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Flora and Fauna Assessment

Nepean Hospital – Penrith Integrated Mental Health Unit

Total Earth Care Pty Ltd
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Flora and Fauna Assessment

Nepean Hospital – Penrith Integrated Mental Health Unit

Executive Summary

Total Earth Care (TEC) has been engaged by Health Infrastructure to conduct a flora and fauna assessment prior to Stage 3 redevelopment within Nepean Hospital. Total Earth Care has previously conducted a flora and fauna assessment associated with the development of the East Block Building and Administration Building in July 2009 for Hassell Pty Ltd. The proposed development requires the completion of a flora and fauna assessment prior to construction as per the Director Generals requirements. The main objective of the flora and fauna assessment is to determine potential impacts on flora and fauna, including threatened species, populations and endangered ecological communities and their habitats within the study area, and document any measures required to be included within the p[proposal to mitigate any identified impacts to protect the environment.

For the purpose of this report, the *subject site* comprises the area of the hospital grounds directly impacted by the proposal which correlates to the development footprint of the proposed Mental Health Buildings, as identified by Woods Bagot (2010) Map A1000 and 360^{o} Map LP-3A-02 (360^{o}, 2010). The *study area* comprises the subject site as well as those sections of the Nepean Hospital grounds that may be directly or indirectly impacted by the proposal. The *locality* consists of a 5 kilometre radius of the subject site, and includes the remainder of the hospital grounds, bound by the Great Western Highway, Somerset Street, Derby Street and Parker Street. The site inspection was conducted one afternoon on September 10th 2010.

A general description of the subject site is a cleared and disturbed vegetation community with landscaped gardens of planted and horticultural varieties of native and exotic species. A large component of the site is highly disturbed comprising an existing open-air concrete car park and hospital buildings. A stand of planted native trees namely *Eucalyptus crebra* (Narrow-leaved Ironbark) run parallel to the construction footprint and adjacent to the administration buildings in the east of the study area. Large mature *Eucalyptus moluccana* (Grey Box), thought to be remnant trees, are scattered within the study area located in the south-eastern area adjacent to the car park. To the north of the subject site construction is already underway for the East Block Building. The western boundaries adjoin the main operating hospital facilities and the southern extent of the subject site boarders Derby Street and residential dwellings.

The proposed development will include the construction of a new building for use in mental health activities and feature healing inspired landscaped gardens (360^{o}, 2010). The construction footprint requires the demolition of an open-air concrete car park, existing hospital buildings and adjacent landscaped gardens. A total of 13 native and exotic trees are to be removed (360^{o}, 2010); including; *Eucalyptus moluccana* (Grey Box), *E. piperita* (Sydney Peppermint), *Corymbia maculata* (Spotted Gum), *Acacia decurrens* (Black Wattle), *Melaleuca stypheliodies* (Prickerly-leaved Tea Tree), *Melia azedarach* (White Cedar) and two exotic trees *Jacaranda mimosifolia* (Jacaranda). A number of densely planted shrubs and groundcover species, mainly within landscaped garden beds, are currently located within the proposed construction footprint and are also to be removed. A Memorial / Aboriginal garden located within the subject site will be relocated to an alternative location within the Nepean Hospital grounds prior to construction (Pers. Comm. Hayley Bell).

A total of 31 flora species were identified within the study area including a number of native and horticultural varieties of Callistemon, Grevillea and other species non-endemic to the location. Ten introduced species were located within the proposed construction footprint and adjacent hospital grounds. Preliminary desktop database research of State and National listing of threatened flora species within a 5km radius revealed a total of 17 previously recorded flora species and two

threatened flora populations. No locally occurring threatened flora species were identified within the subject site during the site inspection. However a planted *Syzygium paniculatum* (Magenta Lily Pilly) was located within the Memorial / Aboriginal garden set for relocation. *Syzygium paniculatum* is currently listed as vulnerable under the NSW *Threatened Species Conservation Act 1995* (TSC Act) and Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

An endangered ecological community, Shale Plains Woodland, has previously been mapped within the study area (NPW, 2002a). The Shale Plains Woodland is a subset of the Cumberland Plain Woodland, listed as an Critically Endangered Ecological Community (EEC) under the *TSC Act 1995* and the *EPBC Act 1999* (NPWS, 2004). Mapping by Tozer (NPWS, 2002a) has included a small portion of the Cumberland Plain Woodland community within the south-eastern extent of the subject site (Map 2 Appendix C). This portion of vegetation was ground-truthed during the current site inspection. The vegetation within this south-eastern corner of the proposed construction footprint does not contain characteristic species of the Cumberland Plain Woodland community.

It was therefore concluded that mapping conducted by Tozer (NPWS, 2002a) had included the projected foliage canopy layer of a stand of *Eucalyptus moluccana* (Grey Box) and *Corymbia maculata* (Spotted Gum) from the adjacent site that overshadows the construction footprint. These species are listed by the Scientific Committee as characteristic species of the Cumberland Plain Woodland vegetation community (DECC, 2008). The architects (360^{o}, 2010) have confirmed that this stand of trees is proposed to be retained and will be assessed by arborists prior to construction (Pers. Comms. Hayley Bell) and appropriate tree protection measures implemented in order to ensure that potential impacts to these trees from the construction work is limited. *Eucalyptus moluccana* (Grey Box), *Corymbia maculata* (Spotted Gum) and *Acacia decurrens* (Black Wattle) are also located within the proposed construction footprint and set for removal. These species are characteristic of the Cumberland Plain Woodland according to the final determination by the Scientific Committee (DECC, 2008). Additional, characteristic species located within the broader study area that will not be impacted by the proposal include; *Hardenbergia violacea* (Purple Coral Pea) *Eucalyptus crebra* (Narrow-leaved Ironbark), *Commelina cyanea* (Scurvy Weed), *Eucalyptus fibrosa* (Red Ironbark) and Melaleuca *decora*.

The fauna assessment identified two avifauna species typical of urban, peri-urban and surrounding natural areas within the Sydney Basin BioRegion during the survey. No threatened fauna species were identified during the site inspection. The weather conditions during the site inspection were gusty high winds with impending heavy showers. Due to the brevity of the fauna survey, habitat conditions and resources were assessed within the study area to identify suitability for threatened fauna species and the likelihood of occurrence within the subject site. Preliminary desktop database research of State and National listing of threatened fauna species within a 5km radius revealed a total of 36 previously recorded fauna species.

This flora and fauna assessment has considered the flora and fauna species, vegetation communities and habitat components and concluded that the Study Area does not currently support threatened flora species, apart from the planted *Syzygium paniculatum* (Magenta Lily Pilly), or significant threatened fauna habitats. The subject site does contain some remnant trees characteristic of Shale Plains Woodland vegetation community, a critically endangered ecological community. Assessments of significance completed for the threatened biodiversity have concluded that the potential impact from the proposed development is not significant, and therefore a Species Impact Statement (SIS), or a Referral to the Commonwealth Environment Minister, is not required. The report includes environmental mitigation measures and recommendations to reduce the potential impacts of the proposal, and maintain or improve the current condition of the subject site.

1 INTRODUCTION

1.1 Background

Total Earth Care has been engaged by Health Infrastructure to conduct a Flora and Fauna Assessment prior to the proposed Stage 3 redevelopment of Nepean Hospital located in the western Sydney suburb of Penrith. The current stage of the proposal includes the construction of a new Mental Health building following the demolition of the existing buildings, gardens and open air parking area. The proposed development includes the removal of a number of mature trees and planted gardens currently located within the construction footprint. As such the proposed development requires a flora and fauna assessment to determine the significance of potential impacts of the proposed works on flora and fauna species occurring within the subject site and broader study area.

The flora and fauna survey was carried out over the afternoon of September 10th 2009. For the purpose of this report, the *subject site* comprises the area of the hospital grounds directly impacted by the proposal which correlates to the development footprint of the proposed Mental Health Buildings, as identified by Woods Bagot (2010) Map A1000 and 360^{o} Map LP-3A-02 (360^{o}, 2010). The *study area* comprises the subject site as well as those sections of the Nepean Hospital grounds that may be directly or indirectly impacted by the proposal. The *locality* consists of a 5 kilometre radius of the subject site, and includes the majority of the hospital grounds bound by the Great Western Highway, Somerset Street, Derby Street and Parker Street.

2 AIMS AND OBJECTIVES

The aims of the flora and fauna assessment for the current proposal are to:

- describe the flora and fauna within the development footprints of the proposed Stage 3 Mental Health buildings,
- determine the presence or likely occurrence of threatened species, populations and ecological communities (or their habitats) from the survey, as listed under the *NSW Threatened Species Conservation Act 1995* (TSC Act);
- determine the presence or likely occurrence of threatened species, migratory species, ecological communities (or their habitats) as listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act);
- identify the need for any further assessments under State or Federal legislation; and
- describe the potential impact of the proposal, and propose a set of impact mitigation measures to avoid or reduce the potential impact of the development on the biodiversity of the locality, especially threatened species.

The current report includes the results of the background research and site survey work, an assessment of the flora and fauna habitats present and the likelihood of threatened species, populations or endangered ecological communities previously recorded from the locality to occur within the study area. The potential impacts from the development proposal to the identified biodiversity values are discussed and recommendations are provided to reduce the potential impacts. For threatened biodiversity listed under the State or Commonwealth legislation that may be potentially impacted by the proposal, assessments of the significance of these impacts have been assessed in order to determine whether or not a Species Impact Statement (SIS) is required, or a Referral to the Australian Government Department of Environment, Water, Heritage and the Arts.

3 LEGISLATION AND POLICY

3.1 Environmental Planning and Assessment Act 1979

The current proposal has been declared a Major Project (MP 10_0067) by the NSW Minister for Planning, and the Director General's Requirements (DGRs) have been provided to NSW Health Infrastructure in order to guide the preparation of the Environmental Assessment. A key issue is Flora and Fauna, and the DGRs state that the assessment should address impacts on flora and fauna, including threatened species, populations and endangered ecological communities and their habitats and steps taken to mitigate any identified impacts to protect the environment.

Section 5A (s.5A) of the *Environmental Planning & Assessment Act 1979* (the so called '7-part test') lists seven factors that "must be taken into account" by a consent or determining authority in the administration of Sections 78A, 79C and 112 of the Act when considering an activity or development proposal. The aim of s.5A is to determine "whether there is likely to be a significant effect on threatened species, populations or ecological communities, or their habitats", as listed under Schedules 1 and 2 of the TSC Act, and hence whether a *Species Impact Statement* (SIS) is required for the activity.

While not specifically referred to in the DGRs, draft Guidelines that identify matters which are relevant to the assessment of impacts to threatened species, populations, or ecological communities, or their habitats arising from a develop proposal assessed under Part 3A were prepared in 2005 by the NSW Department of Environment and Conservation and the Department of Primary Industries. Both s5A and the draft guideline have been referred to in completing this assessment.

3.2 Environment Protection and Biodiversity Conservation Act 1999

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) would only become relevant if it was considered that a significant impact on a 'matter of National Environmental Significance (NES)' were likely, thus providing a trigger for referral of the proposal to the Department of the Environment, Water, Heritage and the Arts (DEWHA).

Matters of national environmental significance identified in the Act are:

- world heritage properties;
- national heritage places;
- Ramsar wetlands;
- nationally threatened species and communities;
- migratory species protected under international agreements;
- the Commonwealth marine environment; and
- nuclear actions.

3.3 Threatened Species Conservation Act 1995

The *Threatened Species Conservation Act 1995* (TSC Act) provides for the conservation and protection of threatened species, populations and ecological communities of animals and plants through specific objectives relating to the conservation of biodiversity and promoting ecologically sustainable development. The Schedules of the TSC Act identify endangered or vulnerable species, populations, ecological communities, critically endangered species or ecological communities and key threatening processes affecting the listed species, populations and ecological communities. Provision is made for the preparation of recovery plans for listed threatened species, populations and ecological communities and threat abatement plans to manage key threatening processes.

The TSC Act provides for the declaration and mapping of habitats that are critical to the survival of those identified threatened species, populations and ecological communities that are classified as endangered (critical habitats). Further, the TSC Act also sets out the methods of assessment,

management and regulation of actions that may damage critical or other habitat or otherwise significantly affect threatened species, populations and ecological communities.

3.4 Penrith LEP 1998

Under the Penrith Local Environment Plan (LEP) the site is zoned 5(a) Special Uses. The objective of the zone is to facilitate certain development on land which is, or is proposed to be, used by public authorities, institutions, organisations or the council to provide and protect services, utilities or transport facilities and associated activities.

