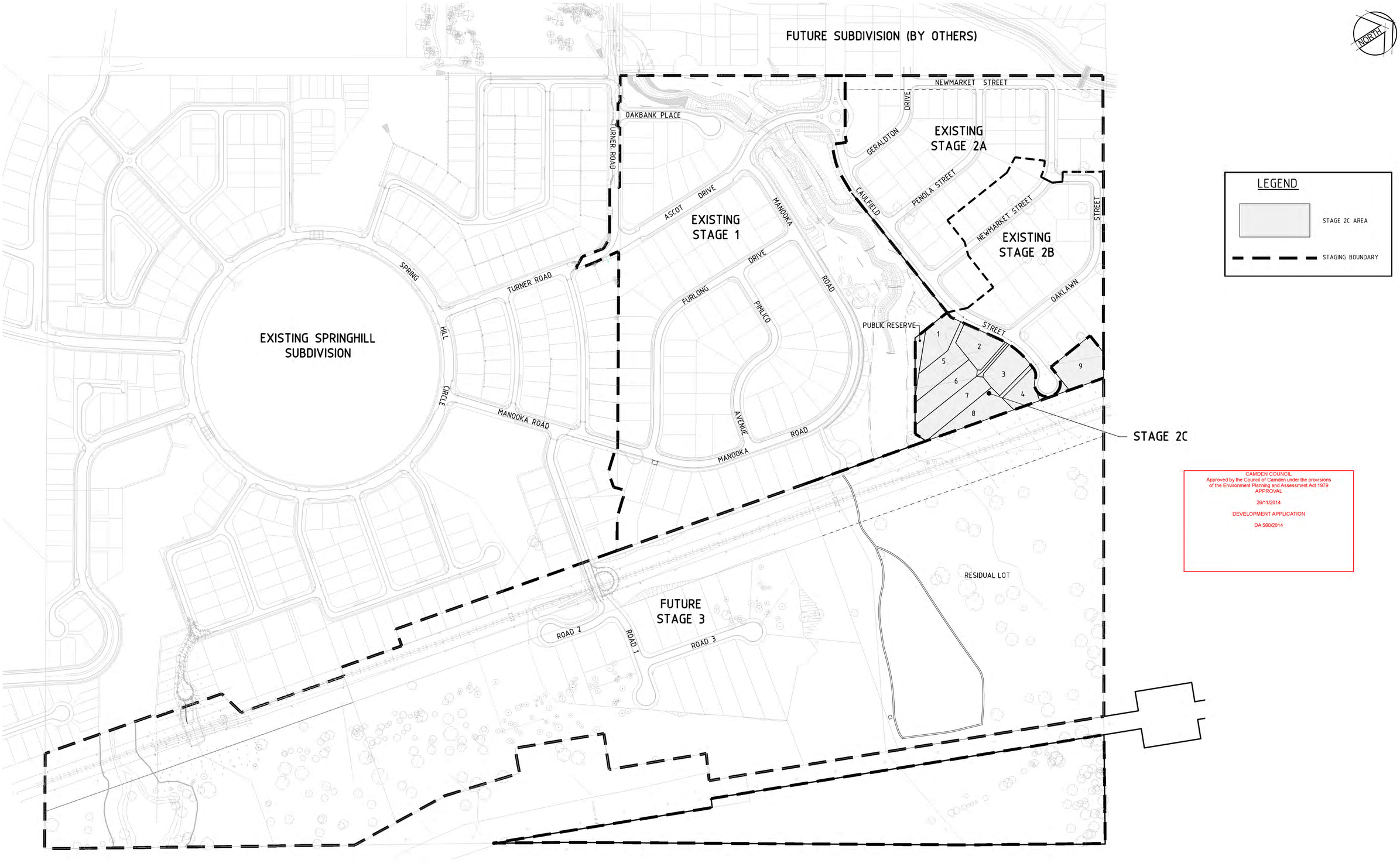
NOTES AND LEGENDS

Status: DEVELOPMENT APPLICATION

Date	Datum	Scale	Size
JULY'14	AHD	NTS	A1

Drawing Number: 294099-2C-001
Revision: 01

DATE PLOTTED: 10 November 2014 1:53 PM BY: CHRIS OAKES



CAMDEN COUNCIL
Approved by the Council of Camden under the provisions of the Environment Planning and Assessment Act 1979
APPROVAL
26/11/2014
DEVELOPMENT APPLICATION
DA 560/2014

Rev	Date	Description	Drawn	Appr.
02	10.11.14	RE-ISSUE FOR DEVELOPMENT APPLICATION	BS	CO
01	11.07.14	ISSUE FOR DEVELOPMENT APPLICATION	AE	CV

0 40 80 120 160 200m
40 30 20 10
SCALE 1:2000

Cardno®
Shaping the Future
Cardno (NSW/ACT) Pty Ltd | ABN 95 001 145 035
Level 9, The Forum, 203 Pacific Highway
St. Leonards, NSW 2065
Tel: 02 9496 7700 Fax: 02 9439 5170
Web: www.cardno.com.au

Drawn	AE	Date MAY'14
Checked	PD	Date MAY'14
Designed	PD	Date MAY'14
Verified	CO	Date JULY'14
Approved	CV	Date JULY'14

Client: LANDCO WOLIN JOINT VENTURE

MANOOKA VALLEY, SPRING HILL
STAGE 2C

GENERAL ARRANGEMENT PLAN

Status: DEVELOPMENT APPLICATION

Date	Datum	Scale	Size
JULY'14	AHD	1:2000	A1

Drawing Number: 294099-2C-005
Revision: 02

0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150mm ON A1 ORIGINAL

CAD FILE: G:\294099 - Manooka Valley Stages 1, 2 & 3\Drawings\Civil\Stage 2C\294099-2C-005 [02]GENERAL ARRANGEMENT PLAN.dwg

DATE PLOTTED: 10 November 2014, 1:54 PM BY : CHRIS OAKES

CAMDEN COUNCIL
Approved by the Council of Camden under the provisions of the Environment Planning and Assessment Act 1979
APPROVAL

26/11/2014

DEVELOPMENT APPLICATION

DA 560/2014

Rev	Date	Description	Drawn	Appr.
02	10.11.14	RE-ISSUE FOR DEVELOPMENT APPLICATION	BS	CO
01	11.07.14	ISSUE FOR DEVELOPMENT APPLICATION	AE	CV

0 10 20 30 40 50m
SCALE: 1:500 @A1

Cardno®
Shaping the Future
Cardno (NSW/ACT) Pty Ltd | ABN 95 001 145 035
Level 9, The Forum, 203 Pacific Highway
St. Leonards, NSW 2065
Tel: 02 9496 7700 Fax: 02 9439 5170
Web: www.cardno.com.au

Drawn	AE	Date MAY'14
Checked	PD	Date MAY'14
Designed	PD	Date MAY'14
Verified	CO	Date JULY'14
Approved	CV	Date JULY'14

Client: LANDCO WOLIN JOINT VENTURE

MANOOKA VALLEY, SPRING HILL
STAGE 2C

CUT AND FILL PLAN

Status: DEVELOPMENT APPLICATION

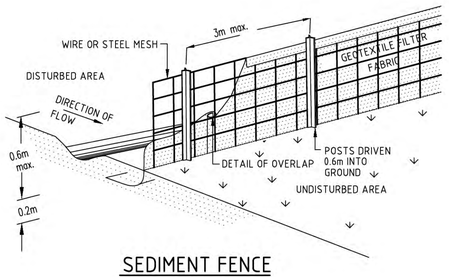
Date	Datum	Scale	Size
JULY'14	AHD	1:1500	A1

Drawing Number: 294099-2C-010
Revision: 02

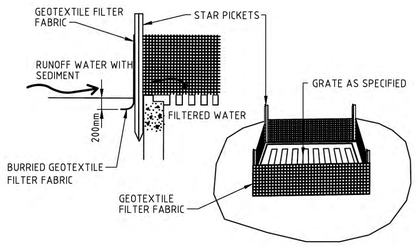
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150mm ON A1 ORIGINAL

CAD FILE: G:\294099 - Manooka Valley Stages 1, 2 & 3\Drawings\Civil\Stage 2C\294099-2C-010 (02)CUT AND FILL PLAN.dwg

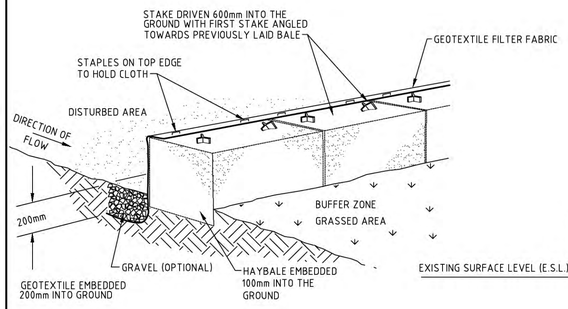
DATE PLOTTED: 10 November 2014, 1:54 PM BY : CHRIS OAKES



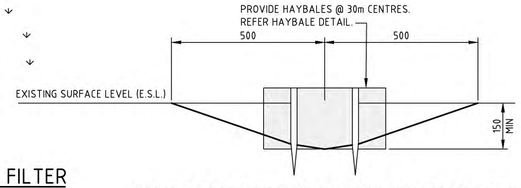
SEDIMENT FENCE
NTS



GEOTEXTILE FILTER PIT SURROUND
NTS

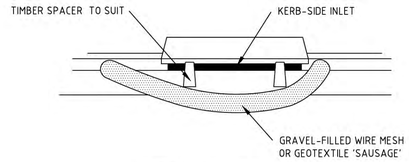


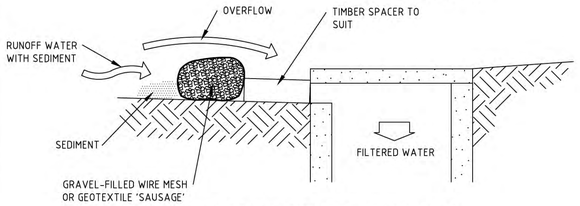
HAYBALE AND GEOTEXTILE SEDIMENT FILTER
NTS



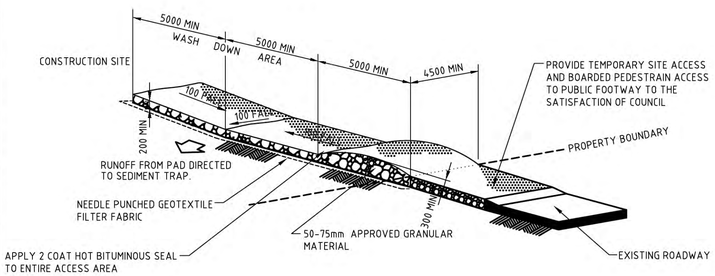
TEMPORARY CATCH DRAIN WITH HAYBALES (MIN FALL 0.5%)
SCALE 1:10

NOTE:
ENSURE BANKS ARE PROPERLY COMPACTED AND MAINTAINED TO PREVENT FAILURE.

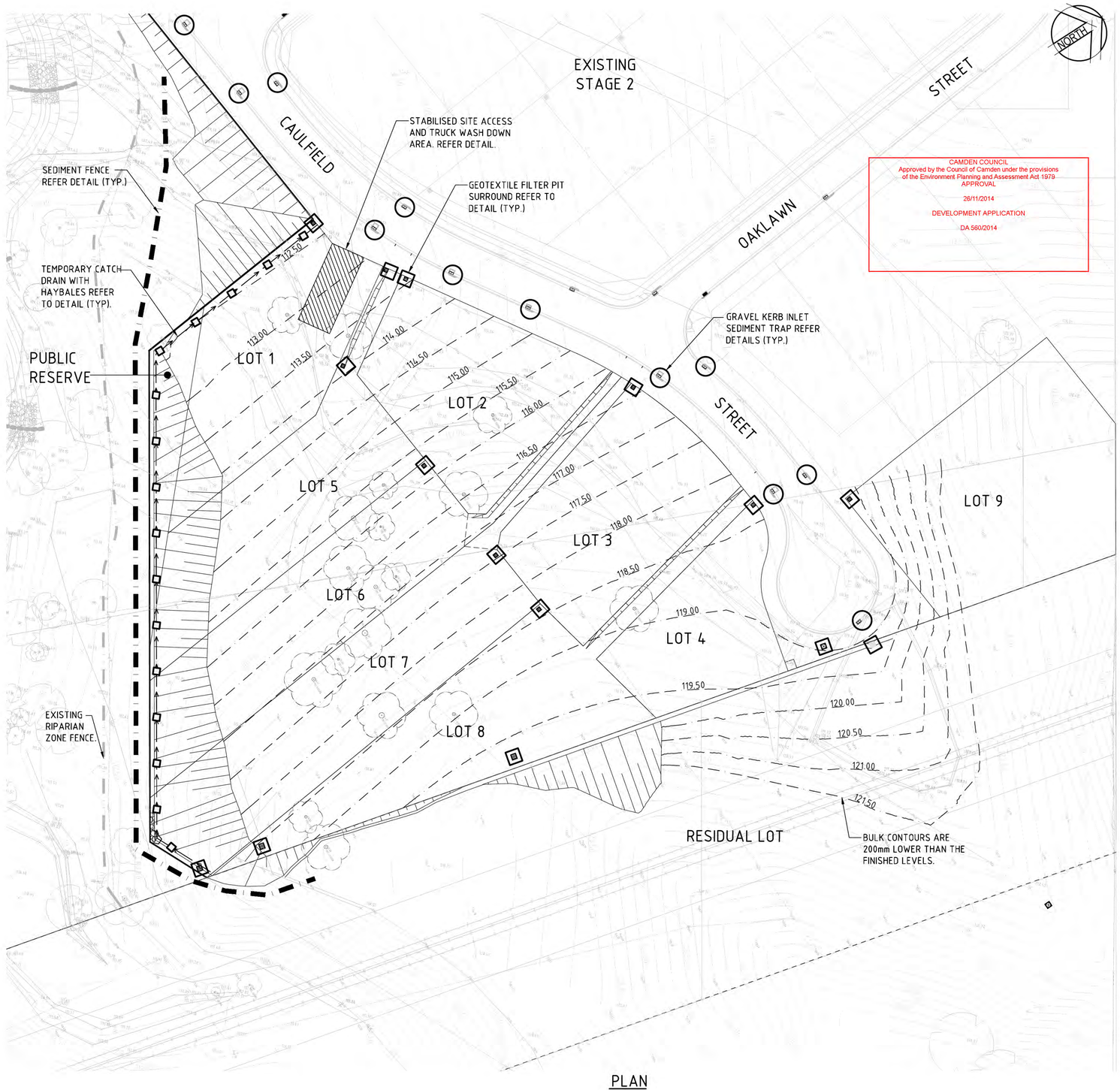




GRAVEL KERB INLET SEDIMENT TRAP
NTS



STABILISED SITE ACCESS AND TRUCK WASH DOWN AREA
NTS



PLAN
SCALE 1:500

Rev	Date	Description	Drawn	Appr.
03	10.11.14	RE-ISSUE FOR DEVELOPMENT APPLICATION	BS	CO
02	22.10.14	RE-ISSUE FOR DEVELOPMENT APPLICATION	NVH	CO
01	11.07.14	ISSUE FOR DEVELOPMENT APPLICATION	AE	CV

0 0.2 0.4 0.6 0.8 1m
SCALE 1:10 @A1

0 10 20 30 40 50m
SCALE 1:500 @A1

Cardno® Shaping the Future
Cardno (NSW/ACT) Pty Ltd | ABN 95 001 145 035
Level 9, The Forum, 203 Pacific Highway
St. Leonards, NSW 2065
Tel: 02 9496 7700 Fax: 02 9439 5170
Web: www.cardno.com.au

Drawn	AE	Date	MAY'14
Checked	PD	Date	MAY'14
Designed	PD	Date	MAY'14
Verified	CO	Date	MAY'14
Approved	CV	Date	JULY'14

Client: LANDCO WOLIN JOINT VENTURE

MANOOKA VALLEY, SPRING HILL
STAGE 2C

BULK EARTHWORKS, SEDIMENT AND EROSION CONTROL PLAN

Status: DEVELOPMENT APPLICATION

Date	Datum	Scale	Size
JULY'14	AHD	AS SHOWN	A1

Drawing Number: 294099-2C-020
Revision: 03

0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150mm ON A1 ORIGINAL

CAD FILE: G:\294099 - Manooka Valley Stages 1, 2 & 3\Drawings\Civil\Stage 2C\294099-2C-020 (03)BULK EARTHWORKS, SEDIMENT AND EROSION CONTROL PLAN.dwg

DATE PLOTTED: 10 November 2014, 1:54 PM BY: CHRIS OAKES

CAD FILE: G:\294099 - Manooka Valley Stages 1, 2 & 3\Drawings\Civil\Stage 2C\294099-2C-030 (02)SITEWORKS AND STORMWATER DRAINAGE PLAN SHEET 1.dwg

NORTH

EXISTING STAGE 2

CAMDEN COUNCIL
Approved by the Council of Camden under the provisions of the Environment Planning and Assessment Act 1979
APPROVAL
26/11/2014
DEVELOPMENT APPLICATION
DA 560/2014

PROVIDE Ø100 uPVC PIPE WITH CAPPING FOR FUTURE DWELLING ROOF WATER TO CONNECT TO EXISTING KERB IN ACCORDANCE WITH CAMDEN COUNCILS STANDARD DRAWING "SD26" (TYP).

SAWCUT PAVEMENT 900mm FROM EXISTING KERB LIP. CONSTRUCT CROSSOVER VEHICULAR ACCESS IN ACCORDANCE WITH CAMDEN COUNCILS STANDARD DRAWING 'DW01' (TYP).

CAULFIELD

STREET

OAKLAWN

STREET

1
4 (TYP)

EXISTING SURFACE CONTOURS (TYP).

PROPOSED FINISHED CONTOURS (TYP).

2m WIDE INTER ALLOTMENT DRAINAGE EASEMENT.

PAVEMENT TO MATCH EXISTING (TYP).

PROVIDE STUB FOR LOT CONNECTION

INTER ALLOTMENT DRAINAGE LINE. REFER LONGSECTIONS FOR DETAILS. (TYP)

TREES REMOVED IN STAGE 2 WORKS. (TYP).

EXISTING TREES TO BE REMOVED. (TYP).

SEWER SHOWN INDICATIVELY. SEWER TO BE DESIGNED BY OTHERS.

LOT 1

LOT 2

LOT 3

LOT 5

PUBLIC RESERVE

G1 B1 F1 B2 E1

50/6

REFER DRAWING 294099-2C-031 FOR CONTINUATION

Rev	Date	Description	Drawn	Appr.
02	10.11.14	RE-ISSUE FOR DEVELOPMENT APPLICATION	BS	CO
01	11.07.14	ISSUE FOR DEVELOPMENT APPLICATION	AE	CV

0 4 8 12 16 20m
4 3 2 1
SCALE 1:200

Cardno® Shaping the Future
Cardno (NSW/ACT) Pty Ltd | ABN 95 001 145 035
Level 9, The Forum, 203 Pacific Highway
St. Leonards, NSW 2065
Tel: 02 9496 7700 Fax: 02 9439 5170
Web: www.cardno.com.au

		Date
Drawn	AE	MAY'14
Checked	PD	MAY'14
Designed	PD	MAY'14
Verified	CO	JULY'14
Approved	CV	JULY'14

Client: LANDCO WOLIN JOINT VENTURE

MANOOKA VALLEY, SPRING HILL
STAGE 2C

SITEWORKS AND STORMWATER DRAINAGE PLAN SHEET 1

Status: DEVELOPMENT APPLICATION

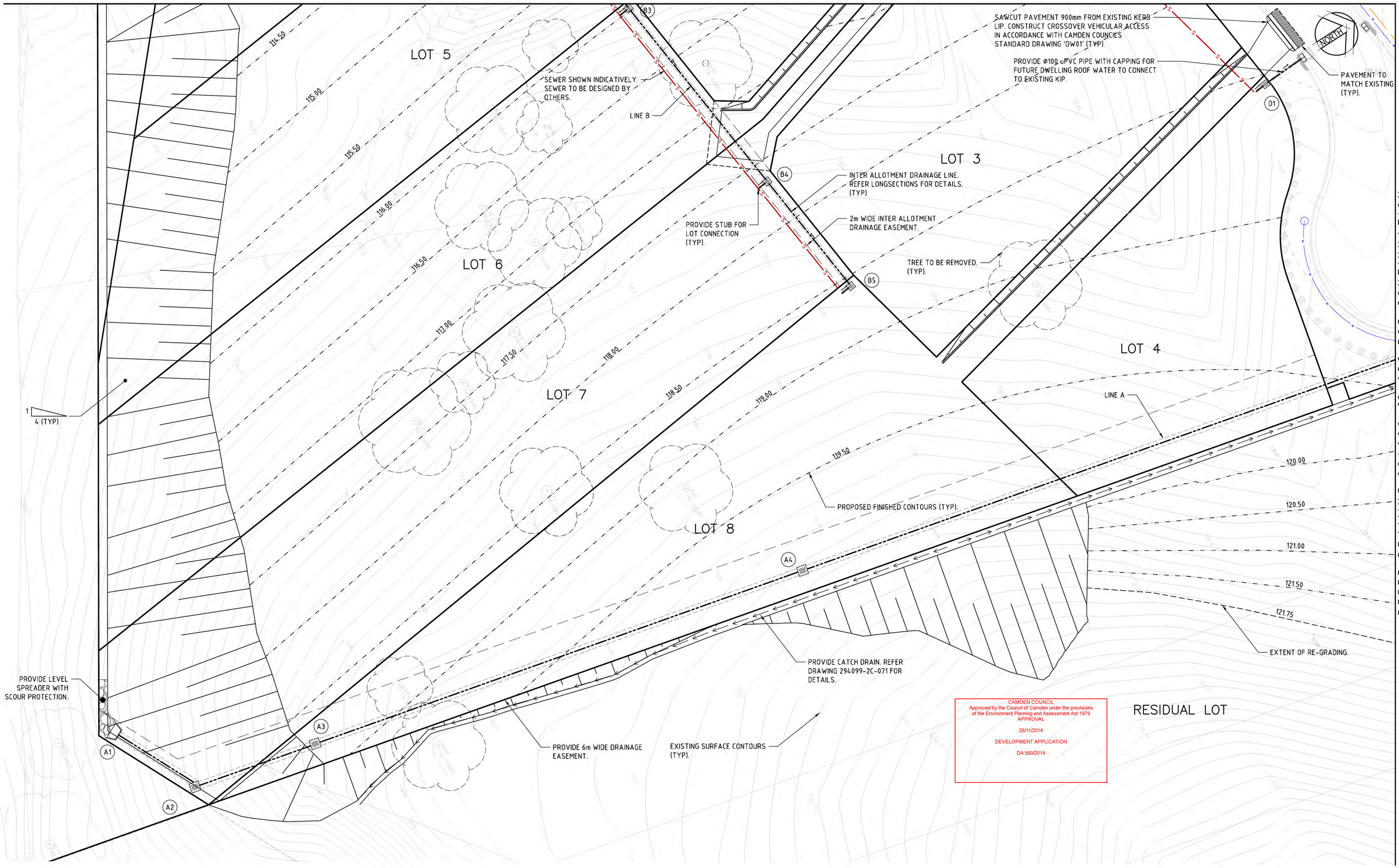
Date	Datum	Scale	Size
JULY'14	AHD	1:200	A1

Drawing Number: 294099-2C-030
Revision: 02

0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150mm ON A1 ORIGINAL

DATE PLOTTED: 10 November 2014, 1:54 PM BY : CHRIS OAKES

REFER DRAWING 294099-2C-030 FOR CONTINUATION



CAMDEN COUNCIL
Approved by the Council of Camden under the provisions of the Environment Planning and Assessment Act 1979
APPROVAL
26/11/2014
DEVELOPMENT APPLICATION
DA 560/2014

REFER DRAWING 294099-2C-032 FOR CONTINUATION

CAD FILE: G:\294099 - Manooka Valley Stages 1, 2 & 3\Drawings\Civil\Stage 2C\294099-2C-031 (04)SITEWORKS AND STORMWATER DRAINAGE PLAN SHEET 2.dwg

Rev	Date	Description	Drawn	Appr.
04	10.11.14	RE-ISSUE FOR DEVELOPMENT APPLICATION	BS	CO
03	22.10.14	RE-ISSUE FOR DEVELOPMENT APPLICATION	NVH	CO
02	16.09.14	RE-ISSUE FOR DEVELOPMENT APPLICATION	ST	CO
01	11.07.14	ISSUE FOR DEVELOPMENT APPLICATION	AE	CV

0 4 8 12 16 20m
4 3 2 1
SCALE 1:200

Cardno®
Shaping the Future
Cardno (NSW/ACT) Pty Ltd | ABN 95 001 145 035
Level 9, The Forum, 203 Pacific Highway
St. Leonards, NSW 2065
Tel: 02 9496 7700 Fax: 02 9439 5170
Web: www.cardno.com.au

Drawn	AE	Date MAY'14
Checked	PD	Date MAY'14
Designed	PD	Date MAY'14
Verified	CO	Date JULY'14
Approved	CV	Date JULY'14

Client: LANDCO WOLIN JOINT VENTURE

MANOOKA VALLEY, SPRING HILL
STAGE 2C

SITEWORKS AND STORMWATER DRAINAGE PLAN
SHEET 2

Status: DEVELOPMENT APPLICATION

Date	Datum	Scale	Size
JULY'14	AHD	1:200	A1

Drawing Number: 294099-2C-031
Revision: 04

0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150mm ON A1 ORIGINAL

APPENDIX

B

PREVIOUS PLANNING PROPOSAL AND SYDNEY NORTH PLANNING PANEL DECISION

Tracy Davey
Cardno (NSW) Pty Ltd
P O Box 19
St Leonards NSW 1590

23 May 2018

Dear Tracey,

Request for a Rezoning Review – 2018SSW004 - PGA_2017_CAMD_001_00

I refer to the request for a Rezoning Review for a proposal at Lot 627 DP 1163903, Currans Hill to amend the Camden Local Environmental Plan 2010 to rezone land at Lot 627 DP 1163903, Currans Hill.

The Sydney Western City Planning Panel (Planning Panel) has considered the request for a Rezoning Review together with the advice provided by Council and determined that the proposal should not proceed to Gateway determination stage. A copy of the Panel's decision is attached.

Although there are no opportunities to appeal this decision, should you wish to pursue this matter further you have the option of preparing a new proposal for consideration by Council. I encourage you to liaise with Council prior to submitting any further proposal.

If you have any queries on this matter, please contact Stuart Withington, Manager, Planning Panels Secretariat on (02) 8217 2062 or via email to stuart.withington@planning.nsw.gov.au

Yours sincerely

Justin Doyle
Chair, Sydney Western City Planning Panel

encl. Rezoning Review Record of Decision

REZONING REVIEW
RECORD OF DECISION
SYDNEY NORTH PLANNING PANEL

DATE OF DECISION	Monday 21 May 2018
PANEL MEMBERS	Justin Doyle (Chair), Bruce McDonald, Julie Savet Ward
APOLOGIES	Nicole Gurran
DECLARATIONS OF INTEREST	Lara Symkowiak and Peter Sidgreaves declared a conflict having voted on this planning proposal in their capacity as Councillors.

REZONING REVIEW
2018SSW004 – Camden – RR_2017_CAMD_001_00 at Lot 627 DP 1163903 Currans Hill (AS DESCRIBED IN SCHEDULE 1)

Reason for Review:
- ☒ The council has notified the proponent that the request to prepare a planning proposal has not been supported
- ☐ The council has failed to indicate its support 90 days after the proponent submitted a request to prepare a planning proposal or took too long to submit the proposal after indicating its support

PANEL CONSIDERATION AND DECISION
The Panel considered: the material listed at item 4 and the matters raised and/or observed at meetings and site inspections listed at item 5 in Schedule 1.

Based on this review, the Panel determined that the proposed instrument:
- ☐ **should** be submitted for a Gateway determination because the proposal has demonstrated strategic and site specific merit
- ☒ **should not** be submitted for a Gateway determination because the proposal has
  - ☒ not demonstrated strategic merit
  - ☐ has demonstrated strategic merit but not site specific merit

The decision was unanimous.

REASONS FOR THE DECISION
The Panel determined that the planning proposal demonstrated neither strategic nor site specific merit and therefore the proposal should not proceed to Gateway.

The South West Growth Area has been planned through an integrated approach to provide a major greenfield contribution of some 110,000 new dwellings to the area's future housing supply and choice. While there is scope within the planning proposal process for increased density to be permitted on sites which demonstrate sufficient strategic and site-specific merit, that does not mean that any site which is located outside the edge of the growth area that can be built upon should be rezoned for higher density.

For this site, the case for strategic merit is not strong. Camden Council staff report that the local government area is currently well placed to meet and exceed its housing targets, particularly in the South West Growth Area. With a target for the LGA of 11,800 for the current planning period, the Council reports 7,000 dwellings constructed or under construction and 7,500 additional approvals.

Within that context, this site is outside the southernmost extremity of the growth area. It is not close to town community facilities and is remote from public transport. While the site offers the advantage of connection to an existing suburban development, there are also significant advantages of preserving the current E4 zoning at least in part to allow a meaningful transition between the metropolitan density of the existing Currans Hill subdivision and the adjacent rural lands. That is particularly so given the significant contribution that the nationally listed critically endangered remnant Cumberland Plain Woodland makes to the visual and ecological catchment. The transition will also increase the amenity and desirability of the areas where increased densities have been permitted.

Some more dense residential development of parts of this site might be justified. Notably, there is an existing residential subdivision which would increase the density that Council reports to be consistent with the current zoning which would allow for 23 environmental living lots (DA 2014/597). The northern residual lot that would be created by that subdivision could also allow for additional lots to add to those 23, with lot sizes similar to the adjacent existing approved house lots.

While recognising that the proposal is consistent with Planning Priority W5 of the draft Plan 'Providing Housing Supply, Choice and Affordability', for the reasons outlined above the Panel considers the contribution of 180-200 additional dwellings to be insufficient strategic justification to compensate for the adverse site-specific impacts. The site is within the colouring mapped as "Metropolitan Urban Area' in the District plan, but the existing approval for 900 m2 lots is not out of step with that designation.

Instead, the objective of supplying 'housing choice' within the Camden LGA would be better supported by the provision of the increasingly scarce 'environmental living' stock, to supplement the denser offerings already existing in Currans Hill.

At the level of site specific assessment, the site presents a number of challenges including:

(a) The location of critically endangered Cumberland Plain Woodland. The current proposal would require removal of 1.8 hectares of vegetation including at least the edges of the existing Cumberland Plain Woodland and one hollow bearing tree, without any significant proposal for embellishment or amelioration. No substantial justification for that removal on this greenfield site was offered other than to increase the land available for residential development.

(b) Access to the development would be afforded by narrow residential streets in the existing subdivision.

(c) The site is irregular, with a slope in excess of 16%, bisected by a high tension transmission easement, a state heritage listed canal and significant bushfire affectation requiring asset protection zones, which combine to limit the developable area and produce challenges to an ordered residential layout and civil engineering.

Despite these challenges, the planning proposal does not propose a maximum building height, FSR or lot size. There was also little information as to how the significant issues of subdivision design might be able to be addressed. Given the range of uses permitted within the R1 Residential zoning, there is potential for development to be both out of character and scale with the established greenfield development adjoining and to provide an unsympathetic transition between the urban area and the adjoining rural context.

The Panel considers the proposal inconsistent with the following Planning Priorities:

- W14 'Protecting and enhancing bushland and biodiversity'
- W15 'Increasing Urban tree canopy cover and delivering Green Grid connections'
- W16 'Protecting and enhancing rural landscapes'

Together the issues discussed above raise as the important issue of the potential for this proposal to create a precedent for further isolated and compromised environmentally or rurally zoned sites, adjacent to existing or planned residential precincts, seeking densities for which they are not well suited solely on the basis that they will add to Sydney's housing stock.

PANEL MEMBERS	
 Justin Doyle (Chair)	 Julie Savet Ward
 Bruce McDonald	

SCHEDULE 1		
1	PANEL REF – LGA – DEPARTMENT REF - ADDRESS	2018SSW004 – Camden – RR_2017_CAMD_001_00 at Lot 627 DP 1163903, Currans Hill
2	LEP TO BE AMENDED	Camden Local Environmental Plan 2010
3	PROPOSED INSTRUMENT	The proposal seeks to amend the Camden LEP2010 by rezoning land at Lot 627 DP 1163903, Currans Hill.
4	MATERIAL CONSIDERED BY THE PANEL	• Rezoning review request documentation • Briefing report from Department of Planning and Environment
5	MEETINGS AND SITE INSPECTIONS BY THE PANEL	• **Site inspection & Briefing meeting with Department of Planning and Environment (DPE):** 21 May 2018, 10.30am ○ **Panel members in attendance:** Justin Doyle (Chair), Julie Savet Ward, Bruce McDonald ○ **Department of Planning and Environment (DPE) staff in attendance:** Chantelle Chow, Terry Doran • **Briefing meeting with Proponent:** 21 May 2018, 12.05pm ○ **Panel members in attendance:** as above ○ **Department of Planning and Environment (DPE) staff in attendance:** as above ○ **Proponent representatives in attendance:** Tracey Davey, Josip Zivko, Andrew Osborne, Hayden Calvey, Jane Riathby-Veall • **Briefing meeting with Council:** 21 May 2018, 1.20pm ○ **Panel members in attendance:** as above ○ **Department of Planning and Environment (DPE) staff in attendance:** as above ○ **Council representatives in attendance:** Heath James, Nicole Magurren, Tina Chappell, Heath James, Ilyas Karaman

APPENDIX

C

FAUNA AND FLORA ASSESSMENT

Flora and Fauna Assessment

Caulfield Stage 2C Rezoning

80219016

Prepared for
Landco (NSW) and Wolin Investments Pty Ltd

7 March 2019

Cardno

Contact Information

Cardno (NSW/ACT) Pty Ltd
ABN 95 001 145 035

Level 9 - The Forum
203 Pacific Highway
St Leonards NSW 2065
Australia

www.cardno.com
Phone +61 2 9496 7700
Fax +61 2 9439 5170

Document Information

Prepared for	Landco (NSW) and Wolin Investments Pty Ltd
Project Name	Caulfield Stage 2C Rezoning
File Reference	80219016-001-004
Job Reference	80219016
Date	07 March 2019
Version Number	V1

Author(s):

Name: Bo Davidson
Job title: Ecologist

Effective Date 7/03/2019

Approved By:

Name: Kevin Roberts
Job title: Technical Director Environmental Services

Date Approved 7/03/2019

Document History

Version	Effective Date	Description of Revision	Prepared by	Reviewed by
RevA	12/12/2018	Draft for client review	Bo Davidson	Kevin Roberts
RevB	07/03/2019	Final	Bo Davidson	Tracy Davey

Executive Summary

Introduction and Aims

Landco (NSW) and Wolin Investments Pty Ltd engaged Cardno NSW/ACT Pty Ltd (Cardno) to conduct a Flora and Fauna Assessment (FFA) to support a rezoning proposal for a portion of lot 627 DP1163903, Currans Hill in the Camden Local Government Area (LGA), hereafter referred to as the Subject Site. This proposal would result in the rezoning of the existing E2 – Environmental Conservation and E4 – Environmental Living lands of the Subject Site to R1 – General Residential for future residential development.

Although the NSW *Biodiversity Conservation Act 2016* (BC Act) came into force on 25 August 2017, the Camden LGA is listed as an Interim Designated Area (IDA). Applications made within this LGA may still be assessed under the previous legislation provided they are submitted prior to the end of the interim period, currently set as 25 November 2019.

Methodology

This FFA consisted of two components, a desktop study and a field survey.

The desktop study consulted a variety of secondary resources, including the NSW BioNet database and the Commonwealth Protected Matters Search Tool (PMST), vegetation spatial mapping resources and relevant NSW and Commonwealth legislative instruments. The desktop study also included a detailed review of an existing FFA conducted for the entirety of lot 627 DP1163903 by Biosis in 2017.

The primary purpose of the desktop study was to identify threatened species, populations and Threatened Ecological Communities (TECs) which could occur on the Subject Site. These entities are those so listed under the NSW *Threatened Species Conservation Act 1995* (TSC Act) and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Surveys were conducted on the Subject Site, on 05 December 2018 by one Ecologist from Cardno. This survey consisted of a thorough walk-through assessment of the entire Subject Site to identify the vegetation communities present, conduct a comprehensive survey for threatened flora and identify areas and items of significant fauna habitat (hollow-bearing trees, waterbodies, creeklines, rock outcrops etc.). The survey also included opportunistic recordings of all flora and fauna encountered as well as dedicated surveys for small reptiles and gastropods.

Results

Surveys conducted as part of this FFA concluded that the Subject Site has been highly modified through recent clearing and is dominated by exposed soil and exotic grasslands. However, a small portion of the TEC Cumberland Plain Woodland (CPW) is present in the south-west as an extension of CPW vegetation in the adjacent Manooka Reserve. In addition, a portion of the regenerating grasslands of the Subject Site were identified as most closely conforming to CPW derived grasslands. CPW is listed as a critically endangered TEC under the TSC Act and EPBC Act.

No threatened flora species were encountered during survey and none are considered likely to occur. Due to the small size of the Subject Site, the entire land area was surveyed with no individuals of any threatened flora species known to occur in the locality documented. The survey was also conducted during an appropriate season (summer) for the detection of the majority of these species.

Significant fauna habitat was observed to be limited with a single mature eucalypt and a small vegetated pond is present in the south-west of the Subject Site. No threatened fauna species were detected during survey; however, two were considered likely to occur based on the presence of suitable habitat and recent occurrence records from within 5 km:

- Cumberland Plain Land Snail (*Meridolum corneovirens*) – listed as endangered under the TSC Act; and
- Green and Golden Bell Frog (*Litoria aurea*) – listed as endangered under the TSC Act and vulnerable under the EPBC Act.

Impact Assessment

No impact on the ecological entities identified in this report would occur as a result of rezoning. To inform future assessment requirements an indicative impact assessment based on the existing concept plan for the Subject Site has been conducted. This assessment assumes clearing of the whole of the Subject Site.

Assessments of the above TEC and threatened species were conducted under the seven-part test methodology (EP&A Act) and/or tests of significance (EPBC Act). These tests concluded that although future development of the Subject Site would result in the removal of the whole occurrence of TEC and threatened fauna habitat from the Subject Site, the level of impact is not considered to be significant. The CPW present on the Subject Site represents less than 1 % of this community present in the entirety of lot 627 DP1163903 and the fauna habitat values present are not limited in the local area. Similar vegetation and fauna habitat is also present within the Manooka Reserve, which is located to the immediate south of the Subject Site.

Based on this assessment, no significant impact on any listed entity under the TSC Act and/or EPBC Act is considered likely as a result of future development of the Subject Site and further assessment through a SIS (NSW) or a referral to the federal Minister of the Environment (Commonwealth) would be required to support a future DA.

Recommendations

Due to the small size of the Subject Site, retention of all or a portion of the TEC and threatened fauna habitat present is not considered practical for any future development. However, as above the impact of this removal is not considered to be a significant impact on these values in the locality.

Secondary impacts can be mitigated through appropriate controls during development as well as environmentally sensitive development design. Manooka Reserve is already bordered by residential development to the west and south and the development of the relatively small Subject Site is not considered likely to significantly exacerbate the existing pressures on this reserve from adjacent residential lands.

A dedicated survey for the Green and Golden Bell Frog is recommended as part of any future DA. This survey would need to be conducted in line with the minimum survey requirements for this species as detailed in the NSW NPWS Environmental Impact Assessment Guidelines.

Based on a review of the OEH Biodiversity Values Map and Threshold Tool (BVMTT) for this report, any future DA would require assessment through the Biodiversity Assessment Method (BAM), as the majority of the Subject Site is mapped as “biodiversity values”. This assessment is required to determine whether offsetting through the Biodiversity Offsets Scheme (BOS) would be required for the small amount of native vegetation and threatened fauna habitat present as per Part 6 of BC Act, when this legislation comes into effect for the Camden LGA on 25 November 2019.

Conclusion

Based on the results of this assessment, the proposed rezoning of the Subject Site is considered likely to be supported. This approach would avoid the majority of high value native vegetation and fauna habitat present in lot 627 DP1163903. The small amount of TEC and potential threatened fauna habitat to be removed from the Subject Site is not considered to represent a significant loss of these resources in the locality.

It is recommended that the E2 zoned lands elsewhere in lot 627 DP1163903 are managed for conservation purposes. This would more than compensate for the small amount of TEC and potential threatened fauna habitat which would be lost through future development of the Subject Site following rezoning.

Table of Contents

Appendices

Tables

Figures

1 Introduction and Aims

Landco (NSW) and Wolin Investments Pty Ltd engaged Cardno NSW/ACT Pty Ltd (Cardno) to conduct a Flora and Fauna Assessment (FFA) to support a rezoning proposal for a portion of lot 627 DP1163903, Currans Hill in the Camden Local Government Area (LGA), hereafter referred to as the Subject Site.

The purpose of the FFA is to:

- Identify the presence or likely presence of any threatened species, population or Threatened Ecological Communities (TECs) listed under the NSW *Threatened Species Conservation Act 1995* (TSC Act) and/or Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) on the Subject Site;
- Determine whether future development works following rezoning would have a significant impact on any identified listed entity; and
- Make recommendations to prevent, mitigate and/or minimise any potential impacts to native flora, fauna and ecological communities.

The NSW *Biodiversity Conservation Act 2016* (BC Act) replaced the TSC Act as of 25 August 2017; however, several LGAs were classified as Interim Designated Areas (IDAs), for which Development Applications (DAs) could continue to be assessed and submitted under the previous legislation until the expiry of the designated interim period. This period was recently extended until 25 November 2019 for several LGAs, which included Camden.

1.1 Description of the Project

Cardno are in the process of preparing a rezoning application for the Subject Site from its current zoning of E4 (Environmental Living) and E2 (Environmental Conservation) to R1 (General Residential) to support future residential development.

