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Preliminary Ecological Assessment - Overview of Constraints

Cherrybrook Gateway Rezoning Project

Total Earth Care Pty Ltd
June 2015

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Date of Issue: June 10, 2015

Quality Control	© Total Earth Care Pty Ltd 2015		
Revision/Version No.	Final	Date of revision	10 June 2015
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1 INTRODUCTION

Grimshaw Architects, on behalf of Toplace, have engaged Total Earth Care to undertake an Ecological Assessment which is to inform a Proposed Rezoning Application for a series of lots (the Gateway Rezoning Area) generally along the southern side of Castle Hill Road between Highs Road and Staley Court, West Pennant Hills (the 'Subject Site' or 'Site' Appendix B, Map 1). For the purpose of this report the Gateway Rezoning Area equates to the Subject Site and is opposite the North-West Rail Link's Cherrybrook Railway Station that is currently under construction. The site is currently zoned as E4 Environmental Living, however with the renewal of West Pennant Hills and introduction of Cherrybrook Station, the proponent supports the transformation of the locality into a medium density residential area. The proposal shows a high density 6-15 storey residential development which would mean the area would need an uplift in Zoning from E4 Environmental Living to R4. As such an application to rezone the subject site will need to be submitted to the Hills Shire Council (Council).

2 AIMS AND OBJECTIVES

The aims of this preliminary ecological assessment for the current proposal are to:

- Determine whether any native vegetation which occurs on the site constitutes a native vegetation community;
- Identify the type, and map the extent of the vegetation community/s present on the site using the Tozer (2003) methodology and/or using the descriptions of communities as listed under the *Threatened Species Conservation Act 1995* (TSC Act), the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and any other relevant documents. Describe the process used and include a plant species list;
- Determine whether the site contains known or potential habitat for any Threatened or Migratory species or populations listed under the *Threatened Species Conservation Act 1995* or the *Environment Protection and Biodiversity Conservation Act 1999*;
- Undertake a sufficient level of survey for Threatened or Migratory species or populations on the site and describe and justify the suitability of the survey methods employed;
- Describe the occurrence or likely occurrence of any Threatened or Migratory species or populations on the site, including the extent of known or potential habitat;
- Propose management measures for the enhancement of the identified biodiversity values
- Identify areas of biodiversity value and high habitat quality that would be prioritized for retention and management

The Gateway Rezoning Area (the subject site) is that area that is proposed for rezoning (as per Appendix B, Map 1). The 'study area' for this assessment is those parts of the subject site (made up of various 'assessment sites' (as per Appendix B, Map 1). Ordinarily, a study area encapsulates the subject site (which is the area of direct impact), and other areas that may be indirectly affected. In this case, areas of the Gateway Rezoning Area (the subject site) that are outside the scope of the Preliminary Ecological Assessment, have not at this stage been assessed as part of the study area. Future assessments will be required to incorporate these areas of the subject site into the study area, including other areas outside the subject site that need to be assessed at a later date.

3 LEGISLATION AND POLICY

3.1 Federal Legislation

3.1.1 Environment Protection and Biodiversity Conservation Act 1999

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is relevant when it is considered that an impact on a 'matters of National Environmental Significance (NES)' are likely, thus providing a trigger for referral of the proposal to the Department of the Environment and Water, Heritage and the Arts.

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.

Several flora and fauna species listed under the schedules of the EPBC Act have been previously recorded within the locality and are relevant to the current assessment (Tables 2 &4). In addition Blue Gum High Forest of the Sydney Basin Bioregion and Turpentine-Ironbark Forest in the Sydney Basin Bioregion endangered ecological communities have been mapped within the locality. These species and communities were targeted as part of the site survey work.

3.2 State Legislation

3.2.1 Environmental Planning and Assessment Act 1979

The current proposal is to be considered under s55 (3) of Part 3 of the EP&A Act. The Relevant Planning Authority (RPA) is to consider any likely impacts of the proposal under section 5A (s.5A) of the EP&A Act (the Assessment of Significance or so called '7-part test'). The assessment of significance will determine whether there is any likelihood that critical habitat or threatened species, populations or ecological communities or their habitats will be adversely affected as a result of the proposal.

Notwithstanding the significance of the impact, any adverse impact will trigger the requirement under section 34A of the Act for the RPA to consult on the planning proposal with the relevant government agency. If required, this consultation does not need to take place until after the issuing of the initial Gateway determination.

Section 117 of the Act enables the Minister to issue directions regarding the content of LEPs to the extent that the content must achieve or give effect to particular principles, aims, objectives or policies set out in those directions.

3.2.2 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.

3.2.3 NSW Protection of the Environment Administration Act 1991 s6(2)

The NSW Protection of the Environment Administration Act 1991 s6(2) defines the Precautionary Principle as:

> *"*if there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation*".'*

The precautionary principle must be considered by decision-makers in broader aspects of the impacts of a proposal on the environment.