The proposal is permissible in the zone as it is ancillary to the purpose of a hospital and is consistent with the zone objectives. These are no maximum height, FSR or other development controls that apply to the site.

4 METHODS

4.1 Preliminary Assessment

Prior to field survey, state and federal government databases were reviewed for previous records of threatened species, populations and endangered ecological communities within a 5 kilometre (km) radius of the subject site. Flora and fauna records were obtained from the Department of Environment, Climate Change and Water (DECCW) Atlas of NSW Wildlife database. An EPBC Act Protected Matters Report was generated using the Commonwealth Department of Environment, Water, Heritage and the Arts (DEWHA) Protected Matters Search Tool for a 5km radius of the subject site. This report identifies matters of national environmental significance in the study area including threatened biodiversity and other matters protected by the EPBC Act.

4.1.1 Native Vegetation of the Cumberland Plain

At a regional scale *The native vegetation of the Cumberland Plain, western Sydney: systematic classification and field identification of communities* (Tozer, 2003), provides a survey of vegetation communities occurring on the Cumberland Plain and adjacent plateaus characterised by Wianamatta Shale soils. This study recognises that most of the native vegetation communities of the Cumberland Plain and neighbouring Wianamatta Shales are listed as endangered under the *Threatened Species Conservation Act 1995* and states that 'Due to the rate of urban development in western Sydney there is a large potential for development proposals to significantly impact on listed communities' (Tozer, 2003). As such, part of the rationale for the survey was to address the need for quantitative data to assist in the identification of native plant communities and provide an assessment of the conservation value of vegetation remnants.

The aim of the survey was to revise the existing plant community classification to take account of; recently described communities and other communities warranting recognition; provide quantitative data for characteristic species in each community (frequency of occurrence and relative abundance); identify species showing high fidelity to each community as a basis for diagnosing community type in the field; estimate the present cover of native vegetation; and derive a spatial model as a basis for predicting the vegetation type and conservation value of all remaining remnants (Tozer, 2003).

The survey incorporated systematic, stratified field sampling to record floristic structure and composition, a classification procedure based on hierarchical, agglomerative clustering analysis; spatial modelling of community distributions using geological, climatic and topographic variables; and the interpretation of patterns in canopy composition and remnant condition in aerial photographs. The resulting *Native Vegetation of the Cumberland Plain, Western Sydney − 1:25 000 Map Series* (NPWS, 2002a) incorporates Penrith LGA in Map 11 of the series.

Preliminary assessment of the vegetation mapping from the locality identified the presence of Shale Plains Woodland, a form of the endangered ecological community Cumberland Plain Woodlands, as occurring within the study area (NPWS 2002a).

Cumberland Plain Woodland is listed as a Critically Endangered Ecological Community under both the *Threatened Species Conservation Act 1995* and the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999.* As a result, an Assessment of Significance (7-part Test) has been conducted for the critically endangered ecological community (EEC) Cumberland Plain Woodland (CPW) as listed under the NSW legislation.

4.1.2 Arboricultural Report

An arborist report will also be available prior to the clearing and construction of the Stage 3 development (Pers. Comm. Hayley Bell). The arborist report will complete an assessment of adjacent trees identified for retention and make assessment of critical root zones and appropriate mitigation measures during the construction period.

4.2 Field Surveys

4.2.1 Flora

General botanical survey and targeted threatened flora searches was conducted within the study area on the afternoon of September 10th, 2009.

The survey involved:

- the identification of plant species according to *Field Guide to the Native Plants of Sydney* (Robinson 2003), other botanical reference books and the *Flora of NSW* (Harden 1992, 1993, 2000, 2002), with reference to recent taxonomic changes;
- the identification and mapping of plant communities to confirm previous mapping of the locality from *Native Vegetation of the Cumberland Plain, Western Sydney* (Tozer 2003), *Native Vegetation of the Cumberland Plain, Western Sydney − 1:25 000 Map Series* (NPWS, 2002) and with reference to the structural definitions of Specht & Specht (1999);
- assessing the condition and significance of plant communities. The distribution of any endangered ecological communities was mapped; and
- targeted searches for plant species of conservation significance according to the "random meander" method of Cropper (1993). Location of threatened flora species will be marked with a GPS and included in accompanying maps.

The conservation significance of plant species and plant communities was determined according to:

- *Threatened Species Conservation Act 1995* for significance within NSW; and
- *Environment Protection & Biodiversity Conservation Act 1999* (EPBC Act) for significance within Australia.

All flora species and their occurrence on the subject site and study area were recorded and an inventory of species was compiled (Appendix B).

4.2.2 Fauna

A brief fauna survey was conducted on the subject site over the afternoon of September 10th 2009 and involved;

- identifying fauna habitats, assessing their condition and assessing their value to threatened fauna species;
- incidental observations of animal activity and indirect evidence of fauna (such as scats, nests, burrows, hollows, tracks, scratches and diggings).

The conservation significance of fauna species and populations was determined according to:

- TSC Act for significance within NSW; and
- EPBC Act for significance within Australia.

All fauna sightings as well as fauna habitat types and evidence of fauna activity were recorded and an inventory of species was compiled (Appendix B).

4.3 Limitations

The field survey was conducted over one afternoon in September 2010. The brevity of the survey and its timing meant that the full spectrum of flora and fauna species and ecological processes likely to occur on the site cannot be fully quantified or described in this report. These limitations have been addressed by identifying potential habitats for such species and assessing the potential for these species to occur on the site based on previous records, the type and condition of habitats present, the land use of the site and its landscape context.

The weather conditions according to the Bureau of Meteorology recorded 50km/h wind gusts and heavy rain followed the site inspection. In this way, the fauna species investigation potentially underrepresented fauna species presence within the study area. Therefore the current survey pays considerable attention to previous ecological reports, publications and database search as well as the potential habitats identified on the site during the survey to assess fauna composition.

5 RESULTS

5.1 Landscape

The Nepean Hosptial site is bound by The Great Western Highway to the north, Somerset St to the east, Derby St to the south and Parker St to the west and is located within a highly urbanised environment (Map 1). Nepean Hospital covers an area of approximately 15 hectares. The majority of the hospital site is dominated by paved parking areas, pre-existing hospital buildings and internal roads (Appendix D, Plates 1&2). The study area is located within the eastern portion of the hospital site and adjoins Somerset St (Map 1). Construction is currently underway for the East Block Building and Staff Administration to the north of the proposed Integrated Mental Health Unit site. Vegetation within the hospital site and study area mainly consists of horticultural gardens beds containing plantings of native and exotic species, although some areas contain remnant native trees within the landscaped areas.

The study area is mapped by Hazelton *et al* (1989) as occurring on the Luddenham Soil Landscape unit of the Penrith 1:100, 000 map sheet. The Luddenham Soil Landscape is described by Bannerman and Hazelton (1990) as being characterised by “undulating to rolling low hills on Wianamatta Group Shales, often associated with Minchinbury Sandstone”. Topographic features of the locality include narrow ridges, hillcrests and valleys. Soils are summarised as being shallow, dark podzolic soils on crests, moderately deep red podzolic soils on upper slopes, moderately deep yellow podzolic soils on lower slopes and drainage lines. Soil limitations include high soil erosion hazard, localised impermeable highly plastic subsoil, and moderately reactive.

5.2 Flora

5.2.1 Plant Species

A total of 31 plant species were recorded within the study area during the current survey, including 21 native species and 10 introduced species (Appendix B). Of the 10 introduced species, one is listed as noxious under Order 20 of the *NSW Noxious Weeds Act 1993* for Penrith LGA.

Table 1 Plant species recorded within the subject site listed under the *NSW Noxious Weeds Act 1993* for Penrith LGA (Order No.20).

Scientific Name	Common Name	Control Class[1]
Olea europaea ssp cuspidata	African Olive	4

5.2.2 Plant Communities

Mapping of the native vegetation of the Cumberland Plain by NPWS (2002) has identified Shale Plains Woodland (SPW) as occurring within a section of the subject site and study area (Map 2). Shale Plains Woodland is a sub unit of the Cumberland Plain Woodland Critically Endangered Ecological Community, listed under Schedule 1 of the TSC Act and under the EPBC Act. The NSW Scientific Committee (1997) has identified an assemblage of species that characterise CPW and a detailed description of the CPW Critically Endangered Ecological Community can be found in Section 5.2.5 of this report. The floristics of the vegetation of the subject site is described below.

The study area can be described as dominated by native/exotic landscaped areas including a fragmented canopy of planted and remnant eucalyptus species including; *Eucalyptus moluccana* (Grey Box), *Eucalyptus crebra* (Narrow-leaved Ironbark), *Corymbia maculata* (Spotted Gum), *Eucalyptus fibrosa* (Red Ironbark) and *Melia azedarach* (White cedar). The mid-storey and understorey have been removed over much of the site. Understorey species are primarily horticultural Grevillea and Callistemon varieties retained within the garden beds. Groundcover consists of a matrix of native cover *Dianella caerulea* (Blue Flax-lily) and exotic perennials.

The study area contains possible CPW remnant *Eucalyptus moluccana* (Grey Box) specimens within the paved parking area to the east of the subject site. Additional characteristic species of the CPW are also present within the study area, although outside the subject site; *Eucalyptus crebra* (Narrow-leaved Ironbark), *Melaleuca decora*, *Hardenbergia violacea* (Purple Coral Pea) and *Commelina cyanea* (Scurvy Weed). These characteristic species of CPW are scattered over the hospital site and have most likely been planted. Where present over the remainder of the site, the understorey has largely been planted and comprises native species such as *Callistemon salignus* Willow Bottlebrush.

Several characteristic species of the CPW occur within the proposed construction footprint including; *Acacia decurrens* (Black Wattle), *Eucalyptus moluccana* (Grey Box), *Eucalyptus crebra* (Narrow-leaved Ironbark) and *Corymbia maculata* (Spotted Gum) (DECCW, 2008). With the exception to *E. crebra* some individuals of these species will be removed according to the proposed construction footprint. *Eucalyptus piperita* (Sydney Peppermint) is also located within the construction footprint, although it is not identified as a characteristic species of CPW.

The CPW community on the subject site as previously mapped (Tozer) persists in the south-eastern corner primarily as overshadowing canopy foliage of the neighbouring trees *Eucalyptus moluccana* (Grey Box) and *Corymbia maculata* (Spotted Gum). Ground-truthing of the Tozer (NPWS, 2002a) mapping has revealed inconsistencies within the mapping. Plate 3 (Appendix D) demonstrates the neighbouring canopy trees and the constructed paved parking area mapped as CPW. No native flora species are located within this area mapped as CPW with the exception to the previously mentioned canopy species. Regeneration potential of this area is limited.

The vegetation community has undergone significant modification as a result of disturbance related to construction of hospital buildings and associated infrastructure, clearing, and maintenance regimes such as mowing. As mentioned previously, CPW persists mainly as canopy trees and scattered mid-storey trees, with the shrub and ground layers absent. The soil profile has been significantly disturbed as a result of the construction of the hospital and other infrastructure on the site. The likelihood of

[1]
- Class 1 State Prohibited Weeds. The plant must be eradicated from the land and the land must be kept free of the plant.
- Class 2 Regionally Prohibited Weeds. The plant must be eradicated from the land and the land must be kept free of the plant.
- Class 3 Regionally Controlled Weeds. The plant must be fully and continuously suppressed and destroyed.
- Class 4 Locally Controlled Weeds. The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority.
- Class 5 Restricted Plants. The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with.

CPW regenerating on the site from soil seedbank is minimal, as the soil seedbank was most probably removed prior to the original construction works or it has since been built over. Additionally, thick mulched landscaped gardens and disturbance to the soil profile during installation of irrigation pipes has also contributed towards the loss of seeds stored within the soil. For the purposes of this report the potential impacts to characteristic CPW remnant trees located within the subject site are will be assessed via an assessment of significance.

A planted Aboriginal Memorial garden is currently located within the proposed development footprint. The garden includes several native species *Livistona australis* (Cabbage Tree-palm) and *Araucaria bidwillii* (Bunya Pine) although not indigenous species to the Cumberland Plain Woodland community. The garden also includes one planted *Syzygium paniculatum* (Magenta Lily Pilly) listed as Vulnerable under Schedule 2 of the *Threatened Species Conservation Act 1995* (TSC Act) and Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). This garden (Appendix D, Plate 6) is to be relocated within the grounds of the Nepean Hospital prior to the construction works commencing (Pers. Comm. Hayley Bell).