1.2 Site Particulars

Locality	The Subject Site is located within the west of existing lot 627 DP1163903, Currans Hill (**Figure 1-1** and **Figure 1-2**)
LGA	Camden
Lot / DP	627/DP1163903
LEP	E4 – Environmental Living
	E2 – Environmental Conservation
Subject Site Area	Approximately 1.3 ha
Current Land Use	The Subject Site consists of cleared, currently unused land
Topography	The Subject Site is located within gently undulating terrain. It has a southerly facing aspect draining towards Manooka Reserve
Bioregion	Sydney Basin/Cumberland
Mitchell Landscape	Cumberland Plain
Geology	Wianamatta Group shales and Hawkesbury shale

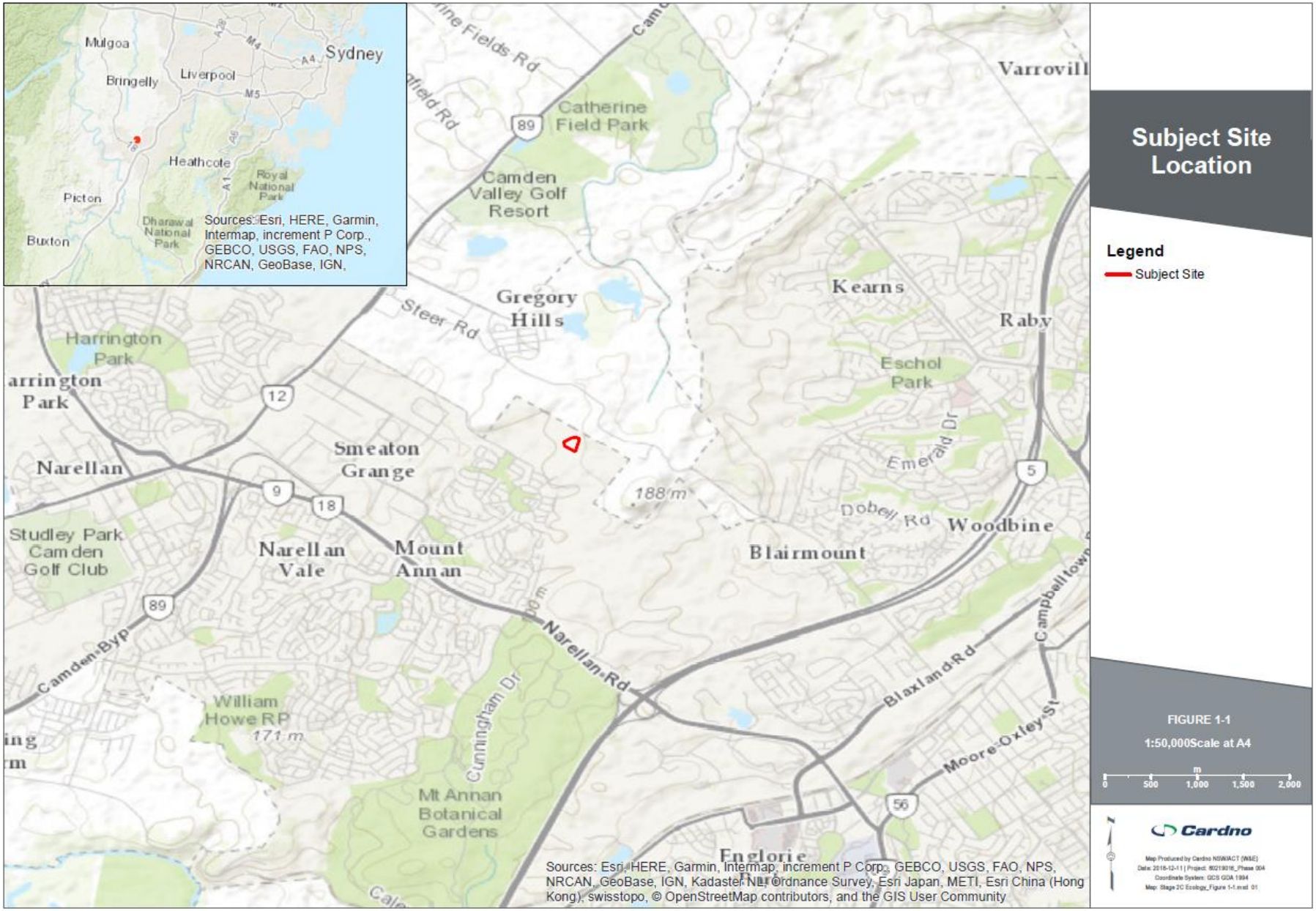


Figure 1-1 Subject Site location

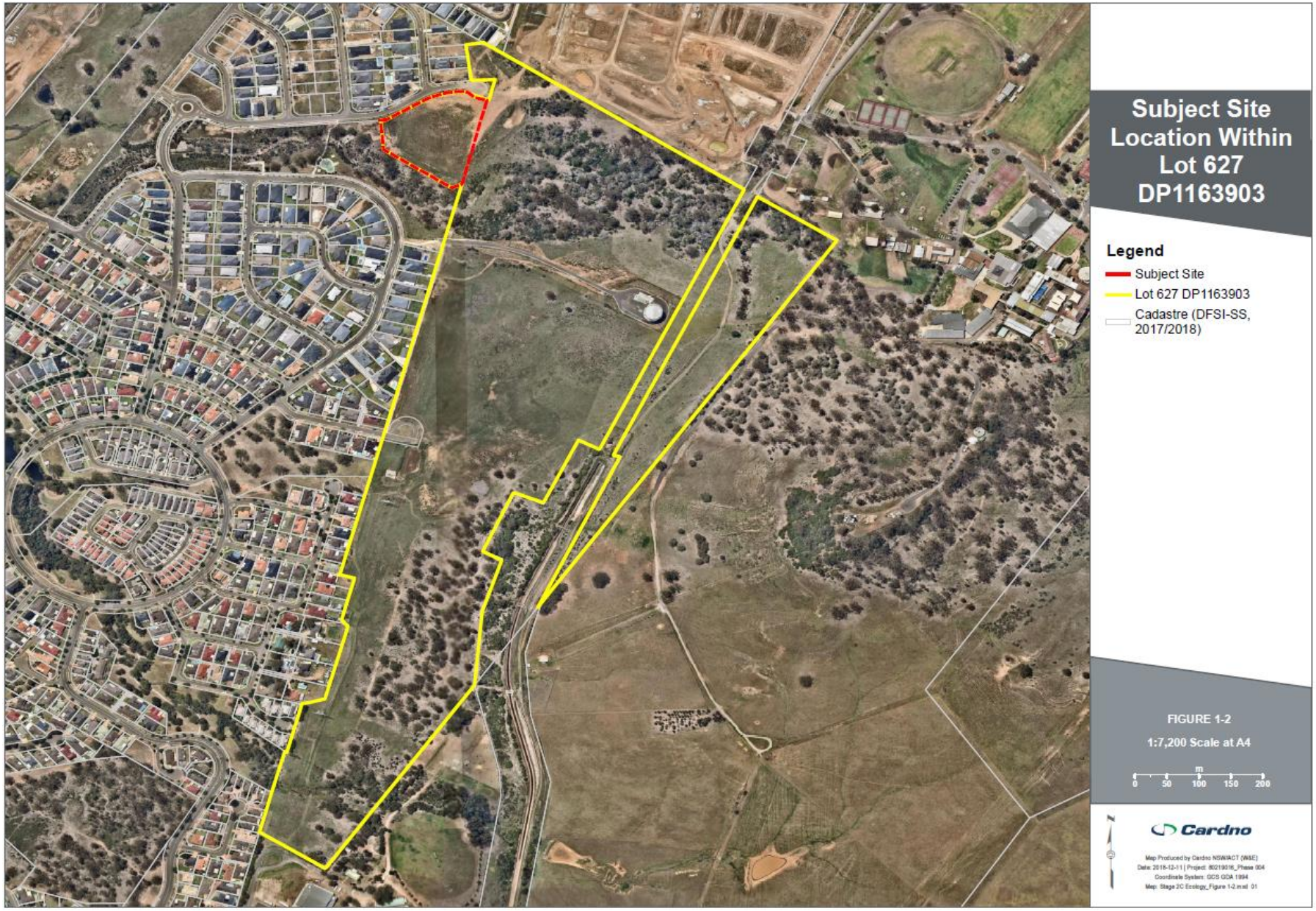


Figure 1-2 Subject Site location within lot 627 DP1163903

1.3 Legislative Requirements

This report presents an assessment of the flora and fauna values present on the Subject Site. It addresses the following specific legislative planning requirements relating to flora and fauna:

- Threatened species, populations and ecological communities listed under the NSW TSC Act, pursuant to **Part 5A** of the NSW EP&A Act; and
- Nationally listed threatened species, populations and ecological communities listed under the Commonwealth EPBC Act.

This report also considers the following legislative instruments:

- NSW *Biosecurity Act 2015*;
- NSW *Fisheries Management Act 1994* (FM Act); and
- NSW *Water Management Act 2000* (WM Act).

This FFA also makes reference to the Camden *Local Environmental Plan 2010* (LEP).

2 Methodology

2.1 Database Searches and Literature Review

A desktop assessment was undertaken to identify current records of threatened flora, fauna and ecological communities, migratory species and Key Threatening Processes (KTP) within and adjacent to the Subject Site. This included searches of online databases and a review of available literature relevant to the Subject Site, particularly:

- The NSW Department of Primary Industries (DPI) threatened species database;
- The NSW Office of Environment and Heritage (OEH) BioNet Atlas database, which contains records of threatened species and ecological communities, and KTPs listed under the NSW TSC Act. The search was undertaken within a 5 km radius of the Subject Site (accessed: 04 December 2018);
- The Commonwealth Department of the Environment (DoE) Protected Matters Search Tool was used to identify MNES listed under the Commonwealth EPBC Act occurring within a 5 km radius from the Subject Site (accessed: 05 December 2018);
- Review of Native Vegetation mapping from the Local Land Services (LLS) Biometric database (OEH 2011); and
- Review the habitat profiles for all threatened species, populations and TECs that are known to or potentially occur within the locality.

A FFA for an earlier rezoning proposal for the whole of lot 627 DP1163903 had previously been prepared by Biosis (Biosis 2017). The findings of this FFA concerning the Subject Site as well as relevant details of the wider landscape were also reviewed as part of this FFA.

2.2 Field Surveys

Ecological surveys were undertaken by a qualified ecologist on the afternoon of the 05 December 2018. Due to the small size and depauperate nature of the Subject Site, this survey's primary function was to confirm the conditions present on the Subject Site apparent from aerial imagery. However, opportunistic and targeted flora and fauna surveys were conducted, as detailed below.

See **Table 2-1** below for the weather and climatic conditions during survey.

Table 2-1 Weather conditions during survey

Field Survey Dates	Temperature (°C)	Rainfall (mm)	Sunrise / Sunset	Moonrise / Moonset
05 December 2018	15.4 - 20.6	1.6	05:37 / 19:53	13:17 / 16:46

Sources: Weatherzone (2018), Timeanddate.com (2018a, 2018b)

2.2.2 Flora

The survey involved a regular meander of the entire Subject Site and adjacent areas of native vegetation with a greater emphasis on key microhabitat features (areas of native vegetation, waterbodies etc.). This survey included targeted searches for endangered species, populations and communities known to occur within the LGA and within 5 km, as identified in the desktop study. Landscape features were also recorded for greater ecological context and weed species were also recorded.

2.2.3 Fauna

Fauna surveys and habitat assessment was undertaken throughout the entire Subject Site and adjacent areas of native vegetation. **Table 2-2** below details the surveys conducted.

Table 2-2 Fauna survey effort

Fauna group	Surveys	Methods
Diurnal birds	Area searches	Birds were identified from visual observations and call identification. Vegetation within the Study Area was also visually searched for existing nests

Fauna group	Surveys	Methods
Amphibians, Gastropods and Herptofauna	Habitat searches	Opportunistic active searches for frogs, native gastropods and reptiles within suitable habitat (i.e. leaf litter, under rocks and long grass). Passive listening to identify calling frogs was also undertaken in areas of suitable habitat
All	Opportunistic sightings	Encounters of all fauna groups were recorded during all phases of work

2.2.4 Habitat Assessment

The availability and quality of habitat within the Subject Site was assessed with respect to the following factors:

- Structural and floral diversity;
- Occurrence and extent of habitat types;
- Habitat connectivity, including continuity with similar habitat within the site, and off-site via habitat corridors;
- Key habitat features such as tree hollows, waterbodies, caves and crevices, rocky areas;
- Degree of disturbance and degradation; and
- Topographic features such as aspect and slope.

The location of trees with potential to provide significant habitat within, and adjacent to, the Subject Site were recorded with a hand-held GPS (accuracy < 2 m). Tree data collection comprised:

- Species;
- Approximate height (in m);
- Approximate Diameter and Breast Height (DBH) in mm;
- Number of hollows;
- Hollow size class (S=<50mm, M=50-150mm, L=>150mm); and
- Other relevant observations (occupancy of hollows, evidence of use, presence of loose bark habitat etc.).

2.2.5 Secondary Indications and Incidental Observations

Opportunistic sightings of secondary indications of resident fauna were noted. Indicators included:

- Distinctive scats and scents left by mammals;
- Collection of predator scats for potential prey species identification;
- Nests made by various guilds of birds;
- Whitewash, regurgitation pellets and prey remains from owls;
- Skeletal material of vertebrate fauna;
- Calls of fauna;
- Footprints left by mammals;
- Chewed She-oak (*Allocasuarina* spp.) cones indicative of feeding by Glossy Black-Cockatoo (*Calyptorhynchus lathami*) – listed as vulnerable under the TSC Act;
- Chewed fruit remains indicative of past feeding by frugivorous birds such as fruit-doves; and
- Any other signs of fauna occupation or site usage.

2.2.6 Survey Limitations

Survey efficacy is influenced by a range of factors. For this type of survey, such limitations are generally due to a single, short duration survey that does not account for seasonal variation. Given the short period of time spent on site, the detection of certain species may be affected by:

- Seasonal migration (particularly migratory birds);
- Seasonal flowering periods (some species are cryptic and are unlikely to be detected outside of the known flowering period);
- Seasonal availability of food, such as blossoms for some fauna;
- Weather conditions during the survey period (some species may go through cycles of activity related to specific weather conditions, for example some microchiropteran bats, reptiles and frogs can be inactive during cold weather); and

> Species lifecycle (cycles of activity related to breeding).

These potential limitations have been addressed by applying the precautionary principle in cases where the survey methodology may have given a false negative result (e.g. a species that could reasonably be expected to occur, based on previous records and available habitat, was not observed). All species have been assessed on the basis of the presence of their habitat and the likely significance of that habitat to a viable local population.

3 Results

3.1 Desktop Study

3.1.1 NSW BioNet Atlas

The NSW BioNet Atlas identified a total of 25 listed flora and fauna entities from within 5 km of the Subject Site (one amphibian, 12 bird, eight mammal, one gastropod and three flora species). The details of these species, their legislative status and number of locality records are provided in **Table A-1** of **Appendix A**.

In addition, this database identified a total of 16 TECs as known to occur within the Camden LGA. These TECs and their legislative status are provided in **Table A-2** of **Appendix A**.

3.1.2 Commonwealth PMST

The Commonwealth PMST identified a total of 52 listed flora and fauna entities which may, are likely to or are known to occur from within 5 km of the Subject Site (three amphibian, eight threatened bird, three fish, seven mammal, one reptile, 16 migratory bird and 14 flora species). These species, their legislative status and type of presence are provided in **Table A-3** of **Appendix A**.

In addition, this database identified a total of six TECs which may, are likely to or are known to occur within 5 km of the Subject Site. These TECs, their legislative presence and type of presence are provided in **Table A-4** of **Appendix A**.

The PMST report is provided in full as **Appendix B**.

3.1.3 Vegetation Mapping

Historical aerial imagery indicated that remnant native vegetation had been removed from the Subject Site in 2015 and the Subject Site has been dominated by exposed soil and regenerating exotic grasslands since this clearing.

OEH vegetation mapping reviewed during the desktop study identified the native vegetation previously present on the Subject Site as Shale Plains Woodland and Shale Hills Woodland. These communities most likely conformed to the following Plant Community Types (PCTs), under the NSW BioNet Vegetation Classification system:

- Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion (PCT ID 849); and
- Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion (PCT ID 850).

Both of these PCTs conform to the TEC of:

- TSC Act:
  - Cumberland Plain Woodland of the Sydney Basin Bioregion – listed as critically endangered.
- EPBC Act:
  - Cumberland Plain Shale Woodlands and Shale - Gravel Transition Forest – listed as critically endangered.

These PCTs are still evident on adjacent lands, in Manooka Reserve to the south as well as in portions of the remainder of lot 627 DP1163903.

3.2 Field Survey

The Subject Site was observed to comprise recently cleared and modified lands. Limited native vegetation and fauna habitat was present. The following sections document the biodiversity values of the Subject Site. Flora and Fauna species encountered during survey are provided in **Appendix C**.

3.2.1 Vegetation Communities

As above, the Subject Site was observed to be dominated by cleared soil and exotic grasslands, indicative of its recent historic clearing. **Figure 2** (**Page 34**) of the Biosis report concurs with the conditions observed on site, displaying the majority of the Subject Site as cleared land, with exotic grasslands present only in the south-east corner.

Vegetation recovery since the publication of the Biosis report was evident during surveys however, with native vegetation present, as shown in **Table 3-1** below. These occurrences were small and restricted to the south-west of the Subject Site, adjacent to better condition native vegetation in Manooka Reserve.

Table 3-1 Vegetation communities on the Subject Site

Vegetation Community	Formation (Keith 2004)	Class (Keith 2004)	Plant Community Type	Plant Community Type ID	TEC	TSC Act Status	EPBC Act Status	Approximate area (ha)
Cumberland Plain Woodland	KF_CH3 Grassy Woodlands	Coastal Valley Grassy Woodlands	Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion	850	Cumberland Plain Woodland in the Sydney Basin Bioregion	CE	CE	0.01
Cumberland Plain Woodland Derived Grassland	KF_CH4 Grasslands	-	Derived grasslands on shale hills of the Cumberland Plain (50-300m asl)	806	Cumberland Plain Woodland in the Sydney Basin Bioregion	CE	-	0.05
Typha Reedlands	KF_CH8 Freshwater Lagoons	Coastal Freshwater Lagoons	Coastal freshwater swamps of the Sydney Basin Bioregion	783	-	-	-	0.02
Exotic grasslands	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.19
Cleared	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1.03
Total								1.3

The distribution and extent of these communities is shown below in **Figure 3-1** and are described in detail in the following sections.

Figure 3-1 Vegetation communities within the Subject Site

3.2.1.2 Cumberland Plain Woodland

This vegetation had a very limited occurrence within the Subject Site, restricted to a single mature *Eucalyptus moluccana* (Grey Box), several immature *E. moluccana,* the shrub *Bursaria spinosa* (Blackthorn) and a variety of native ground cover species including *Desmodium brachypodum* (Large Tick-trefoil), *Glycine tabacina* (Variable Glycine) and *Hardenbergia violacea* (False Sarsaparilla). This community is predominantly present in the south-west corner, with the species described above falling within the mapped boundaries. Mature *E. moluccana* also overhang the Subject Site from Manooka reserve to the south along the southern boundary.

This vegetation is considered to be in moderate to good condition, with mature trees present as well as representatives of all sub-canopy strata and low occurrence of weed species. This vegetation also has connectivity with moderate to good condition CPW in Manooka reserve to the south.

Figure 3-2 below provides an example of this community within the Subject Site.

Figure 3-2 CPW within the Subject Site

Page 11 of the Commonwealth Government Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest: A Guide to Identifying and Protecting the Nationally Threatened Ecological Community provides a key diagnostic features flow chart for the identification of the federally listed community (DEWHA 2010). With reference to this tool, this community is considered to qualify as the federally-listed community due to the following criteria:

- Are native tree species present with a minimum projected foliage cover of 10%?;
  - Yes.
- Is the patch of the ecological community 0.5 ha or greater in size?;
  - Yes, the vegetation is part of the vegetation of the wider Manooka Reserve.
- Of the perennial understorey vegetative cover present, is 50% made up of native species?;

- Yes, refer to **Figure 3-2** above. Native species are present in all sub-canopy strata and there are low levels of exotic weeds.

3.2.1.3 Cumberland Plain Woodland Derived Grassland

This vegetation was indicative of the native woodland vegetation formally present on the Subject Site, as described above. This vegetation community is indicative of the recovery of this vegetation from seedstock as well as likely recruitment from nearby areas of CPW.

This community was represented by numerous CPW indicative groundcover species, including *Cyperus gracilis* (Slender Flat Sedge), *Desmodium brachypodum*, *Eriochloa pseudoacrotricha* (Cupgrass), *Glycine tabacina*, *Hardenbergia violacea* and *Themeda triandra* (Kangaroo Grass) as well as the widespread occurrence of the non-CPW indicative but native grass *Austrostipa rudis* (Speargrass). However, several seedling eucalypts were also present, most likely *Eucalyptus moluccana* due to the proximity of mature individuals of this species on lands to the south. *E. moluccana* is a key indicative CPW canopy species.

This community is considered to be of moderate condition, with large numbers of exotic species present throughout. However, it is considered to conform to CPW under the TSC Act due to the number of indicative species present, with 65% of the native species encountered during surveys being indicative species for this TEC under the OEH scientific determination species list. It is not however, considered to conform to CPW under the EPBC Act. With reference to the Commonwealth Government Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest: A Guide to Identifying and Protecting the Nationally Threatened Ecological Community tool, grasslands do not qualify as the federally-listed community due to the absence of native trees with a minimum projective cover of 10%.

Figure 3-3 provides an example of this community on the Subject Site.

Figure 3-3 CPW Derived Native Grasslands on the Subject Site

3.2.1.4 Typha Reedlands

This community is restricted to a small waterbody in the west of the Subject Site. The base of this waterbody is almost totally dominated by *Typha orientalis* (Cumbungi) as well as other native species including

Cynodon dactylon (Common Couch), *Juncus usitatus* (Common Rush) and *Ludwigia peploides* (Water Primrose). See **Figure 3-4** below for the condition of this community on the Subject Site.

Figure 3-4 Typha Reedlands on the Subject Site

This vegetation does not strongly conform to the PCT detailed in **Table 3-1**, with only two indicative species present and a significant presence of exotic species, primarily *Aster subulatus* (Wild Aster) and a total absence of upper and middle strata species. Due to this and its very small size, it is therefore not considered to conform to the potential TEC of Sydney Freshwater Wetlands in the Sydney Basin Bioregion.

3.2.1.5 Exotic grasslands

As above, this vegetation community occurred throughout the majority of the Subject Site.

Species composition was dominated by exotic grasses and forbs such as *Chloris gayana* (Rhodes Grass), *Eragrostis curvula* (African Love Grass), *Hypericum perforatum* (Common St John's Wort), *Plantago lanceolata* (Lamb's Tongues), *Pennisetum clandestinum* (Kikuyu Grass) and *Sporobolus africanus* (Parramatta Grass). Native grasses and forbs were also present throughout this community; however, at much lower densities than the dominant exotics. **Figure 3-5** provides an example of this vegetation within the Subject Site.

Figure 3-5 Exotic vegetation within the Subject Site

3.2.2 Flora

No threatened flora species or populations listed under the TSC Act and/or EPBC Act were documented on the Subject Site during survey. As above, the vegetation present on the Subject Site was highly limited and dominated by regenerating exotic grasslands species. None of the flora species known to occur from within 5 km of the Subject Site were considered likely to occur.

An assessment of the likelihood of occurrence of all threatened flora species, populations and communities known from the locality is provided as **Table D-1** of **Appendix D**.

3.2.2.1 Priority Weeds

Priority weeds are classified under specific Biosecurity Duties under the NSW Bio Act for the respective Local Land Services (LLS) area. All plants have a general biosecurity duty under the Act.

Priority weeds for the LLS area of Greater Sydney (which includes the Camden LGA) documented on the subject site and their required biosecurity duties are described in **Table 3-2** below.

Table 3-2 Priority weeds documented on the Subject Site and required biosecurity duties under the Bio Act

Scientific name	Common name	Biosecurity duty	Duty description
Olea europaea subsp. *cuspidata*	African Olive	Regional Recommended Measure	An exclusion zone is established for all lands in Blue Mountains City Council and Central Coast local government areas. The remainder of the region is classified as the core infestation area. *Whole region: The plant or parts of the plant are not traded, carried, grown or released into the environment. Exclusion zone: The plant is eradicated from the land and the land kept free of the plant. Core infestation area: Land managers prevent spread from their land where feasible. Land managers reduce impacts from the plant on priority assets*
Senecio madagascariensis	Fireweed	Prohibition on dealings	Must not be imported into the State or sold
-	All plants	General Biosecurity Duty	All plants are regulated with a general biosecurity duty to prevent, eliminate or minimise any biosecurity risk they may pose. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable

3.2.3 Fauna

The Subject Site contained limited habitat for native fauna, with the area dominated by exotic grasslands.

A small pond was observed in the west of the Subject Site, providing the only significant fauna habitat item present. This pond contained standing water and water-dependent riparian vegetation. A mapped ephemeral drainage line was present draining through the Subject Site from the north-east into Manooka Reserve to the south. However, observations during survey indicated that this line had largely been removed by the previous clearing works with no discernible channel present.

The following sections detail the main species encountered and an assessment of the habitat present for the fauna classes encountered during survey.

3.2.3.1 Amphibians

As above, the small pond in the west of the Subject Site provides suitable refuge and breeding resources for native amphibian species. During survey it was observed to contain tadpoles of an unidentified amphibian species and an absence of the exotic Plague Minnow (*Gambusia holbrooki*), a major exotic predator of native amphibian eggs and tadpoles.

Only one native amphibian was identified during survey, the Bleating Tree Frog (*Litoria dentata*), which was heard calling from the nearby Manooka Reserve to the south of the Subject Site. No threatened amphibian species were observed or heard calling during survey. However, conditions were not optimal for the detection of this fauna class.

The small waterbody on the Subject Site conforms to suitable habitat for the Green and Golden Bell Frog (*Litoria aurea*) – listed as endangered under the TSC Act and vulnerable under the EPBC Act. This species is also known from recent occurrence records (2015) from within 5 km of the Subject Site.

3.2.3.2 Birds

Birds were the most frequently encountered fauna class on the Subject Site, with numerous common native species observed or heard calling. Species observed to be utilising the Subject Site included the Australian White Ibis (*Threskiornis molucca*), Australian Wood Duck (*Chenonetta jubata*), Crested Pigeon (*Ocyphaps lophotes*) and Noisy Miner (*Manorina melanocephala*) as well as the exotic Common Myna (*Acridotheres tristis*) and Spotted Turtle Dove (*Spilopelia chinensis*).

No threatened bird species were encountered during surveys. The Subject Site is not considered to support important key life stage habitat (breeding) or important foraging resources for this species class. The small pond is considered too small and exposed to provide suitable refuge and foraging resources for wetland-dependent birds such as the Australasian Bittern (*Botaurus poiciloptilus*) – listed as endangered under the TSC Act and EPBC Act and known from recent occurrence records (2011) from within 5 km of the Subject Site.

The Subject Site does provide foraging resources for seed-eating birds such as finches, fairy wrens and pigeons. However, these resources are not limited in the locality with large areas of similar grassland habitat in the remainder of lot 627 DP1163903 to the east. No threatened bird species is considered dependent on the resources of the Subject Site for their long-term survival.

3.2.3.3 Gastropods

One threatened gastropod species is known from the locality, the Cumberland Plain Land Snail (*Meridolum corneovirens*) – listed as endangered under the TSC Act. This species is known from numerous (39) occurrence records, with the most recent from 2017 and this species is closely associated with the TEC CPW.

Surveys for this species were undertaken within the small portion of remnant CPW in the south and south-west of the Subject Site (refer to **Section 2** above). No living snails or empty shells were encountered during this survey. However, due to the large number of records from the locality and the presence of suitable habitat on the Subject Site and nearby adjacent lands, this species is considered to have potential to occur on the Subject Site.

3.2.3.4 Mammals

Few mammal species were encountered during surveys. The majority of species encountered consisted of exotic wild and domestic species; the Domestic Cat (*Felis catus*), European Hare (*Lepus europaeus*) and the European Rabbit (*Oryctolagus cuniculus*).

Macropod scat, considered most likely attributable to the Swamp Wallaby (*Wallabia bicolor*) was observed in numerous locations and this species as well as other macropods, including the Eastern Grey Kangaroo (*Macropus giganteus*) are considered likely to utilise the Subject Site for grazing as well as watering from the small pond present.

Important habitat for the threatened mammal species known from the local area is not considered to be present on the Subject Site. No hollow-bearing trees, significant rock outcrops or fallen timber resources were observed within the Subject Site. These resources were all present within the adjacent Manooka Reserve.

The Subject Site is considered to be providing foraging and watering resources for native mammals. These resources are not limited in the locality, with large areas of similar exotic and native grasslands present in the remainder of lot 627 DP1163903 as well as small ponds within the creekline of Manooka reserve. No threatened mammal species are considered to be dependent on the resources of the Subject Site for their long-term survival in the locality.

3.2.3.5 Reptiles

No reptile species were encountered during surveys; however, this is considered attributable to the mild weather conditions. Suitable habitat for native skinks, goannas and snakes was present within Manooka Reserve as well as the small portion of CPW and the pond environment of the Subject Site.

A single threatened reptile species is considered to have potential to occur within the locality, the Broad-headed Snake (*Hoplocephalus bungaroides*) – listed as endangered under the TSC Act and vulnerable under the EPBC Act. However, it is not considered likely to occur within the Subject Site. No suitable sandstone outcroppings or hollow-bearing trees were present, key habitat requirements for this species.

4 Impact Assessment

This sections details the potential impacts of development following the rezoning of the Subject Site. Based on concept plans provided to Cardno as part of this assessment it is assumed that future development would necessitate the removal of all vegetation present on the Subject Site. As this FFA has been drafted to support the rezoning proposal for the Subject Site the impacts described below would not arise from the rezoning itself and should be considered as an indicative prediction of future impacts assuming the development of the entire Subject Site.

4.1 Ecological Impacts

4.1.1 Direct Impacts

As above, future development of the Subject Site would result in the removal of all vegetation communities and habitat resources present for the required residential lots, Asset Protection Zones (APZs) and road network.

As removal of the listed TEC CPW would be required, a seven-part test under **Part 5A** of the EP&A Act has been undertaken to assess the significant of the removal of this TEC from the Subject Site. In addition, as a portion of the CPW present also conforms to the Commonwealth listing for this community, a Test of Significance (ToS) is required to be conducted for this listed Matter of National Environmental Significance (MNES) under the EPBC Act as detailed in the Commonwealth Department of Environment Matters of Environmental Significance Significant Impact Guidelines (DoE 2013). These assessments are provided in **Appendix E**.

In addition, two listed fauna species are considered to have a moderate likelihood of occurring on the Subject Site:

- Cumberland Plain Land Snail (*Meridolum corneovirens*) – listed as endangered under the TSC Act; and
- Green and Golden Bell Frog (*Litoria aurea*) – listed as endangered under the TSC Act and vulnerable under the EPBC Act.

Development works for the concept plan would necessitate the removal of all habitat resources for these two species from the Subject Site. Consequently, seven-part tests and ToS (for the Commonwealth MNES species only) have been conducted for these species, and the results provided in **Appendix E**.

These assessments concluded that there is not likely to be a significant impact on these entities as a result of projected future works. **Table 4-1** below details the percentage reduction of TEC in the wider lot 627 DP1163903 as a result of the projected development on the Subject Site (based on the vegetation extent provided in **Section 4.4** of the Biosis FFA and **Table 3-1** of this report).

Table 4-1 Projected TEC reduction from lot 627 DP1163903

TEC	Total extent (ha)	Projected clearing (ha)	Retained area following clearing (ha)	Percentage reduction
Cumberland Plain Woodland	8.86	0.01	8.85	0.1
Cumberland Plain Derived Grassland	0.48	0.05	0.43	10.4
Total	9.34	0.06	9.28	0.6

The projected removal of TEC and threatened fauna habitat from the Subject Site is not considered a significant reduction of the resources in the locality. Large areas of CPW, CPW Derived Grasslands and habitat for the above threatened fauna species are present on the remainder of lot 627 DP1163903 to the east and in Manooka Reserve to the south. Development of the Subject Site would not create a barrier to fauna dispersal across the landscape. Connectivity with woodlands in Manooka Reserve through lot 627 DP1163903 and onto lands further east would be retained following development.

Based on the results of the seven part tests (TSC Act) and ToS (EPBC Act), a significant impact on any listed species, population or TEC known or considered to have potential to occur on the Subject Site is not considered likely as a result of future development following rezoning. Consequently, further assessment through a Species Impact Statement (SIS) under the TSC Act and/or a referral to the federal Minister for the Environment under the EPBC Act is not considered necessary.

4.1.2 Key Threatening Processes

Table 4-2 below details the Key Threatening Processes (KTPs) which could arise from development of the Subject Site following rezoning, as well as an assessment of the extent to which these KTPs would be exacerbated.

Table 4-2 Key Threatening Processes

KTP (TSC Act)	KTP (EPBC Act)	Extent of KTP exacerbation
Anthropogenic Climate Change	Loss of climatic habitat caused by anthropogenic emissions of greenhouse gases	Development of the Subject Site will contribute to greenhouse gas emissions through construction activities and removal of vegetation. Due to the small size of the Subject Site, the proposed works are not considered likely to significantly exacerbate this KTP
Clearing of native vegetation	Land clearance	The development of the Subject Site will result in the removal of a small portion of native vegetation. This impact is not considered a significant exacerbation of this KTP on the locality scale
Infection of frogs by amphibian chytrid causing the disease chytridiomycosis	Infection of amphibians with chytrid fungus resulting in chytridiomycosis	There is a low risk that this pathogen could be introduced in unclean fill, stow-away amphibians in landscaping plants and untreated water running offsite. This is not considered a significant risk provided appropriate mitigation measures are enacted (see **Section 5**)
Infection of native plants by *Phytophthora cinnamomi*	Dieback caused by the root-rot fungus (*Phytophthora cinnamomi*)	This pathogen may be introduced in unclean fill used on site as well as soil in pots of landscaping plants. This is not considered a significant risk provided appropriate mitigation measures are enacted (see **Section 5**)
Introduction and establishment of Exotic Rust Fungi of the order Pucciniales pathogenic on plants of the family Myrtaceae	-	This pathogen may be introduced in unclean fill used on site as well as soil in pots of landscaping plants. This is not considered a significant risk provided appropriate mitigation measures are enacted (see **Section 5**)
Invasion and establishment of exotic vines and scramblers	-	Exotic weed vine and scrambler species may be introduced as seed in unclean fill. Representatives of such species were observed to already be present on the Subject Site, but in low numbers. This is not considered a significant risk provided appropriate mitigation measures are enacted (see **Section 5**)
Invasion and establishment of Scotch Broom (*Cytisus scoparius*)	-	This species may be introduced as seed in unclean fill. This is not considered a significant risk provided appropriate mitigation measures are enacted (see **Section 5**)

KTP (TSC Act)	KTP (EPBC Act)	Extent of KTP exacerbation
Invasion of native plant communities by African Olive *Olea europaea* subsp. *cuspidata* (Wall. ex G. Don) Cif	-	This species may be introduced as seed in unclean fill. Representatives of this species was observed to already be present within the southern boundary of the Subject Site. Future development is not considered likely to significantly exacerbate this KTP in the locality. This is not considered a significant risk provided appropriate mitigation measures are enacted (see **Section 5**)
Invasion of native plant communities by *Chrysanthemoides monilifera*	-	This species may be introduced as seed in unclean fill. This is not considered a significant risk provided appropriate mitigation measures are enacted (see **Section 5**)
Invasion of native plant communities by exotic perennial grasses	-	Exotic perennial grass species may be introduced as seed in unclean fill. Representatives of such species were observed to already be present in significant numbers throughout much of the Subject Site. Future development is not considered likely to significantly exacerbate this KTP in the locality. This is not considered a significant risk provided appropriate mitigation measures are enacted (see **Section 5**)
Invasion, establishment and spread of Lantana (*Lantana camara* L. sens. Lat)	-	This species may be introduced as seed in unclean fill. This is not considered a significant risk provided appropriate mitigation measures are enacted (see **Section 5**)
Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants	Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants	Landscaping and gardening works by future residents following development may introduce new exotic weeds into the locality following development. This is not considered a significant risk provided appropriate mitigation measures are enacted (see **Section 5**)
Removal of dead wood and dead trees	-	Development of the Subject Site would necessitate the removal of minor dead wood. However, no significant large woody debris were observed within the Subject Site during surveys. The development of the Subject Site would represent a negligible exacerbation of this KTP on the locality scale

The future development of the Subject Site is not considered likely to lead to a significant exacerbation of any of the above KTPs, provided mitigation measures detailed in **Section 5** below are implemented during and following development.

4.1.3 Indirect Impacts

In addition to direct impacts associated with the development of lands through removal of native vegetation, fauna habitat, changes to surface drainage patterns etc., developments also have a variety of secondary impacts on the wider locality. Indirect impacts likely to arise as a result of the development of the Subject Site following rezoning comprise.

- Sediment migration from areas of unconsolidated, exposed soil during development works into downslope areas of native vegetation;
- Introduction of new weed species and pathogens into downslope and downstream areas due to runoff from unconsolidated, exposed soil during development as well as in stormwater following development;

- Increased contaminant and nutrient loads introduced from stormwater into native vegetation downslope and downstream of the Subject Site following development;
- Increased vehicle traffic leading to higher incidences of native fauna road fatalities following development;
- Increased noise and light pollution on nearby areas of retained native vegetation, reducing fauna utility of this habitat;
- Increased dust generation during development works, reducing fauna utility of areas of nearby retained habitat; and
- Increases in the local population of exotic predators (dogs and cats) leading to increased predation pressure on native fauna.

Section 5 below details measures which may be implemented throughout all stages of future development to mitigate the effects of the above indirect impacts.

4.2 Matters of National Environmental Significance

As described in **Section** 2 above, an EPBC Act Protected Matters Search was undertaken within the DoE online database (Accessed: 05 December 2018) to identify MNES which are known or have the potential to occur within a 5 km radius of the Subject Site (**Appendix B**). This data, combined with other local knowledge and records, was utilised to assess whether the type of activity proposed within the Subject Site will have, or is likely to have, a significant impact upon a MNES.

The identified MNES and site-specific responses are listed below.

4.2.1 World Heritage Properties

Based on the desktop search, no World Heritage Property listed under the EPBC Act occur within the search area.

4.2.2 National Heritage Places

Based on the desktop search, no National Heritage Places listed under the EPBC Act occur within the search area.

4.2.3 Wetlands of International Importance

Based on the desktop search, no Wetlands of International Importance listed under the EPBC Act occur within the search area.

4.2.4 The Great Barrier Reef Marine Park

The Subject Site is not part of or near the Great Barrier Reef Marine Park. Therefore, the project will not impact on the Great Barrier Reef Marine Park.

4.2.5 Commonwealth Marine Area

The Subject Site is not part of or near the Commonwealth Marine Area. Therefore, the project will not impact on the Commonwealth Marine Area.

4.2.6 Listed Threatened Ecological Communities

The PMST search identified a total of six EPBC Act listed TECs as potentially occurring within 5 km of the Subject Site.

As detailed in **Section 4.1** above, one of these TECs was observed to be present on the Subject Site, CPW. This TEC occurs as a small extension of a larger occurrence in the Manooka Reserve to the south of the Subject Site. As this TEC was confirmed as present on the Subject Site, and the concept plan for future development of the Subject Site would necessitate the removal of this occurrence a ToS for this MNES was conducted (see **Appendix E**).

This assessment concluded that there was unlikely to be a significant impact on this MNES as a result of future development. The removal of this occurrence would result in a reduction of this TEC within the wider lot 627 DP1163903 area by less than 1 %.

As this assessment concluded that the future development is unlikely to have a significant impact on this MNES, further assessment through a referral to the federal Minister for the Environment is not considered necessary.

4.2.7 Listed Threatened Species

A total of 36 listed species were identified as known to, likely to or may occur within 5 km of the Subject Site.

None of these species were encountered during surveys. However, one species was considered to have potential to occur due to recent local occurrence records and the presence of suitable habitat, the Green and Golden Bell Frog (*Litoria aurea*).

The Commonwealth Government have produced significant impact guidelines for the assessment of likely impacts on this species (DEWHA 2009). Under these guidelines, a referral under the EPBC Act should be considered if the action results in triggering at least one of the following thresholds:

1. The removal or degradation of aquatic or ephemeral habitat either where the green and golden bell frog has been recorded since 1995 or habitat that has been assessed as being suitable according to these guidelines. This can include impacts from chytrid and mosquito fish originating off-site;
2. The removal or degradation of terrestrial habitat within 200 metres of habitat identified in threshold 1; and
3. Breaking the continuity of vegetation fringing ephemeral or permanent waterways or other vegetated corridors linking habitats meeting the criteria in threshold 1.

Assessed against these records, future development works are considered to trigger threshold one of the above. The nearest record (from 2015) is located 3.4 km to the south-east, and this habitat has connectivity with the Subject Site through the tributaries of Bow Creek and the network of small farm dams in the locality.

With reference to the habitat suitability checklist on **Page 10-11** of the DEWHA guidelines, the available habitat on the Subject Site is considered suitable for this species, with a presence of preferred aquatic species (*Typha orientalis*) and nearby grass and woodland areas for foraging and dispersal. Unidentified tadpoles were observed to be present within the pond, indicating that the waterbody provides suitable amphibian breeding habitat and a population of the known amphibian egg predator, the Plague Minnow (*Gambusia holbrooki*) was not observed to be present.

On the basis of the presence of the species in the locality and of suitable habitat within the Subject Site, an ToS was conducted for this MNES, see **Appendix E**. This assessment concluded that there is unlikely to be a significant impact on this species as a result of future development on the Subject Site. Suitable breeding habitat on the Subject Site is limited and numerous similar waterbodies are present in the wider locality as well as large areas of grass and woodland foraging and breeding habitat. In addition, none of the key populations listed in the draft NSW Green and Golden Bell Frog *Litoria aurea* (Lesson 1829) Recovery Plan are located within the Camden LGA (DECC 2005). Consequently, the local population is not considered an 'important' population of this species under the definitions in the Commonwealth Significant Impact Guidelines for vulnerable species (DoE 2013).

Based on the assessment conducted for this report, further assessment through a referral to the federal Minister of the Environment is not considered necessary. However, further survey and habitat assessment for this species is recommended as part of an DA for development of the Subject Site (see **Section 5**).

4.2.8 Listed Migratory Species

The PMST identified 16 listed migratory species as known to, likely to or may occur within 5 km of the Subject Site. None of these species were encountered during surveys.

Half of these species were marine or terrestrial species for which the Subject Site provided limited habitat utility due to the near absence of suitable native vegetation for these species. The small pond provides potential foraging and refuge habitat for some wetland species. However, this resource is small and lacks significant fringing vegetation. It is not considered suitable breeding habitat for any of the wetland migratory species known to occur in the locality. In addition, the surrounding locality contains numerous similar aquatic resources for these species. This form of habitat is not considered limited in the locality.

5 Recommendations

5.1 Introduction

When assessing the biodiversity impact of a proposed development the consideration of three approaches provides a comprehensive raft of potential options. These three approaches are listed in a descending order of best biodiversity outcomes:

- Avoid: modify the proposed development so no significant impact on resident biodiversity values would occur. This is typically impractical but can help guide mitigation measures;
- Mitigate: modify the proposed development to reduce the significant impacts on biodiversity values to the maximum extent possible. This is typically achieved through measures such as modification of proposed dwelling envelopes to avoid removing vegetation etc.; and
- Compensate: include measures in the proposed development to compensate for the biodiversity values lost. This can be achieved through an on-site offset which reserves a portion of the subject site in perpetuity for conservation and rehabilitation purposes. It can also be achieved through an off-site offset under the NSW Biobanking scheme. This allows for the proponent of a proposed development to purchase biodiversity credits of an equal value to the credit value of the biodiversity assets present on a subject site. These credits will then be used to preserve an area of equivalent biodiversity value off-site.

This section makes recommendations to reduce or to provide suitable compensation for the impacts on flora and fauna values detailed in **Section 4** above.

5.2 Avoiding Impacts

As detailed in **Section 4** above, the development of the Subject Site under the current concept plan would require the removal of all native vegetation and significant fauna habitat features. Consequently, there is little opportunity to avoid impacts on the flora and fauna values present.

However, the portion of CPW to be removed constitutes less than 1 % of the CPW present in the entirety of lot 627 DP1163903, based on the results of the Biosis FFA and the analysis for this report (see **Section 3**). Development of the Subject Site would have no direct impact on CPW elsewhere in the wider lot.