3.4 Local Government Policy

3.4.1 The Hills Local Environmental Plan 2012

The proposed rezoning will occur on land currently zoned as E4 (Environmental Living) as outlined in Part 2 of The Hills LEP 2012. The land is not mapped as 'Biodiversity (terrestrial)' as outlined in Clause 7.4 of The Hills LEP 2012.

The objectives of E4 are:

- To provide for low-impact residential development in areas with special ecological, scientific or aesthetic values.
- To ensure that residential development does not have an adverse effect on those values.

The proposed uplift of zoning is to R4 (High Density Residential).

The objectives of R4 are:

- To provide for the housing needs of the community within a high density residential environment.
- To provide a variety of housing types within a high density residential environment.
- To enable other land uses that provide facilities or services to meet the day to day needs of residents.
- To encourage high density residential development in locations that are close to population centres and public transport routes.

4 METHODS

4.1 Desktop Research

Prior to field surveys, records of all threatened species, populations and endangered ecological communities (EEC) previously recorded within a 5km radius of the subject site were obtained from the Department of Environment, Climate Change and Water (DECCW) Wildlife Atlas database. An EPBC Act Protected Matters Report was generated using the Commonwealth Department of Environment, Protected Matters Search Tool for a 5km radius of the subject site. The report identifies matters of national environmental significance in the study area including threatened biodiversity and other matters protected by the EPBC Act.

Threatened species, threatened populations, threatened communities, or their habitats, were targeted during the field survey. Recent existing reports of the biodiversity of the study area and locality were also reviewed prior to field surveys and these are briefly summarised in following sections of this report.

4.2 Flora

General botanical surveys were conducted in the study area on 13th November 2013 and 23rd February 2015 involving:

- the identification and mapping of plant communities (where present) according to the structural definitions of Specht & Specht (1999), and to previous broad-scale mapping of the Cumberland Plain by NPWS (2003); and of the Penrith 1:100,000 map sheet by Benson & Howell (1994);
- targeted searches for plant species of conservation significance according to the "random meander" method (Cropper 1993;)
- quadrat surveys based on the number of stratification units and undertaken according to the Threatened Species Survey and Assessment Guidelines.

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

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

4.3 Fauna

Fauna surveys for threatened species, involving diurnal and nocturnal techniques, were conducted on the 20th and 21st November, 2013, and the 15th, 16th and 17th of April, 2015. The diurnal surveys involved observations of animal activity, habitat identification and searches for indirect evidence of fauna (such as scats, nests, burrows, hollows, tracks, scratches and diggings). Nocturnal surveys included call playback, spotlighting, ANABAT devices, Surveys for avifauna and amphibians involved visual detection and aural recognition of bird and frog calls.

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.

5 ECOLOGICAL CONSTRAINTS

5.1 Endangered Ecological Community

One Endangered Ecological Community (EEC), Blue Gum High Forest, which is listed as Critically Endangered on both the TSC Act and EPBC Act, was found to occur on the subject site (Appendix B, Map 2, 3, 4 and 5).

Blue Gum High Forest (BGHF) was identified as occurring on the subject site. Prior to European settlement BGHF was estimated to cover approximately 3700ha across the Sydney Basin Bioregion. The community's current extent covers less than 200ha, less than 4.5% of its original distribution. Due to this vast reduction in distribution and ongoing pressures from numerous external sources and Key Threatening Processes the community has been listed as a critically endangered ecological community on the TSC Act and as critically endangered on the EPBC Act.

The BGHF in the study area meets the requirements of the NSW Scientific Committee's Scientific Determination as an Endangered Ecological Community (EEC). The BGHF in the study area forms part of a broken patchwork of BGHF remnants to the west centred around a larger, more contiguous remnant of BGHF centred along the upper catchment of Darling Mills Creek, including Excelsior Reserve and the Sydney Water Reservoir property, along with numerous private residential properties. This more contiguous extent of BGHF west of the subject site may also meet the requirements of BGHF under the Commonwealth EPBC Act as an Endangered Ecological Community.