5.2.3 Threatened Plant Species

A search of the DECCW Atlas of NSW Wildlife and EPBC Protected Matters Report identified 17 threatened plant species, and two threatened population previously recorded within 5km of the subject site (Table 2).

Table 2 Threatened flora species previously recorded within the locality (5km of the subject site) from the DECCW Wildlife Atlas and EPBC Protected Matters Report.

Scientific Name	Common Name	Status under TSC Act	Status under EPBC Act
Cynanchum elegans	White-flower Wax Plant	-	E
Dillwynia tenuifolia		V	V
Eucalyptus benthamii	Camden White Gum	V	-
Grevillea juniperina subsp. *juniperina*	Juniper-leaved Grevillea	V	
Hibbertia puberula		E1	-
Marsdenia viridiflora subsp. *viridiflora*	Population in Penrith LGA	E2	
Melaleuca deanei	Deane's Paperbark	V	-
Micromyrtus minutiflora		E1	
Persoonia hirsuta	Hairy Geebung	E1	-
Persoonia hirsuta subsp. hirsuta/evoluta		E1	-
Persoonia nutans	Nodding Geebung	E1	E
Pimelea curviflora var. curviflora			V
Pimelea spicata	Spiked Rice-flower	E1	
Pomaderris brunnea	Rufous Pomaderris	-	V

Scientific Name	Common Name	Status under TSC Act	Status under EPBC Act
Pterostylis saxicola	Sydney Plains Greenhood	E1	E
Pultenaea parviflora		E1	V
Pultenaea villifera var. villifera	Pultanaea villifera var. villifera population in the Blue Mountains LGA	E2	-
Syzgium paniculatum	Magenta Lilly Pilly	V	-
Zieria involucrata		E1	V

No threatened flora species were identified on the subject site during the current survey apart from one planted *Syzygium paniculatum* (Magenta Lily Pilly) listed as Vulnerable under Schedule 2 of the *Threatened Species Conservation Act 1995* (TSC Act).

5.2.4 Threatened Populations

No threatened flora populations were identified on the subject site during the current survey.

5.2.5 Endangered Ecological Communities

The Cumberland Plain Woodland (CPW) is listed as *Cumberland Plain Woodland in the Sydney Basin Bioregion* under the NSW *Threatened Species Conservation Act 1995* (TSC ACT). The Scientific Committee review of ecological threats to CPW has consequently led to the increase in conservation status from endangered to critically endangered ecological community under the *Threatened Species Conservation Regulation 2002* (DECCW 2008).

As mentioned previously, Shale Plains Woodland, one of two subsets of the critically endangered ecological community Cumberland Plain Woodland, has been previously mapped as occurring on the subject site (NPWS 2002a). Cumberland Plain Woodland occurs on well structured clay soils, derived from Wianamatta shale.

Under the Scientific Committee Determination CCPW is described as an open canopy supported by a near-continuous groundcover of grasses and herbs (DECCW, 2008). Dominate eucalyptus species include; *Eucalyptus moluccana* (Grey Box), *E. tereticornis* (Forest Red Gum), *E. crebra* (Narrow-leaved Ironbark) and *Corymbia maculata* (Spotted Gum). Vegetation within the understorey is typically sclerophyllous; *Bursaria spinosa* (Blackthorn) *Daviesia ulicifolia* (Gorse Bitter Pea) and *Dillwynia seeberi* and groundcover species, *Dichelachne micrantha* (Plumegrass), *Echinopogon caespitosus* (Forest Hedgehog Grass), *Eragrostis leptostachya* (Paddock Lovegrass), *Microlaena stipoides* (Weeping Grass), *Paspalidium distans* and *Themeda australis* (Kangaroo Grass) (DECCW, 2008). Clearing of vegetation for timber production creates a matrix of areas dominated by dense regrowth of saplings and small trees or in grazed lands a high coverage of native grasses (DECCW, 2008).

Prior to European settlement, Cumberland Plain Woodland was extensive across western Sydney and it has been estimated it once covered 125,000 hectares. This community has been significantly reduced from its original extent due to clearing for agricultural and urban development. Estimates of the remaining original extent include 6% from the Preliminary Determination (NSW Scientific Committee, 1997) to 9% ,of which, only 1,147ha is protected within National Parks (DECCW, 2009), with a further 14% remaining as scattered trees (NPWS, 2004). The community is known from the Auburn, Bankstown, Baulkham Hills, Blacktown, Camden, Campbelltown, Fairfield, Hawkesbury, Holroyd, Liverpool, Parramatta, Penrith and Wollondilly local government areas (NPWS 2004a).

Much of the extent of the community persists as modified or disturbed remnants and the NSW Scientific Committee (1997) has stated that 'regrowth which is likely to achieve a near natural structure or is a seral stage towards that structure' is classified as Cumberland Plain Woodland. The

community can regenerate naturally once threats, including mowing/slashing, are controlled (DEC, 2004) and one of the management techniques for Cumberland Plain Woodland remnants includes removal of slashing and mowing. Other threats to the survival of the community include: clearance for agriculture, grazing, hobby and poultry farms; housing and other developments; invasion by exotic plants; altered fire regimes; and increased nutrient loads due to fertiliser run off from gardens and farmland, dumped refuse or sewer discharge (NSW Scientific Committee, 1997).

A Draft Cumberland Plain Recovery Plan (DECCW, 2009) has been prepared and promotes the following key recovery objectives;

1. To build a protected area network, comprising public and private lands, focused on the identified priority conservation lands
2. To deliver best practice management to remnant bushland across the Cumberland Plain on public lands where the primary management objectives are compatible with biodiversity 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
4. To increase knowledge of the threats to the survival of the Cumberland Plain's threatened biodiversity, and thereby improve capacity to manage these threats in a strategic and effective manner (DECCW, 2009).

Under the Commonwealth EPBC Act the Cumberland Plain Woodland is listed as *Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest* (TSSC, 2008). For consistency within this report the Cumberland Plain Woodland or the subset unit Shale Plain Woodland will be used to describe the vegetative community. The Cumberland Plain Woodland is currently listed as a Critically Endangered Ecological Community under the EPBC Act (TSSC, 2008a). The previous conservation status as Endangered was reviewed in 2009 following the Threatened Species Scientific Committees review of the previous listing as Endangered and the community's threats.

Under the EPBC Act the listing for the Cumberland Plain Woodland is a vegetative community with a dominate tree canopy typically *Eucalyptus molucanna* (Grey Box), *E. tereticornis* (Forest Red Gum) and/or *E. fibrosa* (Red Ironbark). A smaller canopy layer of juvenile *Eucalyptus* species or *Acacia, Exocarpos* and *Melaleuca* may also be present. However, this vegetative strata is typically sparse. The understorey is dominated by ground layer species including native grasses, forbes and herbs including; *Aristida sp.* (Wiregrasses)*, Brunoniella australis* (Blue Trumpet) and *Bursaria spinosa* (Blackthorn).

Characteristic remnant canopy trees *Eucalyptus molucanna* (Grey Box) and *Corymbia maculata* (Spotted Gum) occur within the subject site and the adjacent south-east corner of the study area. However, under the EPBC Act a set of criteria or condition threshold for the assessment of Cumberland Plain Woodland are contained in the listing advice (TSSC, 2008). According to the EPBC Act listing advice significantly degraded patches do not comprise part of the listing of ecological communities and thus do not require further assessment. However, the condition threshold does recognise that these patches may contribute towards additional natural values in the absence of suitable habitats and should be retained when possible. Additionally, under the condition threshold minimum patch size for Cumberland Plain Woodland identification is greater than 0.5ha (TSSC, 2008).

The description of the south-eastern corner identified an absence of vegetative strata with the exception to the projected canopy layer from the adjacent vegetation. This area is currently a paved parking area with adjacent horticultural garden beds. Thus under the EPBC Act assessment the subject site does not meet the threshold for Cumberland Plain Woodland. As such, an assessment, the matters listed within the Significant Impact Guideline has not been completed, and a Referral to the Commonwealth is not required.

5.3 Fauna

5.3.1 Fauna Species

Only two vertebrate fauna species were recorded during the current field survey (Appendix B). This was limited to visual and aural identification of avian species typical of urban, peri-urban and

surrounding natural areas within the Sydney Basin Bioregion. These species are considered widespread in distribution and common to abundant within their ranges.

5.3.2 Fauna Habitats and Corridors

Fauna habitats of the subject site and study area are assessed in two main categories for the current survey. Fauna habitat features and resources at a locality scale form part of the broader fauna habitat landscape of the study area. Site specific fauna habitat features and resources provide the key elements required by native fauna for the maintenance of life cycles. Fauna habitats identified in the current survey and associated general fauna are summarised in Table 3.

Table 3 Fauna habitat types and resources of the subject site.

Area	Habitat Feature	Potential Habitat Resources and Fauna
Locality	Large continuous tracts of native and derived plant communities within Blue Mountains National Park	Foraging, nesting, roosting and sheltering for common protected and threatened birds, reptiles, amphibians, arboreal and terrestrial mammals and bat species.
Subject Site	Scattered native and exotic trees	Foraging, nesting, roosting and sheltering for common protected small, medium and large birds, arboreal mammals.
	Sparse understorey of native and exotic small trees and shrubs	Limited foraging, nesting, roosting and sheltering for small and medium birds, reptiles and common arboreal mammals.
	Native and exotic groundcovers	Limited foraging for common protected small terrestrial mammals, small and medium birds and reptiles.
	Mulched garden beds	Foraging for birds and reptile species.

The locality of the site and evidence of previous disturbance has reduced the habitat complexity suitable for a high majority of native fauna species. The subject site has been described as a cleared and disturbed vegetative community. A few possibly remnant mature *Eucalyptus moluccana* (Grey Box) are scattered throughout the existing paved parking areas and adjacent to existing hospital buildings. Groundcover and shrub layer is limited to plantings of native and horticultural variety of species within established garden beds.

Horticultural varieties of Callistemon and Grevillea species are retained within landscaped gardens and provide nectar resources for nectivorous birds. Native species have been planted throughout the study area. Two continuous stands of *Eucalyptus crebra* (Narrow-leaved Ironbark) and *Corymbia maculata* (Spotted Gum) are located within the study area. The first is located beyond the subject site and runs parallel with the current paved parking area along the eastern boundary. The second, also to be retained is located within the subject site although outside the proposed construction site along the southern boundary. These specimens have obviously been planted given the uniform age class, consistent evenly spacing between trees and the occurrence of a continual line of one tree species. Under the current construction proposal these trees will be retained. Additionally, they provide some roosting, foraging, nesting and connecting resources for medium to large birds and possibly commonly occurring arboreal mammals.

The majority of the study area comprises of existing buildings, internal roads and paved parking areas. As such the study area offers limited natural habitat resources required by many native fauna species. Habitat features absent from the area include, a supply of freshwater, rocky outcrops, loose rocks, logs, substantial ground cover, large continuous tracts of vegetation, tree-hollows and diverse flora feed species.

The hospital site is bounded by heavy congested roads to the north, south, east and west. Regular traffic flow limits less mobile fauna dispersal into or out of the study area. Highly mobile urbanised

avifauna species were identified within the study area and adjacent locations. Surrounding residential dwelling contained limited additional habitat resources. Within the hospital grounds pedestrian traffic and vehicle movement is constant throughout the night and day. Bright permanent lighting may further reduce the likelihood of fauna inhabiting the subject site.

Relative to the modified condition of native vegetation on the subject site, limited connectivity to bushland, and a general lack of many habitat features and resources described above, the subject site has a poor level of fauna habitat value.

5.3.3 Threatened Fauna Species

A search of the DECCW Atlas of NSW Wildlife and EPBC Protected Matters (Table 4) identified 36 threatened fauna species recorded within 5km of the subject site.

Table 4 Threatened fauna species previously recorded within the locality (5km of the site) on the DECCW Wildlife Atlas and EPBC Protected Matters Report.