Threatened fauna habitat on the Subject Site is limited to the small vegetated pond and occurrence of woody CPW vegetation. This habitat is not limited in the locality and the single mature tree present was not observed to contain significant fauna habitat values (hollows, nests etc.). No significant impact on threatened fauna considered to have potential to occur on the Subject Site is considered likely as a result of future development.

As a result, although there is limited scope to avoid the direct impacts of the development of the Subject Site, these impacts are not considered significant on the locality scale.

5.3 Mitigating Impacts

As above, there is limited scope for the retention of all or part of the native vegetation and significant fauna habitat within the Subject Site. Due to the small size of the Subject Site, required surface recontouring, road network and APZs, retention of a portion of the native vegetation present is not considered feasible.

However, a range of mitigation measures are available to mitigate the likely secondary impacts identified in **Section 4.1.3** above. Appropriate mitigation measures for these impacts are described in **Table 5-1** below.

Table 5-1 Appropriate mitigation measures for likely indirect impacts of future development

Impact	Action	Outcome	Timing	Responsibility
Sediment migration from areas of unconsolidated, exposed soil during development works into downslope areas of native vegetation	Sediment fencing is to be installed below all areas of exposed soil during works	Prevention of migration of unconsolidated soil into areas of retained native vegetation	Prior to any soil disturbance works. Maintained and repaired as required. Retained until soil is stabilised by another mechanism (laying of turf, sowing of grass etc.)	Contractor(s) responsible for works
Introduction of new weed species and pathogens into downslope and downstream areas due to runoff from unconsolidated, exposed soil during development as well as in stormwater following development	Appropriate runoff controls such as sediment fencing can be installed prior to any soil disturbance works. Any exogenous soil and water used on site (e.g. for dust suppression) is to be appropriately treated to minimize the rise of the introduction of new pests and diseases. Appropriate stormwater infrastructure design (as detailed below) will also minimize the risk to downslope native vegetation following development	Mitigation of the risk of introduction of new pests and diseases into downslope areas of native vegetation as a result of development	Prior to any soil disturbance works and during development	Contractor(s) responsible for works/Proponent/development planner

Impact	Action	Outcome	Timing	Responsibility
Increased contaminant and nutrient loads introduced from stormwater into native vegetation downslope and downstream of the Subject Site following development	The impact on downslope native vegetation can be mitigated through the use of appropriate stormwater infrastructure that will maximise uptake of stormwater in the development area (semi-permeable surfaces, vegetated roadside swales) as well as to manage stormwater prior to discharge into the retained vegetation area (through the use of vegetated settlement ponds to partially treat stormwater prior to discharge as well as reduce the discharge rate of stormwater entering this area)	Minimisation of contaminated stormwater entering areas of retained native vegetation on the subject site and adjacent lands	During development	Proponent/development planner
Increased vehicle traffic leading to higher incidences of native fauna road fatalities following development	This impact can be reduced by the use of human-exclusion fencing and signage to define the boundaries of adjacent native vegetation areas. Such fencing was observed to be present along the boundary of the Subject Site and Manooka Reserve	Minimal disturbance to the habitat utility of nearby native vegetation for native fauna. Reduction in the risk of vehicle collisions with native fauna	During and following development	Proponent/development planner
Increased noise and light pollution on nearby areas of retained native vegetation, reducing fauna utility of this habitat	Restricting works to daylight hours and minimising the use of loud machinery whenever possible or containing such machinery within noise barriers	Minimal disturbance to sensitive fauna using habitat within the subject site and adjacent lands	During all development works	Contractor(s) responsible for works
Increased dust generation during development works, reducing fauna utility of areas of nearby retained habitat	Dust minimisation through water suppression, avoiding works on high wind days and limiting dust generating activities to the extent possible	Minimal disturbance to sensitive fauna using habitat within the subject site and adjacent lands	During all development works	Contractor(s) responsible for works

Impact	Action	Outcome	Timing	Responsibility
Increases in the local population of exotic predators (dogs and cats) leading to increased predation pressure on native fauna	Education of future residents as to the potential impact these predators can have and recommendations on how to mitigate this impact (not allowing pets to roam at night, containment of pets within backyards etc.).	Minimisation of increased predation pressure from additional domestic exotic predators	Following development	Proponent/development planner

5.4 Compensate

As detailed in **Section 4**, the remainder of lot 627 DP1163903 contains significant stands of CPW, which would not be directly impacted upon by future development of the Subject Site. As detailed in the Biosis report, much of this vegetation occurs within E2 zoned lands and could be managed for conservation purposes. The management and enhancement of this vegetation through weed control and assisted natural regeneration would compensate for the small amount of CPW to be removed from the Subject Site from any future development. However, as no significant impact is anticipated as a result of future development of the Subject Site, the establishment of a formal offset in this area is not required.

In addition, the use of local native species in future landscaping of road reserves etc. is recommended. Such plantings should ideally utilise seedstock from adjacent vegetation to preserve the genetic integrity of the local CPW community.

5.5 Additional recommendations

5.5.1 Dedicated Threatened Fauna Surveys

As detailed in **Section 3** above, suitable habitat for the Green and Golden Bell Frog was documented on the Subject Site during surveys. Although physical inspection for residents of this species was conducted during surveys with no individuals documented, conditions during survey were not considered appropriate for detection. Surveys for amphibians are best conducted following significant rainfall when activity is highest and males are most likely to be calling.

As this species is known from recent occurrence records and suitable breeding habitat is present on the Subject Site, a dedicated survey to determine presence is recommended prior to the submission of any DA. Such a survey is to follow the minimum survey requirements detailed in the NSW National Parks and Wildlife Service (NPWS) Environmental Impact Assessment Guidelines for this species (NSW NPWS 2003). For the Subject Site, such a survey would consist of:

- A minimum of three separate survey events within the species' activity period (September to January) and under suitable conditions (warm conditions following significant rainfall);
- Each survey to be over a minimum of one hour;
- Each survey to consist of the following techniques;
  - Diurnal surveys;
    - Active habitat searches amongst aquatic and riparian vegetation as well as adjacent terrestrial grasslands; and
    - Dip netting for tadpoles.
  - Nocturnal surveys;
    - Torch or headlight searches amongst aquatic and riparian vegetation; and
    - Call playback surveys.

All staff undertaking surveys for this species are to observe appropriate hygiene protocols to minimise the unintentional introduction of the amphibian Chytrid fungus. This would involve disinfection of footwear, survey equipment (dip nets) and hands of involved staff. Encountered amphibians should not be handled; however, if this is required it is to be preceded by hand washing or the wearing of gloves.

5.5.2 Future Assessment Requirements (*Biodiversity Conservation Act 2016*)

As mentioned in **Section 1**, the Camden LGA is currently listed as an IDA for the purposes of assessment under the BC Act. Applications submitted up until 25 November 2019 may be assessed under the previous legislation.

If a DA for the development of the Subject Site is submitted following this date, then assessment through a Biodiversity Development Assessment Report (BDAR) under the Biodiversity Assessment Method (BAM) will be required as the Subject Site falls within lands mapped on the Biodiversity Values Map and Threshold Tool (BVMTT), see **Figure 5-1** below.

Figure 5-1 BVMTT map for the Subject Site

As native vegetation communities and threatened fauna habitat is present on the Subject Site, offsetting for the small amount of these values to be removed by future development through the Biodiversity Offset Scheme (BOS) will be required as part of the BDAR.

It must also be noted that CPW is listed as a Serious and Irreversible Impact (SAII) candidate entity under the BC Act. An assessment of this entity against the SAII criteria will also be required as part of the BDAR and Council will be required to make a determination as to whether the impact of the development constitutes a SAII. If Council considers the impact to be an SAII, it would be required to reject the application.

6 Conclusion

This report describes a FFA conducted to support a proposed rezoning of a portion of lot 627 DP1163903 in the Camden Council LGA. This proposal would result in the rezoning of the existing E2 and E4 lands of the Subject Site to R1 for future residential development.

Surveys conducted as part of this FFA concluded that the Subject Site has been highly modified through recent clearing and is dominated by exposed soil and exotic grasslands. However, a small portion of the TEC CPW is present in the south-west as an extension of CPW vegetation in the adjacent Manooka Reserve. In addition, a portion of the regenerating grasslands of the Subject Site were identified as most closely conforming to CPW derived grasslands. Finally, a small vegetated pond is present providing limited habitat for native fauna, particularly amphibians.

No threatened flora species were encountered during survey and none are considered likely to occur. Due to the small size of the Subject Site, the entire land area was surveyed with no individuals of any threatened flora species known to occur in the locality documented. The survey was also conducted during an appropriate season (summer) for the detection of the majority of these species.

No threatened fauna species were detected during survey; however, two were considered likely to occur based on the presence of suitable habitat and recent occurrence records from within 5 km, the Cumberland Plain Land Snail and the Green and Golden Bell Frog.

An indicative impact assessment was conducted based on the existing concept plan, which would require removal of all vegetation and habitat from the Subject Site. Assessments of the above TECs and threatened species were conducted under the seven-part test methodology (EP&A Act) and/or tests of significance (EPBC Act). These tests concluded that although future development of the Subject Site would result in the removal of the whole occurrence of TEC and threatened fauna habitat from the Subject Site, the level of impact is not considered to be significant. The CPW present on the Subject Site represents less than 1 % of this community present in the entirety of lot 627 DP1163903 and the fauna habitat values present are not limited in the local area.

Based on this assessment, no significant impact on any listed entity under the TSC Act and/or EPBC Act is considered likely as a result of future development of the Subject Site and further assessment through a SIS (NSW) or a referral to the federal Minister of the Environment (Commonwealth) would be required to support a future DA.

The future development of the Subject Site poses a range of potential secondary impacts during and following development on adjacent areas of retained native vegetation in the downslope Manooka Reserve. However, these impacts can be mitigated through appropriate controls during development as well as environmentally sensitive development design. Manooka Reserve is already bordered by residential development to the west and south and the development of the relatively small Subject Site is not considered likely to significantly exacerbate the existing pressures on this reserve from adjacent residential lands.

A dedicated survey for the Green and Golden Bell Frog is recommended as part of any future DA. This survey would need to be conducted in line with the minimum survey requirements for this species as detailed in the NSW NPWS Environmental Impact Assessment Guidelines.

Submission of any DA after the 25 November 2019 will require assessment through the BAM under the new BC Act, based on a review of the BVMTT for this report. This resource shows the majority of the Subject Site mapped as “biodiversity values”. All Part 4 developments on mapped lands require assessment through the BAM.

Based on the results of this assessment, the proposed rezoning of the Subject Site is considered likely to be supported. This approach would avoid the majority of high value native vegetation and fauna habitat present in lot 627 DP1163903. The small amount of TEC and potential threatened fauna habitat to be removed from the Subject Site is not considered to represent a significant loss of these resources in the locality.

It is recommended that the E2 zoned lands elsewhere in lot 627 DP1163903 are managed for conservation purposes. This would more than compensate for the small amount of TEC and potential threatened fauna habitat which would be lost through future development of the Subject Site following rezoning.

7 References

Biosis (2017). Manooka Stage 3 Rezoning: Flora and Fauna Assessment. Report for Cardno. Authors: N Trulock, Biosis Pty Ltd, Sydney. Project no. 21307

Department of Environment (DoE) (2013). Matters of National Environmental Significance. Significant Impact guidelines. Environment Protection and Biodiversity Conservation Act 1999

Department of Environment and Conservation (DEC) NSW (now OEH) (2005). Draft Recovery Plan for the Green and Golden Bell Frog (Litoria aurea). DEC NSW, Hurstville, NSW

DEWHA (Commonwealth Department of the Environment, Water, Heritage and the Arts) (2009). Significant impact guidelines for the vulnerable Green and Golden Bell Frog (Litoria aurea). Nationally threatened species and ecological communitites EPBC Act policy statement 3.19

DEWHA (2010). Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest A guide to identifying and protecting the nationally threatened ecological community Environment Protection and Biodiversity Conservation Act 1999 Policy Statement 3.31

NSW National Parks and Wildlife Service (2003). Environmental Impact Assessment Guidelines. Green and Golden Bell Frog Litoria aurea (Lesson, 1829). NSW National Parks and Wildlife Service

Timeanddate.com (2018a). Sydney, New South Wales, Australia — Sunrise, Sunset, and Daylength, December 2018. Accessed on 06/12/2018 from https://www.timeanddate.com/sun/australia/sydney

Timeanddate.com (2018b). Sydney, New South Wales, Australia — Moonrise, Moonset, and Moon Phases, December 2018. Accessed on 06/12/2018 from https://www.timeanddate.com/moon/australia/sydney

Weatherzone (2018). Campbelltown Daily Summaries. Accessed on 06/12/2018 from http://www.weatherzone.com.au/station.jsp?lt=site&lc=68257&list=ds

Caulfield Stage 2C Rezoning

APPENDIX A

DATABASE SEARCH RESULTS

Appendix A: Database Search Results

Table A-1 NSW BioNet Atlas Threatened species and populations from within 5 km of the Subject Site

Family Name	Scientific Name	Common Name	TSC Act*	EPBC Act*	No. Records
Frogs					
Hylidae	*Litoria aurea*	Green and Golden Bell Frog	E	V	2
Birds					
Anatidae	*Stictonetta naevosa*	Freckled Duck	V	-	1
Ardeidae	*Botaurus poiciloptilus*	Australasian Bittern	E	E	1
	Ardea ibis	Cattle Egret	-	C,J	4
Accipitridae	*Hieraaetus morphnoides*	Little Eagle	V	-	2
Psittacidae	*Glossopsitta pusilla*	Little Lorikeet	V	-	5
	Neophema pulchella	Turquoise Parrot	V	-	1
Strigidae	*Ninox strenua*	Powerful Owl	V	-	1
Meropidae	*Merops ornatus*	Rainbow Bee-eater	-	J	1
Neosittidae	*Daphoenositta chrysoptera*	Varied Sittella	V	-	20
Artamidae	*Artamus cyanopterus cyanopterus*	Dusky Woodswallow	V	-	75
Petroicidae	*Petroica boodang*	Scarlet Robin	V	-	7
Scolopacidae	*Gallinago hardwickii*	Latham's Snipe	-	C,J,K	16
Mammals					
Phascolarctidae	*Phascolarctos cinereus*	Koala	V	V	1
Emballonuridae	*Saccolaimus flaviventris*	Yellow-bellied Sheathtail-bat	V	-	1
Pteropodidae	*Pteropus poliocephalus*	Grey-headed Flying-fox	V	V	11
Molossidae	*Mormopterus norfolkensis*	Eastern Freetail-bat	V	-	10
Vespertilionidae	*Falsistrellus tasmaniensis*	Eastern False Pipistrelle	V	-	2
	Miniopterus schreibersii oceanensis	Eastern Bentwing-bat	V	-	6
	Myotis macropus	Southern Myotis	V	-	5
	Scoteanax rueppellii	Greater Broad-nosed Bat	V	-	2
Gastropods					

Family Name	Scientific Name	Common Name	TSC Act*	EPBC Act*	No. Records
Camaenidae	*Meridolum corneovirens*	Cumberland Plain Land Snail	E	-	39
Flora					
Apocynaceae	*Marsdenia viridiflora* subsp*. viridiflora*	*Marsdenia viridiflora* R. Br. subsp. *viridiflora* population in the Bankstown, Blacktown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and Penrith local government areas	EP	-	7
Myrtaceae	*Eucalyptus scoparia*	Wallangarra White Gum	V	-	1
Thymelaeaceae	*Pimelea spicata*	Spiked Rice-flower	E	E	712

**CE = Critically Endangered, E = Endangered, EP = Endangered Population, V = Vulnerable*

Table A-2 NSW BioNet Atlas Threatened Ecological Communities from the Camden LGA

Community Name	TSC Act	EPBC Act	Type of Presence
Agnes Banks Woodland in the Sydney Basin Bioregion – TSC Act	CE	E	Known
Castlereagh Scribbly Gum and Agnes Banks Woodlands of the Sydney Basin Bioregion – EPBC Act			
Blue Gum High Forest in the Sydney Basin Bioregion – TSC Act	CE	CE	Known
Blue Gum High Forest of the Sydney Basin Bioregion – EPBC Act			
Blue Mountains Shale Cap Forest in the Sydney Basin Bioregion	E	CE	Known
Castlereagh Scribbly Gum Woodland in the Sydney Basin Bioregion –TSC Act	V	E	Known
Castlereagh Scribbly Gum and Agnes Banks Woodlands of the Sydney Basin Bioregion – EPBC Act			
Castlereagh Swamp Woodland Community	E	-	Known
Cooks River/Castlereagh Ironbark Forest of the Sydney Basin Bioregion	E	CE	Known
Cumberland Plain Woodland in the Sydney Basin Bioregion – TSC Act	CE	CE	Known
Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest – EPBC Act			
Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E	-	Known
Moist Shale Woodland in the Sydney Basin Bioregion –TSC Act	E	CE	Known
Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest – EPBC Act			
River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E	-	Known
Shale Gravel Transition Forest in the Sydney Basin Bioregion – TSC Act	E	CE	Known
Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest – EPBC Act			
Shale Sandstone Transition Forest in the Sydney Basin Bioregion –TSC Act	CE	CE	Known
Shale Sandstone Transition Forest of the Sydney Basin Bioregion – EPBC Act			
Southern Sydney sheltered forest on transitional sandstone soils in the Sydney Basin Bioregion	E	-	Known

Community Name	TSC Act	EPBC Act	Type of Presence
Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E	E	Known
Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community			
Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E	-	Known
Western Sydney Dry Rainforest in the Sydney Basin Bioregion – TSC Act	E	CE	Known
Western Sydney Dry Rainforest and Moist Woodland on Shale – EPBC Act			

**CE = Critically Endangered, E = Endangered, V = Vulnerable*

Table A-3 Commonwealth PMST Threatened and migratory species from within 5 km of the Subject Site

Scientific Name	Common Name	TSC Act*	EPBC Act*	Type of Presence
Birds				
Anthochaera phrygia	Regent Honeyeater	CE	CE	Species or species habitat **likely** to occur within area
Botaurus poiciloptilus	Australasian Bittern	E	E	Species or species habitat **known** to occur within area
Calidris ferruginea	Curlew Sandpiper	E	CE	Species or species habitat **likely** occur within area
Dasyornis brachypterus	Eastern Bristlebird	E	E	Species or species habitat **may** to occur within area
Grantiella picta	Painted Honeyeater	V	V	Species or species habitat **likely** to occur within area
Lathamus discolor	Swift Parrot	E	CE	Species or species habitat **known** to occur within area
Numenius madagascariensis	Eastern Curlew	-	CE	Species or species habitat **may** occur within area
Rostratula australis	Australian Painted Snipe	E	E	Species or species habitat **likely** occur within area
Fish				
Maccullochella peelii	Murray Cod	-	V	Species or species habitat **may** occur within area
Macquaria australasica	Macquarie Perch	-	E	Species or species habitat **known** to occur within area
Prototroctes maraena	Australian Grayling	-	V	Species or species habitat **may** occur within area
Frogs				
Heleioporus australiacus	Giant Burrowing Frog	V	V	Species or species habitat **likely** to occur within area
Litoria aurea	Green and Golden Bell Frog	E	V	Species or species habitat **known** occur within area
Litoria raniformis	Growling Grass Frog	E	V	Species or species habitat **may** occur within area
Mammals				
Chalinolobus dwyeri	Large-eared Pied Bat	V	V	Species or species habitat **known** to occur within area
Dasyurus maculatus maculatus	Spotted-tailed Quoll (SE mainland population)	V	E	Species or species habitat **likely** to occur within area
Petauroides volans	Greater Glider	-	V	Species or species habitat **known** to occur within area

Scientific Name	Common Name	TSC Act*	EPBC Act*	Type of Presence
Petrogale penicillata	Brush-tailed Rock-wallaby	E	V	Species or species habitat **likely** to occur within area
Phascolarctos cinereus	Koala (combined populations of Qld, NSW and the ACT)	V	V	Species or species habitat **known** to occur within area
Pseudomys novaehollandiae	New Holland Mouse	-	V	Species or species habitat **likely** to occur within area
Pteropus poliocephalus	Grey-headed Flying-fox	V	V	Roosting **known** to occur within area
Reptiles				
Hoplocephalus bungaroides	Broad-headed Snake	E	V	Species or species habitat **likely** to occur within area
Flora				
Acacia bynoeana	Bynoe's Wattle	E	V	Species or species habitat **may** to occur within area
Acacia pubescens	Downy Wattle	V	V	Species or species habitat **known** to occur within area
Allocasuarina glareicola	-	E	E	Species or species habitat **may** occur within area
Cynanchum elegans	White-flowered Wax Plant	E	E	Species or species habitat **known** to occur within area
Eucalyptus benthamii	Camden White Gum	V	V	Species or species habitat **known** to occur within area
Genoplesium baueri	Yellow Gnat-orchid	E	E	Species or species habitat **likely** to occur within area
Haloragis exalata subsp. *exalata*	Wingless Raspwort	V	V	Species or species habitat **may** occur within area
Persoonia hirsuta	Hairy Geebung	E	E	Species or species habitat **known** to occur within area
Pimelea spicata	Spiked Rice-flower	E	E	Species or species habitat **known** to occur within area
Pomaderris brunnea	Rufous Pomaderris	E	V	Species or species habitat **likely** to occur within area
Pterostylis saxicola	Sydney Plains Greenhood	E	E	Species or species habitat **known** to occur within area
Syzygium paniculatum	Magenta Lilly Pilly	E	V	Species or species habitat **likely** occur within area
Thelymitra kangaloonica	Kangaloon Sun Orchid	CE	CE	Species or species habitat **may** to occur within area
Thesium australe	Austral Toadflax	V	V	Species or species habitat **may** occur within area

Scientific Name	Common Name	TSC Act*	EPBC Act*	Type of Presence
Migratory Marine Birds				
Apus pacificus	Fork-tailed Swift	-	C, J, K	Species or species habitat **likely** to occur within area
Migratory Terrestrial Birds				
Cuculus optatus	Oriental Cuckoo	-	C, J, K	Species or species habitat **may** occur within area
Hirundapus caudacutus	White-throated Needletail	-	C, J, K	Species or species habitat **known** to occur within area
Monarcha melanopsis	Black-faced Monarch	-	Bonn	Species or species habitat **known** to occur within area
Monarcha trivirgatus	Spectacled Monarch	-	Bonn	Species or species habitat **known** to occur within area
Motacilla flava	Yellow Wagtail	-	C, J, K	Species or species habitat **may** occur within area
Myiagra cyanoleuca	Satin Flycatcher	-	Bonn	Species or species habitat **known** to occur within area
Rhipidura rufifrons	Rufous Fantail	-	Bonn	Species or species habitat **known** to occur within area
Migratory Wetlands Birds				
Actitis hypoleucos	Common Sandpiper	-	Bonn, C, J, K	Species or species habitat **may** occur within area
Calidris acuminata	Sharp-tailed Sandpiper	-	Bonn, C, J, K	Species or species habitat **known** to occur within area
Calidris ferruginea	Curlew Sandpiper	E	CE, Bonn, C, J, K	Species or species habitat **likely** to occur within area
Calidris melanotos	Pectoral Sandpiper	-	Bonn, J, K	Species or species habitat **may** occur within area
Gallinago hardwickii	Latham's Snipe	-	Bonn, J, K	Species or species habitat **may** occur within area
Numenius madagascariensis	Eastern Curlew	-	CE, Bonn, C, J, K	Species or species habitat **may** occur within area
Pandion haliaetus	Eastern Osprey	V	Bonn	Species or species habitat **likely** to occur within area
Tringa nebularia	Common Greenshank	-	Bonn, C, J, K	Species or species habitat **likely** to occur within area

**CE = Critically Endangered, E = Endangered, V = Vulnerable, Bonn = Convention on the Conservation of Migratory Species of Wild Animals, C = China-Australia Migratory Bird Agreement, J = Japan-Australia Migratory Bird Agreement, K = Republic of Korea-Australia Migratory Bird Agreement*

Table A-4 Commonwealth PMST Threatened Ecological Communities from within 5 km of the Subject Site

Scientific Name	TSC Act*	EPBC Act*	Type of Presence
Agnes Banks Woodland in the Sydney Basin Bioregion – TSC Act	V	E	Community **may** occur within area
Castlereagh Scribbly Gum and Agnes Banks Woodlands of the Sydney Basin Bioregion - EPBC Act			
Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions - TSC Act	E	E	Community **likely** to occur within area
Coastal Swampoak (Casuarina glauca) Forest of New South Wales and South East Queensland Ecological Community - EPBC Act			
Cooks River/Castlereagh Ironbark Forest of the Sydney Basin Bioregion	E	CE	Community **likely** occur within area
Cumberland Plain Woodland in the Sydney Basin Bioregion – TSC Act	CE	CE	Community **likely** to occur within area
Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest - EPBC Act			
Shale Sandstone Transition Forest in the Sydney Basin Bioregion – TSC Act	CE	CE	Community **may** occur within area
Shale Sandstone Transition Forest of the Sydney Basin Bioregion - EPBC Act			
Western Sydney Dry Rainforest in the Sydney Basin Bioregion –TSC Act	E	CE	Community **likely** to occur within area
Western Sydney Dry Rainforest and Moist Woodland on Shale - EPBC Act			

**CE = Critically Endangered, E = Endangered, V = Vulnerable*

Caulfield Stage 2C Rezoning

APPENDIX B

PMST REPORT

Appendix B: PMST Report

Australian Government
Department of the Environment and Energy

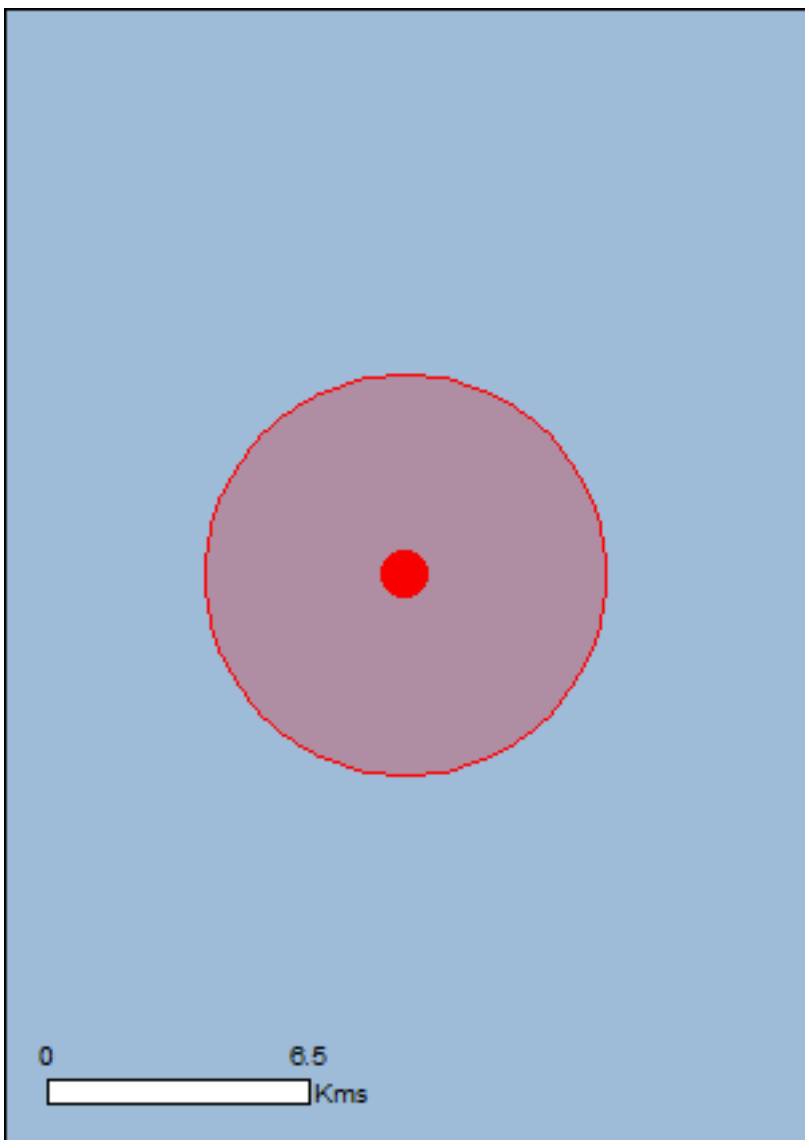
EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

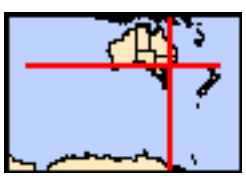
Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

Report created: 05/12/18 09:26:11



Coordinates
Buffer: 5.0Km



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	6
Listed Threatened Species:	36
Listed Migratory Species:	16

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	6
Commonwealth Heritage Places:	None
Listed Marine Species:	22
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	1
Regional Forest Agreements:	None
Invasive Species:	51
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
Castlereagh Scribbly Gum and Agnes Banks Woodlands of the Sydney Basin Bioregion	Endangered	Community may occur within area
Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community	Endangered	Community may occur within area
Cooks River/Castlereagh Ironbark Forest of the Sydney Basin Bioregion	Critically Endangered	Community may occur within area
Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest	Critically Endangered	Community likely to occur within area
Shale Sandstone Transition Forest of the Sydney Basin Bioregion	Critically Endangered	Community may occur within area
Western Sydney Dry Rainforest and Moist Woodland on Shale	Critically Endangered	Community likely to occur within area

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Anthochaera phrygia Regent Honeyeater [82338]	Critically Endangered	Foraging, feeding or related behaviour likely to occur within area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat likely to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area
Dasyornis brachypterus Eastern Bristlebird [533]	Endangered	Species or species habitat may occur within area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat likely to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Rostratula australis Australian Painted-snipe, Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area

Name	Status	Type of Presence
Fish		
Maccullochella peelii Murray Cod [66633]	Vulnerable	Species or species habitat may occur within area
Macquaria australasica Macquarie Perch [66632]	Endangered	Species or species habitat may occur within area
Prototroctes maraena Australian Grayling [26179]	Vulnerable	Species or species habitat may occur within area
Frogs		
Heleioporus australiacus Giant Burrowing Frog [1973]	Vulnerable	Species or species habitat likely to occur within area
Litoria aurea Green and Golden Bell Frog [1870]	Vulnerable	Species or species habitat known to occur within area
Litoria raniformis Growling Grass Frog, Southern Bell Frog, Green and Golden Frog, Warty Swamp Frog [1828]	Vulnerable	Species or species habitat may occur within area
Mammals		
Chalinolobus dwyeri Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat known to occur within area
Dasyurus maculatus maculatus (SE mainland population) Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat likely to occur within area
Petauroides volans Greater Glider [254]	Vulnerable	Species or species habitat likely to occur within area
Petrogale penicillata Brush-tailed Rock-wallaby [225]	Vulnerable	Species or species habitat likely to occur within area
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT) Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Vulnerable	Species or species habitat known to occur within area
Pseudomys novaehollandiae New Holland Mouse, Pookila [96]	Vulnerable	Species or species habitat may occur within area
Pteropus poliocephalus Grey-headed Flying-fox [186]	Vulnerable	Roosting known to occur within area
Plants		
Acacia bynoeana Bynoe's Wattle, Tiny Wattle [8575]	Vulnerable	Species or species habitat may occur within area
Acacia pubescens Downy Wattle, Hairy Stemmed Wattle [18800]	Vulnerable	Species or species habitat may occur within area
Allocasuarina glareicola [21932]	Endangered	Species or species habitat may occur within area
Cynanchum elegans White-flowered Wax Plant [12533]	Endangered	Species or species habitat likely to occur within area

Name	Status	Type of Presence
Eucalyptus benthamii Camden White Gum, Nepean River Gum [2821]	Vulnerable	Species or species habitat may occur within area
Genoplesium baueri Yellow Gnat-orchid [7528]	Endangered	Species or species habitat likely to occur within area
Haloragis exalata subsp. exalata Wingless Raspwort, Square Raspwort [24636]	Vulnerable	Species or species habitat may occur within area
Persoonia hirsuta Hairy Geebung, Hairy Persoonia [19006]	Endangered	Species or species habitat likely to occur within area
Pimelea spicata Spiked Rice-flower [20834]	Endangered	Species or species habitat known to occur within area
Pomaderris brunnea Rufous Pomaderris [16845]	Vulnerable	Species or species habitat likely to occur within area
Pterostylis saxicola Sydney Plains Greenhood [64537]	Endangered	Species or species habitat known to occur within area
Syzygium paniculatum Magenta Lilly Pilly, Magenta Cherry, Daguba, Scrub Cherry, Creek Lilly Pilly, Brush Cherry [20307]	Vulnerable	Species or species habitat may occur within area
Thelymitra kangaloonica Kangaloon Sun Orchid [81861]	Critically Endangered	Species or species habitat may occur within area
Thesium australe Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat may occur within area
Reptiles		
Hoplocephalus bungaroides Broad-headed Snake [1182]	Vulnerable	Species or species habitat may occur within area

Listed Migratory Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Cuculus optatus Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat may occur within area
Hirundapus caudacutus White-throated Needletail [682]		Species or species habitat known to occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area
Monarcha trivirgatus Spectacled Monarch [610]		Species or species habitat known to occur within area

Name	Threatened	Type of Presence
Motacilla flava		
Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca		
Satin Flycatcher [612]		Species or species habitat known to occur within area
Rhipidura rufifrons		
Rufous Fantail [592]		Species or species habitat known to occur within area
Migratory Wetlands Species		
Actitis hypoleucos		
Common Sandpiper [59309]		Species or species habitat may occur within area
Calidris acuminata		
Sharp-tailed Sandpiper [874]		Species or species habitat likely to occur within area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area
Calidris melanotos		
Pectoral Sandpiper [858]		Species or species habitat may occur within area
Gallinago hardwickii		
Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Numenius madagascariensis		
Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus		
Osprey [952]		Species or species habitat likely to occur within area
Tringa nebularia		
Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Name
Commonwealth Land -
Commonwealth Land - Australian Postal Commission
Commonwealth Land - Australian Telecommunications Commission
Commonwealth Land - Australian Telecommunications Corporation
Commonwealth Land - Defence Housing Authority
Commonwealth Land - Telstra Corporation Limited

Listed Marine Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos		
Common Sandpiper [59309]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Breeding known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat likely to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Chrysococcyx osculans Black-eared Cuckoo [705]		Species or species habitat likely to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Hirundapus caudacutus White-throated Needletail [682]		Species or species habitat known to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area
Monarcha trivirgatus Spectacled Monarch [610]		Species or species habitat known to occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat likely to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species

Name	Threatened	Type of Presence
		habitat known to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat likely to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Extra Information

State and Territory Reserves [Resource Information]

Name	State
William Howe	NSW

Invasive Species [Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Alauda arvensis Skylark [656]		Species or species habitat likely to occur within area
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area
Carduelis chloris European Greenfinch [404]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Lonchura punctulata Nutmeg Mannikin [399]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Passer montanus Eurasian Tree Sparrow [406]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Pycnonotus jocosus Red-whiskered Bulbul [631]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Turdus merula Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
Frogs		
Rhinella marina Cane Toad [83218]		Species or species habitat known to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Feral deer Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
Lepus capensis Brown Hare [127]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus norvegicus Brown Rat, Norway Rat [83]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Alternanthera philoxeroides Alligator Weed [11620]		Species or species habitat likely to occur within area
Anredera cordifolia Madeira Vine, Jalap, Lamb's-tail, Mignonette Vine, Anredera, Gulf Madeiravine, Heartleaf Madeiravine, Potato Vine [2643]		Species or species habitat likely to occur within area
Asparagus aethiopicus Asparagus Fern, Ground Asparagus, Basket Fern,		Species or species

Name	Status	Type of Presence
Sprengi's Fern, Bushy Asparagus, Emerald Asparagus [62425] Asparagus asparagoides		habitat likely to occur within area
Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473] Asparagus plumosus		Species or species habitat likely to occur within area
Climbing Asparagus-fern [48993] Asparagus scandens		Species or species habitat likely to occur within area
Asparagus Fern, Climbing Asparagus Fern [23255] Cabomba caroliniana		Species or species habitat likely to occur within area
Cabomba, Fanwort, Carolina Watershield, Fish Grass, Washington Grass, Watershield, Carolina Fanwort, Common Cabomba [5171] Chrysanthemoides monilifera		Species or species habitat likely to occur within area
Bitou Bush, Boneseed [18983] Chrysanthemoides monilifera subsp. monilifera		Species or species habitat may occur within area
Boneseed [16905] Chrysanthemoides monilifera subsp. rotundata		Species or species habitat likely to occur within area
Bitou Bush [16332] Cytisus scoparius		Species or species habitat likely to occur within area
Broom, English Broom, Scotch Broom, Common Broom, Scottish Broom, Spanish Broom [5934] Eichhornia crassipes		Species or species habitat likely to occur within area
Water Hyacinth, Water Orchid, Nile Lily [13466] Genista monspessulana		Species or species habitat likely to occur within area
Montpellier Broom, Cape Broom, Canary Broom, Common Broom, French Broom, Soft Broom [20126] Genista sp. X Genista monspessulana		Species or species habitat likely to occur within area
Broom [67538] Lantana camara		Species or species habitat may occur within area
Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892] Lycium ferocissimum		Species or species habitat likely to occur within area
African Boxthorn, Boxthorn [19235] Nassella neesiana		Species or species habitat likely to occur within area
Chilean Needle grass [67699] Nassella trichotoma		Species or species habitat likely to occur within area
Serrated Tussock, Yass River Tussock, Yass Tussock, Nassella Tussock (NZ) [18884] Opuntia spp.		Species or species habitat likely to occur within area
Prickly Pears [82753] Pinus radiata		Species or species habitat likely to occur within area
Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780] Rubus fruticosus aggregate		Species or species habitat may occur within area
Blackberry, European Blackberry [68406]		Species or species

Name	Status	Type of Presence
		habitat likely to occur within area
Sagittaria platyphylla Delta Arrowhead, Arrowhead, Slender Arrowhead [68483]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Salvinia molesta Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		Species or species habitat likely to occur within area
Senecio madagascariensis Fireweed, Madagascar Ragwort, Madagascar Groundsel [2624]		Species or species habitat likely to occur within area
Ulex europaeus Gorse, Furze [7693]		Species or species habitat likely to occur within area
Reptiles		
Hemidactylus frenatus Asian House Gecko [1708]		Species or species habitat likely to occur within area

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-34.04021 150.77742

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

Department of the Environment
GPO Box 787
Canberra ACT 2601 Australia
+61 2 6274 1111

Caulfield Stage 2C Rezoning

APPENDIX C

SPECIES LISTS

Appendix C: Species Lists

Table C-1 Flora species documented during survey

Family	Scientific Name	Common Name	Exotic	TSC Act*	EPBC Act*	Bio Act	WoNS**
Amaranthaceae	*Einadia nutans*	Climbing Saltbush	-	-	-	-	-
Apiaceae	*Ciclospermum leptophyllum*	Marsh Parsely	-	-	-	-	-
Asphodelaceae	*Bulbine bulbosa*	Bulbine Lily	-	-	-	-	-
Asteraceae	*Aster subulatus*	Wild Aster	*	-	-	-	-
	Cirsium vulgare	Spear Thistle	*	-	-	-	-
	Conyza spp.	Fleabane	*	-	-	-	-
	Euchiton sphaericus	Cudweed	-	-	-	-	-
	Senecio madagascariensis	Fireweed	*	-	-	Priority	Yes
	Sonchus spp.	Milk Thistle	*	-	-	-	-
Boraginaceae	*Echium vulgare*	Blueweed	*	-	-	-	-
Caryophyllaceae	*Paronychia brasiliana*	Brazilian Whitlow	*	-	-	-	-
Convolvulaceae	*Dichondra repens*	Kidney Weed	-	-	-	-	-
Cyperaceae	*Cyperus eragrostis*	Umbrella Sedge	*	-	-	-	-
Fabaceae	*Cyperus gracilis*	Slender Flat Sedge	-	-	-	-	-
	Desmodium brachypodum	Large Tick-trefoil	-	-	-	-	-
	Glycine tabacina	Variable Glycine	-	-	-	-	-
	Hardenbergia violacea	False Sarsaparilla	-	-	-	-	-
	Lotus corniculatus	Common Bird's-foot Trefoil	*	-	-	-	-
	Trifolium spp.	Clover	*	-	-	-	-
Gentianaceae	*Centaurium erythraea*	European Centaury	*	-	-	-	-
Geraniaceae	*Geranium homeanum*	-	-	-	-	-	-
Hypericaceae	*Hypericum japonicum*	Japanese St. John's Wort	*	-	-	-	-
	Hypericum perforatum	Common St John’s Wort	*	-	-	-	-
Juncaceae	*Juncus usitatus*	Common Rush	-	-	-	-	-
Malvaceae	*Modiola caroliniana*	Red Mallow	*	-	-	-	-
	Sida rhombifolia	Paddy's Lucerne	*	-	-	-	-
Myrtaceae	*Eucalyptus moluccana*	Grey Box	-	-	-	-	-
Oleaceae	*Olea europaea* subsp. *cuspidata*	African Olive	*	-	-	Priority	-
Onagraceae	*Ludwigia peploides*	Water Primrose	-	-	-	-	-
Oxalidaceae	*Oxalis corniculata*	Creeping Oxalis	*	-	-	-	-
	Oxalis perennans	-	-	-	-	-	-
Phyllanthaceae	*Phyllanthus virgatus*	-	-	-	-	-	-
Phytolaccaceae	*Phytolacca octandra*	Inkweed	*	-	-	-	-
Pittosporaceae	*Bursaria spinosa*	Blackthorn	-	-	-	-	-
Plantaginaceae	*Plantago lanceolata*	Lambs Tongues	*	-	-	-	-
	Veronica peregrina	American Speedwell	*	-	-	-	-
Poaceae	*Austrostipa rudis*	Speargrass	-	-	-	-	-
	Chloris gayana	Rhodes Grass	*	-	-	-	-

Family	Scientific Name	Common Name	Exotic	TSC Act*	EPBC Act*	Bio Act	WoNS**
	Chloris truncata	Windmill Grass	-	-	-	-	-
	Cynodon dactylon	Common Couch	-	-	-	-	-
	Eragrostis curvula	African Love Grass	*	-	-	-	-
	Eriochloa pseudoacrotricha	Cupgrass	-	-	-	-	-
	Paspalum dilatatum	Paspalum	*	-	-	-	-
	Pennisetum clandestinum	Kikuyu	*	-	-	-	-
	Phalaris aquatica	Harding Grass	*	-	-	-	-
	Rytidosperma fulvum	Wallaby Grass	-	-	-	-	-
	Setaria parviflora	Pale Pigeon Grass	*	-	-	-	-
	Sporobolus africanus	Parramatta Grass	*	-	-	-	-
	Themeda triandra	Kangaroo Grass	-	-	-	-	-
Polygonaceae	*Rumex brownii*	Swamp Dock	-	-	-	-	-
Portulacaceae	*Portulaca oleracea*	Purslane	*	-	-	-	-
Primulaceae	*Anagallis arvensis*	Scarlet Pimpernel	*	-	-	-	-
Solanaceae	*Solanum linnaeanum*	Apple of Sodom	*	-	-	-	-
	Datura stramonium	Jimson Weed	*	-	-	-	-
Typhaceae	*Typha orientalis*	Cumbungi	-	-	-	-	-
Verbenaceae	*Verbena bonariensis*	-	*	-	-	-	-
	Verbena spp.	Purpletop	*	-	-	-	-

**CE = Critically Endangered, E = Endangered, V = Vulnerable, Bonn = Convention on the Conservation of Migratory Species of Wild Animals, C = China-Australia Migratory Bird Agreement, J = Japan-Australia Migratory Bird Agreement, K = Republic of Korea-Australia Migratory Bird Agreement*

***Weed of National Significance*

Table C-2 Fauna species encountered during survey

Family	Scientific Name	Common Names	Exotic	TSC Act	EPBC Act	Mode of detection
Amphibians						
Hylidae	*Litoria dentata*	Bleating Tree Frog	-	-	-	Heard
Birds						
Anatidae	*Chenonetta jubata*	Australian Wood Duck	-	-	-	Seen
Artamidae	*Cracticus torquatus*	Grey Butcherbird	-	-	-	Heard
	Gymnorhina tibicen	Australian Magpie	-	-	-	Heard
Cacatuidae	*Eolophus roseicapillus*	Galah	-	-	-	Heard
	Cacatua galerita	Sulphur-crested Cockatoo	-	-	-	Heard
	Cacatua sanguinea	Short-beaked Corella	-	-	-	Heard
Columbidae	*Spilopelia chinensis*	Spotted Turtle-dove	*	-	-	Seen/heard
	Ocyphaps lophotes	Crested Pigeon	-	-	-	Seen/heard
Corvidae	*Corvus coronoides*	Australian Raven	-	-	-	Seen/heard
Maluridae	*Malurus cyaneus*	Superb Fairy-wren	-	-	-	Heard
Meliphagidae	*Manorina melanocephala*	Noisy Miner	-	-	-	Seen/heard
Monarchidae	*Grallina cyanoleuca*	Magpie Lark	-	-	-	Heard
Psittacidae	*Trichoglossus haematodus*	Rainbow Lorikeet	-	-	-	Seen/heard
	Platycercus elegans	Crimson Rosella	-	-	-	Heard
	Alisterus scapularis	Australian King Parrot	-	-	-	Seen/heard
	Psephotus haematonotus	Red-rumped Parrot	-	-	-	Seen/heard
Sturnidae	*Acridotheres tristis*	Common Myna	*	-	-	Seen/heard
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		-	-	Seen
Mammals						
Felidae	*Felis catus*	Domestic Cat	*	-	-	Seen
Leporidae	*Lepus europaeus*	European Hare	*	-	-	Seen
	Oryctolagus cuniculus	European Rabbit	*	-	-	Seen
Macropodidae	*Wallabia bicolor*	Swamp Wallaby	-	-	-	Scat

**CE = Critically Endangered, E = Endangered, V = Vulnerable, Bonn = Convention on the Conservation of Migratory Species of Wild Animals, C = China-Australia Migratory Bird Agreement, J = Japan-Australia Migratory Bird Agreement, K = Republic of Korea-Australia Migratory Bird Agreement*

Caulfield Stage 2C Rezoning

APPENDIX D

LIKELIHOOD OF OCCURRENCE TABLES

Appendix D: Likelihood of Occurrence Tables

Threatened flora and fauna, and migratory species (listed under the TSC Act and/or EPBC Act) that have been gazetted and are known, or have potential, to occur within a 5 km radius of the Subject Site have been considered in this section. TECs known from the broader area have also been considered. The likelihood of occurrence within the Subject Site of each species and TEC was assessed using the criteria described in **Table D-1** and the findings presented in **Table D-2** (flora species and TECs) and **Table D-3** (fauna species).