As discussed below, with specific reference to BGHF as listed under the NSW TSC Act (1995), these extents of BGHF in the study area occur as: canopy only, or as canopy with groundlayer/understorey. Canopy only extents have been mapped at the canopy level with polygons representing the extent of the projected foliage cover at that level. Extents of BGHF mapped as canopy with groundlayer/understorey have been mapped as polygons including the projected foliage cover of any of these layers that are contiguous. As the Final Determination of BGHF notes that *'Highly modified relics of the community also persist as small clumps of trees without a native understorey'*, isolated BGHF trees have been mapped, as have any associated understorey or groundlayer extents of BGHF species, while occurrences of BGFH understorey or groundlayer species not associated with occurrences of tree species have not been mapped as BGHF if those understorey or groundlayer species are not reasonably associated with tree species. There is a small occurrence of isolated Blue Gum High Forest with only groundlayer/understorey occurring as very small areas of single or few specimens of the climbers *Kennedya rubicunda* and *Stephania japonica* in the southerly parts of 127 Castlehill Road. These areas are not mapped as BGHF in the current report as they are considered too isolated and scant to be mapped as a patch of a plant community, hence not part of the Blue Gum High Forest community on site. The extent of Blue Gum High Forest mapped with only canopy occurs in a fragmented patchwork across the study area within the subject site with greatest abundance around Glenhope Road, although there are isolated occurrences of trees (including small but mature specimens of sub-canopy trees such as *Acacia implexa* and *Pittosporum undulatum*) in the north and particularly central parts of the study area. The extent of BGHF mapped with canopy and groundlayer/understorey within the study area is mapped most extensively within the northern part of the site at 141-145 Castle Hill Road. Limited extents of groundlayer species were observed in the groundlayer under the remnant trees along the roadfront edge of the properties 7 and 9 Glenhope Road. These species included Mic*rolaena stipoides, Dichondra repens, Oplismenus spp* and *Pratia purpurascens*. Additional areas outside the subject site but within the current Study Area that support both canopy and groundlayer/understorey include the area immediately adjacent to the subject site along 109 Staley Court,as well as an extensive area of 10 Highs Road that was previously mapped by Total Earth Care (TEC, 2014). From observations along the boundary of 6-8 Highs Road, that property displays a similar pattern of extent of BGHF canopy and slashed groundlayer as 141, 142 and 145 Castle Hill Road. Additional BGHF species were observed within 6-8 Highs Road that were not observed within neighbouring 141, 142 and 145 Highs Road. A single clump of the locally native fern *Pellaea falcata* was observed under the canopy of *Acacia implexa* of Patch 2d but this patch has been mapped only as canopy due to its limited extent.

Species lists for BGHF found on the subject site are found in Appendix A.

Mapped extents of BGHF are shown in Appendix B, Maps 2, 3, 4 and 5.

5.2 Threatened Species

Seven threatened species were found to occur on the subject site:

- Eastern Bentwing Bat *Miniopterus schreibersii oceanensis*: Listed as Vulnerable on the NSW *Threatened Species Conservation Act 1995* (TSC Act)

- Eastern Freetail-bat *Mormopterus norfolkensis*: Listed as Vulnerable on the NSW *Threatened Species Conservation Act 1995* (TSC Act)

- Little Bentwing-bat *Miniopterus australis*: Listed as Vulnerable on the NSW *Threatened Species Conservation Act 1995* (TSC Act)

- Eastern False Pipistrelle *Falsistrellus tasmaniensis:* Listed as Vulnerable on the NSW *Threatened Species Conservation Act 1995 (TSC Act)*

- Greater Broad-nosed Bat *Scoteanax rueppellii*: Listed as Vulnerable on the NSW *Threatened Species Conservation Act 1995* (TSC Act)

- Powerful Owl *Ninox strenua*: Listed as Vulnerable on the NSW *Threatened Species Conservation Act 1995* (TSC Act);

- Grey-headed Flying-fox *Pteropus poliocephalus*: Listed as Vulnerable on the NSW *Threatened Species Conservation Act 1995* (TSC Act) and *Commonwealth Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act)

Eastern Bentwing-bats have chocolate to reddish-brown fur on its back and slightly lighter coloured fur on its belly. They have a short snout and a high 'domed' head with short round ears. Eastern Bentwing-bats occur along the east and north-west coasts of Australia. Caves are the primary roosting habitat, but the species also roots in derelict mines, storm-water tunnels, buildings and other man-made structures. Eastern Bentwing-bats form discrete populations centred on a maternity cave that is used annually in spring and summer for the birth and rearing of young. Maternity caves have very specific temperature and humidity regimes. At other times of the year, populations disperse within about 300 km range of maternity caves. Cold caves are used for hibernation in southern Australia. Breeding or roosting colonies can number from 100 to 150,000 individuals. They hunt in forested areas, catching moths and other flying insects above the tree tops.

The Eastern Freetail-bat has dark brown to reddish brown fur on the back and is slightly paler below. Like other freetail-bats it has a long (3 - 4 cm) bare tail protruding from the tail membrane. Freetail-bats are also known as mastiff-bats, having hairless faces with wrinkled lips and triangular ears. They weigh up to 10 grams. The Eastern Freetail-bat is found along the east coast from south Queensland to southern NSW. This species occurs in dry sclerophyll forest, woodland, swamp forests and mangrove forests east of the Great Dividing Range. It roosts mainly in tree hollows but will also roost under bark or in man-made structures. It is usually solitary but also recorded roosting communally, and is probably insectivorous.