Scientific Name	Common Name	Status under TSC Act	Status under EPBC Act
Botaurus poiciloptilus	Australasian Bittern	V	-
Burhinus grallarius	Bush Stone-curlew	E1	
Callocephalon fimbriatum	Gang-gang Cockatoo	V	-
Calyptorhynchus lathami	Glossy Black-Cockatoo	V	-
Cercartetus nanus	Eastern Pygmy Possum	V	
Chalinolobus dwyeri	Large-eared Pied Bat	V	V
Dasyurus maculatus maculatus	Spotted-tailed Quoll	V	E
Daphoenositta chrysoptera	Varied Sittella	V	
Ephippiorhynchus asiaticus	Black-necked Stork	E1	
Falsistrellus tasmaniensis	Eastern False Pipistrelle	V	-
Heleioporus australiacus	Giant Burrowing Frog	V	V
Hoplocephalus bungaroides	Broad-headed Snake	E1	V
Lathamus discolor	Swift Parrot	E1	E
Litoria aurea	Green and Golden Bell Frog	E1	V
Lophoictinia isura	Square-tailed Kite	V	
Meridolum corneovirens	Cumberland Plain Land Snail	E1	-
Miniopterus schreibersii oceanensis	Eastern Bentwing-bat	V	-
Mixophyes iteratus	Giant Barred Frog	E1	V
Mormopterus norfolkensis	Eastern Freetail-bat	V	-
Myotis macropus (formally *adversus*	Large-footed Myotis	V	-
Neophema pulchella	Turquoise Parrot	V	
Ninox connivens	Barking Owl	V	-
Ninox strenua	Powerful Owl	V	-
Petalura gigantea	Giant Dragonfly	E1	-

Scientific Name	Common Name	Status under TSC Act	Status under EPBC Act
Petrogale penicillata	Brush-tailed Rock-wallaby	E1	V
Phascolarctos cinereus	Koala	V	-
Potorous tridactylus tridactylus	Long-nosed Potoroo	V	V
Pseudomys novaehollandiae	New Holland Mouse		
Pseudophryne australis	Red-crowned Toadlet	V	-
Pteropus poliocephalus	Grey-headed Flying-fox	V	V
Pyrrholaemus saggitatus	Speckled Warbler	V	
Rostratula australis	Australian Painted Snipe	E1	E
Scoteanax rueppellii	Greater Broad-nosed Bat	V	-
Stictonetta naevosa	Freckled Duck	V	
Tyto novaehollandiae	Masked Owl	V	-
Xanthomyza phrygia	Regent Honeyeater	E1	E

No threatened fauna species were identified on the subject site during the current survey.

5.3.4 Threatened Populations

No threatened fauna populations were identified on the subject site during the current survey.

6 HABITAT POTENTIAL FOR THREATENED SPECIES

6.1 Flora

Table 5 summarises the habitat potential of the subject site for the threatened flora species previously recorded as occurring within 5km of the site on the DECC Wildlife Atlas.

Table 5 Habitat potential for threatened flora species previously recorded within the locality (5km of the site) DECCW Wildlife Atlas and EPBC Protected Matters Report.

Species	Preferred Habitat	Likelihood of Occurrence
Cynanchum elegans	A climber or twiner with a highly variable form. Mature stems have a fissured corky bark and can grow to 10 metres long and 3.5 cm thick. Restricted to eastern NSW where it is distributed from Brunswick Heads to in the Illawarra region, including the Cumberland and Wollemi areas. Occurs on the edge of dry rainforest vegetation, also found in littoral rainforest, Coastal Tea-tree – Coastal Banksia scrub, Forest Red Gum open forest and woodland, Spotted Gum Eucalyptus open forest and woodland and Bracelet Honeymyrtle/ *Melaleuca armillaris* scrub.	Nil. Species not found during the current survey. Subject site does not support preferred habitat. Subject site is located outside of species natural range.

Species	Preferred Habitat	Likelihood of Occurrence
Dillwynia tenuifolia	A low spreading pea-flower shrub to a metre high. Occurs within the Liverpool Shire and The Hills Shire. The Liverpool population occurs on a small outlier of the Berkshire Park Soil Landscape that supports a transition from Castlereagh Ironbark Forest to Castlereagh Scribbly Gum Woodland (also some Shale Gravel Transition Forest). The Hills Shire populations occur in vegetation similar to Cumberland Plain Woodland, on Wianamatta Shale soils.	Nil. Species not found during the current survey. Subject site does not support preferred habitat. Subject site is located outside of species natural range.
Eucalyptus benthamii	A tree that grows to 40m and has smooth white bark with long hanging bark ribbons and a persistent flaky bark stocking at the base. Occurs only in wet open forest on sandy alluvial soils along valley floors at an elevation of 140- 750m. It is known from two main locations, Bents Basin and the Kedumba Valley.	Nil. Species not found during the current survey. Subject site does not support preferred habitat. Subject site is located outside of species natural range.
Grevillea juniperina subsp. *juniperina*	A broadly spreading to erect shrub mostly 0.5 to 2.5m high. Flowers are "spiderlike", 2.5-3.5cm long and may be red to pinkish, yellow, pale orange or greenish. Grevillea juniperina subsp. juniperina is endemic to Western Sydney on the Cumberland Plain Woodland Castlereagh Ironbark Woodland, Castlereagh Scribbly Gum Woodland and Shale/Gravel Transition Forest. Its distribution is centred on an area bounded by Blacktown, Erskine Park, Londonderry and Windsor with outlier populations at Kemps Creek and Pitt Town. G. juniperina subsp. juniperina grows on reddish clay to sandy soils derived from Wianamatta Shale and Tertiary alluvium (often with shale influence). Soils are of the Blacktown and Berkshire Park soil landscapes and typically contain lateritic ironstone gravels. It is generally found in flat or gently sloping, low-lying sites between 30-70m. Plants appear to thrive in relatively open conditions and most populations are found in disturbed sites, particularly along roadsides.	Low. Species not found during the current survey. Subject site highly disturbed seedbank and limited seed dispersal from neighboring areas.
Hibbertia puberula	Shrublets with few spreading but ultimately wiry branches up to 30 cm long, sparsely branched, pubescent, often becoming hairless. Has not been seen for over 40 years. Early records of this species are from the Hawkesbury River area and Frenchs Forest in northern Sydney, South Coogee in eastern Sydney, the Hacking River area in southern Sydney, and the Blue Mountains. Occurs on sandy soil often associated with sandstone.	Nil. Species not found during the current survey. Subject site does not support preferred habitat. Subject site is located outside of species natural range.
Marsdenia viridiflora subsp. *viridiflora*	A climber with twining stems up to 4m high. Young stems contain hairs while older stems and leaves lack hairs. Additional, key identifying features of this species are the prominent midvein, bell-shaped flowers, underground tubers and milky latex when cut. Prefers vine thicket and open shale woodland vegetation communities. Endangered populations occur within Penrith LGA, Bankstown, Blacktown, Camden, Campbelltown, Fairfield, Holroyd and Liverpool.	Low. Subject site does not contain suitable vegetation communities.

Species	Preferred Habitat	Likelihood of Occurrence
Melaleuca deanei	A shrub to 3m with fibrous-flaky bark and narrow elliptic to oblanceolate leaves 12 to 25mm. Flowering in summer the inflorescence is a many-flowered spike to 6cm long and white in colour. The species grows in wet heath on sandstone (Harden 1991) and occurs in two areas in the north and south of Sydney (Ku-ring-gai/Berowra and Holsworthy/Wedderburn areas) with isolated occurrences in the Blue Mountains, Nowra and Central Coast areas (NPWS 2003).	Nil. Species not found during the current survey. Subject site does not support preferred habitat. Subject site is located outside of species natural range.
Micromyrtus minutiflora	Slender spreading shrub to 2 m high. Distribution is restricted to the general area between Richmond and Penrith. The species occurs in Castlereagh Scribbly Gum Woodland, Ironbark Forest, Shale/Gravel Transition Forest, open forest on tertiary alluvium and consolidated river sediments.	Nil. Restricted distribution and subject site does not support preferred alluvial soil types.
Persoonia hirsuta	The Hairy Geebung is best distinguished by its hairiness - long coarse hairs on flowers and branchlets and short stiff ones on the leaves. The Hairy Geebung has been recorded in the Sydney coastal area, the Blue Mountains area and the Southern Highlands. The Hairy Geebung is found in sandy soils in dry sclerophyll open forest, woodland and heath on sandstone. It is usually present as isolated individuals or very small populations.	Nil. Species not found during the current survey. Subject site does not support preferred habitat. Subject site is located outside of species natural range.
Persoonia hirsuta subsp. hirsuta/evoluta	Persoonia hirsuta subsp. hirsuta occurs from Gosford south to Royal National Park within 20 km of the coast and below altitudes of 300m. Persoonia hirsuta subsp. evoluta is sporadically distributed from Putty District to Glen Davis to Hill Top between elevations of 350m to 600m.	Nil. Species not found during the current survey. Subject site does not support preferred habitat. Subject site is located outside of species natural range.
Persoonia nutans	An erect to spreading shrub to 2.5 m high with hairy young branches. Restricted to the Cumberland Plain in western Sydney, between Richmond in the north and Macquarie Fields in the south. Confined to aeolian and alluvial sediments and occurs in a range of sclerophyll forest and woodland vegetation communities, with the majority of individuals occurring within Agnes Banks Woodland or Castlereagh Scribbly Gum Woodland.	Nil. Species not found during the current survey. Subject site does not support preferred habitat. Subject site is located outside of species natural range.
Pimelea curviflora var. curviflora	A much-branched subshrub or shrub 20 to 120cm high with hairy stems and hairy yellow to red flowers. Confined to the coastal area of Sydney between northern Sydney in the south and Maroota in the north-west. Former range extended south to the Parramatta River and Port Jackson region including Five Dock, Bellevue Hill and Manly. Occurs on shaley/lateritic soils over sandstone and shale/sandstone transition soils on ridgetops and upper slopes amongst woodlands. Flowers October to May. Has a cryptic habit as it is fine and scraggly and often grows amongst dense grasses and sedges, moreover it appears to survive for some time without any foliage after fire or grazing, relying on energy reserves in its tuberous roots. Likely to be fire tolerant species capable of resprouting following fire due to the presence of a tap root. Seedlings have been observed following fire.	Nil. Species not found during the current survey. Subject site does not support preferred habitat. Subject site is located outside of species natural range.

Species	Preferred Habitat	Likelihood of Occurrence
Pimelea spicata	Spiked rice-flower is a small erect or prostrate shrub to 50cm tall. Leaves are opposite and elliptical to 20mm long by 8mm wide. Flowering occurs in summer but often occurs throughout the year. Flowers are white tubular with four spreading petals that may contain a slight pink-tinge. Previous distribution throughout Cumberland Plain. Currently located within a limited within Illawara and also Narellan, Marayong and Prospect Reservoir. Species prefers clay soils and commonly associated with Grey Box and Ironbark species.	Low. Subject site highly disturbed and beyond known distribution.
Pomaderris brunnea	A shrub to 3 m tall that has distinctively hairy stems. The small flowers have no petals, are yellowish and form dense clusters at the ends of the branches. Brown Pomaderris is found in a very limited area around the Nepean and Hawkesbury Rivers, including the Bargo area. Grows in moist woodland or forest on clay and alluvial soils of flood plains and creek lines	Nil. Species not found during the current survey. Subject site does not support preferred habitat. Subject site is located outside of species natural range.
Pterostylis saxicola	A ground orchid with a flowering stem to 35cm in height. Flowers are reddish brown and translucent green. Leaves 2.5 – 1.1cm and arranged as 2-4 closely sheathed stem. This species is restricted to the western Sydney region on shallow soil depressions on sandstone rock shelves above cliff lines. Distribution is restricted to small isolated populations from Freemans Reach in the north and Picton in the south. The Sydney Plains Greenhood orchid is threatened by vegetation clearing for housing, inappropriate fire regimes and grazing pressures.	Nil. Species not found during the current survey. Subject site does not support preferred habitat. Subject site is located outside of species natural range.
Pulteaea parviflora	A small erect branching shrub up to 1.8 m. Flowers occur towards the ends of the branchlets, and are 5 - 7 mm long, yellow and pea-like with reddish markings. Flowering may occur between August and November depending on environmental conditions. The species is endemic to the Cumberland Plain with distribution ranging from Windsor to Penrith and east to Dean Park. Isolated populations are recorded from Kemps Creek and Wilberforce. May be locally abundant, particularly within scrubby/dry heath areas within Castlereagh Ironbark Forest and Shale Gravel Transition Forest on tertiary alluvium or laterised clays and may also be common in transitional areas where these communities adjoin Castlereagh Scribbly Gum Woodland. Eucalyptus fibrosa is usually the dominant canopy species	Nil. Species not found during the current survey. Subject site does not support preferred habitat. Subject site is located outside of species natural range.
Pultenaea villifera var. villifera	A spreading to erect shrub to 1 m tall with moderately hairy stems. The yellow to orange pea-like flowers are 10 - 12 mm long. Distribution of the species within NSW is patchy, occurring within the South and Central Coasts and Southern Tablelands. Grows in dry sclerophyll forest and woodlands on sandy soil and appears to favour sheltered spots.	Nil. Species not found during the current survey. Subject site does not support preferred habitat. Subject site is located outside of species natural range.