This assessment was undertaken based on previous records, the results of the field survey and known species habitat requirements. An assessment of the potential impact that would likely be experienced by each species and TEC is also provided in **Table D-2** and **Table D-3**.

Table D-1 Likelihood of occurrence criteria

Likelihood Rating	Criteria
Known	The species was recorded within the Subject Site during the field surveys.
High	It is likely that a species would inhabit or utilise habitat within the Subject Site. Criteria for this category may include: > Species recently and/or regularly recorded in contiguous or nearby habitat. > High quality habitat or resources present within the Subject Site. > Species is known or likely to maintain a resident population surrounding the Subject Site. > Species is known or likely to visit during migration or in response to seasonal availability of resources present on site.
Moderate	Potential habitat for a species occurs within the Subject Site. Criteria for this category may include: > Species previously recorded in contiguous habitat albeit not recently (>10 years). > Habitat present, but poor quality, depauperate or modified types and/or resources. > Species has potential to utilise habitat during migration or seasonal availability of resources. > Cryptic flora species with potential habitat within the Subject Site that have not been targeted by surveys (for example, surveys were not undertaken with the flowering season.
Low	It is unlikely that the species inhabits the area, if it did, it would likely be a transient visitor. Criteria for this category may include: > The Subject Site does not support the specific habitat types or resources required by the species. > The Subject Site is beyond the current distribution of the species or is isolated from known populations. > Non cryptic flora species not observed during targeted surveys.
None/Absent	The habitat within the Subject Site is unsuitable for the species.

Table D-2 Likelihood of Occurrence Table: Flora and TECs

Species / Community Name	TSC Act	EPBC Act	Records Source	Habitat / Community Description	Likelihood of Occurrence	Potential for Impact
Flora						
Acacia bynoeana	E	V	Bionet - 0	Occurs in heath or dry sclerophyll forest on sandy soils. Seems to prefer open, sometimes slightly disturbed sites such as trail margins, edges of roadside spoil mounds and in recently burnt patches. Associated overstorey species include Red Bloodwood, Scribbly Gum, Parramatta Red Gum, Saw Banksia and Narrow-leaved Apple.	**None.** The Subject Site has been recently cleared and is dominated by recovering exotic grasslands and exposed soil. The species is not cryptic and adequate survey was conducted for its detection	**None.** As this species has no chance of occurring within the Subject Site, it is unlikely to be impacted by any future works
(Bynoe's Wattle)			PMST - M			
Acacia pubescens	V	V	Bionet - 0	Occurs on alluviums, shales and at the intergrade between shales and sandstones. The soils are characteristically gravely soils, often with ironstone. Occurs in open woodland and forest, in a variety of plant communities, including Cooks River/Castlereagh Ironbark Forest, Shale/Gravel Transition Forest and Cumberland Plain Woodland	**None.** The Subject Site has been recently cleared and is dominated by recovering exotic grasslands and exposed soil. The species is not cryptic and adequate survey was conducted for its detection	**None.** As this species has no chance of occurring within the Subject Site, it is unlikely to be impacted by any future works
(Downy Wattle)			PMST - Kn			
Allocasuarina glareicola	E	E	Bionet - 0	The species grows in Castlereagh woodland on lateritic soil. Found in open woodland with *Eucalyptus parramattensis, Eucalyptus fibrosa*, *Angophora bakeri*, *Eucalyptus sclerophylla* and *Melaleuca decora*. Common associated understorey species include *Melaleuca nodosa*, *Hakea dactyloides, Hakea sericea, Dillwynia tenuifolia, Micromyrtus minutiflora, Acacia elongate, Acacia brownei, Themeda australis* and *Xanthorrhoea minor.*	**None.** The Subject Site has been recently cleared and is dominated by recovering exotic grasslands and exposed soil. Preferred vegetation for this species was also not present	**None.** As this species has no chance of occurring within the Subject Site, it is unlikely to be impacted by any future works
			PMST - M			
Cynanchum elegans	E	E	Bionet - 0	White-flowered Wax Plant occurs on a variety of lithologies and soil types, usually on steep slopes with varying degrees of soil. Geology is not a limiting factor for this species and associated substrate varies at different	**None.** The Subject Site has been recently cleared and is dominated by recovering exotic grasslands and exposed	**None.** As this species has no chance of occurring within the Subject Site, it is unlikely

Species / Community Name	TSC Act	EPBC Act	Records Source	Habitat / Community Description	Likelihood of Occurrence	Potential for Impact
(White-flowered Wax Plant)			PMST - Kn	locations. This species occurs from near sea level to about 600 m above sea level and experiences hot humid summers with high summer-autumn rainfall, and cool winters with low spring rainfall. Annual average rainfall ranges from 700–1450 mm.	soil. The species is not cryptic and adequate survey was conducted for its detection	to be impacted by any future works
Eucalyptus benthamii	V	V	Bionet - 0	Requires a combination of deep alluvial sands and a flooding regime that permits seedling establishment. Recruitment of juveniles appears to be most successful on bare silt deposits in rivers and streams.	**None.** The Subject Site has been recently cleared and is dominated by recovering exotic grasslands and exposed soil. The species is not cryptic and adequate survey was conducted for its detection	**None.** As this species has no chance of occurring within the Subject Site, it is unlikely to be impacted by any future works
(Camden White Gum)			PMST - Kn			
Eucalyptus scoparia	V	-	Bionet - 1	Found in open eucalypt forest, woodland and heaths on well-drained granite/rhyolite hilltops, slopes and rocky outcrops, typically at high altitudes	**None.** The Subject Site has been recently cleared and is dominated by recovering exotic grasslands and exposed soil. The species is not cryptic and adequate survey was conducted for its detection	**None.** As this species has no chance of occurring within the Subject Site, it is unlikely to be impacted by any future works
(Wallangarra White Gum)			PMST - N/A			
Genoplesium bauera	E	E	Bionet - 0	This species grows in dry sclerophyll forest and moss gardens over sandstone.	**None.** The Subject Site has been recently cleared and is dominated by recovering exotic grasslands and exposed soil. Important habitat constraints were not present	**None.** As this species has no chance of occurring within the Subject Site, it is unlikely to be impacted by any future works
(Yellow Gnat-orchid)			PMST - L			
Haloragis exalata subsp. *exalata*	V	V	Bionet - 0	Square Raspwort appears to require protected and shaded damp situations in riparian habitats.	**None.** The Subject Site has been recently cleared and is dominated by recovering exotic grasslands and exposed	**None.** As this species has no chance of occurring within the Subject Site, it is unlikely

Species / Community Name	TSC Act	EPBC Act	Records Source	Habitat / Community Description	Likelihood of Occurrence	Potential for Impact
(Wingless Raspwort)			PMST - M		soil. Important habitat constraints were not present	to be impacted by any future works
Marsdenia viridiflora R. Br. subsp. *viridiflora* population in the Bankstown, Blacktown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and Penrith local government areas	EP	-	Bionet - 7	Grows in vine thickets and open shale woodland	**None.** The Subject Site has been recently cleared and is dominated by recovering exotic grasslands and exposed soil. The species is not cryptic and adequate survey was conducted for its detection	**None.** As this species has no chance of occurring within the Subject Site, it is unlikely to be impacted by any future works
			PMST - N/A			
Persoonia hirsuta	E	E	Bionet - 0	The Hairy Geebung is found in sandy soils in dry sclerophyll open forest, woodland and heath on sandstone.	**None.** The Subject Site has been recently cleared and is dominated by recovering exotic grasslands and exposed soil. The species is not cryptic and adequate survey was conducted for its detection	**None.** As this species has no chance of occurring within the Subject Site, it is unlikely to be impacted by any future works
(Hairy Geebung)			PMST - Kn			
Pimelea spicata	E	E	Bionet - 712	In both the Cumberland Plain and Illawarra environments this species is found on well-structured clay soils. On the Cumberland Plain sites it is associated with Grey Box communities (particularly Cumberland Plain Woodland	**None.** The Subject Site has been recently cleared and is dominated by recovering exotic grasslands and exposed	**None.** As this species has no chance of occurring within the Subject Site, it is unlikely

Species / Community Name	TSC Act	EPBC Act	Records Source	Habitat / Community Description	Likelihood of Occurrence	Potential for Impact
(Spiked Rice-flower)			PMST - Kn	variants and Moist Shale Woodland) and in areas of ironbark. The co-occurring species in the Cumberland Plain sites are grey box (*Eucalyptus moluccana*), forest red gum (*E. tereticornis*) and narrow-leaved ironbark (*E. crebra*). Blackthorn (*Bursaria spinosa*) is often present at sites (and may be important in protection from grazing) and kangaroo grass (*Themeda australis*) is usually present in the groundcover (also indicative of a less intense grazing history).	soil. The species is not cryptic and adequate survey was conducted for its detection	to be impacted by any future works
Pomaderris brunnea	E	V	Bionet - 0	It grows in moist woodland or forest on clay and alluvial soils of flood plains and creek lines.	**None.** The Subject Site has been recently cleared and is dominated by recovering exotic grasslands and exposed soil. The species is not cryptic and adequate survey was conducted for its detection	**None.** As this species has no chance of occurring within the Subject Site, it is unlikely to be impacted by any future works
(Rufous Pomaderris)			PMST - L			
Pterostylis saxicola	E	E	Bionet - 0	Most commonly found growing in small pockets of shallow soil in depressions on sandstone rock shelves above cliff lines. The vegetation communities above the shelves where *Pterostylis saxicola* occurs are sclerophyll forest or woodland on shale/sandstone transition soils or shale soils.	**None.** The Subject Site has been recently cleared and is dominated by recovering exotic grasslands and exposed soil. Important habitat constraints were not present	**None.** As this species has no chance of occurring within the Subject Site, it is unlikely to be impacted by any future works
(Sydney Plains Greenhood)			PMST - Kn			
Syzygium paniculatum	E	V	Bionet - 0	On the south coast the Magenta Lilly Pilly occurs on grey soils over sandstone, restricted mainly to remnant stands of littoral (coastal) rainforest. On the central coast Magenta Lilly Pilly occurs on gravels, sands, silts and clays in riverside gallery rainforests and remnant littoral rainforest communities.	**None.** The Subject Site has been recently cleared and is dominated by recovering exotic grasslands and exposed soil. The species is not cryptic and adequate survey was conducted for its detection	**None.** As this species has no chance of occurring within the Subject Site, it is unlikely to be impacted by any future works
(Magenta Lilly Pilly)			PMST - L			

Species / Community Name	TSC Act	EPBC Act	Records Source	Habitat / Community Description	Likelihood of Occurrence	Potential for Impact
Thelymitra kangaloonica	CE	CE	Bionet - 0	It is found in swamps in sedgelands over grey silty grey loam soils.	**None.** The Subject Site has been recently cleared and is dominated by recovering exotic grasslands and exposed soil. Important habitat constraints were not present	**None.** As this species has no chance of occurring within the Subject Site, it is unlikely to be impacted by any future works
(Kangaloon Sun Orchid)			PMST - L			
Thesium australe	V	V	Bionet - 0	Although originally described from material collected in the SW Sydney area, populations have not been seen in a long time. It may persist in some areas in the broader region. Occurs in grassland on coastal headlands or grassland and grassy woodland away from the coast. Often found in association with Kangaroo Grass (*Themeda australis*).	**None.** The Subject Site has been recently cleared and is dominated by recovering exotic grasslands and exposed soil. The species is not known from recent occurrence records and adequate survey was conducted in an appropriate season	**None.** As this species has no chance of occurring within the Subject Site, it is unlikely to be impacted by any future works
(Austral Toadflax)			PMST - M			
Ecological Communities						
Agnes Banks Woodland in the Sydney Basin Bioregion –TSC Act	CE	E	Bionet - Kn	A low woodland community with Scribbly Gum (*Eucalyptus sclerophylla*), Narrow-leaved Apple (*Angophora bakeri*) and Old Man Banksia (*Banksia serrata*) as the dominant canopy trees. Diverse understorey shrubs include Wallum Banksia (*Banksia aemula*), *Banksia oblongifolia*, Coneseed (*Cononspermum taxifolium*), Wedding Bush (*Ricinocarpos pinifolius*), Showy Parrot Pea (*Dillwynia sericea*) and Nodding Geebung (*Persoonia nutans*).	**Absent.** The vegetation within the Subject Site is not commensurate with this ecological community due to the flora composition. Therefore, this ecological community does not occur within the Subject Site.	**None.** As this ecological community does not occur within the Subject Site, there would be no impacts by any proposed future development.
Castlereagh Scribbly Gum and Agnes Banks Woodlands of the Sydney Basin Bioregion – EPBC Act			PMST - M			
Blue Gum High Forest in the Sydney Basin Bioregion –TSC Act	CE	CE	Bionet - Kn	A moist, tall open forest community, with dominant canopy trees of Sydney Blue Gum (*Eucalyptus saligna*) and Blackbutt (*E. pilularis*). Forest Oak (*Allocasuarina torulosa*) and Sydney Red Gum (*Angophora costata*) also occur.	**Absent.** The vegetation within the Subject Site is not commensurate with this ecological community due to the flora composition.	**None.** As this ecological community does not occur within the Subject Site, there would be no

Species / Community Name	TSC Act	EPBC Act	Records Source	Habitat / Community Description	Likelihood of Occurrence	Potential for Impact
Blue Gum High Forest of the Sydney Basin Bioregion – EPBC Act			PMST - N/A	Species adapted to moist habitat such as Lilly Pilly (*Acmena smithii*), Sandpaper Fig (*Ficus coronata*), Rainbow Fern (*Calochleana dubia*) and Common Maidenhair (*Adiantum aethiopicum*) may also occur.	Therefore, this ecological community does not occur within the Subject Site.	impacts by any proposed future development.
Blue Mountains Shale Cap Forest in the Sydney Basin Bioregion	CE	CE	Bionet - Kn PMST - N/A	Characteristic tree species of this ecological community are Mountain Blue Gum (*Eucalyptus deanei*), Monkey Gum (*E. cypellocarpa*) and Turpentine (*Syncarpia glomulifera*). Other tree species include Sydney Red Gum (*Angophora costata*), Rough-barked Apple (*A. floribunda*), Mountain Mahogany (*E. notabilis*), Sydney Peppermint (*E. piperita*) and Grey Gum (*E. punctata*). Tree species composition varies between sites depending on geographical location and local conditions (e.g. topography, rainfall exposure)	**Absent.** The vegetation within the Subject Site is not commensurate with this ecological community due to the flora composition. Therefore, this ecological community does not occur within the Subject Site.	**None.** As this ecological community does not occur within the Subject Site, there would be no impacts by any proposed future development.
Castlereagh Scribbly Gum Woodland in the Sydney Basin Bioregion –TSC Act *Castlereagh Scribbly Gum and Agnes Banks Woodlands of the Sydney Basin Bioregion* – EPBC Act	V	E	Bionet - Kn PMST - M	Castlereagh Scribbly Gum Woodland in the Sydney Basin Bioregion is dominated by *Eucalyptus parramattensis* subsp. *parramattensis*, *Angophora bakeri* and *E. sclerophylla*. A small tree stratum of *Melaleuca decora* is sometimes present, generally in areas with poorer drainage. It has a well-developed shrub stratum consisting of sclerophyllous species such as *Banksia spinulosa* var. *spinulosa*, *Melaleuca nodosa*, *Hakea sericea* and *H. dactloides* (multi-stemmed form). The ground stratum consists of a diverse range of forbs including *Themeda australis*, *Entolasia stricta, Cyathochaeta diandra*, *Dianella revolute* subsp. *revolute*, *Stylidium graminifolium*, *Platysace ericoides*, *Laxmannia gracilis* and *Aristida warburgii*.	**Absent.** The vegetation within the Subject Site is not commensurate with this ecological community due to the flora composition. Therefore, this ecological community does not occur within the Subject Site.	**None.** As this ecological community does not occur within the Subject Site, there would be no impacts by any proposed future development.
Castlereagh Swamp Woodland Community	E	-	Bionet - Kn	Occurs in western Sydney in the Castlereagh and Holsworthy areas, on deposits from ancient river systems along today's intermittent creeklines, often in poorly drained depressions. There is now only 616 hectares remaining	**Absent.** The vegetation within the Subject Site is not commensurate with this ecological community due to the flora composition.	**None.** As this ecological community does not occur within the Subject Site, there would be no

Species / Community Name	TSC Act	EPBC Act	Records Source	Habitat / Community Description	Likelihood of Occurrence	Potential for Impact
			PMST - N/A	intact, which mainly occurs in the Hawkesbury, Liverpool and Penrith local government areas. Good examples can be seen at Windsor Downs Nature Reserve and Kemps Creek Nature Reserve	Therefore, this ecological community does not occur within the Subject Site.	impacts by any proposed future development.
Cooks River/Castlereagh Ironbark Forest of the Sydney Basin Bioregion	E	CE	Bionet - Kn PMST - L	Ranges from open forest to low woodland, with a canopy dominated by Broad-leaved Ironbark (Eucalyptus fibrosa) and Paperbark (Melaleuca decora). The canopy may also include other eucalypts such as Woolybutt (E. longifolia). The dense shrubby understorey consists of Prickly-leaved Paperbark (Melaleuca nodosa) and Peach Heath (Lissanthe strigosa), with a range of 'pea' flower shrubs, such as Dillwynia tenuifolia, Hairy Bush-pea (Pultenaea villosa) and Gorse Bitter Pea (Daviesia ulicifolia) (can be locally abundant). The sparse ground layer contains a range of grasses and herbs. Contains many more species and other references should be consulted to identify these.	**Absent.** The vegetation within the Subject Site is not commensurate with this ecological community due to the flora composition.. Therefore, this ecological community does not occur within the Subject Site.	**None.** As this ecological community does not occur within the Subject Site, there would be no impacts by any proposed future development.
Cumberland Plain Woodland in the Sydney Basin Bioregion –TSC Act *Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest* – EPBC Act	CE	CE	Bionet - Kn PMST - L	The dominant canopy trees of Cumberland Plain Woodland are Grey Box (*Eucalyptus moluccana*) and Forest Red Gum (*E. tereticornis*), with Narrow-leaved Ironbark (*E. crebra*), Spotted Gum (*Corymbia maculata*) and Thin-leaved Stringybark (*E. eugenioides*) occurring less frequently. The shrub layer is dominated by Blackthorn (*Bursaria spinosa*), and it is common to find abundant grasses such as Kangaroo Grass (*Themeda australis*) and Weeping Meadow Grass (*Microlaena stipoides* var. *stipoides*). Contains many more species and other references should be consulted to identify these.	**Present.** The vegetation within a portion of the Subject Site is commensurate with this ecological community. It occurs as woodlands and derived grasslands	**Yes.** Future development of the Subject Site would remove a portion of this TEC from the locality
Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E	-	Bionet - Kn	Associated with coastal areas subject to periodic flooding and in which standing fresh water persists for at least part of the year in most years. Typically occurs on silts, muds or humic loams in low-lying parts of floodplains,	**Absent.** The vegetation within the Subject Site is not commensurate with this ecological community due to the flora composition.	**None.** As this ecological community does not occur within the Subject Site, there would be no

Species / Community Name	TSC Act	EPBC Act	Records Source	Habitat / Community Description	Likelihood of Occurrence	Potential for Impact
			PMST - N/A	alluvial flats, depressions, drainage lines, backswamps, lagoons and lakes but may also occur in backbarrier landforms where floodplains adjoin coastal sandplains. Generally occur below 20 m elevation on level areas. They are dominated by herbaceous plants and have very few woody species. The structure and composition of the community varies both spatially and temporally depending on the water regime: Those that lack standing water most of the time are usually dominated by dense grassland or sedgeland vegetation, often forming a turf less than 0.5 metre tall and dominated by amphibious plants including *Paspalum distichum* (water couch), *Leersia hexandra* (swamp rice-grass), *Pseudoraphis spinescens* (mud grass) and *Carex appressa* (tussock sedge). Where they are subject to regular inundation and drying the vegetation may include large emergent sedges over 1 metre tall, such as *Baumea articulata*, *Eleocharis equisetina* and *Lepironia articulata*, as well as emergent or floating herbs such as *Hydrocharis dubia* (frogbit), *Philydrum lanuginosum* (frogsmouth), *Ludwigia peploides* subsp. *montevidensis* (water primrose), *Marsilea mutica* (nardoo) and *Myriophyllum* spp	Therefore, this ecological community does not occur within the Subject Site.	impacts by any proposed future development.
Moist Shale Woodland in the Sydney Basin Bioregion –TSC Act	E	CE	Bionet - Kn	Similar to Cumberland Plain Woodland. It differs in having a shrub understorey that contains plants from moist habitats. Dominant canopy trees include Forest Red Gum *Eucalyptus tereticornis*, Grey Box *E. moluccana*, Narrow-leaved Ironbark *E. crebra* and Spotted Gum *Corymbia maculata*. Small trees, such as Hickory Wattle *Acacia implexa* and Sydney Green Wattle *A. parramattensis* subsp. *parramattensis* are also common. The shrub layer includes *Breynia oblongifolia*, Hairy Clerodendrum *Clerodendrum tomentosum* and Indian Weed *Siegesbeckia orientalis* subsp. *orientalis*.	**Absent.** The vegetation within the Subject Site is not commensurate with this ecological community due to the flora composition. Therefore, this ecological community does not occur within the Subject Site.	**None.** As this ecological community does not occur within the Subject Site, there would be no impacts by any proposed future development.
Western Sydney Dry Rainforest and Moist Woodland on Shale – EPBC Act			PMST - N/A			

Species / Community Name	TSC Act	EPBC Act	Records Source	Habitat / Community Description	Likelihood of Occurrence	Potential for Impact
River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E	-	Bionet - Kn PMST - N/A	As the name suggests, this EEC is found on the river flats of the coastal floodplains. It has a tall open tree layer of eucalypts, which may exceed 40 m in height, but can be considerably shorter in regrowth stands or under conditions of lower site quality. While the composition of the tree stratum varies considerably, the most widespread and abundant dominant trees include *Eucalyptus tereticornis* (Forest Red Gum), *E. amplifolia* (Cabbage Gum), *Angophora floribunda* (Rough-barked Apple) and A. subvelutina (Broad-leaved Apple). *Eucalyptus baueriana* (Blue Box), *E. botryoides* (Bangalay) and *E. elata* (River Peppermint) may be common south from Sydney, *E. ovata* (Swamp Gum) occurs on the far south coast, *E. saligna* (Sydney Blue Gum) and *E. grandis* (Flooded Gum) may occur north of Sydney, while *E. benthamii* is restricted to the Hawkesbury floodplain. A layer of small trees may be present, including *Melaleuca decora, M. styphelioides* (Prickly-leaved Teatree), *Backhousia myrtifolia* (Grey Myrtle), *Melia azaderach* (White Cedar), *Casuarina cunninghamiana* (River Oak) and *C. glauca* (Swamp Oak).	**Absent.** The vegetation within the Subject Site is not commensurate with this ecological community due to the flora composition. Therefore, this ecological community does not occur within the Subject Site.	**None.** As this ecological community does not occur within the Subject Site, there would be no impacts by any proposed future development.
Shale Sandstone Transition Forest of the Sydney Basin Bioregion –TSC Act	CE	CE	Bionet - N/A	Occurs at the edges of the Cumberland Plain, where clay soils from the shale rock intergrade with earthy and sandy soils from sandstone, or where shale caps overlay sandstone. The boundaries are indistinct, and the species composition varies depending on the soil influences. The main tree species include Forest Red Gum (*Eucalyptus tereticornis*), Grey Gum *(E. punctata*), stringybarks (*E. globoidea, E. eugenioides*) and ironbarks (*E. fibrosa and E. crebra*). Areas of low sandstone influence (more clay-loam soil texture) have an understorey that is closer to Cumberland Plain Woodland	**Absent.** The vegetation within the Subject Site is not commensurate with this ecological community due to the flora composition. Therefore, this ecological community does not occur within the Subject Site.	**None.** As this ecological community does not occur within the Subject Site, there would be no impacts by any proposed future development.
Shale Sandstone Transition Forest of the Sydney Basin Bioregion – EPBC Act			PMST - M			

Species / Community Name	TSC Act	EPBC Act	Records Source	Habitat / Community Description	Likelihood of Occurrence	Potential for Impact
Shale Gravel Transition Forest in the Sydney Basin Bioregion –TSC Act	E	CE	Bionet - Kn	Has an open forest structure with a canopy dominated by Broad-leaved Ironbark *Eucalyptus fibrosa*, with Grey Box *E. moluccana* and Forest Red Gum *E. tereticornis* occurring less frequently. Paperbark *Melaleuca decora* is common in the small tree layer. A sparse shrub layer is usually present which includes Blackthorn *Bursaria spinosa*, *Daviesia ulicifolia* and Peach Heath *Lissanthe strigosa*.	**Absent.** The vegetation within the Subject Site is not commensurate with this ecological community due to the flora composition. Therefore, this ecological community does not occur within the Subject Site.	**None.** As this ecological community does not occur within the Subject Site, there would be no impacts by any proposed future development.
Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest – EPBC Act			PMST - M			
Shale Sandstone Transition Forest in the Sydney Basin Bioregion –TSC Act	CE	CE	Bionet - Kn	Occurs at the edges of the Cumberland Plain, where clay soils from the shale rock intergrade with earthy and sandy soils from sandstone, or where shale caps overlay sandstone. The boundaries are indistinct, and the species composition varies depending on the soil influences. The main tree species include Forest Red Gum (*Eucalyptus tereticornis*), Grey Gum (*E. punctata*), stringybarks (*E. globoidea*, *E. eugenioides*) and ironbarks (*E. fibrosa* and *E. crebra*). Areas of low sandstone influence (more clay-loam soil texture) have an understorey that is closer to Cumberland Plain Woodland. Shale Sandstone Transition Forest in the Sydney Basin Bioregion contains many more species than described for the canopy (above) and other references should be consulted to identify these.	**Absent.** The vegetation within the Subject Site is not commensurate with this ecological community due to the flora composition. Therefore, this ecological community does not occur within the Subject Site.	**None.** As this ecological community does not occur within the Subject Site, there would be no impacts by any proposed future development.
Shale Sandstone Transition Forest in the Sydney Basin Bioregion – EPBC Act			PMST - N/A			
Southern Sydney sheltered forest on transitional sandstone soils in the Sydney Basin Bioregion	E	-	Bionet - Kn	Southern Sydney sheltered forest on transitional sandstone soils is an open forest dominated by eucalypts with scattered subcanopy trees, a diverse shrub layer and a well-developed groundcover of ferns, forbs,	**Absent.** The vegetation within the Subject Site is not commensurate with this ecological community due to the flora composition.	**None.** As this ecological community does not occur within the Subject Site, there would be no

Species / Community Name	TSC Act	EPBC Act	Records Source	Habitat / Community Description	Likelihood of Occurrence	Potential for Impact
			PMST - N/A	grasses and graminoids. The dominant trees include *Angophora costata*, *Eucalyptus piperita* and occasionally *Eucalyptus pilularis*, particularly around Helensburgh. *Corymbia gummifera* occurs frequently within the community, although generally at lower abundance than the other eucalypts. Features that distinguish Southern Sydney sheltered forest on transitional sandstone soils from vegetation more typical of sandstone gullies in the eastern Sydney basin include the occurrences of *Eucalyptus pilularis*, *Acacia binervata*, *Elaeocarpus reticulatus*, *Pittosporum undulatum* and its relatively dense groundcover of ferns, grasses, rushes, lilies and forbs. There is considerable variation in species composition, richness and structure within the community in response to local soil variation and geographic gradients across the range. The community typically has an open forest structure, although disturbance may result in local manifestations as woodland or scrub.	Therefore, this ecological community does not occur within the Subject Site.	impacts by any proposed future development.
Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E	E	Bionet - Kn	This community is found on the coastal floodplains of NSW. It has a dense to sparse tree layer in which *Casuarina glauca* (swamp oak) is the dominant species northwards from Bermagui. Other trees including Acmena smithii (lilly pilly), Glochidion spp. (cheese trees) and Melaleuca spp. (paperbarks) may be present as subordinate species, and are found most frequently in stands of the community northwards from Gosford. Tree diversity decreases with latitude, and Melaleuca ericifolia is the only abundant tree in this community south of Bermagui	**Absent.** The vegetation within the Subject Site is not commensurate with this ecological community due to the flora composition. Therefore, this ecological community does not occur within the Subject Site.	**None.** As this ecological community does not occur within the Subject Site, there would be no impacts by any proposed future development.
Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community			PMST - L			
Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E	-	Bionet - Kn	This swamp community has an open to dense tree layer of eucalypts and paperbarks although some remnants now only have scattered trees as a result of partial clearing. The trees may exceed 25 m in height, but can be considerably	**Absent.** The vegetation within the Subject Site is not commensurate with this ecological community due to the flora composition.	**None.** As this ecological community does not occur within the Subject Site, there would be no

Species / Community Name	TSC Act	EPBC Act	Records Source	Habitat / Community Description	Likelihood of Occurrence	Potential for Impact
			PMST - N/A	shorter in regrowth stands or under conditions of lower site quality where the tree stratum is low and dense. For example, stands dominated by *Melaleuca ericifolia* typically do not exceed 8 m in height. The community also includes some areas of fernland and tall reedland or sedgeland, where trees are very sparse or absent. The most widespread and abundant dominant trees include Eucalyptus robusta (swamp mahogany), Melaleuca quinquenervia (paperbark) and, south from Sydney, Eucalyptus botryoides (bangalay) and Eucalyptus longifolia (woollybutt). Other trees may be scattered throughout at low abundance or may be locally common at few sites, including Callistemon salignus (sweet willow bottlebrush), Casuarina glauca (swamp oak) and Eucalyptus resinifera subsp. hemilampra (red mahogany), Livistona australis (cabbage palm) and Lophostemon suaveolens (swamp turpentine).	Therefore, this ecological community does not occur within the Subject Site.	impacts by any proposed future development.
Western Sydney Dry Rainforest in the Sydney Basin Bioregion –TSC Act	E	CE	Bionet - Kn	A dry vine scrub community of the Cumberland Plain, western Sydney. Canopy trees include Prickly Paperbark (*Melaleuca styphelioides*), Hickory Wattle (*Acacia implexa*) and Native Quince (*Alectryon subcinereus*). There are many rainforest species in the shrub layer, such as Mock Olive (*Notolaea longifolia*), Hairy Clerodendrum (*Clerodendrum tomentosum*) and Yellow Pittosporum (*Pittosporum revolutum*). The shrub layer combines with vines, such as Gum Vine (*Aphanopetalum resinosum*), Wonga Vine (*Pandorea pandorana*) and Slender Grape (*Cayratia clematidea*) to form dense thickets in sheltered locations. Contains many more species and other references should be consulted to identify these.	**Absent.** The vegetation within the Subject Site is not commensurate with this ecological community due to the flora composition. Therefore, this ecological community does not occur within the Subject Site.	**None.** As this ecological community does not occur within the Subject Site, there would be no impacts by any proposed future development.
Western Sydney Dry Rainforest and Moist Woodland on Shale – EPBC Act			PMST - L			

**CE = Critically Endangered, E = Endangered, EP = Endangered Population, V = Vulnerable*

Table D-3 Likelihood of Occurrence Table: Fauna

Species	TSC Act*	EPBC Act*	Records Source	Habitat Description	Likelihood of Occurrence	Potential for Impact
Frogs						
Giant Burrowing Frog	V	V	Bionet - 0	The northern population largely confined to the sandstone geology of the Sydney Basin and extending as far south as Ulladulla. Found in heath, woodland and open dry sclerophyll forest on a variety of soil types except those that are clay based. Spends more than 95% of its time in non-breeding habitat in areas up to 300 m from breeding sites.	**None.** This species is not known from recent occurrence records in the locality. Suitable forest and woodland habitat is not present in the Subject Site	**None.** As this species has no chance of occurring within the Subject Site, it is unlikely to be impacted by any future works
(*Heleioporus australiacus*)			PMST - L			
Green and Golden Bell Frog	E	V	Bionet - 2	Inhabits marshes, dams and stream-sides, particularly those containing Bullrushes (*Typha* spp.) or Spikerushes (*Eleocharis* spp.). Optimum habitat includes water-bodies that are unshaded, free of predatory fish such as Plague Minnow (*Gambusia holbrooki*), have a grassy area nearby and diurnal sheltering sites available. Some sites, particularly in the Greater Sydney region occur in highly disturbed areas.	**Moderate.** Potential habitat is present in the form of an ephemeral waterbody; however, it is considered sub optimal habitat due to a lack of significant riparian vegetation	**Yes.** Development of the Subject Site would remove suitable habitat for this species from the locality
(*Litoria aurea*)			PMST - Kn			
Growling Grass Frog	E	V	Bionet - 0	Usually found in or around permanent or ephemeral Black Box/Lignum/Nitre Goosefoot swamps, Lignum/Typha swamps and River Red Gum swamps or billabongs along floodplains and river valleys. They are also found in irrigated rice crops, particularly where there is no available natural habitat	**Low.** This species is not known from recent occurrence records in the locality. Marginal aquatic breeding habitat and no forest/woodland habitat is present in the Subject Site	**Unlikely.** As this species has a low chance of occurring within the Subject Site, it is unlikely to be impacted by any future works
(*Litoria raniformis*)			PMST - M			
Reptiles						
Broad-headed Snake	E	V	Bionet - 0	Shelters in rock crevices and under flat sandstone rocks on exposed cliff edges during autumn, winter and spring. Moves from the sandstone rocks to shelters in crevices or hollows in large trees within 500m of escarpments in summer.	**None.** This species is not known from recent occurrence records in the locality. The Subject Site lacks significant rock outcrop microhabitat features as well as suitable woodland habitat for this species	**None.** As this species has no chance of occurring within the Subject Site, it is unlikely to be impacted by any future works
(*Hoplocephalus bungaroides*)			PMST - L			

Species	TSC Act*	EPBC Act*	Records Source	Habitat Description	Likelihood of Occurrence	Potential for Impact
Birds						
Australasian Bittern (*Botaurus poiciloptilus*)	E	E	Bionet - 1; PMST - Kn	In NSW, they may be found over most of the state except for the far north-west. Favours permanent freshwater wetlands with tall, dense vegetation, particularly bullrushes (*Typha* spp.) and spikerushes (*Eleocharis* spp.).	**Low.** Marginal aquatic habitat is present in the Subject Site but due to the exposed nature of the Subject Site it is unlikely to be utlised by this species	**Unlikely.** As this species has a low chance of occurring within the Subject Site, it is unlikely to be impacted by any future works
Little Eagle (*Hieraaetus morphnoides*)	V	-	Bionet - 2; PMST - N/A	The Little Eagle is found throughout the Australian mainland excepting the most densely forested parts of the Dividing Range escarpment. It occurs as a single population throughout NSW. Occupies open eucalypt forest, woodland or open woodland. Sheoak or Acacia woodlands and riparian woodlands of interior NSW are also used.	**Moderate.** This species is known to occur in the locality and is highly mobile. Therefore, this species has the potential to occur within the Subject Site	**Unlikely.** The habitat within the Subject Site is common in the locality. If this species was detected, it would most likely be moving through to more suitable habitat. The Subject Site does not contain any suitable breeding resources for this species (large trees)
Curlew Sandpiper (*Calidris ferruginea*)	E	CE, Bonn, C,J,K	Bionet - 0; PMST - L	It generally occupies littoral and estuarine habitats, and in New South Wales is mainly found in intertidal mudflats of sheltered coasts. It also occurs in non-tidal swamps, lakes and lagoons on the coast and sometimes inland. It forages in or at the edge of shallow water, occasionally on exposed algal mats or waterweed, or on banks of beach-cast seagrass or seaweed.	**None.** No suitable littoral, estuarine or similar habitat occurred within the Subject Site. Therefore, this species almost no chance of occurring within the Subject Site	**None.** As this species has no chance of occurring within the Subject Site, it is unlikely to be impacted by any future works
Eastern Curlew (*Neophema chrysogaster*)	-	CE, C,J,K	Bionet - 0; PMST - M	The Eastern Curlew is most commonly associated with sheltered coasts, especially estuaries, bays, harbours, inlets and coastal lagoons, with large intertidal mudflats or sandflats, often with beds of seagrass. Occasionally, the species occurs on ocean beaches (often near estuaries), and coral reefs, rock platforms, or rocky islets. The birds are often recorded among saltmarsh and on mudflats fringed by mangroves, and sometimes use the mangroves. The birds are also found in saltworks and sewage farms. The numbers of Eastern Curlew recorded during one study were correlated with wetland areas.	**None.** No suitable littoral, estuarine or similar habitat occurred within the Subject Site. Therefore, this species has almost no chance of occurring within the Subject Site	**None.** As this species has no chance of occurring within the Subject Site, it is unlikely to be impacted by any future works

Species	TSC Act*	EPBC Act*	Records Source	Habitat Description	Likelihood of Occurrence	Potential for Impact
Little Lorikeet (*Glossopsitta pusilla*)	V	-	Bionet - 5 PMST - N/A	Forages primarily in the canopy of open Eucalyptus forest and woodland, yet also finds food in Angophora, Melaleuca and other tree species. Riparian habitats are particularly used, due to higher soil fertility and hence greater productivity. Isolated flowering trees in open country, e.g. paddocks, roadside remnants and urban trees also help sustain viable populations of the species.	**Moderate.** This species is highly mobile and is known from the locality. Therefore, this species has the potential to occur within the Subject Site.	**Unlikely.** The Subject Site does not contain suitable foraging or nesting resources for this species. It would only utilise the resources of the Subject Site on passage to areas of suitable habitat
Swift Parrot (*Lathamus discolor*)	E	CE	Bionet - 0 PMST - Kn	Migrates to the Australian south-east mainland between March and October. On the mainland they occur in areas where eucalypts are flowering profusely or where there are abundant lerp (from sap-sucking bugs) infestations. Favoured feed trees include winter flowering species such as Swamp Mahogany *Eucalyptus robusta*, Spotted Gum *Corymbia maculata*, Red Bloodwood *C. gummifera*, Mugga Ironbark *E. sideroxylon*, and White Box *E. albens*. Commonly used lerp infested trees include Inland Grey Box *E. microcarpa*, Grey Box *E. moluccana* and Blackbutt *E. pilularis*.	**Moderate.** This species is highly mobile and is known from the locality. Therefore, this species has the potential to occur within the Subject Site.	**Unlikely.** The Subject Site does not contain suitable foraging resources for this species. It would only utilise the resources of the Subject Site on passage to areas of suitable habitat
Turquoise Parrot (*Neophema pulchella*)	V	-	Bionet - 1 PMST - N/A	Lives on the edges of eucalypt woodland adjoining clearings, timbered ridges and creeks in farmland. Prefers to feed in the shade of a tree and spends most of the day on the ground searching for the seeds or grasses and herbaceous plants, or browsing on vegetable matter.	**Moderate.** This species is highly mobile and is known from the locality. Therefore, this species has the potential to occur within the Subject Site.	**Unlikely.** The Subject Site does not contain suitable foraging or nesting resources for this species. It would only utilise the resources of the Subject Site on passage to areas of suitable habitat
Powerful Owl (*Ninox strenua*)	V	-	Bionet - 1 PMST - N/A	The Powerful Owl inhabits a range of vegetation types, from woodland and open sclerophyll forest to tall open wet forest and rainforest. The Powerful Owl requires large tracts of forest or woodland habitat but can occur in fragmented landscapes as well. The species breeds and hunts in open or closed sclerophyll forest or woodlands and occasionally hunts in open habitats. It roosts by day in dense vegetation comprising species such as Turpentine *Syncarpia glomulifera*, Black She-oak *Allocasuarina littoralis*, Blackwood *Acacia melanoxylon*, Rough-barked Apple Angophora floribunda, Cherry Ballart *Exocarpus cupressiformis* and a number of eucalypt species.	**Moderate.** This species is highly mobile and is known from the locality. Therefore, this species has the potential to occur within the Subject Site.	**Unlikely.** The Subject Site does not contain suitable foraging or nesting resources for this species. It would only utilise the resources of the Subject Site on passage to areas of suitable habitat