Little Bentwing-bats are small dark chocolate brown insectivorous bats with a body length of about 45 mm. The tip of the wing is formed by a particularly long joint of the third finger, folded back and bent under the wing while the bat is at rest. The fur is long and thick, especially over the crown and around the neck, and is slightly lighter in colour on the belly. They have distinctly short muzzles, and short, rounded roughly triangular shaped ears. This species is distinguished from the Common Bentwing-bat by its smaller size. It is known from the east coast and ranges of Australia from Cape York in Queensland to Wollongong in NSW. Its habitat is moist eucalypt forest, rainforest, vine thicket, wet and dry sclerophyll forest, Melaleuca swamps, dense coastal forests and banksia scrub. Generally it is found in well-timbered areas. Little Bentwing-bats roost in caves, tunnels, tree hollows, abandoned mines, stormwater drains, culverts, bridges and sometimes buildings during the day, and at night forage for small insects beneath the canopy of densely vegetated habitats. They often share roosting sites with the Common Bentwing-bat and, in winter, the two species may form mixed clusters. In NSW the largest known maternity colony is in close association with a large maternity colony of Eastern Bentwing-bats (*Miniopterus schreibersii*) and appears to depend on the large colony to provide the high temperatures needed to rear its young. Maternity colonies form in spring and birthing occurs in early summer. Males and juveniles disperse in summer. Only five nursery sites /maternity colonies are known in Australia.

The Eastern False Pipistrelle is relatively large with a head-body length of about 65 mm. It weighs up to 28 grams. It is dark to reddish-brown above and paler grey on its underside. It has long slender ears set well back on the head and some sparse hair on the nose. The Eastern False Pipistrelle is found on the south-east coast and ranges of Australia, from southern Queensland to Victoria and Tasmania. It prefers moist habitats, with trees taller than 20 m. It generally roosts in eucalypt hollows, but has also been found under loose bark on trees or in buildings. This species hunts beetles, moths, weevils and other flying insects above or just below the tree canopy and hibernates in winter. Females are pregnant in late spring to early summer.

Greater Broad-nosed Bat are large powerful bats, up to 95 mm long, with a broad head and a short square muzzle. They are dark reddish-brown to mid-brown above and slightly paler below. They are distinguished from other broad-nosed bats by its greater size. The Greater Broad-nosed Bat is found mainly in the gullies and river systems that drain the Great Dividing Range, from north-eastern Victoria to the Atherton Tableland, although their distribution extends to the coast over much of its range. In NSW the species is widespread on the New England Tablelands, however does not occur at altitudes above 500 m. The 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. Greater Broad-nosed Bats forage after sunset, flying slowly and directly along creek and river corridors at an altitude of 3 - 6 m. Open woodland habitat and dry open forest suits the direct flight of this species as it searches for beetles and other large, slow-flying insects; this species has been known to eat other bat species. Little is known of its reproductive cycle, however a single young is born in January; prior to birth, females congregate at maternity sites located in suitable trees, where they appear to exclude males during the birth and raising of the single young.

Two Anabat devices were placed each for five nights across the subject site, including derelict buildings, open standing water in the form of disused swimming pools (one vegetated with native floating Duckweeds), open grassed areas adjacent to or amongst planted and remnant native forest. Passes were confirmed for these five threatened species, and seven other non-threatened microchiropteran bat species.

Powerful Owls *Ninox strenua* are the largest predator of nocturnal forest-dwelling animals in Australian forests. They hunt in open forests of woodlands for arboreal prey mainly captured from canopy branches. In NSW, prey species include the Greater Glider, Common Ringtail Possum, Sugar Glider, Grey-headed Flying-Fox and will prey upon roosting diurnal birds, including the Pied Currawong, Australian Magpie and Rainbow Lorikeet. Powerful Owls inhabit open sclerophyll forests and woodlands dominated by Eucalypts, and frequently occurs in sheltered gullies, containing old-growth trees, a dense understorey and often near permanent streams. They require large tracts of forest or woodland habitat and will defend a large home range of 400-1450 ha. The species may also occur in fragmented landscapes on occasion, including open areas adjoining forest (e.g. farmland), parkland or suburban bushland. Powerful Owls have also been recorded utilising disturbed habitats such as exotic pine plantations and large trees in parks and gardens.

A Powerful Owl was observed on subject site on the 21st November, 2013 and 17th April 2015. The first Owl was heard calling prior to be observed, therefore it is likely that the bird flew onto the subject site in response to the call playback survey technique. The second sighting involved seeing the owl after call playback, so may too have flown into the site in response to the call playback. The subject site contains suitable roosting and foraging habitat in the form of large canopy trees and a creekline. Indirect evidence of suitable prey (scats and scratchings) as well as direct observations of small mammals suggests that the subject site contains plentiful resources for Powerful Owls. Powerful Owls are known to nest and produce fledglings in Cumberland State Forest.