Species	Preferred Habitat	Likelihood of Occurrence
Syzgium paniculatum	A tall shrub or small tree with flaky bark; leaves lanceolate to obovate; up to 10 cm long; glabrous on the upper surface and with distinct but small oil glands. Flowers from December to March and the inflorescence is terminal in the upper axils with the fruit developing to 25mm diameter, ovoid in shape and magenta in colour. Occurs in subtropical and littoral rainforest on sandy soils or stabilised sand dunes near the sea. Occurs in disjunct populations between Jervis Bay and Bulahdelah (Harden 1991)	Low. One planted specimen located within Aboriginal / Memorial garden during the current survey. Subject site does not support preferred rainforest habitat. Subject site is located outside of species natural range.
Zieria involucrata	A small, erect, sparse shrub, growing 1 – 2 metres in height.and leaves are densely covered with hairs. Has a disjunct distribution north and west of Sydney, in the Baulkham Hills, Hawkesbury, Hornsby and Blue Mountains local government areas.Occurs primarily on Hawkesbury sandstone. Also occurs on Narrabeen Group sandstone and on Quaternary alluvium. Found primarily in sheltered forests on mid- to lower slopes and valleys, e.g. in or adjacent to gullies which support sheltered forest, although some populations extend upslope into drier vegetation.	Nil. Species not found during the current survey. Subject site does not support preferred habitat. Subject site is located outside of species natural range.

6.2 Fauna

Table 6 summarises the habitat potential of the subject site for the threatened fauna species previously recorded as occurring within 5km of the site on the DECCW Wildlife Atlas.

Table 6 Habitat potential for threatened fauna species previously recorded within the locality (5km of the site) DECCW Wildlife Atlas and EPBC Protected Matters Report.

Species	Preferred Habitat	Likelihood of Occurrence
Botaurus poiciloptilus	The Australasian Bittern may be found across much of NSW except for the far north-west. Favors permanent freshwater wetlands with tall, dense vegetation, particularly bullrushes and spikerushes. Breeding occurs in summer from October to January. Nests are built in secluded places in densely-vegetated wetlands on a platform of reeds.	Nil. Subject site does not support preferred habitat.
Burhinus grallarius	Bush Stone-curlew is widely distributed throughout coastal northern Australia. It prefers open forests and woodlands with a sparse grassy ground layer where it spends a majority of its time. Two eggs are laid in rudely constructed nests on bare soil in early summer. Insects, frogs, lizards and snakes from a majority of its diet. It is most active at night and wails an eerie “wee-loo” type noise.	Nil. Subject site does not support preferred habitat.
Callocephalon fimbriatum	The Gang-gang Cockatoo is a relatively small, dark grey cockatoo. Males have a bright red head and crest while females have a grey head. Found in the central NSW coast and Tableland areas, including Canberra and the Hawkesbury/Nepean and Sydney Metro region. However the Hornsby and Ku-rin-gai Endangered population is the last known breeding population in the Sydney metro region. Usually frequents forested areas with old growth attributes required for nesting and roosting purposes. Also utilises less heavily timbered woodlands and urban fringe areas to forage, but appears to favour well timbered country.	Nil-low. Subject site does not support preferred habitat. Species may pass over the subject site on occasion.

Species	Preferred Habitat	Likelihood of Occurrence
Calyptorhynchus lathami	The Glossy Black Cockatoo is distributed along the Australian east coast and inland districts, the species occurs from western Victoria to Rockhampton in Queensland and as far west as Cobar and Griffith in NSW. Locally nomadic; flocking habitat is limited to dryer forest types of suitable feeding habitat with the species feeding exclusively on seeds from Casuarina species. Breeding occurs in autumn and winter; one chick is raised by both parents in a nest constructed in a large tree-hollow.	Nil-low. Subject site does not support preferred habitat. Species may pass over the subject site on occasion.
Cercartetus nanus	The Eastern Pygmy-possum is found from the NSW coast inland as far as the Pillaga, Dubbo, Parkes and Wagga Wagga on the western slopes. Found in a broad range of habitats from rainforest through sclerophyll (including Box-Ironbark) forest and woodland to heath, but in most areas woodlands and heath appear to be preferred, except in north-eastern NSW where they are most frequently encountered in rainforest. They feed largely on nectar and pollen collected from banksias, eucalypts and bottlebrushes. Shelters in tree hollows, rotten stumps, holes in the ground, abandoned bird-nests, Ringtail Possum (Pseudocheirus peregrinus) dreys or thickets of vegetation, (eg. grass-tree skirts). Nest-building appears to be restricted to breeding females, where tree hollows are favoured but spherical nests have been found under the bark of eucalypts and in shredded bark in tree forks.	Nil. Subject site does not support preferred habitat.
Chalinolobus dwyeri	The Large-eared Pied Bat is a microchiropteran bat found mainly in areas with extensive cliffs and caves, from Rockhampton in Queensland south to Bungonia in the NSW Southern Highlands. It is generally rare with a very patchy distribution in NSW. There are scattered records from the New England Tablelands and North West Slopes. Roosts in caves (near their entrances), crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin (Hirundo ariel). Forage in low to mid-elevation dry open forest and woodland and well-timbered areas containing gullies close to roosting habitat, typically roof domes in sandstone caves and have a high fidelity to the same cave over many years. This species probably forages for small, flying insects below the forest canopy and likely to hibernate through the coolest months.	Nil. Subject site does not support preferred habitat.
Dasyurus maculatus maculatus	Currently found along the escarpments, tablelands and coast of the eastern seaboard from the Bundaberg area in south-east Qld south through NSW to Victoria and Tasmania. Spotted-tailed Quolls are found in a variety of forest types including dry and moist eucalypt forests and rainforest. They tend to move along drainage lines and make dens in fallen hollow logs or among large rocky outcrops. They are usually nocturnal but are known to hunt and bask during the day. They are known to hunt on the ground and in trees.	Nil. Subject site does not support preferred habitat.
Daphoenositta chrysoptera	Varied Sittella is a songbird with a distinctive upturned bill, short tail, orange wing-bar and yellow eyes and feet. It is typically a sedentary species feeding on arthropods in rough or decorticating bark or standing dead trees. Prefers eucalyptus forests and woodlands with rough-barked and mature smooth-barked gums and acacia woodlands. Its former distribution within NSW has reduced in recent decades from the threat of habitat loss and destruction of habitat quality. It also avoids habitat dominated by Noisy Miners.	Nil. Subject site does not support preferred habitat.

Species	Preferred Habitat	Likelihood of Occurrence
Ephippiorhynchus asiaticus	Black-necked Stork is a large billed black and white waterbird with long bright orange legs. It is the only species of stork native to Australia. Distribution is widespread throughout coastal and subcoastal NSW although increasingly rare in the Sydney region. It may also inhabit non-coastal areas. The main determining factor is the presence of shallow, permanent freshwater wetlands and adjacent vegetation. Diet consists of eels, fish, frogs, snakes and invertebrates.	Nil. Subject site does not support preferred habitat.
Falsistrellus tasmaniensis	The Eastern False Pipistrelle is found on the south-east coast and ranges of Australia, from southern Queensland to Victoria and Tasmania. 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. Hunts beetles, moths, weevils and other flying insects above or just below the tree canopy. Hibernates in winter. Females are pregnant in late spring to early summer.	Nil. Subject site does not support preferred habitat.
Heleioporus australiacus	The Giant Burrowing Frog inhabits urban areas, forests, woodlands and heath. Mostly restricted to Hawkesbury Sandstone found around sandy creek banks, with crayfish burrows. The females lay eggs in burrows in creek banks. Burrows into deep litter or loose soil, emerging to feed or breed after rain.	Nil. Subject site does not support preferred habitat.
Hoplocephalus bungaroides	The Broad Headed Snake is found in rocky outcrops and adjacent sclerophyll forest and woodland. Most suitable sites occur in sandstone ridgetops. Near Bathurst snakes occur in forest growing on shale or conglomerate slopes and bluffs. Snakes prefer sites with a W to NW aspect. Occupied crevices have a sunny aspect and rocks used by snakes are those that receive the most warmth from the sun. The majority of occupied retreat sites occur on exposed cliff edges. In woodland, snakes shelter in hollows in a variety of tree species Snakes show preferences for large trees, trees with multiple hollows, and dead trees (DEH 2005).	Nil. Subject site does not support preferred habitat.
Lathamus discolor	The Swift Parrot migrates from breeding grounds in Tasmania to the Australian mainland in winter the species ranges from south-eastern South Australia across inland and coastal areas to southeast Queensland. The preferred habitat on mainland Australia is woodlands and riparian vegetation where there are winter flowering eucalypts such as the Swamp Mahogany and Eucalyptus robusta in coastal areas.	Nil-low. Subject site does not support preferred habitat. Species may pass over the subject site during migratory movements.
Litoria aurea	In NSW, the Green and Golden Bell Frog inhabits wetlands, marshes, dams and stream verges. Preferred habitat includes unshaded water bodies with adjacent grassy areas and suitable diurnal sheltering sites such as emergent vegetation and rocks and is known to inhabit highly disturbed sites within the Greater Sydney region Breeding usually occurs in summer when conditions are warm and wet and water-bodies used for breeding usually have a substrate of sand, rock or clay, are still and shallow and are free of predatory fish.	Nil. Subject site does not support preferred habitat.

Species	Preferred Habitat	Likelihood of Occurrence
Lophoictinia isura	In NSW, scattered records of the Square-tailed Kite throughout the state indicate that the species is a regular resident in the north, north-east and along the major west-flowing river systems. It is a summer breeding migrant to the south-east, including the NSW south coast, arriving in September and leaving by March. Found in a variety of timbered habitats including dry woodlands and open forests. Shows a particular preference for timbered watercourses.	Nil. Subject site does not support preferred habitat. Species may pass over the subject site during migratory movements.
Meridolum corneovirens	The Cumberland Plain Land Snail typically occurs in woodland of the Cumberland Plain, under logs and other debris, amongst leaf and bark accumulations around bases of trees and sometimes under grass clumps. Where possible it will burrow into loose soil, especially around the bases of large trees. The species can persist for some time under isolated trees or logs in otherwise poor habitat.	Nil. Subject site does not support preferred habitat. Species was not found during targeted search.
Miniopterus schreibersii oceanensis	In NSW, the Eastern Bent-wing Bat has been recorded from the coast to the western slopes of the Great Dividing Range. Occurring in forests and woodlands the species live in colonies and roost in caves, old mines and occasionally buildings. Females form nursing colonies in spring utilising specific nursery caves with high humidity and temperature. The species forages for insects above the tree canopy.	Nil-low. Subject site does not support preferred habitat. Species may pass over the subject site on occasion.
Mixophyes iteratus	Distribution of the Giant Barred Frog is along the coast and ranges from south-eastern Queensland to the Hawkesbury River in NSW. The species inhabits deep, damp leaf litter in rainforests, moist eucalypt forest and nearby dry eucalypt forest, at elevations below 1000 m. Breed around shallow, flowing rocky streams from late spring to summer.	Nil. Subject site does not support preferred habitat.
Mormopterus norfolkensis	The Eastern Freetail-bat occurs in dry sclerophyll forest and woodland east of the Great Dividing Range from south Queensland to southern NSW. Roosts mainly in tree hollows but also known to roost under bark or in man-made structures.	Nil-low. Subject site does not support preferred habitat. Species may pass over the subject site on occasion.
Myotis macropus (formally M. adversus)	The Large-footed Myotis is found in the coastal band from the north-west of Australia, across the top-end and south to western Victoria. It is rarely found more than 100 km inland, except along major rivers. 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. Forages over streams and pools catching insects and small fish by raking their feet across the water surface.	Nil. Subject site does not support preferred habitat.
Neophema pulchella	Distribution of the Turquoise Parrot extends from southern Queensland through to northern Victoria, from the coastal plains to the western slopes of the Great Dividing Range. Inhabits the margins of eucalypt woodland adjoining clearings, timbered ridges and creeks in farmland. Nests in tree hollows, logs or posts, from August to December. It lays four or five white, rounded eggs on a nest of decayed wood dust.	Nil. Subject site does not support preferred habitat. Species may pass over the subject site during migratory movements.