Species	TSC Act*	EPBC Act*	Records Source	Habitat Description	Likelihood of Occurrence	Potential for Impact
Eastern Bristlebird (*Dasyornis brachypterus*)	E	E	Bionet - 0 PMST - M	Habitat for central and southern populations is characterised by dense, low vegetation including heath and open woodland with a heathy understorey. In northern NSW the habitat occurs in open forest with dense tussocky grass understorey and sparse mid-storey near rainforest ecotone; all of these vegetation types are fire prone.	**None.** No suitable heath or heathy woodland habitat occurred within the Subject Site. Therefore, this species has alomost no chance of occurring within the Subject Site	**None.** As this species has no chance of occurring within the Subject Site, it is unlikely to be impacted by any future works
Regent Honeyeater (*Anthochaera phrygia*)	CE	CE	Bionet - 0 PMST - L	The species inhabits dry open forest and woodland, particularly Box-Ironbark woodland, and riparian forests of River Sheoak. Regent Honeyeaters inhabit woodlands that support a significantly high abundance and species richness of bird species. These woodlands have significantly large numbers of mature trees, high canopy cover and abundance of mistletoes.	**Low,** This species is highly mobile but is not well known from the locality. Therefore, this species has a low potential to occur within the Subject Site.	**Unlikely.** The Subject Site does not contain suitable foraging or nesting resources for this species. It would only utilise the Subject Site on passage to areas of suitable habitat
Painted Honeyeater (*Grantiella picta*)	V	V	Bionet - 0 PMST - L	The greatest concentrations of the bird and almost all breeding occurs on the inland slopes of the Great Dividing Range in NSW. Inhabits Boree, Brigalow and Box-Gum Woodlands and Box-Ironbark Forests. A specialist feeder on the fruits of mistletoes growing on woodland eucalypts and acacias. Prefers mistletoes of the genus *Amyema.*	**Low,** This species is highly mobile but is not well known from the locality. Therefore, this species has a low potential to occur within the Subject Site.	**Unlikely.** The Subject Site does not contain suitable foraging or nesting resources for this species. It would only utilise the Subject Site on passage to areas of suitable habitat
Varied Sittella (*Daphoenositta chrysoptera*)	V	-	Bionet - 20 PMST - N/A	Inhabits eucalypt forests and woodlands, especially those containing rough-barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland.	**Moderate.** This species is highly mobile and is known from the locality. Therefore, this species has the potential to occur within the Subject Site.	**Unlikely.** The Subject Site does not contain suitable foraging or nesting resources for this species. It would only utilise the resources of the Subject Site on passage to areas of suitable habitat
Dusky Woodswallow (*Artamus cyanopterus cyanopterus*)	V	-	Bionet - 75 PMST - N/A	Often reported in woodlands and dry open sclerophyll forests, usually dominated by eucalypts, including mallee associations. It has also been recorded in shrublands and heathlands and various modified habitats, including regenerating forests and very occasionally in moist forests or rainforests.	**Moderate.** This species is highly mobile and is known from the locality. Therefore, this species has the potential to occur within the Subject Site.	**Unlikely.** The Subject Site does not contain suitable foraging or nesting resources for this species. It would only utilise the resources of the Subject Site on passage to areas of suitable habitat
Scarlet Robin	V	-	Bionet - 7	The Scarlet Robin lives in dry eucalypt forests and woodlands. The understorey is usually open and grassy with few scattered shrubs. This species lives in	**Moderate.** This species is highly mobile and is known from the locality. Therefore,	**Unlikely.** The Subject Site does not contain suitable foraging or nesting

Species	TSC Act*	EPBC Act*	Records Source	Habitat Description	Likelihood of Occurrence	Potential for Impact
(*Petroica boodang*)			PMST - N/A	both mature and regrowth vegetation. It occasionally occurs in mallee or wet forest communities, or in wetlands and tea-tree swamps. Scarlet Robin habitat usually contains abundant logs and fallen timber: these are important components of its habitat. The Scarlet Robin is primarily a resident in forests and woodlands, but some adults and young birds disperse to more open habitats after breeding.	this species has the potential to occur within the Subject Site.	resources for this species. It would only utilise the resources of the Subject Site on passage to areas of suitable habitat
Australian Painted Snipe	E	E	Bionet - 0	Prefers fringes of swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber.	**Low.** This species is highly mobile but is not well known from the locality. Therefore, this species has a low potential to occur within the Subject Site. Nearby lands contain dams and watercourses but the Subject Site lacks contigious vegetation cover which could be used by this species	**Unlikely.** The Subject Site does not contain suitable foraging or nesting resources for this species. It would only utilise the resources of the Subject Site on passage to areas of suitable habitat
(*Rostratula australis*)			PMST - L			
Freckled Duck	V	-	Bionet - 1	Prefer permanent freshwater swamps and creeks with heavy growth of Cumbungi, Lignum or Tea-tree. During drier times they move from ephemeral breeding swamps to more permanent waters such as lakes, reservoirs, farm dams and sewage ponds	**None.** No suitable waterbodies or stream habitat occurred within the Subject Site. Therefore, this species has alomost no chance of occurring within the Subject Site. Nearby lands contain dams and watercourses but the Subject Site lacks contigious vegetation cover which could be used by this species	**None.** As this species has no chance of occurring within the Subject Site, it is unlikely to be impacted by any future works
(*Stictonetta naevosa*)			PMST - N/A			
Fish						
Murray Cod	-	V	Bionet - 0	The Murray Cod utilises a diverse range of habitats from clear rocky streams, such as those found in the upper western slopes of NSW (including the ACT), to	**None.** No suitable waterbodies or stream habitat occurred within the	**None.** As this species has no chance of occurring within the Subject Site, it is

Species	TSC Act*	EPBC Act*	Records Source	Habitat Description	Likelihood of Occurrence	Potential for Impact
(*Maccullochella peelii*)			PMST - M	slow-flowing, turbid lowland rivers and billabongs. Murray Cod are frequently found in the main channels of rivers and larger tributaries. The species is, therefore, considered a main-channel specialist. Murray Cod tend to occur in floodplain channels and anabranches when they are inundated, but the species' use of these floodplain habitats appears limited. Juveniles less than one year old have been found in main river channels where it appears they settle at a late larval (newly born) stage	Subject Site. Therefore, this species has alomost no chance of occurring within the Subject Site	unlikely to be impacted by any future works
Macquarie Perch	-	V	Bionet - 0	The Macquarie Perch is a riverine, schooling species. It prefers clear water and deep, rocky holes with lots of cover. As well as aquatic vegetation, additional cover may comprise of large boulders, debris and overhanging banks. Spawning occurs just above riffles (shallow running water). Populations may survive in impoundments if able to access suitable spawning sites	**None.** No suitable waterbodies or stream habitat occurred within the Subject Site. Therefore, this species has alomost no chance of occurring within the Subject Site	**None.** As this species has no chance of occurring within the Subject Site, it is unlikely to be impacted by any future works
(*Macquaria australasica*)			PMST - Kn			
Australian Grayling	-	V	Bionet - 0	The Australian Grayling is diadromous, spending part of its lifecycle in freshwater and at least part of the larval and/or juvenile stages in coastal seas. Adults (including pre spawning and spawning adults) inhabit cool, clear, freshwater streams with gravel substrate and areas alternating between pools and riffle zones	**None.** No suitable waterbodies or stream habitat occurred within the Subject Site. Therefore, this species has alomost no chance of occurring within the Subject Site	**None.** As this species has no chance of occurring within the Subject Site, it is unlikely to be impacted by any future works
(*Prototroctes maraena*)			PMST - M			
Mammals						
Spotted-tailed Quoll	V	E	Bionet - 0	Spotted-tailed quolls live in various environments including forests, woodlands, coastal heathlands and rainforests. They are sometimes seen in open country, or on grazed areas and rocky outcrops. They are mainly solitary animals, and will make their dens in rock shelters, small caves, hollow logs and tree hollows. They use these dens for shelter and to raise young. These animals are highly mobile. They can move up to several kilometres in a night and may have quite large territories. Within their territories, they will have latrine areas where they defecate. These are often in exposed areas, such as on rocky outcrops.	**Low.** This species is highly mobile but is not well known from the locality. Therefore, this species has a low potential to occur within the Subject Site. Nearby lands contain suitable woodland and riparian habitat, but the Subject Site lacks contigious vegetation cover which could be used by this species	**Unlikely.** The Subject Site does not contain suitable foraging or denning resources for this species. It would only utilise the resources of the Subject Site on passage to areas of suitable habitat
(*Dasyurus maculatus*)			PMST - L			

Species	TSC Act*	EPBC Act*	Records Source	Habitat Description	Likelihood of Occurrence	Potential for Impact
Koala (combined populations of Qld, NSW and the ACT) (*Phascolarctos cinereus*)	V	V	Bionet - 1 PMST - Kn	Inhabit eucalypt woodlands and forests. Feed on the foliage of more than 70 eucalypt species and 30 non-eucalypt species, but in any one area will select preferred browse species	**Low.** This species is highly mobile and is known from the locality; however, the Subject Site contains no mature eucalypt trees. Therefore, this species has a low potential to occur within the Subject Site.	**Unlikely.** As this species has a low chance of occurring within the Subject Site, it is unlikely to be impacted by any future works
Greater Glider (*Petauroides volans*)	-	V	Bionet - 0 PMST - Kn	Feeds exclusively on eucalypt leaves, buds, flowers and mistletoe. Shelter during the day in tree hollows and will use up to 18 hollows in their home range. Occupy a relatively small home range with an average size of 1 to 3 ha.	**Low.** This species is highly mobile but is not well known from the locality. The Subject Site also contains no mature eucalypt trees. Therefore, this species has a low potential to occur within the Subject Site.	**Unlikely.** As this species has a low chance of occurring within the Subject Site, it is unlikely to be impacted by any future works
Brush-tailed Rock-wallaby (*Petrogale penicillata*)	E	V	Bionet - 0 PMST - L	Occurs in forests and woodlands along the Great Divide and on the western slopes in escarpment country with rocky outcrops, steep rocky slopes, gorges, boulders and isolated rocky areas. The majority of populations favour north-facing aspects, but some southern aspects have been recorded. Apart from the critical rock structure, Brush-tailed Rock-wallaby also requires adjacent vegetation types, associated types include, dense rainforest, wet sclerophyll, vine thicket, dry sclerophyll forest and open forest. They also require suitable caves and rocky overhangs for shelter and also for 'lookout' posts.	**None.** No suitable escapment habitat is present on the Subject Site or nearby lands	**None.** As this species has no chance of occurring within the Subject Site, it is unlikely to be impacted by any future works
New Holland Mouse (*Pseudomys novaehollandiae*)	-	V	Bionet - 0 PMST - L	Known to inhabit open heathlands, woodlands and forests with a heathland understorey and vegetated sand dunes. It is a social animal, living predominantly in burrows shared with other individuals. Distribution is patchy in time and space, with peaks in abundance during early to mid-stages of vegetation succession typically induced by fire.	**Low.** No suitable healthy understorey or similar habitat occurred within the Subject Site. Therefore, this species has a low chance of occurring within Subject Site.	**Unlikely.** As this species has a low chance of occurring within the Subject Site, it is unlikely to be impacted by any future works.
Grey-headed Flying-fox	V	V	Bionet - 11	Grey-headed Flying-foxes are generally found within 200 km of the eastern coast of Australia, from Rockhampton in Queensland to Adelaide in South	**Moderate.** This species is highly mobile and well known from the locality. The	**Unlikely.** The Subject Site does not contain suitable foraging or roosting

Species	TSC Act*	EPBC Act*	Records Source	Habitat Description	Likelihood of Occurrence	Potential for Impact
(*Pteropus poliocephalus*)			PMST - Kn	Australia. Occur in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops. Roosting camps are generally located within 20 km of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy. Individual camps may have tens of thousands of animals and are used for mating, and for giving birth and rearing young.	single eucalypt present would provide some foraging utility; however, this habitat is not limited in the locality	resources for this species. It would only utilise the Subject Site on passage to areas of suitable habitat
Large-eared Pied Bat	V	V	Bionet - 0	Found in well-timbered areas containing gullies. Roosts in caves (near their entrances), crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin (*Petrochelidon ariel*), frequenting low to mid-elevation dry open forest and woodland close to these features. Females have been recorded raising young in maternity roosts (c. 20-40 females) from November through to January in roof domes in sandstone caves and overhangs. They remain loyal to the same cave over many years.	**Low.** This species is known to occur in the locality; however, no suitable woodland foraging or roosting microhabitats are present. Therefore, this species has a low potential to occur within the Subject Site.	**Unlikely.** The Subject Site does not contain suitable foraging or roosting resources for this species. It would only utilise the Subject Site on passage to areas of suitable habitat
(*Chalinolobus dwyeri*)			PMST - Kn			
Eastern Freetail-bat	V	-	Bionet - 10	Occur in dry sclerophyll forest, woodland, swamp forests and mangrove forests east of the Great Dividing Range. Roost mainly in tree hollows but will also roost under bark or in man-made structures.	**Moderate.** This species is well known from the locality; however, no suitable woodland foraging or roosting trees are present. Therefore, this species has a low potential to occur within the Subject Site.	**Unlikely.** The Subject Site does not contain suitable foraging or roosting resources for this species. It would only utilise the Subject Site on passage to areas of suitable habitat
(*Mormopterus norfolkensis*)			PMST - N/A			
Eastern False Pipistrelle	V	-	Bionet - 2	Prefers moist habitats, with trees taller than 20 m. Generally roosts in eucalypt hollows, but has also been found under loose bark on trees or in buildings.	**Low.** This species is not well known from the locality. No suitable woodland foraging or roosting trees are present. Therefore, this species has a low potential to occur within the Subject Site.	**Unlikely.** The Subject Site does not contain suitable foraging or roosting resources for this species. It would only utilise the Subject Site on passage to areas of suitable habitat
(*Falsistrellus tasmaniensis*)			PMST - N/A			
Eastern Bentwing-bat	V	-	Bionet - 6	Caves are the primary roosting habitat, but also use derelict mines, storm-water tunnels, buildings and other man-made structures. Form discrete	**Moderate.** This species is well known from the locality; however, no suitable	**Unlikely.** The Subject Site does not contain suitable foraging or roosting

Species	TSC Act*	EPBC Act*	Records Source	Habitat Description	Likelihood of Occurrence	Potential for Impact
(*Miniopterus schreibersii oceanensis*)			PMST - N/A	populations centred on a maternity cave that is used annually in spring and summer for the birth and rearing of young. Maternity caves have very specific temperature and humidity regimes. At other times of the year, populations disperse within about 300 km range of maternity caves.	woodland foraging or roosting trees are present. Therefore, this species has a low potential to occur within the Subject Site.	resources for this species. It would only utilise the Subject Site on passage to areas of suitable habitat
Southern Myotis	V	-	Bionet - 5	Generally roost in groups of 10 - 15 close to water in caves, mine shafts, hollow-bearing trees, storm water channels, buildings, under bridges and in dense foliage. Forage over streams and pools catching insects and small fish by raking their feet across the water surface.	**Moderate.** This species is well known from the locality; however, no suitable riparian woodland foraging or roosting trees are present. Therefore, this species has a low potential to occur within the Subject Site.	**Unlikely.** The Subject Site does not contain suitable foraging or roosting resources for this species. It would only utilise the Subject Site on passage to areas of suitable habitat
(*Myotis macropus*)			PMST - N/A			
Yellow-bellied Sheathtail Bat	V	-	Bionet - 1	Roosts singly or in groups of up to six, in tree hollows and buildings; in treeless areas they are known to utilise mammal burrows.	**Low.** This species is not well known from the locality. No suitable woodland foraging or roosting trees are present. Therefore, this species has a low potential to occur within the Subject Site.	**Unlikely.** The Subject Site does not contain suitable foraging or roosting resources for this species. It would only utilise the Subject Site on passage to areas of suitable habitat
(*Saccolaimus flaviventris*)			PMST - N/A			
Greater Broad-nosed Bat	V	-	Bionet - 1	Utilises a variety of habitats from woodland through to moist and dry eucalypt forest and rainforest, though it is most commonly found in tall wet forest. Although this species usually roosts in tree hollows, it has also been found in buildings.	**Low.** This species is not well known from the locality. No suitable woodland foraging or roosting trees are present. Therefore, this species has a low potential to occur within the Subject Site.	**Unlikely.** The Subject Site does not contain suitable foraging or roosting resources for this species. It would only utilise the Subject Site on passage to areas of suitable habitat
(*Scoteanax rueppellii*)			PMST - N/A			
Gastropods						
Cumberland Plain Land Snail	E	-	Bionet - 39	Primarily inhabits Cumberland Plain Woodland (a critically endangered ecological community). This community is a grassy, open woodland with occasional dense patches of shrubs. It is also known from Shale Gravel Transition Forests, Castlereagh	**Moderate.** This species is well known from the locality and suitable habitat is present on adjacent lands in the form of Cumberland	**Yes.** Development of the Subject Site would remove suitable habitat for this species from the locality

Species	TSC Act*	EPBC Act*	Records Source	Habitat Description	Likelihood of Occurrence	Potential for Impact
(*Meridolum corneovirens*)			PMST - N/A	Swamp. Lives under litter of bark, leaves and logs, or shelters in loose soil around grass clumps. Occasionally shelters under rubbishWoodlands and the margins of River-flat Eucalypt Forest, which are also listed communities.	Plain Woodland vegetation. Therefore, this species has the potential to occur within the Subject Site	
Migratory species						
Fork-tailed Swift	-	C, J, K	Bionet - 0	The Fork-tailed Swift is almost exclusively aerial, flying from less than 1 m to at least 300 m above ground and probably much higher. In Australia, they mostly occur over inland plains but sometimes above foothills or in coastal areas.	**Moderate.** This species has the potential to fly over the Subject Site during migration. Therefore, this species has the potential to occur within the Subject Site.	**Unlikely.** Any future works on the Subject Site are unlikely to affect the foraging utility of the above airspace for this species
(*Apus pacificus*)			PMST - L			
Cattle Egret	-	C,J	Bionet - 4	The Cattle Egret occurs in tropical and temperate grasslands, wooded lands and terrestrial wetlands	**Moderate.** Marginal aquatic and suitable grassland foraging habitat is present in the Subject Site for this species. Therefore, this species has the potential to occur within the subject site	**Unlikely.** Grassland habitat on the Subject Site is not limited in the locality and is not vital to the long-term survival of this species in the locality. Removal of this habitat by any future works would have a negligible impact on this species in the locality
(*Ardea ibis*)			PMST - N/A			
Oriental Cuckoo	-	C, J, K	Bionet - 0	Non-breeding habitat only: monsoonal rainforest, vine thickets, wet sclerophyll forest or open Casuarina, Acacia or Eucalyptus woodlands. The species frequently occurs at edges or ecotones between habitat types. Riparian forest is favoured habitat in the Kimberley region.	**Low.** The Subject Site does not contain the preferred habitat types for this species; however, it may pass through the locality during migration. Therefore, this species has a low potential to occur within the Subject Site.	**Unlikely.** As this species has a low chance of occurring within the Subject Site, it is unlikely to be impacted by the project.
(*Cuculus optatus*)			PMST - M			
White-throated Needletail	-	C, J, K	Bionet - 0	Non-breeding habitat only: Found across a range of habitats, more often over wooded areas, where it is almost exclusively aerial. Large tracts of native vegetation, particularly forest, may be a key habitat requirement for the species. Found to roost in tree hollows in tall trees on ridge-tops, on bark or rock faces. Appears to have traditional roost sites.	**Moderate.** This species has the potential to fly over the Subject Site during migration. Therefore, this species has the potential to occur within the Subject Site.	**Unlikely.** Any future works on the Subject Site are unlikely to affect the foraging utility of the above airspace for this species
(*Hirundapus caudacutus*)			PMST - Kn			

Species	TSC Act*	EPBC Act*	Records Source	Habitat Description	Likelihood of Occurrence	Potential for Impact
Rainbow Bee-eater	-	J	Bionet - 1	The Rainbow Bee-eater occurs mainly in open forests and woodlands, shrublands, and in various cleared or semi-cleared habitats, including farmland and areas of human habitation	**Moderate.** The Subject Site and adjacent lands contain broadly suitable habitat for this species and it may pass through the locality during migration. Therefore, this species has the potential to occur within the Subject Site.	**Unlikely.** Grassland habitats on the Subject Site is not limited in the locality and is not vital to the long-term survival of this species in the locality. Removal of this habitat by any future works would have a negligible impact on this species in the locality
(*Merops ornatus*)			PMST - N/A			
Black-faced Monarch	-	Bonn	Bionet - 0	Wet forest specialist, found mainly in rainforest and wet sclerophyll forest, especially in sheltered gullies and slopes with a dense understorey of ferns and/or shrubs.	**Low.** The Subject Site does not contain the preferred habitat types for this species; however, it may pass through the locality during migration. Therefore, this species has a low potential to occur within the Subject Site.	**Unlikely.** As this species has a low chance of occurring within the Subject Site, it is unlikely to be impacted by the project.
(*Monarcha melanopsis*)			PMST - Kn			
Spectacled Monarch	-	Bonn	Bionet - 0	The Spectacled Monarch prefers thick understorey in rainforests, wet gullies and waterside vegetation, as well as mangroves.	**Low.** The Subject Site does not contain the preferred habitat types for this species; however, it may pass through the locality during migration. Therefore, this species has a low potential to occur within the Subject Site.	**Unlikely.** As this species has a low chance of occurring within the Subject Site, it is unlikely to be impacted by the project.
(*Monarcha trivirgatus*)			PMST - Kn			
Yellow Wagtail	-	C, J, K	Bionet - 0	Non-breeding habitat only: mostly well-watered open grasslands and the fringes of wetlands. Roosts in mangroves and other dense vegetation.	**Low.** The Subject Site does not contain the preferred habitat types for this species; however, it may pass through the locality during migration and riparian vegetation is present nearby. Therefore, this species has a low potential to occur within the Subject Site.	**Unlikely.** As this species has a low chance of occurring within the Subject Site, it is unlikely to be impacted by the project.
(*Motacilla flava*)			PMST - M			

Species	TSC Act*	EPBC Act*	Records Source	Habitat Description	Likelihood of Occurrence	Potential for Impact
Satin Flycatcher	-	Bonn	Bionet - 0	Eucalypt forest and woodlands, at high elevations when breeding. They are particularly common in tall wet sclerophyll forest, often in gullies or along watercourses. In woodlands they prefer open, grassy woodland types. During migration, habitat preferences expand, with the species recorded in most wooded habitats except rainforests. Wintering birds in northern Qld will use rainforest - gallery forests interfaces, and birds have been recorded wintering in mangroves and paperbark swamps.	**Low.** The Subject Site does not contain the preferred habitat types for this species; however, it may pass through the locality during migration and riparian vegetation is present nearby. Therefore, this species has a low potential to occur within the Subject Site.	**Unlikely.** As this species has a low chance of occurring within the Subject Site, it is unlikely to be impacted by the project.
(*Myiagra cyanoleuca*)			PMST - Kn			
Rufous Fantail	-	Bonn	Bionet - 0	Moist, dense habitats, including mangroves, rainforest, riparian forests and thickets, and wet eucalypt forests with a dense understorey. When on passage a wider range of habitats are used including dry eucalypt forests and woodlands and Brigalow shrublands.	**Low.** The Subject Site does not contain the preferred habitat types for this species; however, it may pass through the locality during migration and riparian vegetation is present nearby. Therefore, this species has a low potential to occur within the Subject Site.	**Unlikely.** As this species has a low chance of occurring within the Subject Site, it is unlikely to be impacted by the project.
(*Rhipidura rufifrons*)			PMST - Kn			
Common Sandpiper	-	Bonn, C,J,K	Bionet - 0	Found along all coastlines of Australia and in many areas inland, the Common Sandpiper is widespread in small numbers. The population when in Australia is concentrated in northern and western Australia.	**None.** No suitable littoral, estuarine or similar habitat occurred within the Subject Site. Therefore, this species almost no chance of occurring within the Subject Site	**None.** As this species has no chance of occurring within the Subject Site, it is unlikely to be impacted by any future works
(*Actitis hypoleucus*)			PMST - M			
Sharp-tailed Sandpiper	-	Bonn, C,J,K	Bionet - 0	In Australasia, the Sharp-tailed Sandpiper prefers muddy edges of shallow fresh or brackish wetlands, with inundated or emergent sedges, grass, saltmarsh or other low vegetation. This includes lagoons, swamps, lakes and pools near the coast, and dams, waterholes, soaks, bore drains and bore swamps, saltpans and hypersaline saltlakes inland.	**None.** No suitable littoral, estuarine or similar habitat occurred within the Subject Site. Therefore, this species almost no chance of occurring within the Subject Site	**None.** As this species has no chance of occurring within the Subject Site, it is unlikely to be impacted by any future works
(*Calidris acuminata*)			PMST - Kn			
Curlew Sandpiper	E	CE, Bonn, C,J,K	Bionet - 0	As above.	**None.** No suitable littoral, estuarine or similar habitat occurred within the Subject	**None.** As this species has no chance of occurring within the Subject Site, it is

Species	TSC Act*	EPBC Act*	Records Source	Habitat Description	Likelihood of Occurrence	Potential for Impact
(*Calidris ferruginea*)			PMST - L		Site. Therefore, this species almost no chance of occurring within the Subject Site	unlikely to be impacted by any future works
Pectoral Sandpiper	-	Bonn, J,K	Bionet - 0	In Australasia, the Pectoral Sandpiper prefers shallow fresh to saline wetlands. The species is found at coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains and artificial wetlands.	**None.** No suitable littoral, estuarine or similar habitat occurred within the Subject Site. Therefore, this species almost no chance of occurring within the Subject Site	**None.** As this species has no chance of occurring within the Subject Site, it is unlikely to be impacted by any future works
(*Calidris melanotos*)			PMST - M			
Latham's Snipe	-	Bonn, J,K	Bionet - 16	Occurs in permanent and ephemeral wetlands up to 2000 m above sea-level. They usually inhabit open, freshwater wetlands with low, dense vegetation (e.g. swamps, flooded grasslands or heathlands, around bogs and other water bodies). However, they can also occur in habitats with saline or brackish water, in modified or artificial habitats, and in habitats located close to humans or human activity.	**Moderate.** This species is highly mobile and well known from the locality. Therefore, this species has the potential to occur within the Subject Site. Nearby lands contain dams and watercourses but the Subject Site lacks contigious vegetation cover which could be used by this species	**Unlikely.** The Subject Site does not contain suitable foraging or nesting resources for this species. It would only utilise the resources of the Subject Site on passage to areas of suitable habitat
(*Gallinago hardwickii*)			PMST - M			
Eastern Curlew	-	CE, Bonn, C,J,K	Bionet - 0	The Eastern Curlew is most commonly associated with sheltered coasts, especially estuaries, bays, harbours, inlets and coastal lagoons, with large intertidal mudflats or sandflats, often with beds of seagrass. Occasionally, the species occurs on ocean beaches (often near estuaries), and coral reefs, rock platforms, or rocky islets. The birds are often recorded among saltmarsh and on mudflats fringed by mangroves, and sometimes use the mangroves. The birds are also found in saltworks and sewage farms. The numbers of Eastern Curlew recorded during one study were correlated with wetland areas.	**None.** No suitable littoral, estuarine or similar habitat occurred within the Subject Site. Therefore, this species has almost no chance of occurring within the Subject Site	**None.** As this species has no chance of occurring within the Subject Site, it is unlikely to be impacted by any future works
(*Numenius madagascariensis*)			PMST - M			
Eastern Osprey	V	Bonn	Bionet - 0	Favour coastal areas, especially the mouths of large rivers, lagoons and lakes. Feed on fish over clear, open water	**Moderate.** This species is highly mobile and well known from the locality. Therefore, this species has the potential to occur within the Subject Site. Nearby lands contain dams,	**Unlikely.** The Subject Site does not contain suitable foraging or nesting resources for this species. It would only utilise the resources of the Subject
(*Pandion haliaetus*)			PMST - L			

Species	TSC Act*	EPBC Act*	Records Source	Habitat Description	Likelihood of Occurrence	Potential for Impact
					watercourses and native woodlands but the Subject Site lacks contigious vegetation cover which could be used by this species	Site on passage to areas of suitable habitat
Common Greenshank	-	Bonn, C,J,K	Bionet - 0	The Common Greenshank occurs in sheltered coastal habitats, typically with large mudflats and saltmarsh, mangroves or seagrass. Habitats include embayments, harbours, river estuaries, deltas and lagoons and are recorded less often in round tidal pools, rock-flats and rock platforms.	**None.** No suitable littoral, estuarine or similar habitat occurred within the Subject Site. Therefore, this species has almost no chance of occurring within the Subject Site	**None.** As this species has no chance of occurring within the Subject Site, it is unlikely to be impacted by any future works
(*Tringa nebularia*)			PMST - L			

**CE = Critically Endangered, E = Endangered, EP = Endangered Population, V = Vulnerable, Bonn = Convention on the Conservation of Migratory Species of Wild Animals, C = China-Australia Migratory Bird Agreement, J = Japan-Australia Migratory Bird Agreement, K = Republic of Korea-Australia Migratory Bird Agreement*

Caulfield Stage 2C Rezoning

APPENDIX E

SEVEN PART TESTS (TSC ACT) AND TESTS OF SIGNIFICANCE (EPBC ACT)

Appendix E: Seven Part Tests (TSC Act) and Tests of Significance (EPBC Act)

Seven Part Tests (TSC Act)

Under **Part 5A** of the *Environmental Planning and Assessment Act 1979* (EP&A Act) a seven-part test is required to determine whether a significant impact on any threatened species or TEC listed under the NSW *Threatened Species Conservation Act 1995* (TSC Act) known or considered likely to occur on a site as a result of a proposed action. If a significant impact is considered likely, based on the test then further assessment through a Species Impact Statement (SIS) is required.

The following listed entities are considered to be present or to have suitable habitat and a potential to occur on the Subject Site and would be impacted upon by future development of the Subject Site.

Flora

Cumberland Plan Woodland in the Sydney Basin Bioregion

This TEC is listed as critically endangered under the TSC Act. The following description has been taken from the NSW OEH profile description for this TEC.

The dominant canopy trees of Cumberland Plain Woodland are Grey Box (*Eucalyptus moluccana*) and Forest Red Gum (*E. tereticornis*), with Narrow-leaved Ironbark (*E. crebra*), Spotted Gum (*Corymbia maculata*) and Thin-leaved Stringybark (*E. eugenioides*) occurring less frequently. The shrub layer is dominated by Blackthorn (*Bursaria spinosa*), and it is common to find abundant grasses such as Kangaroo Grass (*Themeda australis*) and Weeping Meadow Grass (*Microlaena stipoides* var. *stipoides*).

Distribution

Occurs on soils derived from Wianamatta Shale, and throughout the driest part of the Sydney Basin. Before European settlement, was extensive across the Cumberland Plain, western Sydney. Today, only 9 percent of the original extent remains intact, with the remnants scattered widely across the Cumberland Plain. Good examples can be seen at Scheyville National Park and Mulgoa Nature Reserve.

Habitat and ecology

- Typically occurs on heavy clay soils derived from Wianamatta Shale;
- Well adapted to drought and fire, and the understorey plants often rely on underground tubers or profuse annual seed production to survive adverse conditions; and
- Cumberland Plain Woodland is habitat for threatened species such as the Cumberland land snail (*Meridolum corneovirens*).

This TEC occurs on the fringes of the Subject Site as two sub-communities, CPW and CPW derived grassland. CPW is confined to a single mature tree and understory vegetation in the south-west and CPW derived grassland occurs as a small regenerating clump in the south and south-west of the Subject Site.

(a) In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

Not applicable to a TEC.

(b) In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.

Not applicable to a TEC.

(c) In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

(i) Is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction; or

(ii) Is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.

Development of the Subject Site would remove a small portion of CPW and CPW derived grassland from the locality. The occurrence of this TEC on the Subject Site represents a very small portion of its wider occurrence. Large areas of more intact CPW and CPW derived grassland are present on lands to the south and east which would not be directly impacted upon by the development of the Subject Site. Development of the Subject Site would not place the local occurrence of this TEC at risk of extinction.

CPW vegetation downslope of the Subject Site may be affected by secondary impacts of future development (sediment runoff, introduction of new exotic species). However, this vegetation already abuts an urbanised landscape with many of these secondary stressors already present. Development of the Subject Site is not considered likely to exacerbate these impacts to the extent that the local occurrence of this TEC would be placed at risk of extinction.

(d) In relation to the habitat of a threatened species, population or ecological community:

(i) The extent to which habitat is likely to be removed or modified as a result of the action proposed;

(ii) Whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action; and

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.

All of the occurrence of this TEC would be removed by the development of the Subject Site (refer to **Table 3-1** of the above report). However, this would amount to less than 1% of the total occurrence of this TEC within the entirety of lot 627 DP1163903.

Habitat would not be fragmented or isolated by the development of the Subject Site. Existing CPW on lands to the east and south would retain their current level of connectivity following development through Manooka Reserve. Lands to the north and west of the Subject Site have already been developed and do not provide connectivity for any native vegetation habitat in the locality.

The CPW on the Subject Site represents a small portion of the local occurrence. It is located on the outer edge of a large occurrence of this TEC, which largely falls within protected lands of Manooka Reserve. The occurrence on the Subject Site is prone to impacts from nearby development and exotic grasslands. The small portion of this TEC which would be removed by future development of the Subject Site is not considered important to the long-term survival of this TEC in the locality.

(e) Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly).

At present, there are four critical habitats declared under **Section 53–55** of the TSC Act:

- Gould's Petrel - critical habitat declaration;
- Little penguin population in Sydney's North Harbour - critical habitat declaration;
- Mitchell's Rainforest Snail in Stotts Island Nature Reserve - critical habitat declaration; and
- Wollemi Pine - critical habitat declaration.

Of the above listed critical habitats, the Little penguin population in Sydney's North Harbour - critical habitat is located closest to the Subject Site. However, as the Subject Site is located over 50 km from the critical habitat, future development would not be expected to have any direct or indirect effect on this or any other declared critical habitat.

(f) Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan.

The Cumberland Plain Recovery Plan is relevant to this TEC.

This plan has the following objectives:

1. To build a protected area network, comprising public and private lands, focused on the priority conservation lands;

2. To deliver best practice management for threatened species, populations and ecological communities across the Cumberland Plain, with a specific focus on the priority conservation lands and public lands where the primary management objectives are compatible with conservation;
3. To develop an understanding and enhanced awareness in the community of the Cumberland Plain's threatened biodiversity, the best practice standards for its management, and the recovery program; and
4. To increase knowledge of the threats to the survival of the Cumberland Plain's threatened species, populations and ecological communities, and thereby improve capacity to manage these in a strategic and effective manner.

The development of the Subject Site is not considered inconsistent with the objectives of the Recovery Plan. The Subject Site is not located within any priority conservation lands for this TEC. The nearest such lands are within Harrington Forest, over 2.4 km to the north-west.

The development of the Subject Site would remove a small portion of this TEC from the locality with the majority retained elsewhere in the remainder of lot 627 DP1163903.

To date, no threat abatement plan relevant to Cumberland Plain Woodland has been developed.

(g) Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

Development of the Subject Site would or may constitute, introduce or exacerbate the following Key Threatening Processes (KTPs) relevant to this TEC:

> Anthropogenic climate change;
> Clearing of native vegetation;
> Infection of native plants by *Phytophthora cinnamomi*;
> Introduction and establishment of Exotic Rust Fungi of the order Pucciniales pathogenic on plants of the family Myrtaceae;
> Invasion and establishment of exotic vines and scramblers;
> Invasion and establishment of Scotch Broom (*Cytisus scoparius*);
> Invasion of native plant communities by African Olive *Olea europaea* subsp. *cuspidata* (Wall. ex G. Don) Cif;
> Invasion of native plant communities by *Chrysanthemoides monilifera*;
> Invasion of native plant communities by exotic perennial grasses;
> Invasion, establishment and spread of Lantana (*Lantana camara* L. sens. Lat);
> Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants; and
> Removal of dead wood and dead trees.

Development of the Subject Site would result in a small loss of native vegetation, production of greenhouse gases and removal of dead wood. However, these KTPs arising from the development are not considered significant on the locality scale. Removal of CPW from the Subject Site would represent less than 1% of the occurrence of this TEC within the entirety of lot 627 DP1163903.

The introduction of pest weeds and diseases may occur in untreated water, unclean fill and from landscaping and garden plantings. However, these impacts can be mitigated through appropriate controls. With appropriate mitigation, development of the Subject Site is not considered likely to significantly exacerbate these KTPs on the locality scale.

Conclusion

This TEC is present as a small stand of woody vegetation and derived grasslands in the south and south-west of the Subject Site. Future development of the Subject Site would entail the removal of the entire occurrence of this TEC. However, this loss is not considered significant on the locality scale with large areas of this TEC present on adjacent lands to the south and east.

No significant impact on this TEC is anticipated by the future development of the Subject Site. Consequently, further assessment through the preparation of a SIS is not considered necessary.

Fauna

Cumberland Plain Land Snail (Meridolum corneovirens)

This species is listed as endangered under the TSC Act.

Superficially similar to the familiar exotic Garden Snail (*Helix aspera*). It differs most obviously in its 25 - 30 mm diameter shell. While this shell may be almost any shade of brown, it is always uniform in colour, while that of Helix consists of dark patches on a pale background. A green or yellow tinge may be present. The Cumberland Land Snail also has a more flattened shell that is very thin and fragile, compared with the thick shell of the Garden Snail.

The under side of the shell, especially in living individuals, tends to have a glossy appearance and is semitransparent, enabling the observer to see the animal colour and some internal organs. The upper side of the shell has a coarse wrinkly appearance. In adult shells the edge of the aperture is reflected, forming a slight lip. This is typically white in colour. However, the feature is absent in both juvenile and sub-adult individuals. The juveniles have a more angular shell and tend to have an open area in the central part of the underside of the shell, known as the umbilicus. Generally, in adults the umbilicus is closed or partially covered. Sometimes there is a reddish brown patch around the umbilical area.

M. corneovirens can also be easily confused with other members of the genus *Meridolum*, especially those found along the edges of its' range.

Distribution

Lives in small areas on the Cumberland Plain west of Sydney, from Richmond and Windsor south to Picton and from Liverpool west to the Hawkesbury and Nepean Rivers at the base of the Blue Mountains. known from over 100 different locations, but not all are currently occupied, and they are usually isolated from each other as a result of land use patterns.

Habitat and ecology

- Primarily inhabits Cumberland Plain Woodland (a critically endangered ecological community). This community is a grassy, open woodland with occasional dense patches of shrubs. It is also known from Shale Gravel Transition Forests, Castlereagh Swamp Woodlands and the margins of River-flat Eucalypt Forest, which are also listed communities;
- Lives under litter of bark, leaves and logs, or shelters in loose soil around grass clumps. Occasionally shelters under rubbish;
- Can dig several centimetres into soil to escape drought;
- Is a fungus specialist. Unlike the Garden Snail, does not eat green plants. It is generally active at night; and
- Little is known of its biology, including breeding biology. It is known to be hermaphroditic, laying clutches of 20-25 small, round, white eggs in moist, dark areas (such as under logs), with the eggs taking 2-3 weeks to hatch. There is a suggestion that the species breeds throughout the year when conditions are suitable.

This species was not detected on the Subject Site during surveys. However, it is known from numerous local occurrence records and suitable CPW vegetation is present. It is therefore considered likely to utilise the Subject Site as part of its local range.

(a) In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

Development of the Subject Site would remove a small portion of this species' available habitat in the locality. However, this represents only a small portion of available habitat with large areas of CPW habitat present on lands to the east and south.

Development of the Subject Site is not considered likely to place the local population of this species at risk of extinction.

(b) In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.

Not applicable to a threatened species.

(c) In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

(i) Is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction; or

(ii) Is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.

Not applicable to a threatened species.

(d) In relation to the habitat of a threatened species, population or ecological community:

(i) The extent to which habitat is likely to be removed or modified as a result of the action proposed;

(ii) Whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action; and

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.

All suitable CPW habitat for this species would be removed by the development of the Subject Site (refer to **Table 3-1** of the above report). However, this would amount to less than 1 % of the total available habitat within the entirety of lot 627 DP1163903.

Habitat would not be fragmented or isolated by the development of the Subject Site. Existing CPW on lands to the east and south would retain their current level of connectivity following development through Manooka Reserve. Lands to the north and west of the Subject Site have already been developed and do not provide connectivity for this species in the locality.

Suitable habitat for this species on the Subject Site represents a small portion of the local occurrence of suitable habitat. It is located on the outer edge of a large occurrence of CPW, which largely falls within protected lands of Manooka Reserve. The occurrence on the Subject Site is prone to impacts from nearby development and exotic grasslands. The small portion of this habitat which would be removed by future development of the Subject Site is not considered important to the long-term survival of this species in the locality.

(e) Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly).

At present, there are four critical habitats declared under **Section 53**–**55** of the TSC Act:

> Gould's Petrel - critical habitat declaration;

> Little penguin population in Sydney's North Harbour - critical habitat declaration;

> Mitchell's Rainforest Snail in Stotts Island Nature Reserve - critical habitat declaration; and

> Wollemi Pine - critical habitat declaration.

Of the above listed critical habitats, the Little penguin population in Sydney's North Harbour - critical habitat is located closest to the Subject Site. However, as the Subject Site is located over 50 km from the critical habitat, future development would not be expected to have any direct or indirect effect on this or any other declared critical habitat.

(f) Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan.

The Cumberland Plain Recovery Plan is relevant to this species.

This plan has the following objectives:

1. To build a protected area network, comprising public and private lands, focused on the priority conservation lands;
2. To deliver best practice management for threatened species, populations and ecological communities across the Cumberland Plain, with a specific focus on the priority conservation lands and public lands where the primary management objectives are compatible with conservation;
3. To develop an understanding and enhanced awareness in the community of the Cumberland Plain's threatened biodiversity, the best practice standards for its management, and the recovery program; and
4. To increase knowledge of the threats to the survival of the Cumberland Plain's threatened species, populations and ecological communities, and thereby improve capacity to manage these in a strategic and effective manner.

The development of the Subject Site is not considered inconsistent with the objectives of the Recovery Plan. The Subject Site is not located within any priority conservation lands for this TEC. The nearest such lands are within Harrington Forest, over 2.4 km to the north-west.

The development of the Subject Site would remove a small portion of this TEC form the locality with the majority retained elsewhere in the remainder of lot 627 DP1163903.

To date, no threat abatement plan relevant to this species has been developed.

(g) Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

Development of the Subject Site would or may constitute, introduce or exacerbate the following KTPs relevant to this species:

> Anthropogenic climate change;
> Clearing of native vegetation;
> Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants; and
> Removal of dead wood and dead trees.

Development of the Subject Site would result in a small loss of native vegetation, production of greenhouse gases and removal of dead wood. However, these KTPs arising from the development are not considered significant on the locality scale. Removal of native vegetation from the Subject Site would represent a loss of less than 1 % of the occurrence of this vegetation within the entirety of lot 627 DP1163903.

The introduction of pest weeds may occur in unclean fill and from landscaping and garden plantings. However, these impacts can be mitigated through appropriate controls. With appropriate mitigation, development of the Subject Site is not considered likely to significantly exacerbate these KTPs on the locality scale.

Conclusion

Suitable habitat for this species is present as a small stand of woody vegetation south-west of the Subject Site. Future development of the Subject Site would entail the removal of the entire occurrence of this habitat. However, this loss is not considered significant on the locality scale with large areas of suitable habitat present on adjacent lands to the south and east.

No significant impact on this species is anticipated by the future development of the Subject Site. Consequently, further assessment through the preparation of a SIS is not considered necessary.

Green and Golden Bell Frog (Litoria aurea)

This species is listed as endangered under the TSC Act.