Pteropus poliocephalus Grey-Headed Flying-Fox is listed as a Vulnerable species under Part 1 of Schedule 2 of the *Threatened Species Conservation Act 1995* (TSC Act) and as Vulnerable at a National level under the EPBC Act. Grey-headed Flying-foxes are distributed within 200km from the east Australian coastline, from Bundaberg in Queensland in the north to Melbourne in Victoria in the south. Locations are generally restricted to the eastern slopes of the Great Dividing Range within subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps habitats. In urban areas Grey-headed Flying-foxes regularly utilise cultivated fruit crops and metropolitan gardens. Grey-headed Flying-foxes form ‘bat camps’ along gullies in close proximity to creeks and rivers to rear their young and daily roosting. Camps may number up to tens of thousand

and are dependent on a reliable source within 20km; however, foraging distances of 50km recorded by individuals in one night. Roosting camps are located within the Botanic Gardens at Farm Cove, Gordon, and Cabramatta. There is a maternity camp located in Campbelltown. Diet typically comprises a wide variety of flowering and fruiting plants (Tidemann 1995, Churchill 1998), in particular Eucalyptus, Melaleuca and Banksia, and fruits of rainforest trees and vines. Non-indigenous and exotic tree species introduced to the urban landscape provide additional foraging habitat for this species within the locality; where previously existed a period of reduced availability of native food resource during the winter months, non-native species now supply food resources throughout the year (Parry-Jones & Augee 2001, Williams et al 2006).

Grey-headed Flying-foxes were observed foraging within canopy trees on the Subject Site on the 20th November, 2013 and the 15th, 16th and 17th of April 2015.

5.3 Potential Habitat for Threatened Species

A Bionet Atlas Search identified 22 flora species, 31 fauna species and one threatened fauna population that were threatened in NSW and previously recorded in the locality. It should be noted that Koalas were not on this list despite known sightings of the species in the locality within the past 10 years (R. Kavanagh, pers. comm. 23/1/14)

5.3.1 Flora

Table 1 summarises the habitat potential of the subject site for the threatened flora species previously recorded within 5 km of the subject site on the OEH Wildlife Atlas and listed on the EPBC Act Protected Matters Report generated for the locality.

Table 1 Habitat potential for threatened flora species previously recorded within the locality (5km of the subject site) on the OEH Wildlife Atlas and listed under the EPBC Act.

Scientific Name	Species Habitat Preference	Likelihood of Species to Occur on Subject Site
Acacia bynoeana	Occurs in heath or dry sclerophyll forest on sandy soils. Prefers open, sometimes slightly disturbed sites such as trail margins, edges of roadside spoil mounds and in recently burnt patches.	Nil - Low. Subject site does not support preferred habitat.
Acacia gordonii	Restricted to northwest of Sydney. Disjunct distribution - lower Blue Mountains and Maroota/Glenorie. Occurs within the Hawkesbury, Blue Mountains, Baulkham Hills LGAs. Occurs in dry sclerophyll forest and heathlands amongst or within rock platforms on sandstone outcrops	Nil- Low. Subject site does not support preferred habitat or vegetation associations.
Acacia pubescens	The Downy Wattle is a spreading shrub, 1 - 4 m high with brilliant yellow flowers from August to October. In NSW, the species is known from the Bankstown-Fairfield-Rookwood area and Pitt Town area, with outliers occurring at Barden Ridge, Oakdale and Mountain Lagoon. It is found in association with alluviums, shales and at the intergrade between shales and sandstones, in open woodland and forest.	Nil- Low. Subject site does not support preferred habitat or vegetation associations.
Darwinia biflora	An erect to spreading shrub to 80cm high. Flowers are green, surrounded by two red bracteoles, and are mostly in pairs. Occurs on the edges of weathered shale-capped ridges, where these intergrade with Hawkesbury Sandstone. Associated overstorey species include *Eucalyptus haemastoma, Corymbia gummifera* and/or *E. squamosa*. The vegetation structure is usually woodland, open forest or scrub-heath.	Nil -Low. Subject site does not support typical soil types or not the preferred vegetation associations.