Species	Preferred Habitat	Likelihood of Occurrence
Ninox connivens	Distribution of the Barking Owl is throughout Australia except for the central arid regions and Tasmania. The species inhabits eucalypt woodland, open forest, swamp woodlands and, especially in inland areas, timber along watercourses. Roosts along creek lines, usually in tall understorey trees with dense foliage such as Acacia and Casuarina species, or the dense clumps of canopy leaves in large eucalypts. Home range is 30 to 200 hectares.	Nil-low. Subject site does not support preferred habitat. Species may pass over the subject site on occasion.
Ninox strenua	The Powerful Owl is found throughout forests and woodlands of south eastern Australia from southeast Queensland to southeast South Australia. Occupies a large home range of more than 1000 ha. Roosts by day in dense vegetation, commonly on drainage lines and in gullies. Requires tree-hollows of more than 50cm depth for nesting.	Nil-low. Subject site does not support preferred habitat. Species may pass over the subject site on occasion.
Petalura gigantea	The Giant Dragonfly is found along the east coast of NSW. It is not found west of the Great Dividing Range. There are known occurrences in the Blue Mountains and Southern Highlands, in the Clarence River catchment, and on a few coastal swamps from north of Grafton to Nadgee in the south. The species inhabitats permanent swamps and bogs with some free water and open vegetation.	Nil. Subject site does not support preferred habitat.
Petrogale penicillata	In NSW, the Brush-tailed Wallaby occurs from the Queensland border in the north to the Shoalhaven in the south, with the population in the Warrumbungle Ranges being the western limit. The species occurs on rocky escarpments, outcrops and cliffs with a preference for complex structures with fissures, caves and ledges facing north. The species forages at night and during the day, shelters or basks in rock crevices, caves and overhangs. Highly territorial and have strong site fidelity with an average home range size of about 15 ha.	Nil. Subject site does not support preferred habitat.
Potorous tridactylus tridactylus	Long-nosed Potoroos are generally restricted to areas with an annual rainfall greater than 760 mm where they inhabit dry and wet sclerophyll forests and woodland with a heathy understorey with the preferred habitat in north eastern NSW being dry and wet open shrubland. The species requires relatively thick ground cover growing on friable soils.	Nil. Subject site does not support preferred habitat.
Pseudomys novaehollandiae	New Holland Mouse is a small burrowing native rodent. Distribution is fragmented across much of Australia. Monitoring surveys during the previous decade have been limited therefore the current population size and distribution is unknown. Species prefers open woodlands with a heathland understorey and vegetated sand dunes. It is typically a social species and prefers fire influenced habitats.	Nil. Subject site does not support preferred habitat.
Pseudophryne australis	Distribution of the Red-crowned Toadlet is confined to the Sydney Basin where the species occurs in open forests, mostly on Hawkesbury and Narrabeen Sandstones. Inhabits periodically wet drainage lines below sandstone ridges that often have shale lenses or cappings, sheltering under rocks and amongst dense vegetation in thick leaf litter. Breeds in damp leaf litter.	Nil. Subject site does not support preferred habitat.

Species	Preferred Habitat	Likelihood of Occurrence
Petaurus australis	The Yellow-bellied Glider is found along the eastern seaboard to the western slopes of the Great Divide, from southern Queensland to Victoria. The species inhabits tall mature eucalypt forests and nests in large tree hollows where they build substantial, spherical nests of eucalypt leaves. Yellow-bellied Gliders feed from a range of sources, including winter-flowering eucalypts that provide nectar and pollen, and sap-trees, which are eucalypt trees into which they chew V-shaped incisions to collect sap.	Nil. Subject site does not support preferred habitat.
Pteropus poliocephalus	The Grey-headed Flying-Fox occurs along the east coast of Australia from Bundaberg in Queensland to Melbourne in Victoria and to the western slopes of the Great Diving Range in northern NSW.. The species roosts in aggregations of up to tens of thousands of animals and migrates depending on availability of food resources, which may be seasonal. Nectar, pollen and fruits or foraged from native trees and vines or sometimes fruit crops.	Nil-low. Subject site does not support preferred habitat. Subject site does not support a camp for this species. Species may pass over the subject site on occasion.
Pyrrholaemus saggitatus	Speckled Warbler is a small ground-dwelling bird to 13cm tall. It feathers are primarily brown, white and black streaks. Its distribution is patchy. Species have been recorded within the eastern eucalyptus dominated communities with a grassy understorey and rocky ridges or gullies. It also frequents the Great Dividing Range tablelands. Diet consists of inspects located within grass tussocks and under bushes.	Nil. Subject site does not support preferred habitat.
Rostratula australis	The Painted Snipe inhabits shallow freshwater wetlands, vegetated ephemeral and permanent lakes and swamps, and inundated grasslands. The Painted Snipe roosts during the day in dense vegetation and is active at dusk, throughout the night and dawn. It nests on the ground amongst tall reed-like vegetation near water, and feeds near the water's edge and on mudflats, taking invertebrates, such as insects and worms, and seeds.	Nil. Subject site does not support preferred habitat.
Scoteanax rueppellii	The Greater Broad-nosed Bat is found mainly in the gullies and river systems that drain the Great Dividing Range. In NSW it is widespread on the New England Tablelands, however does not occur at altitudes above 500 m. This species 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. Maternity sites are often located in suitable trees.	Nil. Subject site does not support preferred habitat.
Stictonetta naevosa	Freckled Duck derives its name from the speckled plumage. The males are identified during breeding season by the crimson base at the bill. Habitat preference includes freshwater swamps and creeks in inland and coastal southern Australia. It disperses long distances during drought periods when water sources dry to located farm dams or permanent artificial water sources. It requires dense foliage cover and deep water to rest. Foraging occurs at dawn and dusk on algae and aquatic vegetation and invertebrates.	Nil. Subject site does not support preferred habitat.

Species	Preferred Habitat	Likelihood of Occurrence
Tyto novaehollandiae	Masked owls are sparsely distributed in coastal and near-coastal regions of Australia. In NSW they are recorded sporadically in the north-east along the coast and tablelands in dry eucalypt forest and woodlands from sea level to 1100m. Masked Owls are forest owls but often hunt along the edges of forests, including roadsides. They have large home-ranges of 500 to 1000 hectares per pair, covering forested and partly open country. Masked Owls roost and breed in moist eucalypt forested gullies, using large tree hollows, or sometimes caves, for nesting.	Nil-low. Subject site does not support preferred habitat. Subject site does not support a camp for this species. Species may pass over the subject site on occasion.
Xanthomyza phrygia	In NSW the Regent Honeyeater has been recorded from coastal areas to as far west as Narrabri with important breeding areas west of Armidale. The species is semi-nomadic and occurs in temperate eucalypt woodlands with most records from box-ironbark associations and wet lowland coastal forests. Nests in eucalypts, casuarinas or mistletoes.	Nil-low. Subject site does not support preferred habitat. Subject site does not support a camp for this species. Species may pass over the subject site during migratory movements.

7 IMPACT ASSESSMENT, MITIGATION AND CONCLUSION

As mentioned previously, Shale Plains Woodland, a subset of Cumberland Plain Woodland, has been mapped across the subject site (NPWS 2002a). Cumberland Plain Woodland is listed as critically Endangered Ecological Community under Schedule 1 of the TSC Act. The current proposal requires the removal of approximately 13 trees (360^{o} 2010), including four species that are diagnostic canopy species of Cumberland Plain Woodland: *Eucalyptus molucanna* (Grey Box), *Corymbia maculata* (Spotted Gum), *Eucalyptus crebra* (Narrow-leaved Ironbark) and *Acacia decurrens* (Black Wattle). As a result, an Assessment of Significance (s5A of the EP&A Act) has been carried out for this community (Appendix A).

The likely presence of each of the locally recorded threatened species was assessed using knowledge of each species habitat and lifecycle requirements in relation to the habitats present within the study area (Table 5 and 6). The location and number of nearby, recent records were also considered in determining likelihood of occurrence. In accordance with the *Threatened Species Assessment Guidelines* (DECC 2007), an assessment of significance does not need to be carried out for a species that:

- Does not occur in the study area; or
- Will not use on-site habitats in occasion; or
- Will not be influenced by off-site impacts of the proposal.

As a result of the highly modified state of the subject site, threatened species previously known to occur within 5km of the site were predominately assessed as having a Nil or Low likelihood of occurring on the subject site (Table 5 and 6). Therefore, an assessment of significance was not carried out for these species. Although clearly planted within the Memorial Garden area, a s5A assessment has been prepared for the *Syzygium paniculatum* (Magenta Lily Pilly), listed as Vulnerable under Schedule 2 of the *Threatened Species Conservation Act 1995* (TSC Act) (Appendix A).

7.1 Potential Impacts and Impact Minimisation

A direct impact of the current proposal is the removal of 13 mature trees, of which 11 are native species. Trees for removal include; *Eucalyptus molucanna* (Grey Box), *Eucalyptus crebra* (Narrow-leaved Ironbark), *Eucalyptus piperita* (Sydney Peppermint), *Corymbia maculata* (Spotted Gum), *Acacia decurrens* (Black Wattle), *Melia azedarach* (White Cedar) and two exotic *Jacaranda mimosifolia* (Jacaranda).

As discussed in the attached 7-part test, the removal of these trees will not fragment or significantly modify remaining vegetation, or habitat occurring on the study area. The vegetation to be removed does not comprise a significant area of habitat for protected flora and fauna species or endangered vegetation communities that occur on the site, study area or within the locality. As a result, the current proposal is unlikely to result in a significant effect on the long term survival or habitats of native flora and fauna occurring on the site, in the locality or the region.

Potential indirect impacts of the current proposal may include loss of shade/shelter, weed invasion, and/or sedimentation. The loss of shade/shelter is directly related to the trees to be removed. However, the absence of a mid-storey and understorey means shade/shelter is already minimal. Disturbance to the soil may contribute to the invasion or spread of weeds from adjacent areas, and potential sedimentation downslope. The potential impact of sedimentation during works may be minimised by appropriate mitigation measures outlined below. Run-off and sedimentation will most probably not increase from their present levels following the completion of works.

These unavoidable impacts can be reduced or controlled through the implementation of impact mitigation measures. Mitigation measures and additional recommendations in relation to the current proposal are summarised below.

- The current proposal is to be carried out in accordance with all policies, operational procedures and guidelines in place relating to environmental management or impact minimisation for construction projects of similar scope to the current proposal;
- Appropriate measures should be undertaken to reduce potential detrimental effects of construction on trees proposed to be retained, as outlined in the Arborist's report to be prepared. This should include tree protection measures such as fencing around trees to be retained, exclusing of excavation and materials/vehicle storage within the drip line or trees and hand excavation within the critical root zone of trees to be retained;
- The loss of the native plant species should be offset by implementing landscaping or revegetation works within the Nepean Hospital site which incorporates locally indigenous plant species that are characteristic of Cumberland Plain Woodland. The offset should result in a least two species planted for each one removed. Offsets should occur in areas that will not be disturbed as part of the redevelopment of the hospital. If no suitable area for offsets is present within the hospital site, an alternate location within the locality with a 'conservation' zoning, such as a Council Reserve, or 'priority conservation areas' highlighted within the Draft Recovery Plan for the Cumberland Plain (DECCW 2009), should be considered;
- Installation, maintenance and decommissioning of sediment and erosion controls as required and as specified in any consent;
- Temporary fencing should be installed to exclude the passage of native fauna through construction or storage compounds to minimise opportunities for fauna to shelter in machinery or materials stockpiles;
- Machinery is to be cleaned of soil and debris before bringing it on site to reduce the potential spread of weeds and the fungal pathogen *Phytophthora cinnamomi*;
- Assess the feasibility of transplanting the planted *Syzygium paniculatum* (Magenta Lily Pilly) located within the memorial garden, and if possible relocate prior to construction commencing; and
- The site is to be made good on completion of construction with no excess construction materials or debris to remain on the site.