A relatively large, stout frog, ranging in size from approximately 45 mm to approximately 100 mm snout to vent length. Diagnostic features are a gold or creamish white stripe running along the side, extending from the upper eyelids almost to the groin, with a narrow dark brown stripe beneath it, from nostril to eye. It also has blue or bluish-green colour on the inside of the thighs. The colour of the body varies. Usually a vivid pea-green, splotched with an almost metallic brassy brown or gold. The backs of some individuals may be almost entirely green; in others golden-brown markings may dominate.

Distribution

Formerly distributed from the NSW north coast near Brunswick Heads, southwards along the NSW coast to Victoria where it extends into east Gippsland. Records from west to Bathurst, Tumut and the ACT region. Since 1990 there have been approximately 50 recorded locations in NSW, most of which are small, coastal, or near coastal populations. These locations occur over the species' former range, however they are widely separated and isolated. Large populations in NSW are located around the metropolitan areas of Sydney, Shoalhaven and mid north coast (one an island population). There is only one known population on the NSW Southern Tablelands.

Habitat and ecology

- Inhabits marshes, dams and stream-sides, particularly those containing bullrushes (*Typha* spp.) or spikerushes (*Eleocharis* spp.);
- Optimum habitat includes water-bodies that are unshaded, free of predatory fish such as Plague Minnow (*Gambusia holbrooki*), have a grassy area nearby and diurnal sheltering sites available;
- Some sites, particularly in the Greater Sydney region occur in highly disturbed areas;
- The species is active by day and usually breeds in summer when conditions are warm and wet;
- Males call while floating in water and females produce a raft of eggs that initially float before settling to the bottom, often amongst vegetation;
- Tadpoles feed on algae and other plant-matter; adults eat mainly insects, but also other frogs; and
- Preyed upon by various wading birds and snakes.

This species was not detected on the Subject Site during surveys. However, it is known from recent occurrence records and suitable habitat was observed to be present in the form of a small waterbody containing *Typha spp.* reeds.

(a) In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

Development of the Subject Site would remove habitat for this species from the local area, including potential breeding habitat. However, numerous similar small waterbodies are present in the locality and the local population is not considered dependent on the waterbody of the Subject Site for their survival.

Development of the Subject Site is not considered likely to place the local population of this species at risk of extinction.

(b) In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.

Not applicable to a threatened species.

(c) In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

(i) Is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction; or

(ii) Is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.

Not applicable to a threatened species.

(d) In relation to the habitat of a threatened species, population or ecological community:

(i) The extent to which habitat is likely to be removed or modified as a result of the action proposed;

(ii) Whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action; and

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.

All suitable aquatic habitat for this species would be removed by the development of the Subject Site (refer to **Table 3-1** of the above report). However, this habitat is not considered limited in the locality with several major creeklines and numerous vegetated ponds and farm dams present within 5 km. The local population is not considered dependent on the resources of the Subject Site for their long-term survival.

Habitat would not be fragmented or isolated by the development of the Subject Site. The species would retain its current level of mobility through Kenny Creek and its tributaries following development through Manooka Reserve. Lands to the north and west of the Subject Site have already been developed and do not provide connectivity for this species in the locality.

Habitat for this species on the Subject Site represents a small portion of the local occurrence of suitable habitat. Habitat on the Subject Site is prone to impacts from nearby development and is exposed to exotic predators (domestic cats etc.). The small portion of this habitat which would be removed by future development of the Subject Site is not considered important to the long-term survival of this species in the locality.

(e) Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly).

At present, there are four critical habitats declared under **Section 53**–**55** of the TSC Act:

- Gould's Petrel - critical habitat declaration;
- Little penguin population in Sydney's North Harbour - critical habitat declaration;
- Mitchell's Rainforest Snail in Stotts Island Nature Reserve - critical habitat declaration; and
- Wollemi Pine - critical habitat declaration.

Of the above listed critical habitats, the Little penguin population in Sydney's North Harbour - critical habitat is located closest to the Subject Site. However, as the Subject Site is located over 50 km from the critical habitat, future development would not be expected to have any direct or indirect effect on this or any other declared critical habitat.

(f) Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan.

The draft Green and Golden Bell Frog Recovery Plan is relevant to this species.

This plan has the following objectives:

1. Increase the security of key GGBF populations by way of preventing the further loss of GGBF habitat at key populations across the species range and where possible secure opportunities for increasing protection of habitat areas;
2. Ensure extant GGBF populations are managed to eliminate or attenuate the operation of factors that are known or discovered to be detrimentally affecting the species;
3. Implement habitat management initiatives that are informed by data obtained through investigations into the general biology and ecology of the GGBF through a systematic and coordinated monitoring program;
4. Establish, within more than one institution, self sustaining and representative captive populations (particularly ‘at risk’ populations) of the Green and Golden Bell Frog for the primary purpose of maintaining ‘insurance’ colonies for re-establishment and supplementation of populations of the species; with research and educational purposes a secondary objective.); and
5. Increase the level of regional and local awareness of the conservation status of the Green and Golden Bell Frog and provide greater opportunity for community involvement in the implementation of this recovery plan.

The development of the Subject Site is not considered inconsistent with the objectives of the Recovery Plan. The Subject Site is not located within any listed key population lands for this species in the Sydney region. The nearest such population is within the suburb of Hammondville, approximately 20 km to the north-east.

The development of the Subject Site would remove a small portion of suitable habitat from the locality for this species. Several significant creeklines and numerous small, vegetation ponds and farm dams are present in

the local area. The local population of this species is not considered dependent on the resources of the Subject Site for its long-term survival.

The threat abatement plan of *Infection of Amphibians with Chytrid Fungus Resulting in Chytridiomycosis* is relevant to this species. This plan has the following objectives:

1. To prevent amphibian populations or regions that are currently chytridiomycosis-free from becoming infected by preventing further spread of the amphibian chytrid within Australia; and
2. To decrease the impact of infection with the amphibian chytrid fungus on populations that are currently infected.

Provided appropriate mitigation measures are implemented (see **Section 5** of the above report), the development of the Subject Site is not considered likely to introduce this pathogen into the locality.

(g) Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

Development of the Subject Site would or may constitute, introduce or exacerbate the following KTPs relevant to this species:

> Anthropogenic climate change;

> Infection of frogs by amphibian chytrid causing the disease chytridiomycosis;

> Clearing of native vegetation;

> Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants; and

> Removal of dead wood and dead trees.

Development of the Subject Site would result in a small loss of native vegetation, production of greenhouse gases and removal of dead wood. However, these KTPs arising from the development are not considered significant on the locality scale. Removal of native vegetation from the Subject Site would represent less than 1 % of the occurrence of this vegetation within the entirety of lot 627 DP1163903.

The introduction of diseases and pest weeds may occur in untreated water, unclean fill and from landscaping and garden plantings. However, these impacts can be mitigated through appropriate controls. With appropriate mitigation, development of the Subject Site is not considered likely to significantly exacerbate these KTPs on the locality scale.

Conclusion

Suitable habitat for this species is present on the Subject Site as a small stand of woody vegetation, grasslands and a small vegetated pond. Future development of the Subject Site would entail the removal of the entire occurrence of this habitat. However, this loss is not considered significant on the locality scale with large areas of suitable habitat present on adjacent lands to the south and east and the wider locality. The development of the Subject Site is not considered likely to place this species at risk of extinction in the locality.

No significant impact on this species is anticipated by the future development of the Subject Site. Consequently, further assessment through the preparation of a SIS is not considered necessary.

Tests of Significance (EPBC Act)

Flora

Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest

This TEC is listed as critically endangered under the EPBC Act. The following description has been taken from the NSW OEH profile description for this TEC.

The dominant canopy trees of Cumberland Plain Woodland are Grey Box (*Eucalyptus moluccana*) and Forest Red Gum (*E. tereticornis*), with Narrow-leaved Ironbark (*E. crebra*), Spotted Gum (*Corymbia maculata*) and Thin-leaved Stringybark (*E. eugenioides*) occurring less frequently. The shrub layer is dominated by Blackthorn (*Bursaria spinosa*), and it is common to find abundant grasses such as Kangaroo Grass (*Themeda australis*) and Weeping Meadow Grass (*Microlaena stipoides* var. *stipoides*).

Distribution

Occurs on soils derived from Wianamatta Shale, and throughout the driest part of the Sydney Basin. Before European settlement, was extensive across the Cumberland Plain, western Sydney. Today, only 9 percent of the original extent remains intact, with the remnants scattered widely across the Cumberland Plain. Good examples can be seen at Scheyville National Park and Mulgoa Nature Reserve.

Habitat and ecology

- Typically occurs on heavy clay soils derived from Wianamatta Shale;
- Well adapted to drought and fire, and the understorey plants often rely on underground tubers or profuse annual seed production to survive adverse conditions; and
- Cumberland Plain Woodland is habitat for threatened species such as the Cumberland land snail (*Meridolum corneovirens*).

This TEC occurs on the fringes of the Subject Site as two sub-communities, CPW and CPW derived grassland. CPW is confined to a single mature tree and understory vegetation in the south-west and CPW derived grassland occurs as a small regenerating clump in the south and south-west of the Subject Site. Under the EPBC Act determinations, only patches containing the tree component are considered to conform to the listing. As a result, the CPW derived grasslands are not considered in this assessment.

(a) Reduce the extent of an ecological community

Development of the Subject Site would remove a small portion of this TEC from the locality (refer to **Table 3-1** of the above report). The occurrence of this TEC on the Subject Site represents less than 1% of the total occurrence of this TEC on lot 627 DP1163903. The TEC which would be removed by future development of the Subject Site is not considered to constitute a significant reduction in the extent of this TEC in the locality.

(b) Fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines

This TEC would not be fragmented or isolated by the development of the Subject Site. Existing CPW on lands to the east and south would retain their current level of connectivity following development through Manooka Reserve. Lands to the north and west of the Subject Site have already been developed and do not provide connectivity for any native vegetation habitat in the locality.

(c) Adversely affect habitat critical to the survival of an ecological community

The CPW on the Subject Site represents a small portion of the local occurrence. It is located on the outer edge of a large occurrence of this TEC, which largely falls within protected lands of Manooka Reserve. The occurrence on the Subject Site is prone to impacts from nearby development and exotic grasslands. The small portion of this TEC which would be removed by future development of the Subject Site is not considered critical habitat to the long-term survival of this TEC.

(d) Modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns

The development of the Subject Site would remove abiotic factors necessary for this TEC's survival. However, this impact would be limited to the Subject Site and secondary impacts on retained CPW on adjacent lands as a result of development are not considered significant. Large areas to the north and west

of Manooka Reserve are already developed and development of the Subject Site is not considered likely to significantly exacerbate the effect of this existing development.

(e) Cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting

Loss of this TEC would be restricted to the small stand present in the south-west of the Subject Site. Portions of this TEC elsewhere on lot 627 DP1163903 would not be directly impacted upon and would not be particularly prone to secondary impacts as these lands are located upslope of the Subject Site. The development of the Subject Site is not considered likely to cause a significant change in the species composition of this TEC in the locality.

(f) Cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to:

(i) Assisting invasive species, that are harmful to the listed ecological community, to become established, or

(ii) Causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community, or

Lands to the north and west of the Subject Site have previously been developed and retained CPW in Manooka Reserve is already exposed to secondary impacts of this development. Development of the Subject Site is not considered likely to significantly increase these secondary effects. In addition, appropriate mitigation measures can be implemented to reduce the secondary effects of future development (see **Section 5** of this report).

(g) Interfere with the recovery of an ecological community.

The removal of the small occurrence of this TEC on the Subject Site is not considered a significant reduction in the occurrence of the TEC in the locality. It is small edge area, containing a significant exotic weed component and vulnerable to further impacts from nearby disturbed lands. Large areas of better condition CPW are present in the remainder of lot 627 DP1163903 which would not be directly impacted upon by the development of the Subject Site.

Development of the Subject Site is not considered likely to interfere with the recovery of this TEC in the locality.

Conclusion

This TEC is present as a small stand of woody vegetation south-west of the Subject Site. Future development of the Subject Site would entail the removal of the entire occurrence of this TEC. However, this loss is not considered significant on the locality scale with large areas of this TEC present on adjacent lands to the south and east.

No significant impact on this TEC is anticipated by the future development of the Subject Site. Consequently, further assessment through a referral to the federal Minister of the Environment is not considered necessary.

Fauna

Green and Golden Bell Frog (Litoria aurea)

This species is listed as vulnerable under the EPBC Act.

A relatively large, stout frog, ranging in size from approximately 45 mm to approximately 100 mm snout to vent length. Diagnostic features are a gold or creamish white stripe running along the side, extending from the upper eyelids almost to the groin, with a narrow dark brown stripe beneath it, from nostril to eye. It also has blue or bluish-green colour on the inside of the thighs. The colour of the body varies. Usually a vivid pea-green, splotched with an almost metallic brassy brown or gold. The backs of some individuals may be almost entirely green; in others golden-brown markings may dominate.

Distribution

Formerly distributed from the NSW north coast near Brunswick Heads, southwards along the NSW coast to Victoria where it extends into east Gippsland. Records from west to Bathurst, Tumut and the ACT region. Since 1990 there have been approximately 50 recorded locations in NSW, most of which are small, coastal, or near coastal populations. These locations occur over the species' former range, however they are widely separated and isolated. Large populations in NSW are located around the metropolitan areas of Sydney, Shoalhaven and mid north coast (one an island population). There is only one known population on the NSW Southern Tablelands.

Habitat and ecology

- Inhabits marshes, dams and stream-sides, particularly those containing bullrushes (*Typha* spp.) or spikerushes (*Eleocharis* spp.);
- Optimum habitat includes water-bodies that are unshaded, free of predatory fish such as Plague Minnow (*Gambusia holbrooki*), have a grassy area nearby and diurnal sheltering sites available;
- Some sites, particularly in the Greater Sydney region occur in highly disturbed areas;
- The species is active by day and usually breeds in summer when conditions are warm and wet;
- Males call while floating in water and females produce a raft of eggs that initially float before settling to the bottom, often amongst vegetation;
- Tadpoles feed on algae and other plant-matter; adults eat mainly insects, but also other frogs; and
- Preyed upon by various wading birds and snakes.

This species was not detected on the Subject Site during surveys. However, it is known from recent occurrence records and suitable habitat was observed to be present in the form of a small waterbody containing *Typha spp.* reeds.

(a) Lead to a long-term decrease in the size of an important population of a species;

The species is not well known from the locality and the Subject Site is located approximately 20 km from the nearest key population of this species under the NSW draft Recovery Plan for the Green and Golden Bell Frog. Therefore, the local population is not considered to constitute an important population of this species.

Development of the Subject Site would remove habitat for this species from the local area, including potential breeding habitat. However, numerous similar small waterbodies are present in the locality and the local population is not considered dependent on the waterbody of the Subject Site for their survival.

(b) Reduce the area of occupancy of an important population;

As above, the local population of this species is not considered to constitute an important population.

The development of the Subject Site would remove suitable habitat for this species from the locality. However, this habitat is not limited in the local area with several major creeklines and numerous vegetated ponds and dams within 5 km. The removal of suitable habitat from the Subject Site is not considered to represent a significant reduction in available habitat for the local population of this species.

(c) Fragment an existing important population into two or more populations;

Habitat for this species would not be fragmented or isolated by the development of the Subject Site. The species would retain its current level of mobility through Kenny Creek and its tributaries following development through Manooka Reserve. Lands to the north and west of the Subject Site have already been developed and do not provide connectivity for this species in the locality.

(d) Adversely affect habitat critical to the survival of a species;

The Subject Site contains a small pond, representing suitable breeding habitat for this species. However, this habitat is not limited in the locality, with several major creeklines and numerous ponds and dams present within 5 km of the Subject Site.

The habitat present on the Subject Site is not considered critical to the survival of this species.

(e) Disrupt the breeding cycle of an important population;

As above, the local population of this species is not considered to constitute an important population.

The small pond on the Subject Site is considered to constitute suitable breeding habitat for this species. However, this habitat is not limited in the locality with several major creeklines and numerous ponds and dams present within 5 km of the Subject Site.

Development of the Subject Site is not considered likely to disrupt the breeding cycle of an important population of this species.

(f) Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;

The development of the Subject Site would remove suitable habitat for this species from the local area, including potential breeding habitat. However, this represents a small portion of the available habitat for this species in the locality with several major creeklines and numerous vegetated ponds and dams within 5 km of the Subject Site.

The removal of habitat from the Subject Site is not considered likely to impact on local habitat for this species to the extent that it is likely to decline.

(g) Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat;

Development of nearby lands for residential purposes has led to an increase in the local population of exotic predators, potentially harmful to this species (domestic cats). The development of the Subject Site for residential purposes is not considered likely to lead to a significant increase in the local population of these domestic predators.

(h) Introduce disease that may cause the species to decline; or

The Chytrid fungus has the potential to be introduced through unclean soil and untreated water used on site (e.g. for dust suppression) during development works. However, as detailed in **Section 5** of this report, this risk can be managed through appropriate safeguards.

Provided recommended mitigation measures are implemented, this risk is not considered to be significant.

(i) Interfere substantially with the recovery of the species.

The Subject Site contains a small portion of suitable habitat for the local population of this species, including potential breeding habitat. However, this habitat is not considered limited in the locality. Several significant creeklines and numerous vegetated ponds and dams are present within 5 km of the Subject Site and the species' ability to disperse across the landscape would not be reduced by the development of the Subject Site.

The development of the Subject Site is not considered likely to interfere substantially with the recovery of this species.

Conclusion

Suitable habitat for this species is present on the Subject Site as a small stand of woody vegetation, grasslands and a small vegetated pond. Future development of the Subject Site would entail the removal of the entire occurrence of this habitat. However, this loss is not considered significant on the locality scale with large areas of suitable habitat present on adjacent lands to the south and east and the wider locality. The development of the Subject Site is not considered likely to place this species at risk of extinction in the locality.

No significant impact on this species is anticipated by the future development of the Subject Site. Consequently, further assessment through a referral to the federal Minister of the Environment is not considered necessary.

APPENDIX

D

TRAFFIC ASSESSMENT

Traffic Impact Assessment

Stage 2C Caulfield Close

80219016

Prepared for
Wolin Investments and Landco Pty Ltd

2 December 2019

Cardno

Contact Information

Cardno (NSW/ACT) Pty Ltd
ABN 95 001 145 035

Level 9 - The Forum
203 Pacific Highway
St Leonards NSW 2065
Australia

www.cardno.com
Phone +61 2 9496 7700
Fax +61 2 9439 5170

Document Information

Prepared for	Wolin Investments and Landco Pty Ltd
Project Name	Stage 2C Caulfield Close
File Reference	80219016-TR-REP-001 Stage 2C Caulfield Close TIA ver B.docx
Job Reference	80219016
Date	2 December 2019
Version Number	B

Author(s):

Name: Aaron Pau
Job title: Traffic Engineer

Effective Date 8/03/2019

Approved By:

Name: Hayden Calvey
Job title: Senior Traffic Engineer

Date Approved 8/03/2019

Document History

Version	Effective Date	Description of Revision	Prepared by	Reviewed by
A	20/02/19	Draft	Aaron Pau	Hayden Calvey
B	08/03/19	Final	Aaron Pau	Hayden Calvey
C	18/11/19	Amended Final	Aaron Pau	Hayden Calvey

Table of Contents

Appendices

Tables

Figures

1 Introduction

1.1 Background

Cardno has been commissioned by Wolin Investments and Landco Pty Ltd to produce a Traffic Impact Assessment (TIA) to accompany a planning proposal to amend the Minimum Lot Size Development Standard applying to land at Currans Hill.

The site was approved by Camden Council for the subdivision of 9 lots on the 26 November 2014, as contained in DA/2014/560/1, 8 lots of which are on the subject site. While this current planning proposal pertains to the use of the site only, an indicative layout suggests that it is possible to achieve a total of 17 lots, therefore in terms of traffic generation there is a potential net increase of 9 dwellings.

1.2 Scope of Works

The following scope of works has been undertaken as part of this study:

- Review existing public transport facilities and future commitments to establish if any modifications to the public transport network is required to support the development.
- Review traffic generation potential against the RMS Guide.
- Assess the impact of the development on the existing road network.
- Modelling of Currans Hill Drive / Spring Hill Circle and Glenfield Drive / Spring Hill Circle using the traffic modelling software SIDRA.
- Identify potential impacts, if any, to residential amenity and road safety considerations.
- Review potential access / driveway arrangements and provide assessment of any issues / mitigations.

1.3 Reference Documents

In preparing this report, reference has been made to a number of background documents, including:

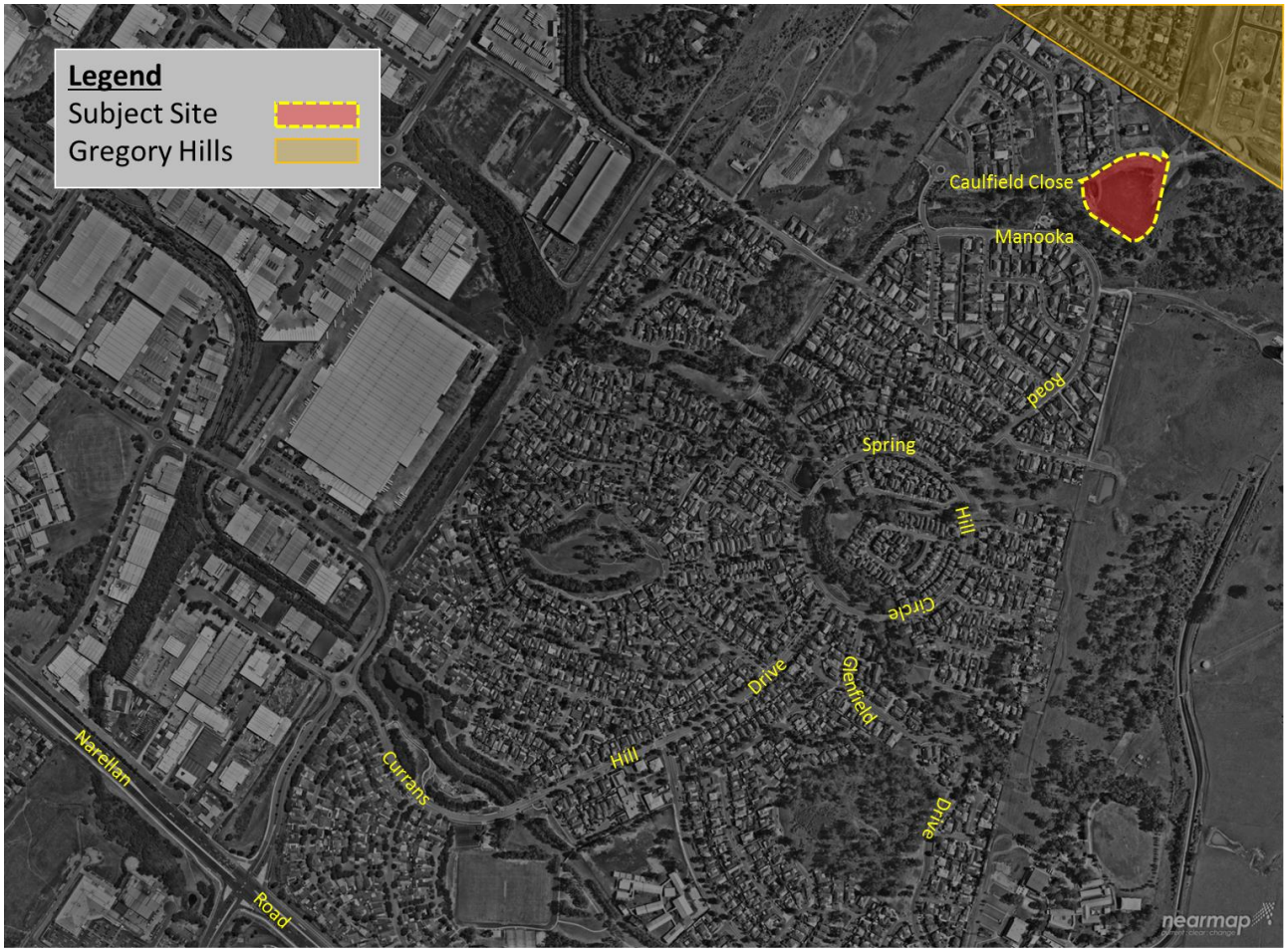
- Schedule of Classified Roads and Unclassified Regional Roads (Roads and Maritime Services, 2014).
- Development Control Plan (DCP) Part B: General Land Use Controls (Camden Council, 2011).
- Camden Growth Centre Precincts DCP (Department of Planning and Environment, 2015).
- Turner Road Precinct DCP (Department of Planning and Environment, 2018).
- Guide to Traffic Generating Developments (Roads and Maritime Services, 2002).
- Technical Direction (TDT 2013/04a) (Roads and Maritime Services, 2013).
- Walking, Riding and Access to Public Transport (Department of Infrastructure and Transport, 2013).

2 Existing Conditions

2.1 Subject Site

The subject site is located to the south of Gregory Hills and north of Narellan Road as shown in **Figure 2-1**.

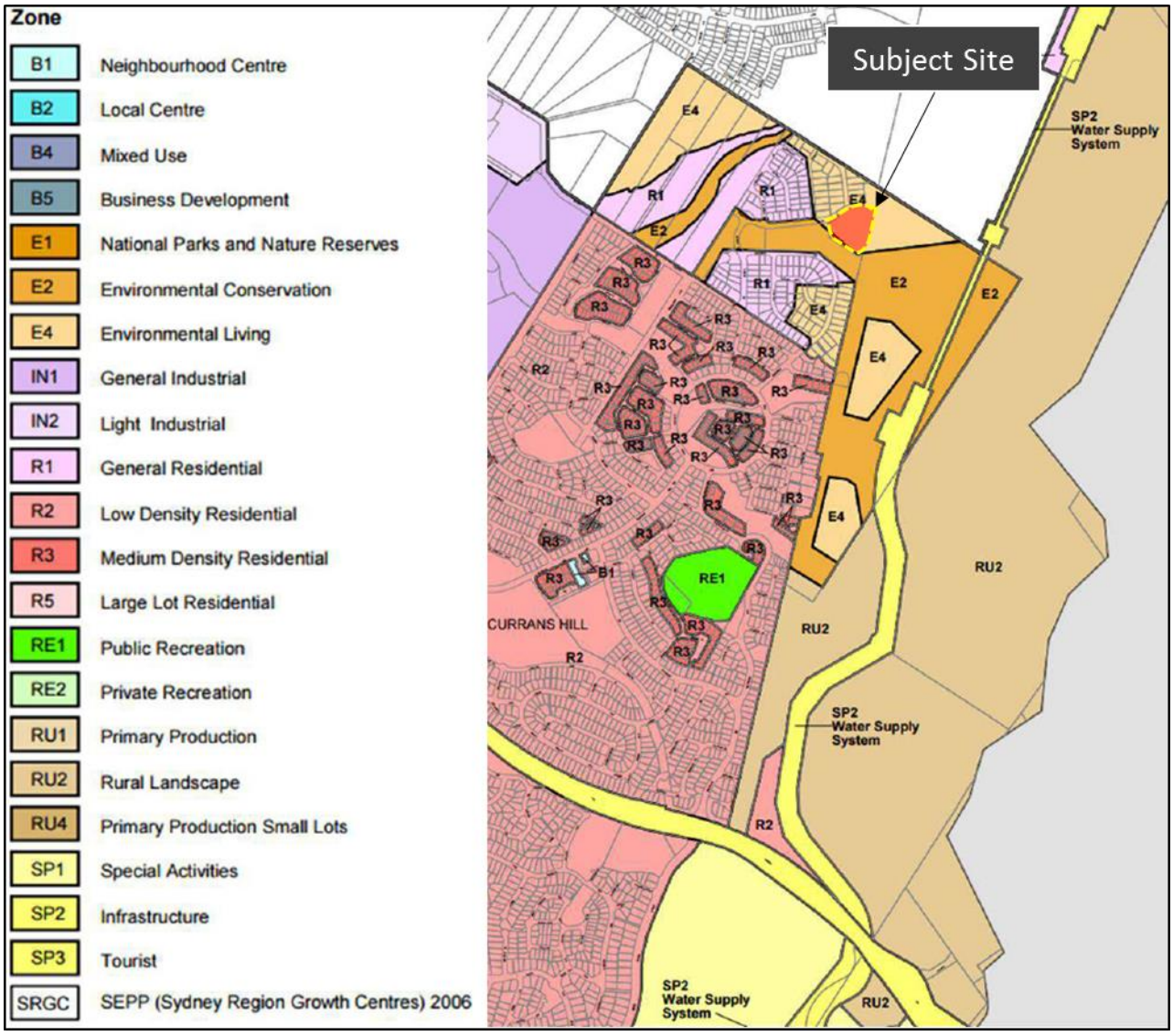
Figure 2-1 Subject Site Location



Source: Nearmap, 2019

The subject site is currently zoned as E4 – Environmental Living. A map of the existing zoning in the surrounding area is illustrated in **Figure 2-2**.

Figure 2-2 Existing Zoning Map



Source: Camden Local Environmental Plan 2010

2.2 Existing Road Network

2.2.1 Schedule of Road Classification

Roads and Maritime in partnership with local government established an administrative framework of State, Regional and Local Road categories to assist managing the extensive network of roads.

State roads are managed and financed by Roads and Maritime, and Regional / Local Roads are managed and financed by councils. Notwithstanding, Regional Roads perform an intermediate function between the main arterial network of State Roads and council controlled Local Roads and therefore received financial assistance from Roads and Maritime.

2.2.2 Narellan Road

Narellan Road is classified as a State Road under the care and maintenance of Roads and Maritime, connecting Campbelltown at Appin Road to Narellan at The Northern Road.

Narellan Road is a major arterial road signposted with a speed limit between 60km/h - 80km/h along various sections of the road.

2.2.3 Currans Hill Drive

Currans Hill Drive is a local road under the care and maintenance of Camden Council. The road is signposted with a speed limit of 50km/h. A 40km/h school zone exists between Hodges Place and William Mannix Avenue. Parking is generally allowed on both sides of Currans Hill Drive.

2.2.4 Spring Hill Circle

Spring Hill Circle is a local road under the care and maintenance of Camden Council. The road is signposted with a speed limit of 50km/h.

2.2.5 Glenfield Drive

Glenfield Drive is a local road under the care and maintenance of Camden Council. The road is signposted with a speed limit of 50km/h and parking is generally allowed on both sides of the road.

2.3 Current Road Upgrades

2.3.1 Narellan Road

Narellan Road has been upgraded between Camden Valley Way, Narellan and Blaxland Road, Campbelltown. The upgrade has been completed and opened to public April 2018. The upgrade has helped reduce congestion and improve safety and travel time within the vicinity of the subject site.

2.3.2 Camden Valley Way

Camden Valley Way has been upgrade to a four lane divided road with a wide vegetated median. Camden Valley Way now has an off-road shared pedestrian / cyclist path along the western carriageway and bus priority to the new South West Rail Lin Station at Leppington.

2.3.3 The Northern Road

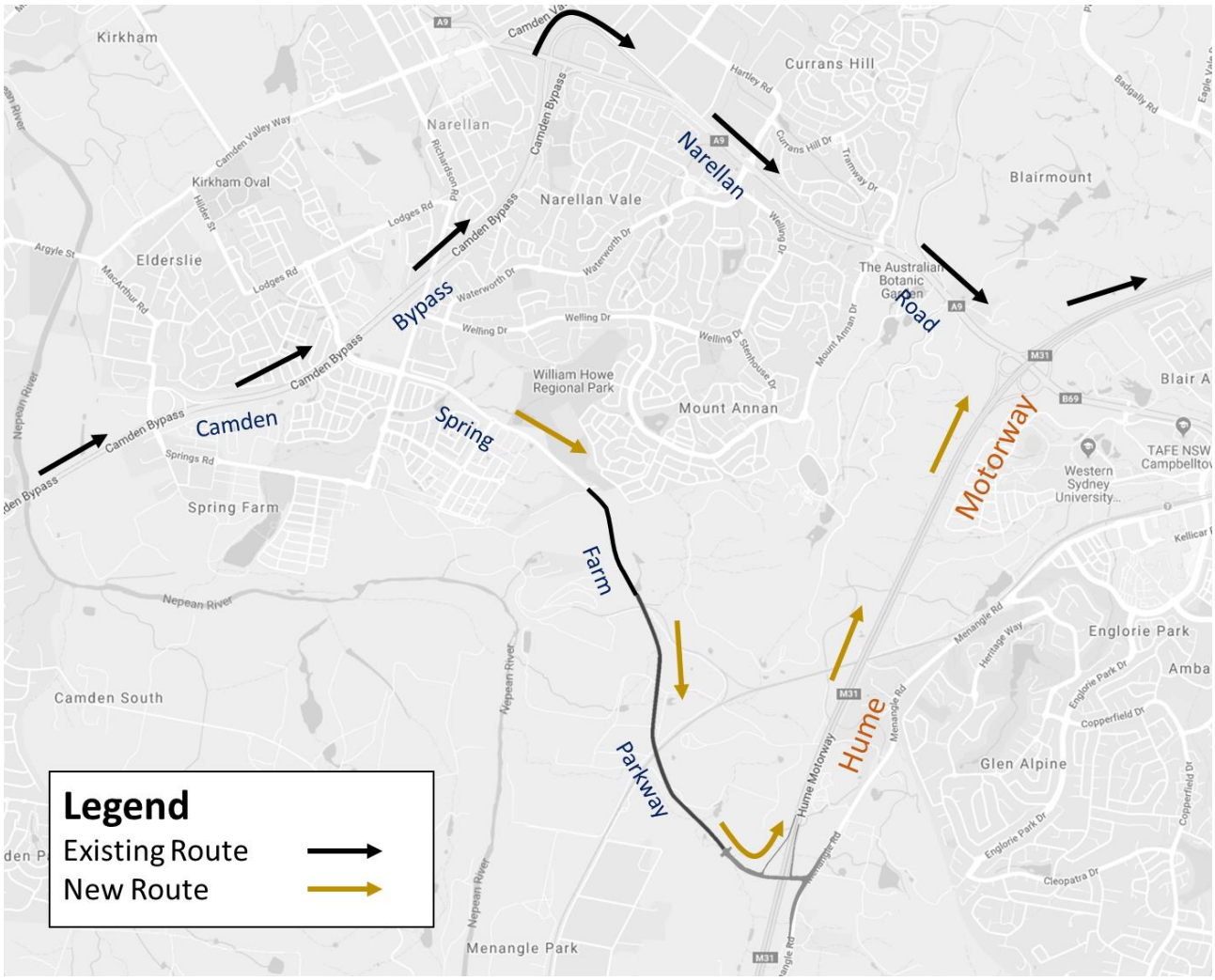
The Northern Road is currently undergoing upgrades between Richmond Road, Bligh Park and Camden Valley Way, Narellan. The upgrades aim to provide more reliable journeys through connections to motorways and new growth areas and provide additional capacity to the road network in anticipation of the significant growth in Western Sydney.

2.3.4 Spring Farm Parkway Extension

The NSW Government is proposing to build a link road from the Menangle Park development area to Menangle Road to support future growth. This 2.5 kilometre road, including north facing motorway ramps, will form part of the future Spring Farm Parkway linking the Camden Bypass, the M31 Hume Motorway and Menangle Road, Menangle Park.

It is anticipated that Spring Farm Parkway will alleviate the traffic issues on Narellan Road. **Figure 2-3** illustrates the new route for those travelling from Camden Bypass to Hume Motorway bypassing Narellan Road.

Figure 2-3 Spring Farm Parkway Extension



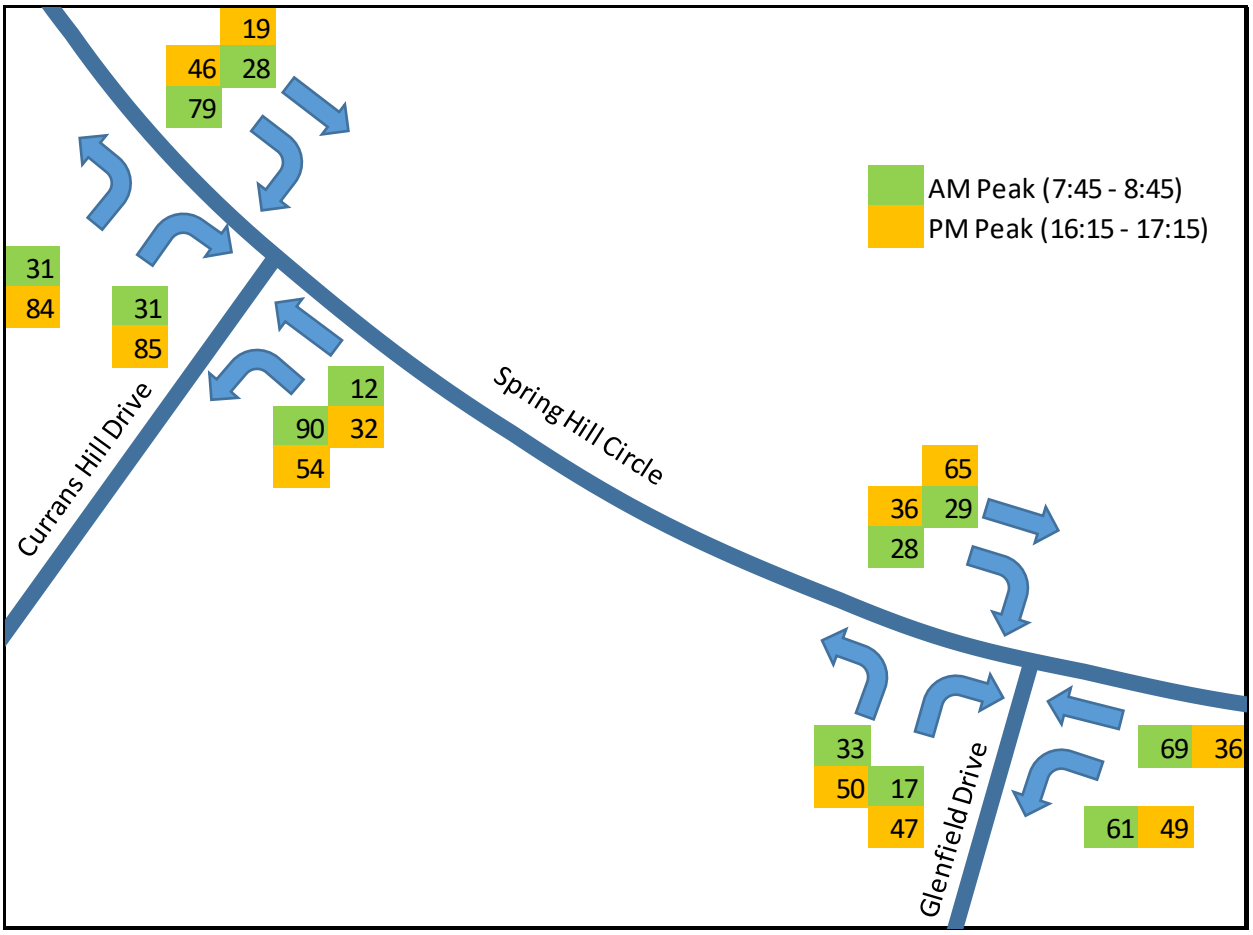
2.4 Existing Traffic Volumes

An indication of the existing traffic volumes in the vicinity of the subject site is provided by peak hour traffic surveys undertaken on 8 December 2016 between 7am-9am and 4pm-6pm at the following intersections:

- Currans Hill Drive / Spring Hill Circle
- Spring Hill Circle / Glenfield Drive

The survey data for Currans Hill Drive / Spring Hill Circle and Glenfield Drive / Spring Hill Circle is summarised in **Figure 2-4**.

Figure 2-4 Surveyed Turn Volumes at Spring Hill Circle / Manooka Road (2016)



2.5 Public Transport Service

"Most people are prepared to spend about 10 minutes walking or riding to a high-frequency, direct public transport service such as a train or express bus. This equates to 800 metres walking or two to three kilometres riding. For less frequent or indirect local services, people are generally prepared to walk for up to five minutes, about 400 metres." Department of Infrastructure and Transport (Walking, Riding and Access to Public Transport, 2013).

2.5.1 Existing Bus Services

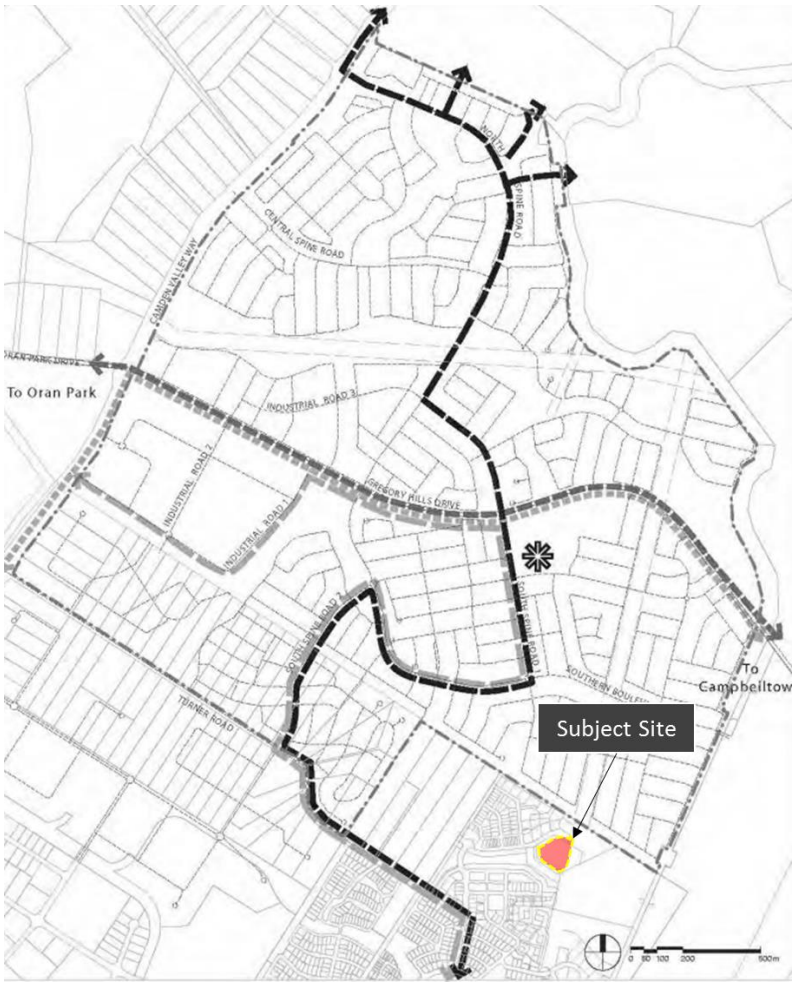
The closest operational bus stops are Glenfield Drive before Spring Hill Circle (2567139) providing services westbound and Glenfield Drive after Spring Hill Circle (2567145) providing services eastbound. According to Google Maps, these bus stops are a 1.3km walk (16 minutes) from the subject site. The following bus services operate from these bus stops:

- 890 – One (1) service running eastbound to Campbelltown Station at 3:10pm on weekdays.
- 891 – Runs approximately every 30 minutes and takes about 25 minutes to arrive at Campbelltown Station during morning peak hour.
- 896 – One (1) service running westbound to Greggory Hills and Oran Park at 7:27 am on weekdays. One (1) service running eastbound to Campbelltown Station at 3:09 pm on weekdays.