Scientific Name	Species Habitat Preference	Likelihood of Species to Occur on Subject Site
Epacris purpurascens var. purpurascens	An erect shrub, 50 - 180 cm high; older stems with prominent short, broad leaf scars. Leaves are spreading and recurved above, ovate to heart-shaped, 7 - 21 mm long, 4.4 - 9 mm wide, with sharply pointed tips. Flowers are showy, 7 - 10 mm diam., covering much of the branchlets, white or sometimes pinkish. Fruit approximately 2 mm long. Found in a range of habitat types, most of which have a strong shale soil influence	Low - Medium. Subject site supports typical soil types and preferred vegetation types. The species may be present in soil stored seed.
Eucalyptus camfieldii	Mostly a mallee to 4 m tall though can grow to a straggly tree to 9 m high. Bark is rough, fibrous and stringy, red or dark grey-brown and flowers creamy-white. Distribution restricted to a narrow band with the most northerly records in the Raymond Terrace Area south to Waterfall. Localised and scattered distribution includes sites at Norah Head (Tuggerah Lakes), Peats Ridge, Mt Colah, Elvina Bay Trail (West Head), Terrey Hills, Killara, North Head, Menai, Wattamolla and a few other sites in Royal National Park. Occurs in coastal areas in shallow sandy soils overlying Hawkesbury sandstone. Present in coastal heath mostly on exposed sandy ridges in small scattered stands near the boundary of tall coastal heaths and low open woodland of the slightly more fertile inland areas.	Nil - Low. Subject site does not support preferred vegetation type, topography or soil type.
Eucalyptus sp. Cattai	Occurs between Colo Heights and Castle Hill, NW Sydney, historical records from central Sydney. Occurs in scrub, heath and low woodland on sandy soils, sites being generally flat and on ridge tops. Associated soils are laterised clays overlying sandstone.	Low. Subject site does not support preferred habitat or vegetation associations
Eucalyptus nicholii	The Narrow-Leaved Black Peppermint is a medium-sized tree 15 - 20 m tall with rough, thick, grey-brown bark which extends to the larger branches. It is widely planted as an urban street tree and in gardens but is quite rare in the wild. It is confined to the New England Tablelands of NSW. Grows in dry grassy woodland, on shallow and infertile soils, mainly on granite.	Nil. Subject site exists outside the species natural range. Record likely to be from planted street tree.
Eucalyptus scoparia	A small tree to 15 m tall with smooth, powdery white to pale grey bark. The adult leaves are shiny green, 10 - 15 cm long and 6 - 10 mm wide. The flower buds are oval-shaped with a conical cap, and the small gumnuts are oval-shaped, 4-5 mm long and wide. Occurs in Queensland and reaches its southern limit in NSW. In NSW it is known from only three locations near Tenterfield, including Bald Rock National Park. Found in open eucalypt forest and woodland on well-drained granite hilltops, slopes and rocky outcrops.	Nil. Subject site exists outside the species natural range. Record likely to be from planted street tree.
Galium australe	Tangled Bedstraw is a straggling and inter-twining herb with weak, hairy stems to 60 cm long. Tangled Bedstraw is widespread in Victoria and is also found in South Australia and Tasmania. Once regarded as presumed extinct in NSW, this species is now known from a few near-coastal sites south of Nowra. In NSW Tangled Bedstraw has been found in moist gullies of tall forest, *Eucalyptus tereticornis* forest, coastal Banksia shrubland, and *Allocasuarina nana* heathland. In other States the species is found in a range of near-coastal habitats, including sand dunes, sand spits, shrubland and woodland.	Medium. Subject site supports preferred habitat and marginal vegetation associations

Scientific Name	Species Habitat Preference	Likelihood of Species to Occur on Subject Site
Genoplesium baueri	A terrestrial orchid 6-15 cm high, fleshy, brittle, yellowish-green or reddish. Inflorescence sparse, 1-3 cm long, 1-6-flowered. The species has been recorded from locations between Ulladulla and Port Stephens. About half the records were made before 1960 with most of the older records being from Sydney suburbs including Asquith, Cowan, Gladesville, Longueville and Wahroonga. No collections have been made from those sites in recent years. Currently the species is known from just over 200 plants across 13 sites. Grows in dry sclerophyll forest and moss gardens over sandstone.	Low. Subject site does not support preferred habitat or vegetation associations
Grammitis stenophylla	Occurs in eastern Queensland and eastern NSW. In NSW it has been found on the south, central and north coasts and as far west as Mount Kaputar National Park near Narrabri. The species occurs in moist places, usually near streams, on rocks or in trees, in rainforest and moist eucalypt forest.	Nil-Low Subject site supports marginal preferred vegetation associations, however the vegetation structure is not closed enough to provide the moisture the species requires.
Hibbertia superans	A low spreading shrub to 300 cm high, with few to many weak, twisted stems and branches, covered with long shaggy hairs when young, becoming more densely hairy with longer hairs wearing off. Seeds are ant dispersed and the soil seedbank is persistent. Highly sensitive to fire and other disturbance regimes. The recommended minimum fire interval is unknown, however the recommended maximum fire interval is 25 years. An obligate seeder, it is usually killed by fire, sometimes resprouting from the base. Flowers first appear from resprouting material about 2 years after fire. Flowering time is July to December. The species occurs on sandstone ridgetops often near the shale/sandstone boundary. Occurs in both open woodland and heathland, and appears to prefer open disturbed areas, such as tracksides.	Low. Subject site does not support preferred soil type and vegetation associations. Species may be present within seedbank.
Leucopogon fletcheri subsp. fletcheri	An erect densely branched shrub, seldom more that 1 m high. The white flowers are pendent-like, tubular, 4 - 5 mm long. Distribution of the species is restricted to north-western Sydney between St Albans in the north and Annangrove in the south, within the local government areas of Hawkesbury, the Hills Shire and Blue Mountains. Occurs in dry eucalypt woodland or in shrubland on clayey lateritic soils, generally on flat to gently sloping terrain along ridges and spurs.	Low. Subject site does not support preferred habitat or vegetation associations
Melaleuca deanei	Deane's Paperbark is a shrub to 3 m high with fibrous, flaky bark. New stems are furry and white, though the mature stems are hairless. The smooth leaves are not paired. They are narrow, to 25 mm long and 6 mm wide, with pointed tips. The many white flowers form spikes to 6 cm long, on a furry stem. The five petals are less than 5 mm long; each is paired with a bundle of 17 - 28 stamens. The woody fruits are barrel-shaped, to 7 mm in diameter. *Melaleuca deanei* mostly occupies broad flat ridgetops, dry ridges and slopes. *Melaleuca deanei* is strongly associated with sandy loam soils that are low in nutrients, sometimes with ironstone present (Benson & McDougall 1998), or on deep and well developed lateritic soils. *M. deanei* occurs in a wide range of vegetation communities, but is most often found in Coastal Sandstone Ridgetop Woodland (Tindall et al. 2004).	Low. Subject site does not support preferred habitat or vegetation associations.
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. It is a spreading shrub with small leaves of variable shape. They are from 6 - 12 mm long,	Nil-Low. Subject site does not support preferred habitat or vegetation associations