7.2 Conclusion

Total Earth Care has conducted a flora and fauna assessment, which involved the research and review of previous data and literature of relevance to the subject site and study area, including data from the DECCW Atlas of NSW Wildlife and EPBC Protected Matters report. A diurnal survey of the subject site and study area was conducted on September 10th to identify vegetation communities, flora species, fauna species, and fauna habitats.

During the current survey, 31 plant species (including 21 native species and 10 introduced species) and 2 fauna species were recorded within the subject site. An assessment of significance was not carried out for those species assessed of having a Nil, Low or Low-medium likelihood of occurring on the subject site.

Disturbance related to the construction of the hospital and associated infrastructure such as access roads and car parks, has resulted in the loss of much of the vegetation, while maintenance regimes such as mowing limit the potential for the regeneration of native species. Soil disturbance associated with the original construction has most probably reduced the potential for Shale Plains Woodland to regenerate from the soil seedbank, even upon the cessation of mowing. The highly modified nature of the subject site has also resulted in the loss of many of the natural habitat features and resources that are important in the maintenance of native fauna diversity and life cycles. Important fauna habitat features that are missing from the subject site include fully structured vegetation, a diverse shrub layer for food sources and protection, rocky outcrops, loose rocks, leaf litter, and logs. Accordingly, the subject site has been assessed as having a poor level of fauna habitat value. In summary, the current proposal is unlikely to significantly affect the ecological function or long term survival and integrity of the vegetation, flora and fauna occurring in the locality.

One plant community was identified within the subject site and study area during the current survey; a native/exotic landscaped community which in some areas supports a highly modified and disturbed form of Shale Plains Woodland, a subset of the Cumberland Plain Woodland. The highly modified remnant of Shale Plains Woodland identified as occurring on the subject site (NPWS 2002a) persists primarily as canopy trees *Eucalytus molucanna* (Grey Box), *Corymbia maculala* (Spotted Gum) and *Eucalyptus crebra* (Narrow-leaved Ironbark) that are characteristic of the community.

The memorial garden includes one planted *Syzygium paniculatum* (Magenta Lily Pilly) listed as Vulnerable under Schedule 2 of the *Threatened Species Conservation Act 1995* (TSC Act). This garden is to be re-located to another section of the hospital as part of the proposal, however it is unclear if the plant will be translocated or removed as part of the proposal. The assessment of significance has concluded that the removal or relocation of this plant which has been planted within the hospital grounds is not significant, and therefore a Species Impact Statement is not required.

While direct impacts will occur from clearing several canopy trees characteristic of Shale Plains Woodland, and one planted *Syzygium paniculatum* (Magenta Lily Pilly), the preferred development including the mitigation and offset measures, will aim to maintain or improve biodiversity values within the locality by including offsets of unavoidable impacts, will not reduce the long-term viability of a local population of the species or ecological community, is unlikely to significantly accelerate the extinction of the species or ecological community, and will not adversely affect critical habitat.

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Appendix A

Assessments of Significance

Nepean Hospital

Penrith Integrated Mental Health Unit

ASSESSMENT OF SIGNIFICANCE – CUMBERLAND PLAIN WOODLAND

(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.

The TSC Act defines a "threatened species" as "a species specified in Part 1 or 4 of Schedule 1 or in Schedule 2" of the Act. Cumberland Plain Woodland is not a "threatened species", as defined under the TSC Act.

(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.

The TSC Act defines an 'endangered population' as 'a population specified in Part 2 of Schedule 1' of the Act. Cumberland Plain Woodland is not an 'endangered population', as defined under the TSC Act.

(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.**

The proposed action comprises the removal of approximately 13 trees, some of which are characteristic species of CPW. Cumberland Plain Woodland is listed as a Critically Endangered Ecological Community under Schedule 1 of the TSC Act. Mapping by Tozer (NPWS, 2002a) have indicated that Shale Plains Woodland subunit of Cumberland Plain Woodland occurs within the south-eastern corner of the subject site. Ground-truthing identified that this area incorporates the canopy foliage coverage of the adjacent strand of trees *Eucalyptus moluccana* (Grey Box) and *Corymbia maculata* (Spotted Gum) located outside the construction footprint. These species are characteristic of the CPW vegetative community and are located throughout the hospital site and sections of the study area. However, the south-eastern corner mapped by Tozer (NPWS, 2002a) as CPW is currently located within a paved parking area with no vegetation present except the overhanging canopy layer.

Several characteristic species of CPW are located within the proposed construction footprint and require removal. These include one possible remnant *Eucalyptus moluccana* (Grey Box) and planted eucalyptus species, *E.crebra* (Narrow-leaved Ironbark and *Corymbia maculata* (Spotted Gum) located within the south-western corner of the subject site. *Acacia decurrens* (Black Wattle) also a characteristic species and *Eucalyptus piperita* (Sydney Peppermint) and *Melia azedarach* (White Cedar) are not considered characteristic species of the CPW are also located within this area.

The occurrence of the community on the subject site and in the study area has undergone significant modification as a result of disturbance related to construction of hospital buildings and associated infrastructure, clearing, and maintenance regimes such as mowing. The likelihood of CPW regenerating on the site from the soil seedbank is negligible as the original soil seedbank may have been removed prior to the original construction works, it has since been built over or on-going land-use precludes the presence of bushland at the site. Much of the community is degraded and comprises a floristically and structurally simple composition. As a result, the proposed actions are unlikely to have an adverse effect on the extent of CPW, nor will substantially or adversely modify the composition of the community, such that the local occurrence of the community is likely to be placed at greater risk of extinction.

(d) In relation to a 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, and**
- **(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.**

It is estimated that prior to European settlement Cumberland Plain Woodland covered 125,000 hectares across western Sydney. Clearing for agriculture and urban development has resulted in a substantial loss and fragmentation of the community (NPWS, 2004). Estimates of the remaining original extent include between 6% from the Final Determination (NSW Scientific Committee, 1997) to 9%, with a further 14% remaining as scattered trees (NPWS, 2004). The Shale Plains Woodland subunit of Cumberland Plain Woodland occurring on the subject site is a highly modified remnant with no connectivity to other stands of Cumberland Plain Woodland.

At a locality scale the current proposal will not increase fragmentation or isolation of the community as the Shale Plains Woodland subunit of Cumberland Plain Woodland occurring on the subject site is highly disturbed with no connectivity to a significant stand of Cumberland Plain Woodland in the locality. The long-term viability of the community of the subject site is extremely low, with the persistence at the site mainly as mature canopy species, some shrub species and little to no ground layer species. This is due to the past and ongoing disturbance, the lack of vegetation layer structure and low species diversity.

As a result, the proposed action will not significantly remove or modify a significant extent of CPW occurring in the locality. The proposed action will not significantly increase fragmentation or isolation of the community on the in the locality. The long-term survival of CPW occurring on the subject site and in the locality will not be significantly affected by the removal of the canopy species as the site represents a very simplified vegetation structure that is within and surrounded by a highly modified urban environment.

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

No area has been designated as 'critical habitat' under Part 3 of the TSC Act 1995 for Cumberland Plain Woodland.

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

A draft recovery plan was adopted in 2009 (DECCW) and has increased priority actions to a total of 18. The proposed development is not inconsistent with the strategies and actions listed in the priority action statement. There are no Threat Abatement Plans currently in operation for any Key Threatening Processes threatening Cumberland Plain Woodland.

(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.

The TSC Act defines "threatening process" as "a process that threatens, or may have the capability to threaten, the survival or evolutionary development of species, populations or ecological communities". Schedule 3 of the TSC Act provides a list of the "key threatening processes" (KTP). Of the KTP's listed in Schedule 3 of the TSC Act the and in the context of the current and continuing land use the following KTP's are relevant to Cumberland Plain Woodland of the subject site:

- Clearing of Native Vegetation.

Clearing of native vegetation is recognised as the major KTP affecting Cumberland Plain Woodland. The proposed action will contribute to the clearing of native vegetation as this is required for the

construction of the new building. However, as the area to be affected is small and the condition of the Cumberland Plain Woodland to be affected is low, the proposal will not significantly increase the impact of this KTP.

Conclusion

In light of the consideration of the above seven factors (1 -7), the proposed activity on the subject site is not likely to have "a significant effect" on Shale Plains Woodland on the subject site or wider locality as a result of the current proposal, as:

- The proposal will not adversely affect the lifecycle of the community;
- The proposal will not remove, modify or further fragment or isolate a significant area of habitat for the community; and
- The proposal does not significantly contribute to any KTP threatening the community.

Consequently, a Species Impact Statement is not required.

ASSESSMENT OF SIGNIFICANCE – *Syzygium paniculatum* (Magenta Lily Pilly)

(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.

S. paniculatum is a widely cultivated species available as an ornamental and garden plant. There is no recorded viable local population within the locality and while the species is endemic to the Central Coast region of NSW no population records occur within the Penrith LGA. As such the removal and/or translocation of the single planted specimen will not place the species at an increased 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.

S. paniculatum is not listed as an endangered population.

(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.

S. paniculatum is not part of an endangered ecological community.

(d) In relation to a 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, and
(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.

S. paniculatum occurs on Quaternary gravels, sands, silts and clays, in riparian gallery rainforests and remnant littoral rainforest communities (Payne 1997). These habitats are rare throughout the species' range, having been largely cleared for coastal development. No suitable habitat occurs within the study area and the plant present is a cultivated species planted within a memorial garden. The habitat being removed is not connected to other suitable habitat for the species and is not important to the long-term survival of the species.

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

No critical habitat has been declared.

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

No Plans exist for this species. The preparation of a Recovery Plan is the one Priority Action for this species.

(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.

The action will remove one plant from an area that is not typical habitat fo rthis species. The action will not increase the impact of fire, impacts from livestock or weed invasion.

Conclusion

In light of the consideration of the above seven factors (1 -7), the proposed activity on the subject site is not likely to have "a significant effect" on *Syzygium paniculatum* (Magenta Lily Pilly) on the subject site or wider locality as a result of the current proposal, as:

- The proposal will not adversely affect the lifecycle of the species;
- The proposal will not remove, modify or further fragment or isolate a significant area of habitat for the species; and
- The proposal does not significantly contribute to any KTP threatening the species long-term survival.

Consequently, a Species Impact Statement is not required.

Appendix B

Flora and Fauna Species Inventories

Nepean Hospital

Penrith Integrated Mental Health Unit

Table 1 Native and exotic plant species for Nepean Hospital Stage 3 Development Penrith Integrated Mental Health Unit September 2010.

General Status

*	Exotic (not native to Australia)
N	Noxious weeds as listed on the *NSW Noxious Weeds Act 1993* for the Hawkesbury City Council LGA
ni	Non - indigenous native species (does not naturally occur at this locality)
(?)	Uncertain identification

Conservation Status

E	Endangered - listed under Schedule 1 of the TSC Act
V	Vulnerable - listed under Schedule 2 of the TSC Act
c	Common, species occur all over the site
o	Occasional, species occur over the survey area but not in large numbers at any occurrence
uc	Uncommon, species occur only once or twice during the survey

Status	Family	Botanical Name	Common Name	Study Site
*	Fabaceae - Mimosoideae	*Acacia decurrens*	Black Wattle	UC
	Myrtaceae	*Acmena smithii*	Lilly Pilly	UC
		Araucaria bidwillii	Bunya Pine	UC
*	Buxaceae	*Buxus*	sp	C
	Myrtaceae	*Callistemon salignus*	Willow Bottlebrush	C
	Commelinaceae	*Commelina cyanea*	Scurvy Weed	O
	Myrtaceae	*Corymbia maculata*	Spotted Gum	C
	Phormiaceae	*Dianella caerulea*	Blue Flax-lily	O
	Iridaceae	*Dietes robinsoniana*	Lord Howe Wedding Lily	O
*	Poaceae	*Ehrharta erecta*	Panic Veldtgrass	C
	Myrtaceae	*Eucalyptus crebra*	Narrow-leaved Ironbark	C
	Myrtaceae	*Eucalyptus fibrosa*	Red Ironbark	UC
	Myrtaceae	*Eucalyptus moluccana*	Grey Box	C
	Myrtaceae	*Eucalyptus piperita*	Sydney Peppermint	O
*	Moraceae	*Ficus sp*		O
	Proteaceae	*Grevillea sp*		C
	Fabaceae - Faboideae	*Hardenbergia violacea*	Purple Coral Pea	C
*	Bignoniaceae	*Jacaranda mimosifolia*	Jacaranda	C
	Myrtaceae	*Leptospermum sp*		UC
LOC	Arecaceae	*Livistona australis*	Cabbage Fan-palm	UC
	Myrtaceae	*Melaleuca decora*		
	Myrtaceae	*Melaleuca nodosa*		UC
	Myrtaceae	*Melaleuca styphelioides*	Prickly-leaved Tea Tree	O
	Meliaceae	*Melia azedarach*	White Cedar	C
*		*Nandina domestica*		O
*	Oleaceae	*Olea europaea ssp cuspidata*	African Olive	UC
*	Oleaceae	*Olea europaea ssp europaea*	Olive	UC
*	Arecaceae	*Phoenix canariensis*	Canary Island Date Palm	C
*	Amygdalaceae	*Prunus sp*		O
T	Myrtaceae	*Syzygium paniculatum*	Brush Cherry	O
*	Fabaceae - Caesalpinioideae	*Senna pendula var glabrata*		O

Table 2 Native and exotic fauna species for Nepean Hospital Stage 3 Development Penrith Integrated Mental Health Unit September 2010.