2.5.2 Potential Bus Services

Turner Road Precinct DCP proposes a new bus route servicing the Turner Road Precinct travelling from Turner Road to Campbelltown (from Catherine Fields). **Figure 2-5** is sourced from the Turner Road Precinct DCP and illustrates the proposed route for the bus service. This bus route is approximately 500m from the subject site and, if implemented, will provide a service accessible to the subject site.

Figure 2-5 New Bus Route - Turner Road to Campbelltown (from Catherine Fields)



Source: Turner Road Precinct DCP

2.5.3 Train

The Subject site is located approximately 6 km from both Campbelltown Station and Macarthur Station by car. The currently connected rail networks include:

- T2 Airport, Inner West and South Line, comprising three varying routes connecting Sydney CBD to Macarthur, Edmondson Park and Leppington;
- T5 Cumberland Line connecting to Schofields through the Western Suburbs of Sydney, including Parramatta and Blacktown, and
- Southern Highland Line, connecting Campbelltown with rural regional centres such as Bowral and Goulburn.

The future South West Rail Link Extension is proposed to run from the existing Leppington Station to a new station at Narellan, approximately 5 km from the site. This new line will have the potential to connect with the future Western Sydney Airport at Badgerys Creek. This will attract trips to the west of the site for commuters linking with heavy rail transport.

3 Proposed Development

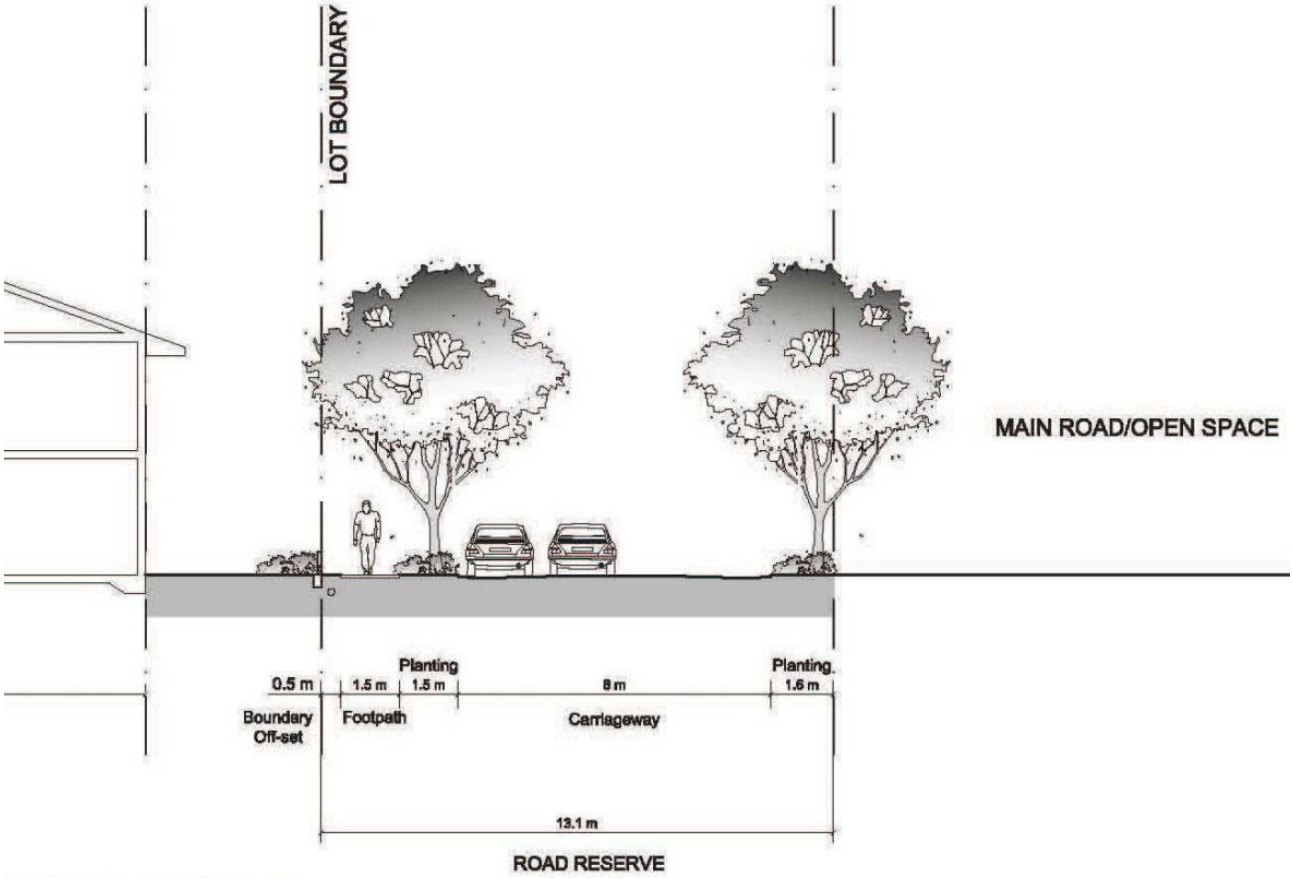
The Planning Proposal would facilitate a potential subdivision of the land into approximately 17 lots for low density dwellings. The built design of houses and driveways is subject to individual development applications and construction certificates.

Error! Reference source not found. illustrates an indicative layout for the subject site.

3.1 Road Layout

Due to the low traffic volumes utilising the road infrastructure, a loop access street is deemed suitable to provide access to the dwellings. **Figure 3-1** illustrates a typical access street cross section.

Figure 3-1 Typical Access Road Cross Section



Source: Camden Growth Centre Precincts Development Control Plan

According to the DCP, the carriageway is to be a minimum width of 8m, however, it can be reduced to a minimum of 6.5m subject to consideration of traffic volumes and road safety issues.

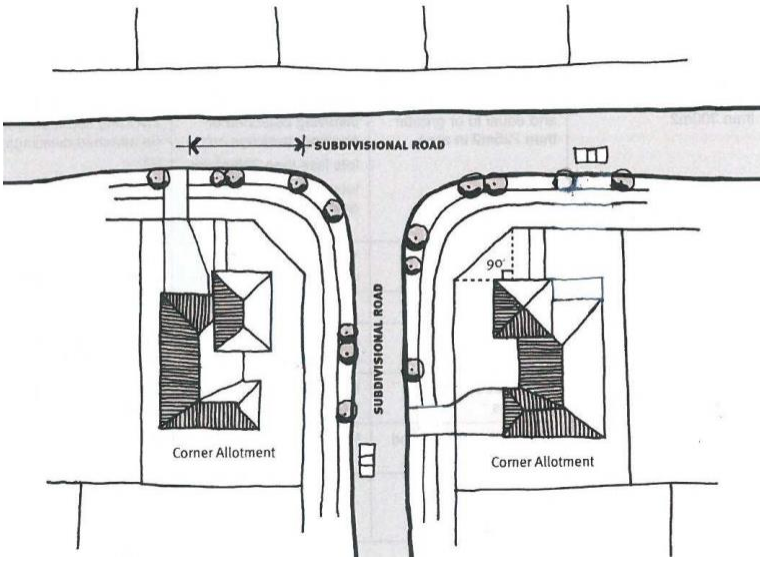
3.2 Driveways

The driveway design and location are to adhere to Council specification and are subject to individual development applications and construction certification.

3.2.1 Corner Lots

Corner lots are to be designed in accordance with AS 2890 and Council's Engineering Specifications. An example of a corner lot driveway layout can be found in Camden Growth Centre DCP and is provided in **Figure 3-2**.

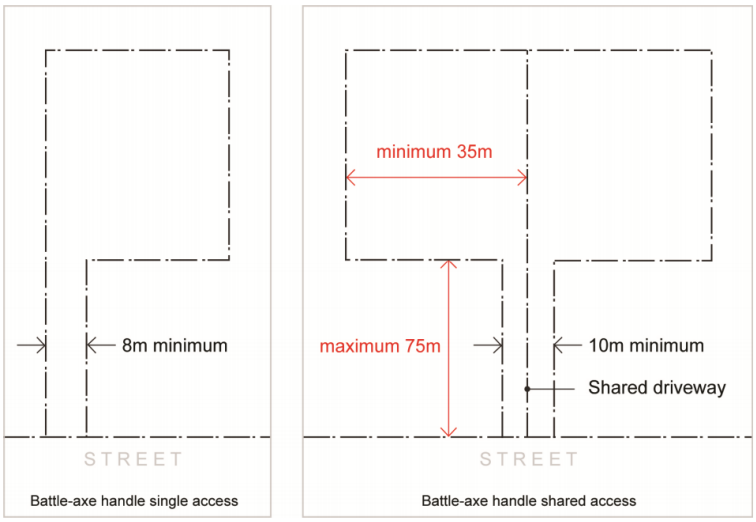
Figure 3-2 Corner Lots Driveway Layout



3.2.2 Battle-axe Lots

Driveway for battle-axe lots will adhere to specifications outlined in their DCP requirements as illustrated in **Figure 3-3**.

Figure 3-3 Battle-axe Lot Dimensions



Source: Camden Growth Centre Precincts Development Control Plan

Note: This Report supports a Planning Proposal which is to amend an existing Minimum Lot Size Development Standard to 500m^2 A subdivision layout will be the subject of a separate application. The indicative layout confirms that it is feasible to subdivide the land and meet Councils controls and guidelines.

4 Traffic Impact Assessment

4.1 Traffic Generation

An indication of the traffic generation potential of the proposed development is sourced from the Roads and Maritime's Technical Direction (TDT 2013/04a), which nominates the following traffic generation rates applicable to the proposed development:

Low Density Residential Dwellings (Sydney)

- AM Peak: 0.95 peak hour vehicle trips per dwelling.
- PM Peak: 0.99 peak hour vehicle trips per dwelling.

Table 4-1 below summarises the estimated traffic generation of the proposed 17 residential lots.

Table 4-1 Traffic Generation Summary

Land Use	RMS Guide Definition	Quantum	Traffic Generation	
			AM	PM
Residential	Low-Density	17 lots	17 trips	17 trips

Improved public transport infrastructure (such as an extension to the existing bus services to service dwellings in the vicinity of the proposed development) and improved walking and cycling facilities would help reduce reliance on private vehicle usage and will therefore reduce the traffic generation of the development.

When considering the existing approval of 8 dwellings, the site is forecast to **generate an additional 9 peak hour vehicle trips.** This is relatively low, being 1 vehicle movement every 5 minutes which would have a negligible impact on the surrounding local road network and not be of a noticeable difference to the existing neighbourhood. This volume would not adversely impact residential amenity considerations or road safety performance of the local road network. There is no nexus between the application, and increase of 1 vehicle every 5 minutes, with road safety or crash types in the area of Currans Hill.

Furthermore, concerning the consideration of traffic volumes in the determination of carriageway width of an access street, the proposed development can be reduced to a minimum carriageway width of 6.5m.

4.2 Trip Distribution and Assignment

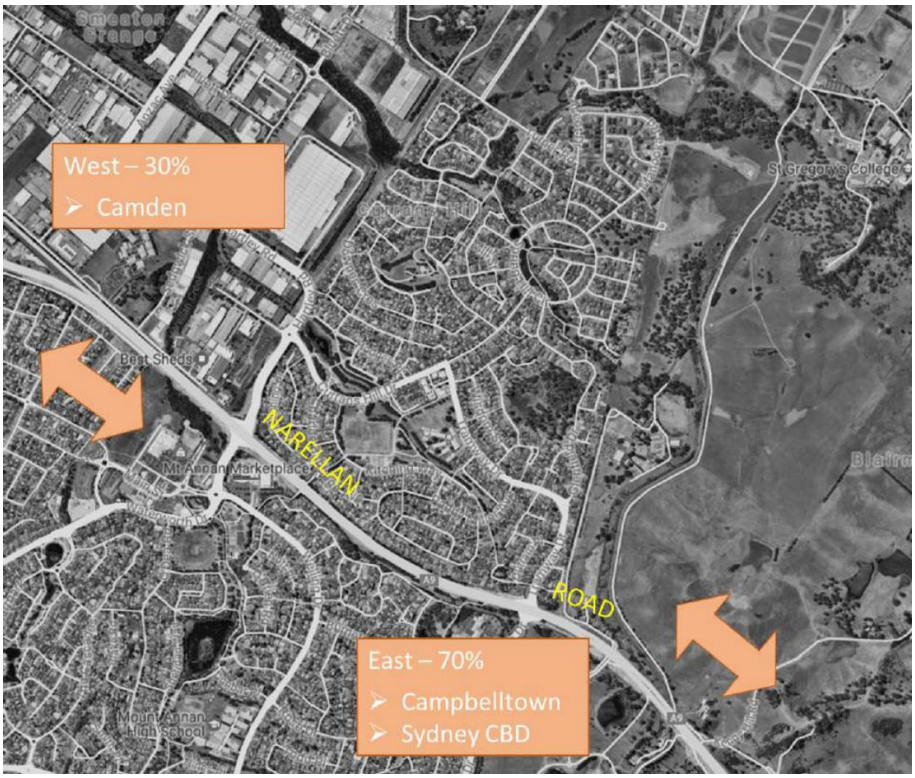
4.2.1 Directional Distribution

The directional distribution and assignment of traffic generated by the proposed development would be influenced by a number of factors:

- Configuration of the adjoining local road network in the vicinity of the site.
- Accessibility and suitability of the local road network to cater for additional traffic.
- Existing operation of intersections providing access around the adjoining road network.
- Development of a residential lots layout within the subject area.
- Surroundings employment centres, retail centres and schools in relation to the site.
- Likely distribution of employee's residences in relation to the site.
- Configuration of the access arrangement to the site.

Having considered all the above and Census Journey to Work (JTW) data, the directional distribution of development generated traffic is established in **Figure 4-1**.

Figure 4-1 Directional Traffic Distribution



The above figure indicates 70% of generated trips will head east towards Campbelltown and Sydney CBD and 30 % of generated trips will head west towards Camden.

4.2.2 Inbound / Outbound Distribution

The ratio of the inbound and outbound traffic movements is assumed to be 20:80 in the AM peak hour (i.e. 20% inbound and 80% outbound) and 80:20 in the PM peak hour (i.e. 80% inbound and 20% outbound).

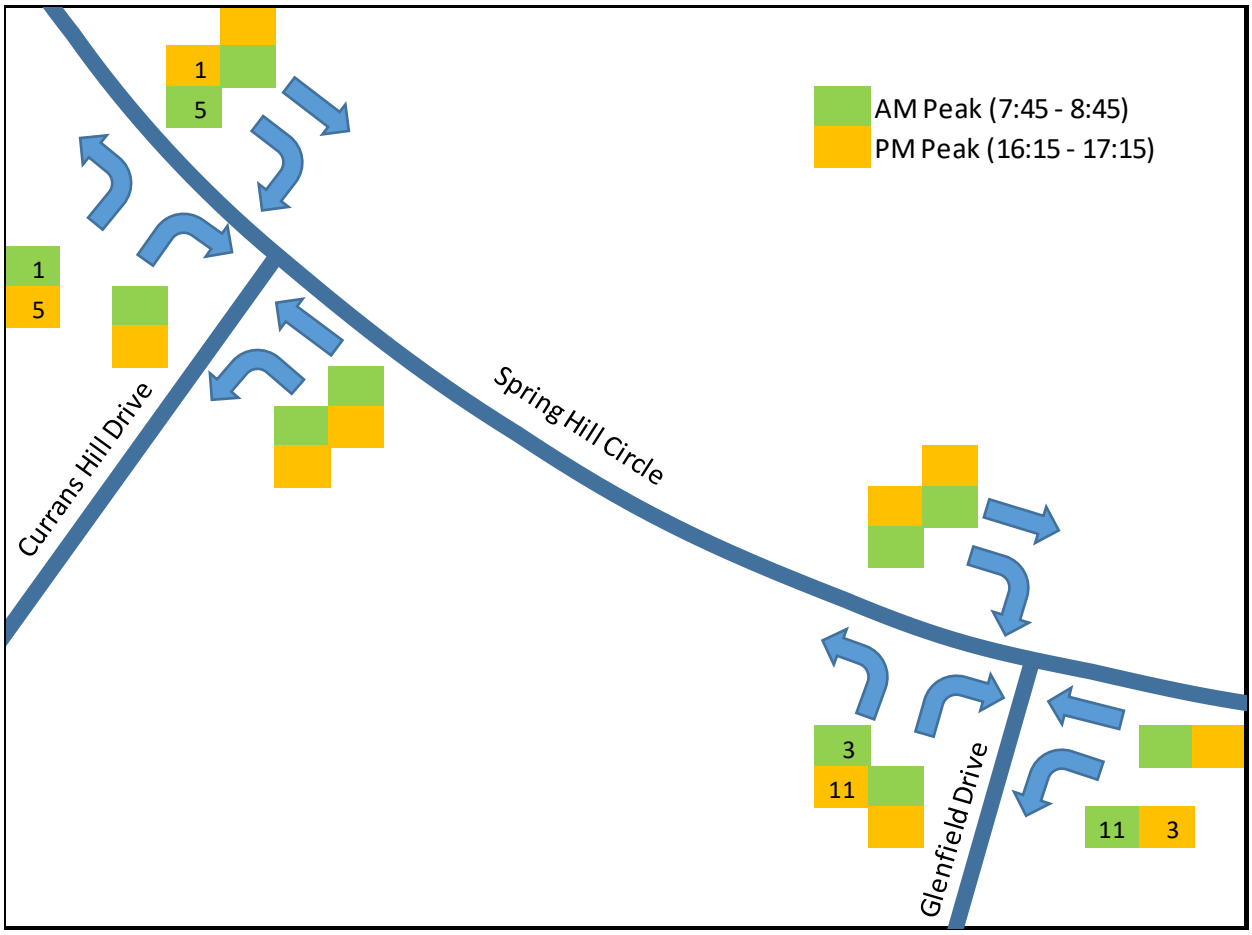
4.2.3 Trip Assignment

For the purposes of this report, the following two (2) intersections will be assessed:

- Currans Hills Drive / Spring Hill Circle
- Glenfield Drive / Spring Hill Circle

Figure 4-2 incorporates the aforementioned trip generation and directional split of the proposed development.

Figure 4-2 Traffic Assignment of Stage 2C Caulfield Close



4.3 Level of Service Criteria for intersections

In an urban area, the capacity of a road network can be largely determined by the capacity of the controlling intersections. The existing intersection operating performance was assessed using the SIDRA software package to determine the Degree of Saturation (DOS), Average Delay (AVD in seconds) and Level of Service (LOS) at each intersection. The key indicator of intersection performance is Level of Service, where results are placed on a continuum from 'A' to 'F', as shown in **Table 4-2**.

Table 4-2 Intersection Level of Service

LOS	Traffic Signal / Roundabout	Give Way / Stop Sign / T-Junction Control
A	Good operation	Good operation
B	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	Satisfactory	Satisfactory, but crash study required
D	Operating near capacity	Near capacity and crash study required
E	At capacity at signals, incidents will cause excessive delays	At capacity and requires alternative control model
F	Unsatisfactory and requires additional capacity Roundabout requires alternative control mode	Exceeds capacity and requires alternative control mode

The Average Vehicle Delay (AVD) provides a measure of the operational performance of an intersection as indicated in **Table 4-3** which relates AVD to LOS. The AVDs should be taken as a guide only as longer delays could be tolerated in some locations (i.e. inner city conditions) and on some roads (i.e. minor side street intersection with major arterial route). For traffic signals, the average delay over all movements should be taken. For roundabouts and priority control intersections (sign control) the critical movement for level of service assessment should be that movement with the highest average delay.

Table 4-3 Intersection Average Vehicle Delay

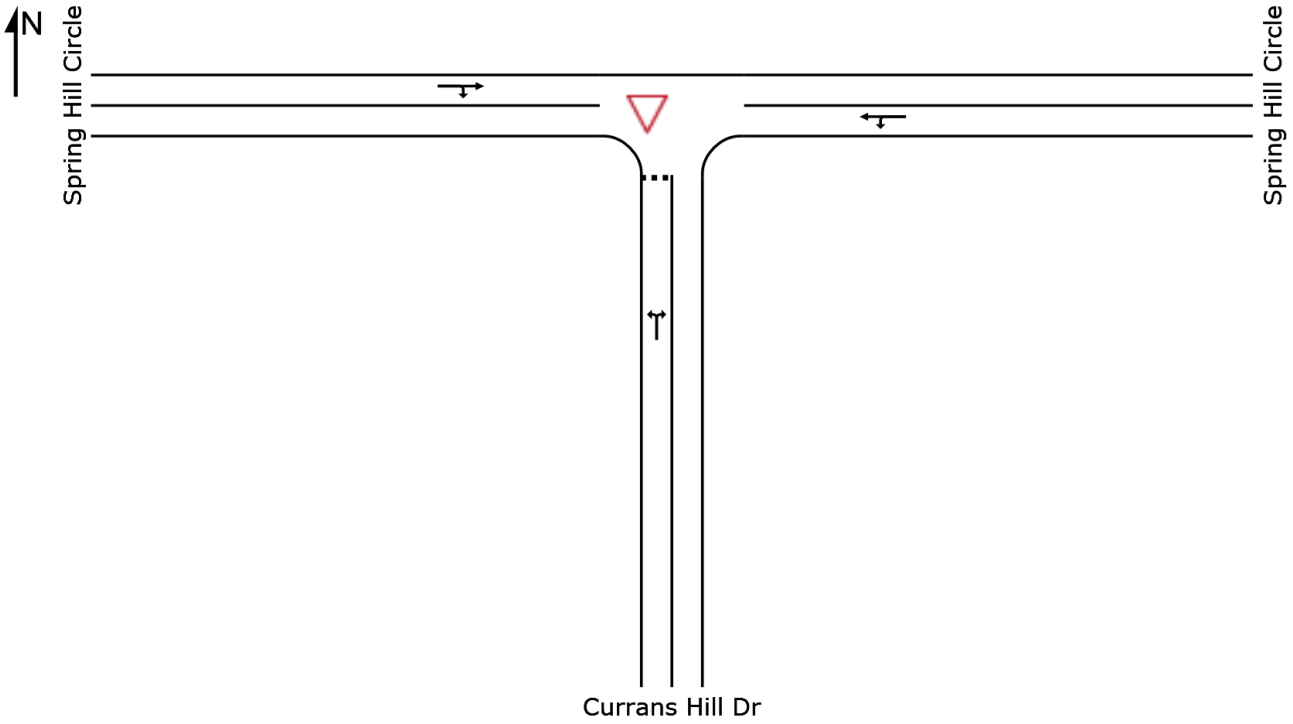
LoS	Average Delay per Vehicle (seconds)
A	Less than 14
B	15 to 28
C	29 to 42
D	43 to 56
E	57 to 70
F	More than 70

The degree of saturation (DOS) is another measure of the operational performance of individual intersections. For intersections controlled by traffic signals both queue length and delay increase rapidly as DOS approaches 1.000. It is usual to attempt to keep DOS to less than 0.9. DOS in the order of 0.7 generally represent satisfactory intersection operation, when DOS exceed 0.9 vehicle queues can be expected.

4.3.2 Currans Hill Drive / Spring Hill Circle

The layout of Currans Hill Drive / Spring Hill Circle is illustrated in **Figure 4-3**.

Figure 4-3 Currans Hill Drive / Spring Hill Circle Intersection Layout



The SIDRA assessment of Currans Hill Drive / Spring Hill Circle intersection is summarised in **Table 4-4**.

Table 4-4 Currans Hills Drive / Spring Hill Circle Intersection

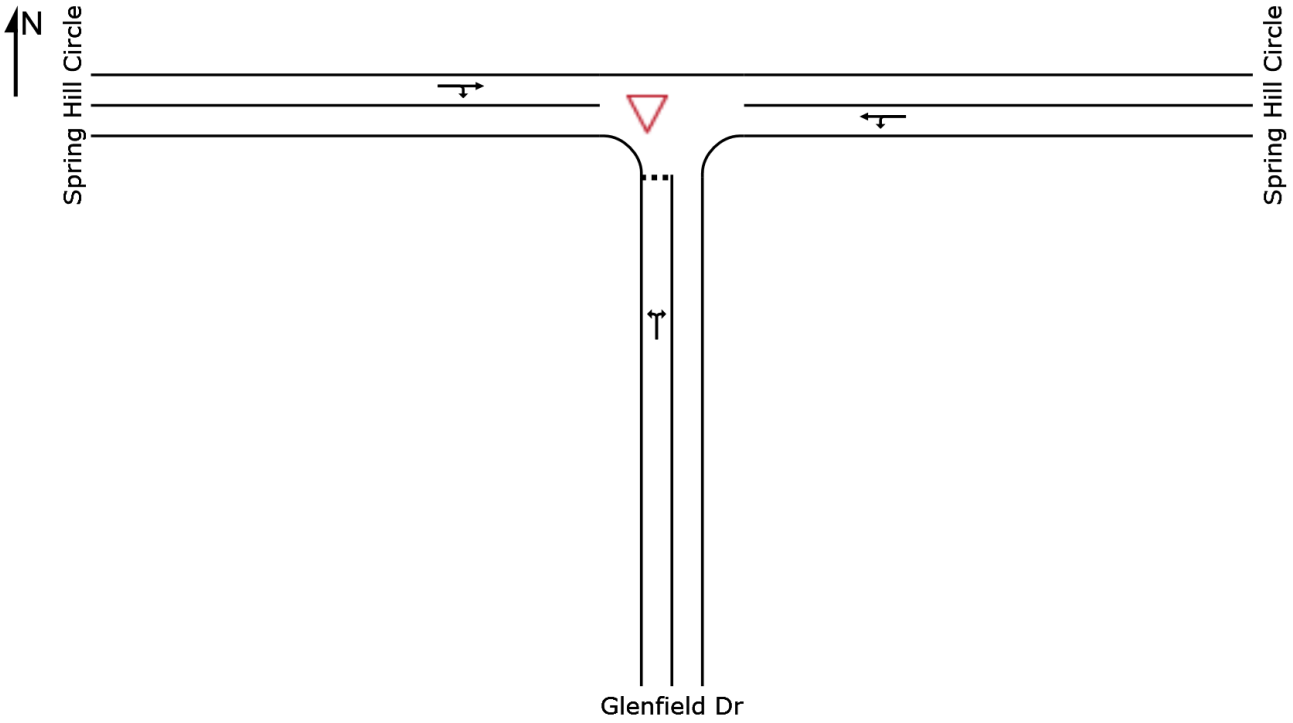
Scenario	AM			PM		
	DOS	Delay (s)	LOS	DOS	Delay (s)	LOS
2021 Base	0.054	5.5	A	0.133	5.1	A
2021 Base + Development	0.055	5.5	A	0.137	5.1	A

The above SIDRA results indicate that the intersection is expected to operate satisfactorily in both the AM and PM peak hour for both assessment scenarios with LOS A. The SIDRA movement summarises are provided in **Appendix A**.

4.3.3 Glenfield Drive / Spring Hill Circle

The layout of Glenfield Drive / Spring Hill Circle is illustrated in **Figure 4-4**.

Figure 4-4 Glenfield Drive / Spring Hill Circle Intersection Layout



The SIDRA assessment of Glenfield Drive / Spring Hill Circle intersection is summarised in **Table 4-5**.

Table 4-5 Glenfield Drive / Spring Hill Circle Intersection

Scenario	AM			PM		
	DOS	Delay (s)	LOS	DOS	Delay (s)	LOS
2021 Base	0.042	5.4	A	0.078	5.2	A
2021 Base + Development	0.044	5.4	A	0.086	5.2	A

The above SIDRA results indicate that the intersection is expected to operate satisfactorily in both the AM and PM peak hour for all assessment scenarios with LOS A. The SIDRA movement summarised are found in **Appendix A**.

5 Conclusions

Cardno has been commissioned by Wolin Investments and Landco Pty Ltd to produce a Traffic Impact Assessment (TIA) to accompany a planning proposal to amend the Minimum Lot Size development Standardaplying to a single parcel of land on Caulfield Close at Currans Hill. The site is currently approved for 8 dwellings seeking approval for an increase of 9 additional dwellings.

The following conclusion outlines the analysis and discussions presented within this report:

- It is anticipated that Spring Farm Parkway Extension will alleviate the traffic issues on Narellan Road.
- Nearest bus stop is approximately 1km from the subject site with a bus service to Campbelltown running every 30 minutes during peak hours.
- The proposed increase of 9 dwellings would equate to 1 vehicle movement every 5 minutes which would have a negligible impact on the surrounding local road network and not be of a noticeable difference to the existing neighbourhood.
- Assessment done on Currans Hill Drive / Spring Hill Circle indicate that no significant impact on the road network will be caused by the proposed development.
- Assessment done on Glenfield Drive / Spring Hill Circle indicate that no significant impact on the road network will be caused by the proposed development.

APPENDIX A

SIDRA MOVEMENT SUMMARIES

MOVEMENT SUMMARY

Site: [2021 Base AM Currans Hill Dr x Spring Hill Circle]

Opening Year Base 2021
Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Currans Hill Dr											
1	L2	33	9.7	0.054	4.7	LOS A	0.2	1.5	0.05	0.53	45.8
3	R2	33	19.4	0.054	5.5	LOS A	0.2	1.5	0.05	0.53	45.1
Approach		65	14.5	0.054	5.1	LOS A	0.2	1.5	0.05	0.53	45.5
East: Spring Hill Circle											
4	L2	95	6.7	0.060	4.6	LOS A	0.0	0.0	0.00	0.47	46.5
5	T1	13	0.0	0.060	0.0	LOS A	0.0	0.0	0.00	0.47	47.4
Approach		107	5.9	0.060	4.1	NA	0.0	0.0	0.00	0.47	46.6
West: Spring Hill Circle											
11	T1	29	3.6	0.067	0.3	LOS A	0.3	2.3	0.22	0.39	47.3
12	R2	83	1.3	0.067	4.9	LOS A	0.3	2.3	0.22	0.39	45.9
Approach		113	1.9	0.067	3.7	NA	0.3	2.3	0.22	0.39	46.3
All Vehicles		285	6.3	0.067	4.2	NA	0.3	2.3	0.10	0.45	46.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: [2021 Base + Development AM Currans Hill Dr x Spring Hill Circle]

Opening Year Base + Development 2021
Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Currans Hill Dr											
1	L2	34	9.4	0.055	4.7	LOS A	0.2	1.5	0.05	0.53	45.8
3	R2	33	19.4	0.055	5.5	LOS A	0.2	1.5	0.05	0.53	45.1
Approach		66	14.3	0.055	5.1	LOS A	0.2	1.5	0.05	0.53	45.5
East: Spring Hill Circle											
4	L2	95	6.7	0.060	4.6	LOS A	0.0	0.0	0.00	0.47	46.5
5	T1	13	0.0	0.060	0.0	LOS A	0.0	0.0	0.00	0.47	47.4
Approach		107	5.9	0.060	4.1	NA	0.0	0.0	0.00	0.47	46.6
West: Spring Hill Circle											
11	T1	29	3.6	0.070	0.3	LOS A	0.3	2.4	0.22	0.40	47.2
12	R2	88	1.2	0.070	4.9	LOS A	0.3	2.4	0.22	0.40	45.9
Approach		118	1.8	0.070	3.8	NA	0.3	2.4	0.22	0.40	46.3
All Vehicles		292	6.1	0.070	4.2	NA	0.3	2.4	0.10	0.45	46.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: [2021 Base PM Currans Hill Dr x Spring Hill Circle]

Opening Year Base 2021
Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Currans Hill Dr											
1	L2	88	1.2	0.133	4.7	LOS A	0.5	3.7	0.11	0.53	45.9
3	R2	87	3.6	0.133	5.1	LOS A	0.5	3.7	0.11	0.53	45.4
Approach		176	2.4	0.133	4.9	LOS A	0.5	3.7	0.11	0.53	45.6
East: Spring Hill Circle											
4	L2	57	5.6	0.049	4.6	LOS A	0.0	0.0	0.00	0.34	47.3
5	T1	34	0.0	0.049	0.0	LOS A	0.0	0.0	0.00	0.34	48.1
Approach		91	3.5	0.049	2.9	NA	0.0	0.0	0.00	0.34	47.6
West: Spring Hill Circle											
11	T1	20	0.0	0.040	0.2	LOS A	0.2	1.3	0.19	0.37	47.4
12	R2	48	2.2	0.040	4.8	LOS A	0.2	1.3	0.19	0.37	46.1
Approach		68	1.5	0.040	3.5	NA	0.2	1.3	0.19	0.37	46.5
All Vehicles		335	2.5	0.133	4.1	NA	0.5	3.7	0.10	0.44	46.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: [2021 Base + Development PM Currans Hill Dr x Spring Hill Circle]

Opening Year Base + Development 2021
Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Currans Hill Dr											
1	L2	94	1.1	0.137	4.7	LOS A	0.5	3.8	0.11	0.53	45.9
3	R2	87	3.6	0.137	5.1	LOS A	0.5	3.8	0.11	0.53	45.4
Approach		181	2.3	0.137	4.9	LOS A	0.5	3.8	0.11	0.53	45.6
East: Spring Hill Circle											
4	L2	57	5.6	0.049	4.6	LOS A	0.0	0.0	0.00	0.34	47.3
5	T1	34	0.0	0.049	0.0	LOS A	0.0	0.0	0.00	0.34	48.1
Approach		91	3.5	0.049	2.9	NA	0.0	0.0	0.00	0.34	47.6
West: Spring Hill Circle											
11	T1	20	0.0	0.041	0.2	LOS A	0.2	1.3	0.19	0.37	47.4
12	R2	49	2.1	0.041	4.8	LOS A	0.2	1.3	0.19	0.37	46.1
Approach		69	1.5	0.041	3.5	NA	0.2	1.3	0.19	0.37	46.5
All Vehicles		341	2.5	0.137	4.1	NA	0.5	3.8	0.10	0.45	46.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: [2021 Base AM Glenfield Dr x Spring Hill Circle]

Opening Year Base 2021
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Glenfield Dr											
1	L2	35	15.2	0.042	4.9	LOS A	0.2	1.2	0.17	0.52	46.0
3	R2	18	17.6	0.042	5.4	LOS A	0.2	1.2	0.17	0.52	45.5
Approach		53	16.0	0.042	5.1	LOS A	0.2	1.2	0.17	0.52	45.8
East: Spring Hill Circle											
4	L2	64	1.6	0.073	4.6	LOS A	0.0	0.0	0.00	0.25	48.1
5	T1	73	1.4	0.073	0.0	LOS A	0.0	0.0	0.00	0.25	48.6
Approach		137	1.5	0.073	2.2	NA	0.0	0.0	0.00	0.25	48.3
West: Spring Hill Circle											
11	T1	31	0.0	0.037	0.4	LOS A	0.2	1.2	0.22	0.26	48.1
12	R2	29	17.9	0.037	5.2	LOS A	0.2	1.2	0.22	0.26	46.9
Approach		60	8.8	0.037	2.7	NA	0.2	1.2	0.22	0.26	47.5
All Vehicles		249	6.3	0.073	2.9	NA	0.2	1.2	0.09	0.31	47.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: [2021 Base + Development AM Glenfield Dr x Spring Hill Circle]

Opening Year Base + Development 2021
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Glenfield Dr											
1	L2	38	13.9	0.044	4.9	LOS A	0.2	1.3	0.17	0.52	46.0
3	R2	18	17.6	0.044	5.4	LOS A	0.2	1.3	0.17	0.52	45.5
Approach		56	15.1	0.044	5.1	LOS A	0.2	1.3	0.17	0.52	45.9
East: Spring Hill Circle											
4	L2	76	1.4	0.079	4.6	LOS A	0.0	0.0	0.00	0.28	48.0
5	T1	73	1.4	0.079	0.0	LOS A	0.0	0.0	0.00	0.28	48.4
Approach		148	1.4	0.079	2.3	NA	0.0	0.0	0.00	0.28	48.2
West: Spring Hill Circle											
11	T1	31	0.0	0.038	0.4	LOS A	0.2	1.2	0.23	0.26	48.1
12	R2	29	17.9	0.038	5.3	LOS A	0.2	1.2	0.23	0.26	46.9
Approach		60	8.8	0.038	2.8	NA	0.2	1.2	0.23	0.26	47.5
All Vehicles		264	6.0	0.079	3.0	NA	0.2	1.3	0.09	0.32	47.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: [2021 Base PM Glenfield Dr x Spring Hill Circle]

Opening Year Base 2021
Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Glenfield Dr											
1	L2	53	4.0	0.078	4.7	LOS A	0.3	2.1	0.12	0.53	46.3
3	R2	49	0.0	0.078	5.2	LOS A	0.3	2.1	0.12	0.53	45.9
Approach		102	2.1	0.078	4.9	LOS A	0.3	2.1	0.12	0.53	46.1
East: Spring Hill Circle											
4	L2	52	2.0	0.048	4.6	LOS A	0.0	0.0	0.00	0.31	47.8
5	T1	38	2.8	0.048	0.0	LOS A	0.0	0.0	0.00	0.31	48.2
Approach		89	2.4	0.048	2.6	NA	0.0	0.0	0.00	0.31	48.0
West: Spring Hill Circle											
11	T1	68	0.0	0.060	0.2	LOS A	0.2	1.5	0.14	0.19	48.6
12	R2	38	5.6	0.060	4.9	LOS A	0.2	1.5	0.14	0.19	47.6
Approach		106	2.0	0.060	1.8	NA	0.2	1.5	0.14	0.19	48.2
All Vehicles		298	2.1	0.078	3.1	NA	0.3	2.1	0.09	0.34	47.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: [2021 Base + Development PM Glenfield Dr x Spring Hill Circle]

Opening Year Base + Development 2021
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Glenfield Dr											
1	L2	64	3.3	0.086	4.7	LOS A	0.3	2.3	0.11	0.53	46.3
3	R2	49	0.0	0.086	5.2	LOS A	0.3	2.3	0.11	0.53	45.9
Approach		114	1.9	0.086	4.9	LOS A	0.3	2.3	0.11	0.53	46.2
East: Spring Hill Circle											
4	L2	55	1.9	0.050	4.6	LOS A	0.0	0.0	0.00	0.32	47.7
5	T1	38	2.8	0.050	0.0	LOS A	0.0	0.0	0.00	0.32	48.2
Approach		93	2.3	0.050	2.7	NA	0.0	0.0	0.00	0.32	47.9
West: Spring Hill Circle											
11	T1	68	0.0	0.060	0.2	LOS A	0.2	1.5	0.14	0.19	48.6
12	R2	38	5.6	0.060	4.9	LOS A	0.2	1.5	0.14	0.19	47.6
Approach		106	2.0	0.060	1.8	NA	0.2	1.5	0.14	0.19	48.2
All Vehicles		313	2.0	0.086	3.2	NA	0.3	2.3	0.09	0.35	47.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

APPENDIX

E

BUSHFIRE ASSESSMENT REPORT

Travers

bushfire & ecology

Bushfire Protection Assessment

Planning Proposal

Part Lot 627 DP 1163903
Lot 2C, Caulfield Close, Currans Hill

Under Section 117(2) Direction No 4.4
of the *EP&A Act*

December 2019
(REF:18CSL02)

Bushfire Protection Assessment

Planning Proposal
Part Lot 627 DP 1163903

Lot 2C, Caulfield Close, Currans Hill

Report Authors:	Nicole van Dorst B. App. Sc., Grad. Dip., BPAD-L3 2361 Emma Buxton B. App. Sc.
Plans prepared:	Alexandra Scott B. Sc.
Checked by:	Nicole van Dorst
Date:	2/12/19
File:	18CSL02

BPAD Bushfire Planning & Design Accredited Practitioner Level 3

Disclaimer:

This report has been prepared to provide advice to the client on matters pertaining to the particular and specific development proposal as advised by the client and / or their authorised representatives. This report can be used by the client only for its intended purpose and for that purpose only. Should any other use of the advice be made by any person including the client then this firm advises that the advice should not be relied upon. The report and its attachments should be read as a whole and no individual part of the report or its attachments should be relied upon as meaning it reflects any advice by this firm. The report does not suggest or guarantee that a bush or grass fire will not occur and or impact the development. This report advises on matters published by the *NSW Rural Fire Service* in their guideline *Planning for Bush Fire Protection 2006* and other advice available from that organisation.

The mapping is indicative of available space and location of features which may prove critical in assessing the viability of the proposed works. Mapping has been produced on a map base with an inherent level of inaccuracy, the location of all mapped features are to be confirmed by a registered surveyor.

TBE Environmental Pty Ltd
ABN 85 624 419 870
PO Box 7138
Kariong NSW 2250

38A The Avenue
Mt Penang Parklands
Central Coast Highway
Kariong NSW 2250

t: 02 4340 5331
e: info@traversecology.com.au
www.traversecology.com.au

EXECUTIVE SUMMARY

A bushfire protection assessment has been undertaken for the proposed amendment to the Minimum Lot Size Development Standard that applies to land located at Lot 2C, Caulfield Close, Currans Hill.

The site is located at the southern end of Caulfield Close and is zoned E4 - Environmental Living and in part E2 - Environmental Conservation. The planning proposal seeks to amend the Minimum Lot Size Development Standards to allow for a minimum lot size of 500m^2.

This report identifies matters for consideration for the planning proposal and highlights the required bushfire protection measures, including asset protection zones (APZs), for future development under the *Environmental Planning and Assessment Act 1979 (EP&A Act), Section 117 Direction 4.4 and* in accordance *Planning for Bush Fire Protection 2006* (*PBP*) and *Community Resilience Practice Note 2/12 Planning Instruments and Policies*.

This assessment will also take into consideration the methodology outlined in the *Pre-release PBP 2018.* It is anticipated that *PBP 2018* will become legislated early next year. Until then, *PBP 2018* is in a 'pre-release' stage, also known as the transitionary period. Until *PBP 2018* becomes legislated, *PBP 2006* is the legally referenced document, however *PBP 2018* can be used on a performance basis.

The key principle for the proposal is to ensure that future development is capable of complying with *PBP*. Planning principles for the proposal include the provision of adequate access including perimeter roads, establishment of adequate APZs for future housing, specifying minimum lot depths to accommodate APZs and the introduction of controls which avoid placing inappropriate developments in hazardous areas and placement of combustible material in APZs.

Our assessment found that bushfire can potentially affect the site from the woodland vegetation associated within the riparian corridor to the south & west resulting in possible ember attack and radiant heat attack. Indicative APZ's have also been provided to the eastern boundary of the site to provide a 'worst case' scenario based on woodland vegetation. This area includes a transmission easement to the east, which will be managed regularly in accordance with Transgrid guidelines.

The bushfire risk posed to the planning proposal can be mitigated if appropriate bushfire protection measures (including APZs) are put in place and managed in perpetuity.

The assessment has concluded that future development on site will provide compliance with the planning principles of *PBP* and *Community Resilience Practice Note 2/12 – Planning Instruments and Policies*.

GLOSSARY OF TERMS

AHIMS	Aboriginal Heritage Information System
APZ	asset protection zone
AS1596	*Australian Standard – The storage and handling of LP Gas*
AS2419	*Australian Standard – Fire hydrant installations*
AS3745	*Australian Standard – Planning for emergencies in facilities*
AS3959	*Australian Standard – Construction of buildings in bushfire-prone areas 2009*
BAL	*bushfire attack level*
BSA	Bushfire safety authority
EEC	endangered ecological community
FDI	fire danger index
IPA	inner protection area
LEP	*local environmental plan*
NCC	*National Construction Code*
OPA	outer protection area
PBP	*Planning for Bush Fire Protection 2006*
RFS	NSW Rural Fire Service
SFPP	special fire protection purpose

TABLE OF CONTENTS

Introduction 1

Travers bushfire & ecology) has been requested by *Cardno to* undertake a bushfire protection assessment for the planning proposal located at Lot 2C (Part Lot 627 1163903), Caulfield Close, Currans Hill.