Scientific Name	Species Habitat Preference	Likelihood of Species to Occur on Subject Site
	from oblong to narrow in shape and crowded along the stems; they are curled under at the edges. Groups of flowers grow into a leafy shoot. The tubular flowers are yellow or orange and about 1 cm long and also hairy. There are two subspecies - both are considered to be endangered. 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. It is probably killed by fire (as other Persoonia species are) but will regenerate from seed.	
Persoonia mollis subsp. maxima	Highly restricted, known from the Hornsby Heights-Mt Colah area north of Sydney in the Sydney Basin Bioregion. Occurs in three populations (described on a catchment basis) located over an approximate north-south range of 5.75 km and east-west distance of 7.5 km. Additional locations may exist outside the current distribution. Occurs in sheltered aspects of deep gullies or on the steep upper hillsides of narrow gullies on Hawkesbury Sandstone. These habitats support relatively moist, tall forest vegetation communities, often with warm temperate rainforest influences. Associated species: Smooth Barked Apple *Angophora costata*, Sydney Peppermint *Eucalyptus piperita*, Red Bloodwood *Corymbia gummifera*, Turpentine *Syncarpia glomulifera*, Coachwood *Ceratopetalum apetalum* and Black Wattle *Callicoma serratifolia*.	Low. Subject site does not support preferred habitat or vegetation associations
Persoonia nutans	Restricted to the Cumberland Plain in western Sydney, between Richmond in the north and Macquarie Fields in the south. The species has a disjunct distribution, with the majority of populations (and 99% of individuals) occurring in the north of the species range in the Agnes Banks, Londonderry, Castlereagh, Berkshire Park and Windsor Downs areas. Core distribution occurs within the Penrith, and to a lesser extent Hawkesbury, local government areas, with isolated and relatively small populations also occurring in the Liverpool, Campbelltown, Bankstown and Blacktown local government areas. 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.	Low. Subject site does not support preferred habitat or vegetation associations
Pimelea curviflora var. curviflora	A much-branched shrub 20 to 120cm high with hairy stems and flowers are red to yellow. Confined to the coastal area of Sydney between northern Sydney in the south and Maroota in the north-west. Occurs on shale/lateritic soils over sandstone and shale/sandstone transition soils on ridge tops and upper slopes in woodlands amongst dense grasses and sedges. It may not always be visible at a site as it appears to survive for some time without any foliage after fire or grazing.	Low. Subject site does support typical soil types and preferred vegetation types.
Pterostylis nigricans	The Dark Greenhood is a small autumn-flowering ground orchid that grows from a tuber. The Dark Greenhood occurs in north-east NSW north from Evans Head, and in Queensland. The species occurs on Coastal heathland with Heath Banksia (*Banksia ericifolia*), and lower-growing heath with lichen-encrusted and relatively undisturbed soil surfaces, on sandy soils.	Nil-Low. Subject site exists outside the species natural range. Record likely to a misidentification.