General Status	
*	Exotic/introduced species
(?)	Uncertain identification
Conservation Status	
E	Endangered - listed under Schedule 1 of the TSC Act
V	Vulnerable - listed under Schedule 2 of the TSC Act
Record Type	
Fl	Flying over the site
Vi	Visual observation
Au	Aural (call recognition)
Ul	Ultrasonic call recognition (Anabat)
Sc	Scat or scent
T	Tracks
Scr	Scratch marks on tree trunks or other
N	Nest
B	Burrow
H	Hollows (in trees, trunks or other)
F	Fur or feathers
E	Eggs or juvenile morphs
A	Anecdotal

Status	Group	Family	Scientific Name	Common Name	Obs Type	Certainty
P	Aves	Psittaciformes	*Manorina melanocephala*	Noisy Miner	Vi	Certain
P	Aves	Psittaciformes	*Trichoglossus haematodus*	Rainbow Lorikeet	Au	Certain

Appendix C

Maps and Figures

Nepean Hospital

Penrith Integrated Mental Health Unit

Title: **Nepean Hospital**
Penrith Integrated Mental Health Unit

Client: Health Infrastructure
Date: September 2010
Project No: C2056-SAI
Author: R Blackall

Legend

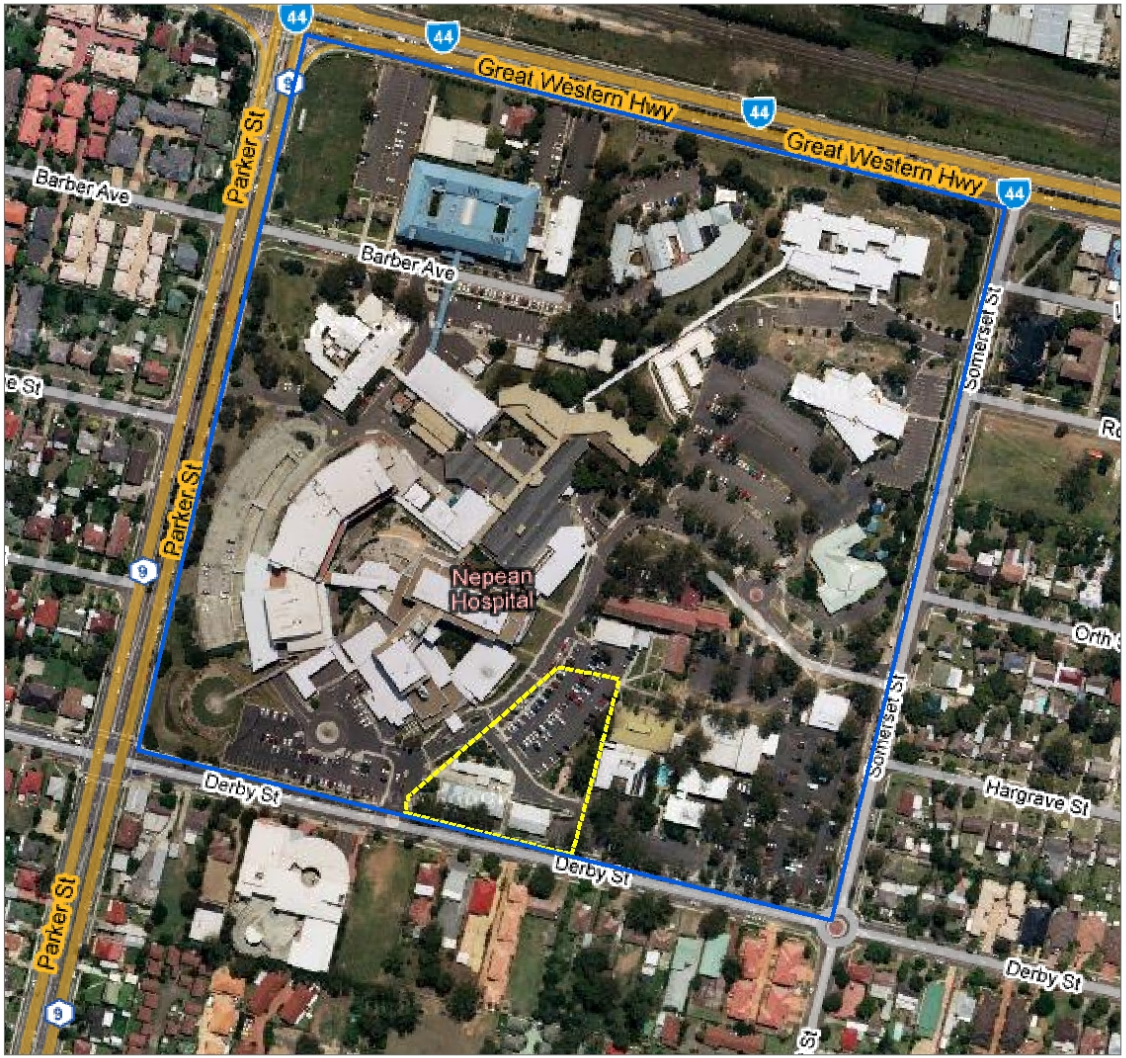
Nepean Hospital
Study Area

Metres
0 30 60 120
N

Data Source:
Total Earth Care
Google

Tel: 02 9913 1432 Fax: 02 9913 1434

total earth care



Title: Nepean Hospital

Previous Vegetation Mapping Tozer 2002

Client: Health Infrastructure
Date: September 2010
Project No: C2056-SAI
Author: R Blackall

Legend

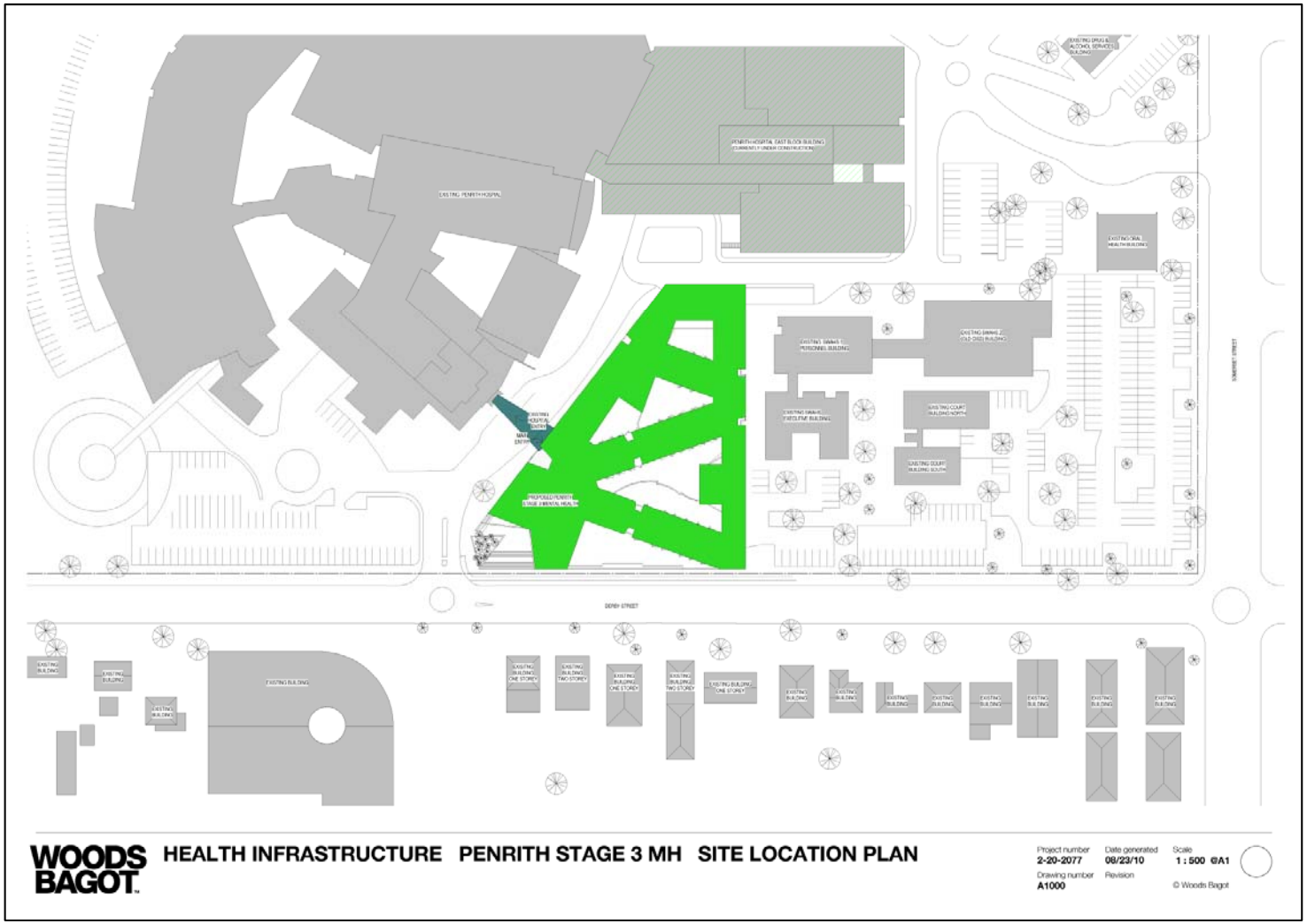
- Shale Plains Woodland
- Study Area
- Nepean Hospital

Metres
0 10 20 40
N

Data Source:
Tozer 2002
Total Earth Care
Google

Tel: 02 9913 1432 Fax: 02 9913 1434

total earth care


WOODS BAGOT
HEALTH INFRASTRUCTURE PENRITH STAGE 3 MH SITE LOCATION PLAN
Project number 2-20-2077
Date generated 09/23/10
Scale 1 : 500 @A1
Drawing number A1000
Revision
© Woods Bagot

Appendix D

Photo Plates

Nepean Hospital

Penrith Integrated Mental Health Unit

Plate 1- photo point 1 looking West towards emergency wards and over the car park located within proposed construction footprint.

Plate 2 - photo point 2 looking south across car park within proposed construction footprint

Plate 3 - photo point 3 looking west towards construction footprint. Note trees to be retained as part of Cumberland Plain Woodland remnant vegetation community.

Plate 4 - photo point 4 looking south towards building and shrubs to be demolished for proposed construction footprint.

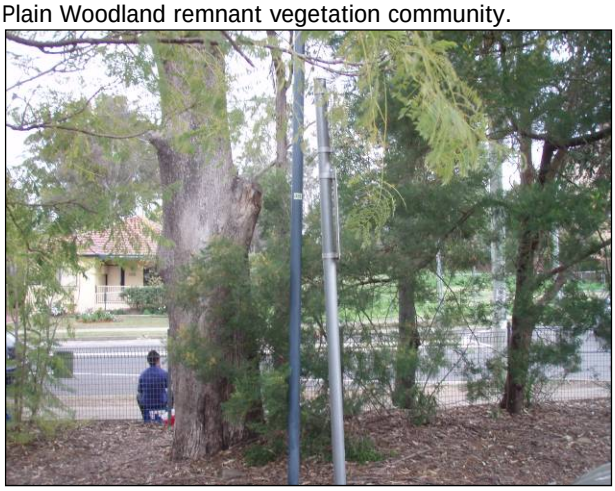


Plate 5 - photo point 5 looking south at trees proposed for removal for landscaped gardens.

Plate 6 – Aboriginal / Memorial gardens to be relocated and planted specimen *Syzygium paniculatum* (Magenta Lily Pilly).