The proposal is located on land mapped by *Camden Council* as being bushfire prone. *Direction 4.4, Planning for Bush Fire Protection 2006 (PBP)* identifies matters for consideration for planning proposals that will affect, or are in proximity to land mapped as bushfire prone.

As such, the proposal is subject to the requirements of Section 117(2) of *the Environmental Planning and Assessment Act 1979 (EP&A Act)* which requires Council to consult with the Commissioner of the NSW Rural Fire Service (RFS) and to take into account any comments by the Commissioner.

1.1 Aims of the assessment

The aims of the bushfire protection assessment are to:

- review the bushfire threat to the landscape
- undertake a bushfire attack assessment in accordance with *PBP*
- provide advice on planning principles, including the provision of perimeter roads, asset protection zones (APZs) and other specific fire management issues
- review the potential to carry out hazard management over the landscape, taking into consideration the proposed retention of trees within the final development plans.

1.2 Project synopsis

The aim of the Planning Proposal is to seek an amendment to the Camden Local Environmental Plan (CLEP) 2010. The proposed amendment is to apply a minimum lot size of 500m2 to the subject land.

An indicative layout sketch has been provided in Figure 1.2 and Schedule 1 attached, bushfire constraints have been highlighted and minimum APZs have been recommended. The final subdivision design should ensure that APZ's are either contained within the perimeter road or within the individual lot boundaries to ensure ongoing maintenance.

Recommendations have also been made for future road design, building construction, water supply and utilities.

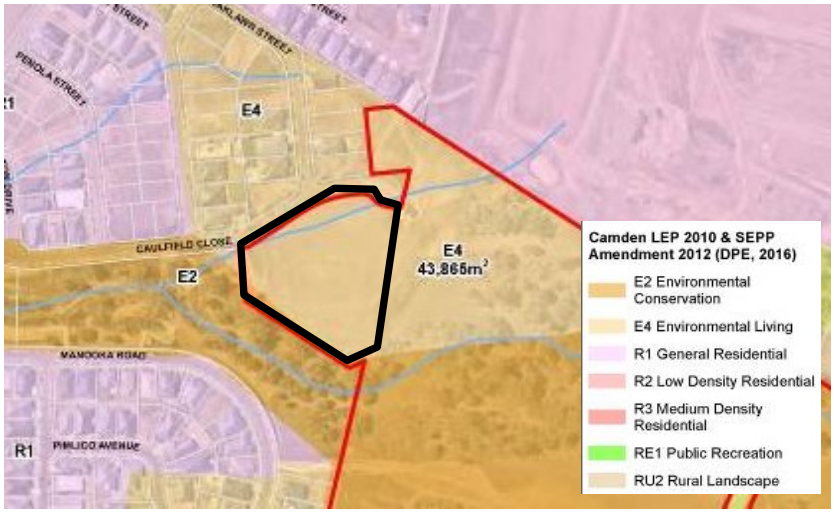


Figure 1.1 – Zoning

Figure 1.2 – Proposed layout plan
(source: *Cardno*, 18/10/19)

1.3 Information collation

To achieve the aims of this report, a review of the information relevant to the property was undertaken prior to the initiation of field surveys. Information sources reviewed include the following:

- Lot Layout – Option 5, Currans Hill Subdivision, prepared by *Cardno*, dated 18/10/19

- Bushfire protection assessment – Rezoning Application Stage 3 Manooka Valley, prepared by *Travers bushfire & ecology* dated March 2017 (amended July 2017)
- Manooka Stage 3 Rezoning: Flora and Fauna Assessment – final report (version 2) prepared by *Biosis* dated 27th February 2017.
- Camden Local Environmental Plan 2010
- Camden Development Control Plan 2011
- NearMap aerial photography
- Topographical maps *DLPI of NSW* 1:25,000
- *Australian Standard 3959 Construction of buildings in bushfire-prone areas*
- *Planning for Bush Fire Protection 2006 (PBP)*
- *Draft Planning for Bush Fire Protection 2018 (PBP)*
- *Community Resilience Practice Notes 2/12 Planning Instruments and Policies.*

An inspection of the proposed development site and surrounds was undertaken by Nicole van Dorst to assess the topography, slopes, aspect, drainage, vegetation and adjoining land use. The identification of existing bushfire measures and a visual appraisal of bushfire hazard and risk were also undertaken.

1.4 Site description

The site is located at Lot 2C Caulfield Close, Currans Hill (refer Figure 1.3). The site forms part of the greater Lot 627 DP 1163903.

The property is adjoined by Caulfield Close and residential land to the north, a mixture of managed land, grassland and bushland associated with the existing TransGrid Electrical Easement to the east and woodland vegetation associated with a riparian corridor to the south and west.

Figure 1.3 – Aerial appraisal
(source: Nearmap, 2018)

1.5 Legislation and planning instruments

1.5.1 Environmental Planning and Assessment Act 1979 (EP&A Act) and bushfire prone land

The *EP&A Act* governs environmental and land use planning and assessment within New South Wales. It provides for the establishment of environmental planning instruments, development controls and the operation of construction controls through the *National Construction Code (NCC).* The identification of bushfire prone land is required under Section 146 of the *EP&A Act*.

Bushfire prone land maps provide a trigger for the development assessment provisions. The property is located on land that is mapped by *Camden Council* as being bushfire prone – Category 2 open woodland vegetation (depicted orange) and its associated buffer (depicted yellow) (refer Figure 1.4).

Figure 1.4 – Bushfire prone land map (11th October 2013)
(Source: Camden Council)

PBP (pg 4) stipulates that if a proposed amendment to land use zoning or land use affects a designated bushfire prone area then the Section 117(2) Direction No 4.4 of the *EP&A Act* must be applied. This requires Council to consult with the Commissioner of the RFS and to take into account any comments by the Commissioner and to have regard to the planning principles of *PBP* (detailed within Section 1.5.3).

1.5.2 Local Environmental Plan (LEP)

A LEP provides for a range of zonings which list development that is permissible or not permissible, as well as the objectives for development within a zone.

The proposal, including the provision of APZs, would seek to comply with the objectives of the zoning with APZ's excluded from the E2 zoned land.

1.5.3 Planning for Bush Fire Protection 2006 (PBP)

Bushfire protection planning requires the consideration of the RFS planning document entitled *PBP.* The policy aims to provide for the protection of human life (including fire fighters) and to minimise impacts on property and the environment from the threat of bushfire, while having due regard to development potential, on site amenity and protection of the environment.

PBP outlines the following planning principles that must be achieved for all planning proposals:

1. provision of a perimeter road with two way access which delineates the extent of the intended development.
2. provision, at the urban interface, for the establishment of adequate APZs for future housing.
3. specifying minimum residential lot depths to accommodate APZs for lots on perimeter roads.
4. minimising the perimeter of the area of land interfacing the hazard, which may be developed.
5. introduction of controls which avoid placing inappropriate developments in hazardous areas, and
6. introduction of controls on the placement of combustible materials in APZs.

In addition to the above, *PBP* outlines the bushfire protection measures required to be assessed for new development in bushfire prone areas.

The planning proposal has been assessed in compliance with the following measures to ensure that future development is capable of complying with *PBP*:

- asset protection zones
- building construction and design
- access arrangements
- water supply and utilities
- landscaping
- emergency arrangements

1.5.4 National Construction Code (NCC) and the Australian Standard AS3959 Construction in bushfire-prone areas 2009 (AS3959)

The *NCC* is given effect through the *EP&A Act* and forms part of the regulatory environment of construction standards and building controls. The *NCC* outlines objectives, functional statements, performance requirements and deemed to satisfy provisions. For residential dwellings these include Classes 1, 2 and 3 buildings. The construction manual for the deemed to satisfy requirements is *AS3959.*

Although consideration of *AS3959* is not specifically required in a planning proposal, this report (Section 3.2) provides the indicative setbacks for each dwelling construction level and can be used in future planning for master plans and / or subdivision proposals.

1.6 Environmental and cultural constraints

1.6.1 Environmental constraints

A review of the broader Manooka Valley Flora and Fauna Assessment prepared by Biosis (dated 27st February 2017) has been undertaken. The mapping has not identified any Critically Endangered Ecological Community (CEEC) or Endangered Ecological Community (EEC) within the current study area. A small portion of the site (south-eastern corner) is mapped as exotic grassland vegetation with the remainder of the site identified as cleared land (refer Figure 1.5).

Figure 1.5 – Vegetation Community (Biosis, 2017)

1.6.2 Cultural constraints

A basic search was conducted on the Aboriginal Heritage Information System (AHIMS). The results show that there are four (4) identified Aboriginal sites of significance within the broader Lot 627 DP 1163903 or within 50m of the site.

Bushfire Threat Assessment 2

To assess the bushfire threat and to determine the required width of an APZ for a development, a review of the elements that comprise the overall threat needs to be completed.

PBP provides a methodology to determine the size of any APZ that may be required to offset possible bushfire attack. These elements include the potential hazardous landscape that may affect the site and the effective slope within that hazardous vegetation.

2.1 Hazardous fuels

PBP guidelines require the identification of the predominant vegetation formation, for a distance of at least 140m from a proposed development envelope, in accordance with David Keith (2004) to determine APZ distances.

Recently these vegetation groups have been subject to further fuel load research by the University of Wollongong (UoW) and Dr Penny Watson. These fuel loads have been published in the 2017 public draft release of PBP 2017 (RFS 2017) and are summarised in Table 2.1. The fuel loads adopted in this assessment are based on UoW research and are current best practice.

The hazardous vegetation within 140m of the planning proposal (to the east) has been mapped by Bioisis (refer Figure 1.5) and consists of a mixture of grassland, woodland and forested wetland. The vegetation within Manooka Reserve to the south and west is mapped by NPWS (2002) as Shale Plains Woodland.

Table 2.1 – Vegetation / fuel load

Vegetation community	Vegetation Formation / Fuel load (PBP 2006)	Vegetation Class / Fuel load (Pre-release PBP 2018)
Cumberland Plain Woodland	Woodland (10/15 t/ha)	Woodland (grassy & woody) (10.5 / 20.2 t/ha)
Cumberland Plain Woodland - derived shrubland		
Shale Plains Woodland		
River-Flat Eucalypt Forest	Forested Wetland (15/20 t/ha)	Coastal Floodplain Wetland (8.2 / 15.1 t/ha)
Exotic Grassland	N/A	Grassland (6 / 6 t/ha)

Photo 1: Woodland vegetation located within the riparian corridor (south)

A TransGrid easement runs parallel and adjacent to the development area to the immediate east. This easement consists of a mixture of managed land, grassland and bushland. A worst case scenario has been adopted and a 'woodland' vegetation formation has been used in the calculations. A reassessment of the APZ required will be undertaken at subdivision stage following a further review of the future maintenance of the easement.

2.2 Effective slope

The effective slope is determined by reviewing the slopes within 100m of the development boundary. Effective slope refers to that slope which provides the most effect upon likely fire behaviour. A mean average slope may not in all cases provide sufficient information such that an appropriate assessment can be determined.

The effective slope within the hazardous vegetation to the south and west is 5 – 10 degrees downslope. The effective slope within the grassland / potential future woodland vegetation to the east is level to upslope.

2.3 Bushfire attack assessment

A fire danger index (FDI) of 100 has been used to calculate bushfire behaviour on the site using forest vegetation located within the Greater Sydney region.

Table 2.2 below provides a summary of the bushfire attack assessment and the minimum required APZs in compliance with BAL 29 building construction standards as outlined in Pre-release PBP 2018. This is considered an alternative solution approach.

Table 2.2 – Bushfire attack assessment

Aspect	Vegetation formation within 140m of development	Effective slope of land	Minimum APZ required Pre-release PBP 2018 (metres)	Building construction standards Pre-release PBP 2018 (metres)
North	Managed lands	N/A	N/A	N/A
South, south-east and west	Woodland	5-10 ^{0D}	20	BAL 29 (20-<28) BAL 19 (28 - <39) BAL 12.5 (39-<100)
East	Woodland	Level to upslope	12	BAL 29 (12-<18) BAL 19 (18 - <26) BAL 12.5 (26-<100)

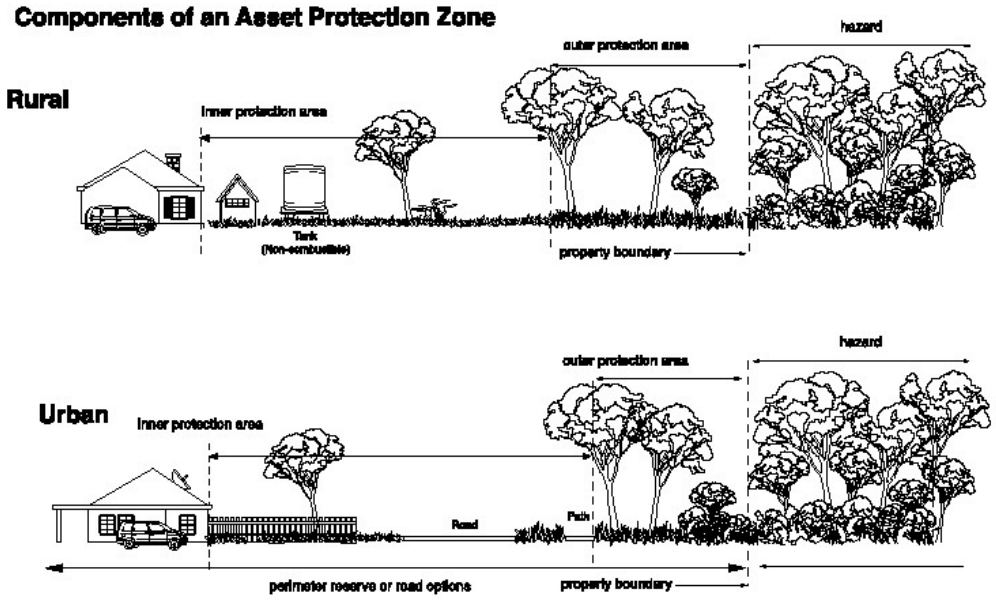
*Notes: * Slope is either 'U' meaning up slope or 'C' meaning cross slope or 'D' meaning down slope*

Specific Protection Issues

3

3.1 Asset protection zones (APZs)

APZs are areas of defendable space separating hazardous vegetation from buildings. The APZ generally consists of two subordinate areas, an inner protection area (IPA) and an outer protection area (OPA). The OPA is closest to the bush and the IPA is closest to the dwellings. In this case the APZ will consist of an IPA only. The IPA cannot be used for habitable dwellings but can be used for all external non-habitable structures such as pools, sheds, non-attached garages, cabanas, etc. A typical APZ and therefore defendable space is graphically represented below:



Source: RFS, 2006

Note: Vegetation management as shown is for illustrative purposes only. Specific advice is to be sought in regard to vegetation removal and retention from a qualified and experienced expert to ensure APZs comply with the *RFS* performance criteria.

PBP dictates that the subsequent extent of bushfire attack that can potentially emanate from a bushfire must not exceed a radiant heat flux of 29*kW/m*^{2} for residential subdivision developments. This rating assists in determining the size of the APZ in compliance with *PBP* to provide the necessary defendable space between hazardous vegetation and a building. Table 3.1 outlines the proposals compliance with the performance criteria for APZs.

Table 3.1 – Performance criteria for asset protection zones (*PBP* guidelines pg. 19)

Performance criteria	Acceptable solutions	Acceptable solution	Performance solution	Comment
Radiant heat levels at any point on a proposed building will not exceed 29kW/m^2	APZs are provided in accordance with Appendix 2 APZs are wholly within the boundary of the development site	☐	☑	Refer Section 2.3. An alternative solution has been used to determine minimum APZ's based on Pre-release PBP 2018. APZ's have been recommended based on a radiant heat exposure of less than 29kW/m^2.
APZs are managed and maintained to prevent the spread of fire towards the building	In accordance with the requirements of *Standards for Asset Protection Zones* (RFS 2005)	☑	☐	The APZ will consist of landscaped areas The APZ is not located on slopes exceeding 18^o.
APZ maintenance is practical, soil stability is not compromised and the potential for crown fires is negated	The APZ is located on lands with a slope of less than 18^o	☑	☐	Yes. APZs are located on slopes less than 18^o

3.2 Building protection

In terms of future subdivision approval, the minimum APZ must be provided in accordance with *PBP*. The APZs provided in Table 2.2 (Section 2.3) of this report are based on an alternative solution approach to comply with the setbacks provided in Pre-release PBP 2018 (Table A1.12.5)

Although not required in terms of a planning proposal, the following advice in relation to building construction levels can be used for future planning and subdivision design.

The construction classification system is based on five (5) bushfire attack levels (BAL). These are BAL – Flame Zone (FZ), BAL 40, BAL 29, BAL 19 and BAL 12.5 AS3959 – *Construction of buildings in bushfire-prone areas*. The lowest level, BAL 12.5, has the longest APZ distance while BAL – FZ has the shortest APZ distance. These allow for varying levels of building design and use of appropriate materials.

Table 2.2 provides an indication of the BAL setbacks that are likely to apply for future building construction. These BAL levels are for planning purposes only and will be assessed / confirmed prior to building construction stage. The APZ depicted in Schedule 1 attached is based on BAL 29 building construction for those lots fronting the bushfire hazard.

3.3 Hazard management

In terms of implementing and / or maintaining APZs, there is no physical reason that would constrain hazard management from being successfully carried out by normal means (e.g. mowing / slashing).

The APZs are to be managed in accordance with the RFS guidelines *Standards for Asset Protection Zones (RFS, 2005),* with landscaping to comply with Appendix 5 of *PBP.*

A summary of the guidelines for managing APZs is attached as Appendix 1 to this report.

Minimum APZs have been recommended and are depicted in Schedule 1. The APZ will consist of an IPA only. The final subdivision design should ensure that APZ's are either contained within a perimeter road or within individual lot boundaries to ensure ongoing maintenance.

3.4 Access for fire fighting operations

Future residential development within the site will access Caulfield Close in the north.

An indicative layout sketch has been provided (refer Schedule 1 attached). Future road design should comply with the performance criteria and acceptable solutions for public roads as outlined within the table below. Perimeter roads (fronting the bushfire hazard) are to have a carriageway width of 8m (excluding parking). Internal roads are required to have a carriageway width of 5.5m (excluding parking) as allowable within Pre-release PBP 2018.

Table 3.3 outlines the performance criteria and acceptable solutions for future public roads within future subdivision design.

Table 3.2 – Performance criteria for public roads (*PBP* guidelines pg. 20)

Performance criteria	Acceptable solutions
Fire fighters are provided with safe all weather access to structures (thus allowing more efficient use of fire fighting resources).	Public roads are two-wheel drive, all weather roads.
Public road widths and design that allow safe access for fire fighters while residents are evacuating an area.	Urban perimeter roads are two way, that is, at least two traffic lane widths (carriageway 8m minimum kerb to kerb) allowing traffic to pass in opposite directions. Non perimeter roads comply with Table 3.3 below. Perimeter road is linked with the internal road system at an interval of no greater than 500m in urban areas. Traffic management devices are constructed to facilitate access by emergency services. Public roads have a cross fall not exceeding 3°. All roads are through roads. If unavoidable, dead end roads are not more than 200m in length, incorporate a minimum 12m outer radius turning circle, sign posted dead end and direct traffic away from the hazard. Curves of roads (other than perimeter) have a minimum inner radius of 6m and are minimal in number to allow for rapid access and egress. The minimum distance between inner and outer curves is 6m. Maximum grades for sealed roads do not exceed 15° and an average grade of not more than 10°. Minimum vertical clearance of 4m above the road at all times.
The capacity of road surfaces and bridges is sufficient to carry fully loaded fire fighting vehicles	The capacity of road surfaces and bridges is sufficient to carry fully loaded fire fighting vehicles (15 tonnes for reticulated water and 28 tonnes for all other areas). Bridges clearly indicate load rating.
Roads that are clearly sign posted (with easily distinguishable names) and buildings / properties that are clearly numbered.	Public roads >6.5m wide to locate hydrants outside of parking reserves to ensure accessibility to reticulated water. Public roads 6.5-8m wide are No Parking on one side with the hydrant located on this side to ensure accessibility to reticulated water. Public roads <6.5m wide provide parking within parking bays and locate services outside of parking bays to ensure accessibility to reticulated water. One way only public access are no less than 3.5m wide and provide parking within parking bays and locate services outside of parking bays to ensure accessibility to reticulated water.

Performance criteria	Acceptable solutions
There is clear access to reticulated water supply. Parking does not obstruct the minimum paved width	Parking bays are a minimum of 2.6m wide from kerb edge to road pavement. No services or hydrants are located within parking bays. Public roads directly interfacing the bushfire hazard are to provide roll top kerbing to the hazard side of the road.

Table 3.3 – Minimum widths for public roads that are not perimeter roads

Curve radius (inside edge) (metres width)	Swept path (metres width)	Single lane (metres width)	Two way (metres width)
<40	3.5	4.5	8.0
40-69	3.0	3.9	7.5
70-100	2.7	3.6	6.9
>100	2.5	3.5	6.5

3.5 Water supplies

Town reticulated water supply is available to the property in the form of an underground reticulated water system.

Table 3.4 outlines the performance criteria and acceptable solutions for reticulated water supply.

Table 3.4 – Performance criteria for reticulated water supplies (*PBP* guidelines pg. 27)

Performance criteria	Acceptable solutions
Water supplies are easily accessible and located at regular intervals.	Reticulated water supply to urban subdivision uses a ring main system for areas with perimeter roads. Fire hydrant spacing, sizing and pressures comply with AS2419.1 - 2005. Where this cannot be met, the RFS will require a test report of the water pressures anticipated by the relevant water supply authority. In such cases, the location, number and sizing of hydrants shall be determined using fire engineering principles. Hydrants are not placed within any road carriageway. All above ground water and gas pipes external to the building are metal, including and up to taps. The provisions of parking on public roads are met.

3.6 Gas

Table 3.5 outlines the required performance criteria for the gas supply.

Table 3.5 – Performance criteria for gas supplies (*PBP* guidelines pg. 27)

Performance criteria	Acceptable solutions
Location of gas services will not lead to the ignition of surrounding bushland land or the fabric of buildings	Reticulated or bottled gas bottles are to be installed and maintained in accordance with AS1596 (2002) and the requirements of relevant authorities. Metal piping is to be used. All fixed gas cylinders are to be kept clear of flammable materials to a distance of 10m and shielded on the hazard side of the installation. If gas cylinders are to be kept close to the building the release valves must be directed away from the building and at least 2m away from any combustible material, so that they do not act as a catalyst to combustion. Connections to and from gas cylinders are metal. Polymer sheathed flexible gas supply lines to gas meters adjacent to buildings are not to be used.

3.7 Electricity

Table 3.6 outlines the required performance criteria for electricity supply.

Table 3.6 – Performance criteria for electricity services (*PBP* guidelines pg. 27)

Performance criteria	Acceptable solutions
Location of electricity services limit the possibility of ignition of surrounding bushland or the fabric of buildings Regular inspection of lines in undertaken to ensure they are not fouled by branches.	Where practicable, electrical transmission lines are underground Where overhead electrical transmission lines are proposed: • Lines are installed with short pole spacing (30m), unless crossing gullies, gorges or riparian areas: and • No part of a tree is closer to a power line than the distance set out in accordance with the specification in *Vegetation Safety Clearances* issued by *Energy Australia* (NS179, April 2002).

Conclusion & Recommendations

4

4.1 Conclusion

A bushfire protection assessment has been undertaken for the planning proposal located at Lot 2C, Caulfield Close, Currans Hill.

Our assessment found that bushfire can potentially affect the site from the woodland vegetation associated with the riparian corridor to the south and west and the woodland extending beyond the electrical easement to the east resulting in possible ember attack and radiant heat attack.

The bushfire risk posed to the planning proposal however can be mitigated if appropriate bushfire protection measures (including APZs) are put in place and managed in perpetuity.

Future development on site is to comply with the following planning principles.

Table 4.1 – Planning principles

Planning principles	Recommendations
Provision of a perimeter road with two way access which delineates the extent of the intended development.	A perimeter road (8m carriageway width) is to be provided adjacent to all bushland areas.
Provision, at the urban interface, for the establishment of adequate APZs for future housing.	APZs have been recommended in compliance with BAL 29 (Pre-release PBP 2018).
Specifying minimum residential lot depths to accommodate APZs for lots on perimeter roads.	Future subdivision design is to allow for the minimum APZs as recommended within Table 2.2 and as depicted within Schedule 1 attached.
Minimising the perimeter of the area of land interfacing the hazard, which may be developed.	Compliant.
Introduction of controls which avoid placing inappropriate developments in hazardous areas.	Future development consists of residential dwellings and is appropriate for the level of bushfire risk.
Introduction of controls on the placement of combustible materials in APZs.	Compliant – can be made a condition of consent.

The following recommendations are provided to ensure that future residential development is in accordance with, or greater than, the requirements of *PBP.*

4.2 Recommendations

Recommendation 1 - APZs are to be provided to the future residential development. APZs are to be measured from the exposed wall of any dwelling toward the hazardous vegetation. The minimum APZ must be achievable within all lots fronting the bushfire hazard as nominated in Table 2.2 and also as generally depicted in Schedule 1.

Recommendation 2 - Fuel management within the APZs is to be maintained as an inner protection area with regular maintenance of the landscaped areas, mowing of lawns in accordance with the guidelines provided in Appendix 1, and as advised by the RFS in their publications.

Recommendation 3 - Building construction standards are to be applied for future residential dwellings in accordance with *Australian Standard AS3959 Construction of buildings in bushfire-prone areas (2009)* with additional construction requirements as listed within Section A3.7 of Addendum Appendix 3 of *PBP.*

Recommendation 4 – Public access roads are to comply with the performance criteria as outlined within Section 4.1.3 of *PBP* (refer Section 3.4 of this report). A perimeter road is to be provided.

Recommendation 5 – Water, electricity and gas supply is to comply with the acceptable solutions as provided within Section 4.1.3 of *PBP* (refer Sections 3.5, 3.6 and 3.7 of this report).

REFERENCES

Australian Building Codes Board (2010) – *Building Code of Australia*, Class 1 and Class 10 Buildings Housing Provisions Volume 2

Chan, K.W. (2001) – *The suitability of the use of various treated timbers for building constructions in bushfire prone areas*. Warrington Fire Research

Councils of Standards Australia AS3959 (2009) – *Australian Standard Construction of buildings in bush fire-prone areas*

Hon Brad Hazzard (7 June 2012) – *Planning proposal to rezone land at Boundary Road, Medowie from 1 (c1) Rural Small Holdings Zone to 1(c5) Rural Small Holdings, 1(c4) Rural Small Holdings and 7(a) Environmental Protection*

Keith, David (2004) – *Ocean Shores to Desert Dunes – The Native Vegetation of New South Wales and the ACT*. The Department of Environment and Climate Change

Rural Fire Service (2006) - *Planning for bushfire protection– a guide for councils, planners, fire authorities and developers*. NSW Rural Fire Service

Rural Fire Service (2006) - Bushfire Attack Software on RFS web site

Tan, B., Midgley, S., Douglas, G. and Short (2004) - *A methodology for assessing bushfire attack.* RFS Development Control Service

Travers, J. (2003) *The Ecological Management of Asset Protection Zones at Wallarah Peninsula – A Case Study*

Umwelt, 2012. *Ecological Assessment for Rezoning Application Lots 93 – 96 Boundary Road, Medowie*

Plan of Bushfire Protection Measures

S1

Legend

- Site location
- Contours - 1m (source: LiDAR)
- Asset Protection Zone (Inner Protection Area)
- Proposed rezoning - E2 Environmental Management

Aerial source:Nearmap

PROJECT & MXD REFERENCE	DATE & ISSUE	SCALE & COORDINATE SYSTEM
Lot 2C, Caulfield Close, Currans Hill 18CSL02_BF001	2/12/2019 Issue 1	1:1,500 @ A4 GDA 1994 MGA Zone 56

0 20 40 m

TITLE

Schedule 1 - Bushfire Protection Measures

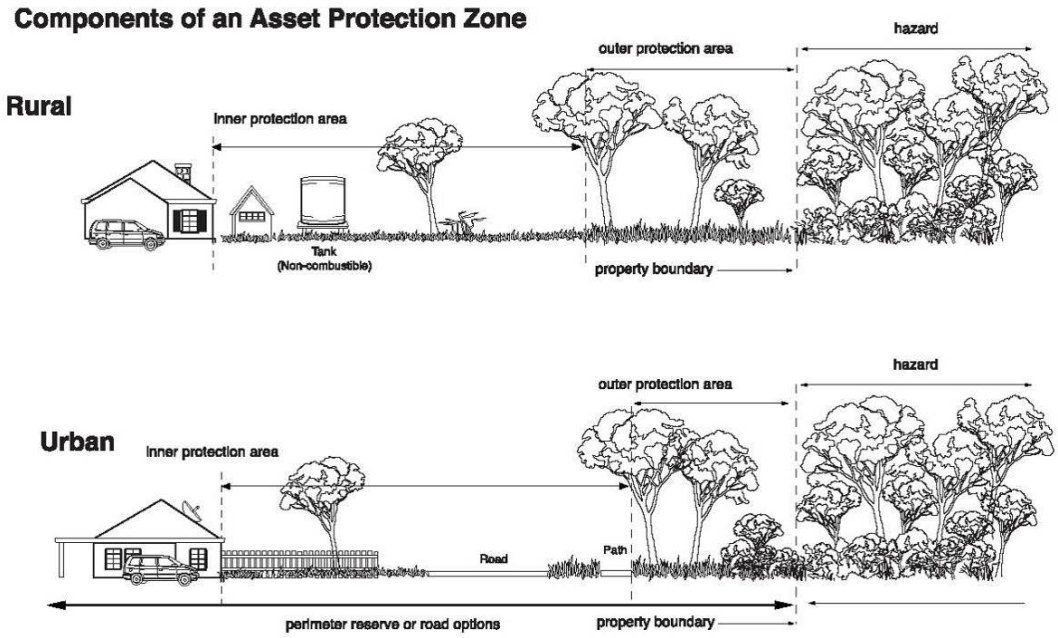
Document Path: N:\GIS STORAGE\N Drive\18CSL02_CaulfieldCls_CurransHill\MXDs\18CSL02_BF001.mxd

Disclaimer: The mapping is indicative of available space and location of features which may prove critical in assessing the viability of the proposed works. Mapping has been produced on a map base with an inherent level of inaccuracy, the location of all mapped features are to be confirmed by a registered surveyor.

Management of Asset Protection Zones A1

The RFS provides basic advice in respect of managing APZs through documents such as, *Standards for Asset Protection Zones* (RFS, 2005), with landscaping to comply with Appendix 5 of *PBP*.

The APZ generally consists of two subordinate areas, an inner protection area (IPA) and an outer protection area (OPA). The OPA is closest to the bush and the IPA is closest to the dwellings. The property is to be managed to IPA standards only. A typical APZ is graphically represented below:



APZs and progressive reduction in fuel loads (Source: RFS, 2006)

Note: Vegetation management as shown is for illustrative purposes only. Specific advice is to be sought in regard to vegetation removal and retention from a qualified and experienced expert to ensure APZs comply with the RFS performance criteria.

The following provides maintenance advice for vegetation within the IPA and OPA.

Inner protection area (IPA)
Fuel loads within the IPA are to be maintained so it does not exceed 4t/ha.

Trees are to be maintained to ensure;

- canopy cover does not exceed 15%
- trees (at maturity) do not touch or overhang the building

- tree canopies (at maturity) should be well spread out and not form a continuous canopy
- lower limbs should be removed up to a height of 2m above ground
- preference should be given to smooth barked and evergreen trees.

Shrubs are to be maintained to ensure;

- large discontinuities or gaps in vegetation
- shrubs should not be located under trees
- shrubs should not form more than 10% of ground cover
- clumps of shrubs should be separated from exposed windows and doors by a distance of at least twice the height of vegetation.

Grass is to be maintained to ensure;

- a height of 10cm or less
- leaves and debris are removed.

Landscaping to the site is to comply with the principles of Appendix 5 of PBP. In this regard the following landscaping principles are to be incorporated into the development:

- Suitable impervious areas being provided immediately surrounding the building such as courtyards, paths and driveways;
- Restrict planting in the immediate vicinity of the building which may over time and if not properly maintained come in contact with the building;
- When considering landscape species consideration needs to be given to estimated size of the plant at maturity;
- Avoid species with rough fibrous bark, or which retain/shed bark in long strips or retain dead material in their canopies;
- Use smooth bark species of trees species which generally do not carry a fire up the bark into the crown;
- Avoid planting of deciduous species that may increase fuel at surface/ ground level (i.e. leaf litter);
- Avoid climbing species to walls and pergolas;
- Locate combustible materials such as woodchips/mulch, flammable fuel stores away from the building;
- Locate combustible structures such as garden sheds, pergolas and materials such timber garden furniture way from the building; and
- Use of low flammability vegetation species.

APPENDIX

F

SEPPS ASSESSMENT

State Environmental Planning Policy	Consistency	Comment
State Environmental Planning Policy No 1—Development Standards	N/A	
State Environmental Planning Policy No 19—Bushland in Urban Areas	The PP is consistent with SEPP 19.	The site is subject to the provisions of SEPP 19. SEPP 19 applies to the proposed rezoning as Camden Council LGA is listed in Schedule 1 – 'Areas and part areas to which the Policy applies'. The study area contains native vegetation which is similar to the original vegetation community, fitting the definition of bushland provided in Clause 4.1 of the Act. The Subject Site does not contain nor border land that is zoned or reserved for public open space purposes, and thus no Plan of Management is required.
State Environmental Planning Policy No 21—Caravan Parks	N/A	
State Environmental Planning Policy No 30—Intensive Agriculture	N/A	
State Environmental Planning Policy No 33—Hazardous and Offensive Development	N/A	
State Environmental Planning Policy No 36—Manufactured Home Estates	N/A	
State Environmental Planning Policy No 44—Koala Habitat Protection	N/A	The site does not support Koala Habitat
State Environmental Planning Policy No 47—Moore Park Showground	N/A	
State Environmental Planning Policy No 50—Canal Estate Development	N/A	
State Environmental Planning Policy No 52—Farm Dams and Other Works in Land and Water Management Plan Areas	N/A	
State Environmental Planning Policy No 55—Remediation of Land	The PP is consistent with SEPP 55.	Based on the results of contamination investigations previously undertaken at the site by GeoEnviro Consultancy Pty Ltd, January 2015, the Subject Site was generally assessed to have a low risk of gross ground contamination. Additionally, the site is identified as a contaminated site by the Environment Protection Authority contamination register. Therefore, the site is therefore considered suitable for the proposed rezoning.
State Environmental Planning Policy No 62—Sustainable Aquaculture	N/A	
State Environmental Planning Policy No 64—Advertising and Signage	N/A	

State Environmental Planning Policy	Consistency	Comment
State Environmental Planning Policy No 65—Design Quality of Residential Flat Development	N/A	
State Environmental Planning Policy No 70—Affordable Housing (Revised Schemes)	N/A	
State Environmental Planning Policy (Affordable Rental Housing) 2009	N/A	
State Environmental Planning Policy (Building Sustainability Index: BASIX) 2004	N/A	
State Environmental Planning Policy (Coastal Management) 2018	N/A	
State Environmental Planning Policy (Educational Establishment and Child Care Facilities) 2017	N/A	
State Environmental Planning Policy (Exempt and Complying Development Codes) 2008	N/A	
State Environmental Planning Policy (Gosford City Centre) 2018	N/A	
State Environmental Planning Policy (Housing for Seniors or People with a Disability) 2004	N/A	
State Environmental Planning Policy (Infrastructure) 2007	N/A	
State Environmental Planning Policy (Kosciuszko National Park—Alpine Resorts) 2007	N/A	
State Environmental Planning Policy (Kurnell Peninsula) 1989	N/A	
State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007	N/A	
State Environmental Planning Policy (Miscellaneous Consent Provision) 2007	N/A	
State Environmental Planning Policy (Penrith Lakes Scheme) 1989	N/A	
State Environmental Planning Policy (Rural Lands) 2008	N/A	
State Environmental Planning Policy (State and Regional Development) 2011	N/A	
State Environmental Planning Policy (State Significant Precinct) 2005	N/A	
State Environmental Planning Policy (Sydney Drinking Water Catchment) 2011	N/A	
State Environmental Planning Policy (Sydney Region Growth Centres) 2006	N/A	

State Environmental Planning Policy	Consistency	Comment
State Environmental Planning Policy (Three Ports) 2013	N/A	
State Environmental Planning Policy (Urban Renewal) 2010	N/A	
State Environmental Planning Policy (Vegetation in Non-Rural Areas) 2017	The PP is consistent with SEPP (Vegetation in Non-Rural Area) 2017.	No trees and vegetation are proposed to be removed as part of the PP. A small number of trees may potentially be removed in future subdivision of the land but the Flora / Fauna Assessment that accompanies this PP has found that the loss of these trees would not have a significant impact on the ecological values of the locality. Existing Cumberland Plain Woodland would be protected through the retention of the existing E2 Environmental Conservation and E4 Environmental Living zones.
State Environmental Planning Policy (Western Sydney Employment Area) 2009	N/A	
State Environmental Planning Policy (Western Sydney Parklands) 2009	N/A	
Sydney Regional Environmental Plan No 8 (Central Coast Plateau Areas)	N/A	
Sydney Regional Environmental Plan No 9—Extractive Industry (No 2—1995)	N/A	
Sydney Regional Environmental Plan No 16—Walsh Bay	N/A	
Sydney Regional Environmental Plan No 20—Hawkesbury-Nepean River (No 2—1997)	N/A	
Sydney Regional Environmental Plan No 24—Homebush Bay Area	N/A	
Sydney Regional Environmental Plan No 26—City West	N/A	
Sydney Regional Environmental Plan No 30—St Marys	N/A	
Sydney Regional Environmental Plan No 33—Cooks Cove	N/A	
Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005	N/A	

APPENDIX

G

INDICATIVE LAYOUT

OPTION 5 LAYOUT PLAN

SCALE 1:500

Rev.	Date	Description	Des.	Verif.	Appd.
1	TBC	UNDER REVISION			

0 10 20 30 40 50m

SCALE 1:500 @A1

Cardno (NSW/ACT) Pty Ltd | ABN 95 001 145 035
Level 9, The Forum, 203 Pacific Highway
St. Leonards, NSW 2065
Tel: 02 9496 7700 Fax: 02 9439 5170
Web: www.cardno.com.au

Drawn	YNL	Date 18.10.2019
Checked		Date
Designed		Date
Verified		Date
Approved		

Client: TBC

Project: CURRANS HILLS, NSW
SUBDIVISIION

Title: LOT LAYOUT
OPTION 5

Status: PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION PURPOSES

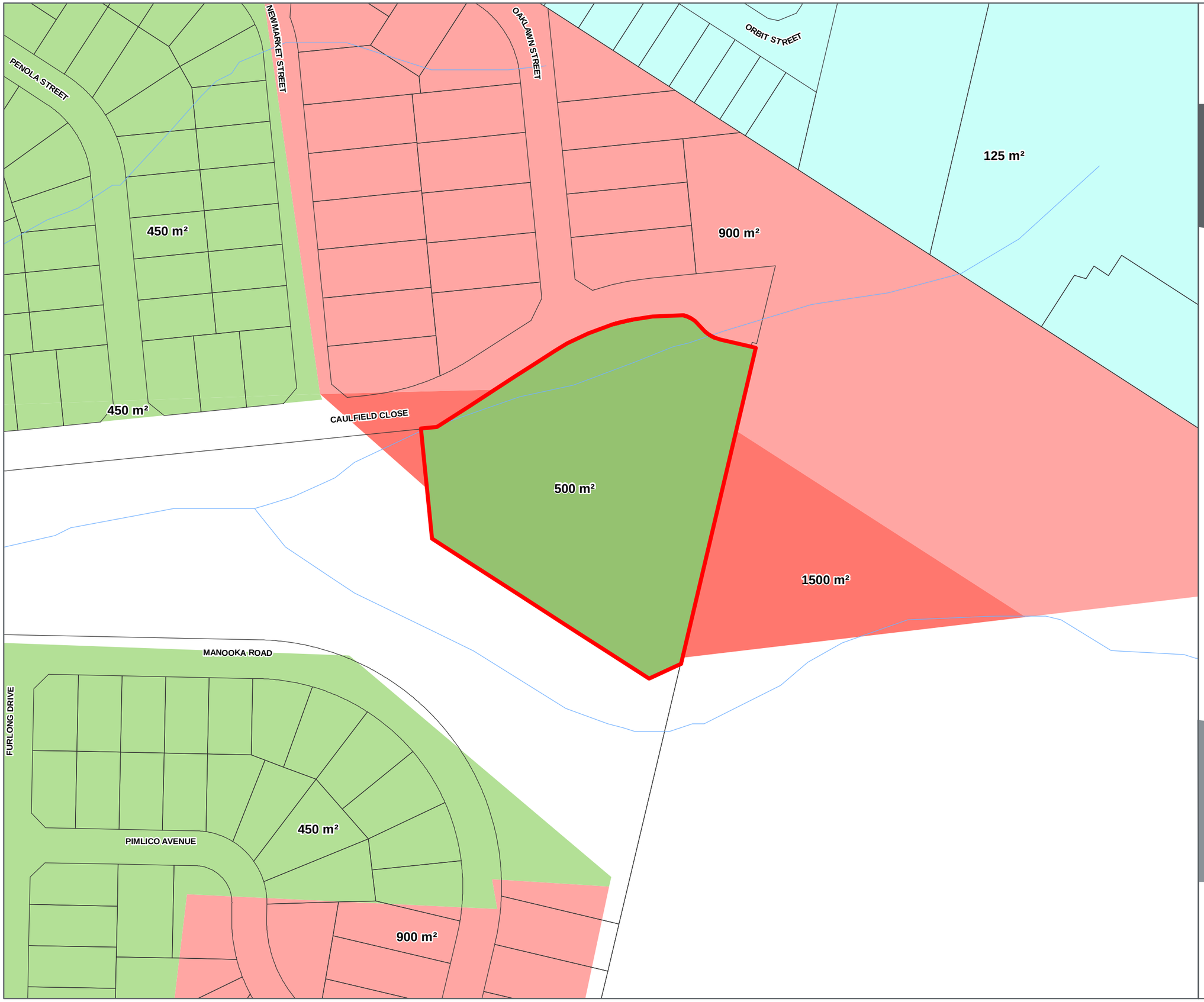
DATUM	DATE	Scale	Size
AHD	18.10.2019	1:500	A1

Drawing Number: 80219033-SK001

Revision: 1

APPENDIX H

LEP MAPS



Proposed Minimum Lot Size

CAULFIELD CLOSE

Legend

- Site Boundary
- Watercourse (NSW SS)
- Cadastre (NSW SS, 2017)

Proposed Minimum Lot Size

- A: 125m²
- G: 450m²
- T: 900m²
- U: 1500m²
- I: 500 m²

1:1,500 Scale at A3

m
0 10 20 30 40 50

N

Cardno

Map Produced by Cardno NSW/ACT Pty Ltd (WOL)
Date: 2019-10-29 | Project: 80219016
Coordinate System: GDA 1994 MGA Zone 56
Map: 80219016_GS-011_ProposedMinimumLotSize.mxd 01