Scientific Name	Species Habitat Preference	Likelihood of Species to Occur on Subject Site
Syzygium paniculatum	Magenta Lilly Pilly is a small to medium sized rainforest tree that grows to 8 m tall. The Magenta Lilly Pilly is found only in NSW, in a narrow, linear coastal strip from Bulahdelah to Conjola State Forest. On the south coast the Magenta Lilly Pilly occurs on grey soils over sandstone, restricted mainly to remnant stands of littoral (coastal) rainforest. On the central coast Magenta Lilly Pilly occurs on gravels, sands, silts and clays in riverside gallery rainforests and remnant littoral rainforest communities.	Low. Subject site does not contain preferred vegetation types or microclimatic conditions. Record likely to be from planted street tree.
Tetratheca glandulosa	A small spreading shrub which grows 20 - 50cm in height. Stems often become entwined among other small shrubs, sedges and grasses. Restricted to the Baulkham Hills, Gosford, Hawkesbury, Hornsby, Ku-ring-gai, Pittwater, Ryde, Warringah and Wyong LGA's the eastern limit is at Ingleside and the western limit is at East Kurrajong. Occurs in shale-sandstone transition habitat where shale-cappings occur over sandstone, and the plant occupies ridgetops, upper-slopes and to a lesser extent mid-slope sandstone benches. Soils are generally shallow, consisting of a yellow, clayey/sandy loam. Stony lateritic fragments are also common in the soil profile on many of these ridgetops. Vegetation structure varies from heaths and scrub to woodlands/open woodlands, and open forest. Vegetation communities correspond broadly to Sydney Sandstone Ridgetop Woodland.	Nil - Low. Subject site does not support the preferred vegetation or soil type.

Table 2 summarises the habitat potential of the subject site for the threatened fauna species previously recorded within 5 km of the subject site on the OEH Wildlife Atlas and listed on the EPBC Act Protected Matters Report generated for the locality. Additionally, there are reports of Koalas in the locality and even the study area in recent years, so this species has been considered below, along with Grey headed Flying Fox, a regular known visitor to the locality, despite there being no listings on the Atlas for these two species.

Koalas are also known to inhabit The Hills Shire Council; and there have been observations within the last year from the locality ((R. Kavanagh, pers. comm. 23/1/14). OEH lists various Koala habitat and feed trees for the Central Coast region of NSW http://www.environment.nsw.gov.au/animals/koalahabitat.htm#central). 'Koala feed tree species, including *Eucalyptus tereticornis*, *Eucalyptus resinifera* and *Eucalyptus punctata* occurred over the subject site. Under Schedule 2 of State Environmental Planning Policy No 44--Koala Habitat Protection SEPP 44 (Feed tree species), listed feed tree species are restricted to 10 species, including *Eucalyptus tereticornis* and *Eucalyptus punctata*. Other species may well be present that are listed as Koala feed trees under the SEPP. Under the *State Environmental Planning Policy 44* (SEPP 44) 'potential koala habitat' is defined as an area which has koala feed tree species in an abundance greater than 15%, but as no tree assessment has occurred this cannot be determined and whether the subject site would, therefore, be considered 'potential koala habitat' under SEPP 44 cannot be determined. However, The Hills Shire Council is not listed as a local government area to which SEPP 44 applies, therefore the planning instrument does not apply to the subject site.

5.3.2 Fauna

Table 2 Habitat potential for threatened fauna species previously recorded within the locality (5km of the subject site) on the OEH Wildlife Atlas and listed under the EPBC Act.

Scientific Name	Species Habitat Preference	Likelihood of Species to Occur on Subject site
Callocephalon fimbriatum	In summer, Gang-gang cockatoos are generally found in tall mountain forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. In winter, may occur at lower altitudes in drier more open eucalypt forests and woodlands, and often found in urban areas. Favours old growth attributes for nesting and roosting.	High. The subject site contains very limited foraging habitat. The species may fly over the site periodically.
Calyptorhynchus lathami	The Glossy Black-cockatoo is a dusky brown to black cockatoo with a massive, bulbous bill and a broad, red band through the tail. Inhabits open forest and woodlands of the coast and the Great Dividing Range up to 1000m in which stands of she-oak species, particularly Black She-oak (*Allocasuarina littoralis*), Forest She-oak (*A. torulosa*) or Drooping She-oak (*A. verticillata*) occur. Feeds almost exclusively on the seeds of several species of she-oak (Casuarina and Allocasuarina species), shredding the cones with the massive bill. Dependent on large hollow-bearing eucalypts for nest sites. One or two eggs are laid between March and August.	Low. The subject site contains a patchwork of preferred habitat with limited foraging opportunities due to few Casuarinaceae. Species may fly over the site periodically.
Daphoenositta chrysoptera	Varied Sittellas are a small (10 cm) songbird with a sharp, slightly upturned bill, short tail, barred undertail, and yellow eyes and feet. In flight the orange wing-bar and white rump are prominent. Varied Sittellas are sedentary and inhabit most of mainland Australia except the treeless deserts and open grasslands. Distribution in NSW is nearly continuous from the coast to the far west. Varied Sittella's population size in NSW is uncertain but it is believed to have undergone a moderate reduction over the past several decades. Inhabits eucalypt forests and woodlands, especially those containing rough-barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland.	Low - medium. Subject site contains potential foraging and habitat.

Scientific Name	Species Habitat Preference	Likelihood of Species to Occur on Subject site
Dasyurus maculatus	The Spotted-tailed Quoll is about the size of a domestic cat with rust to dark-brown fur above, with irregular white spots on the back and tail, and a pale belly. Recorded across a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline. Mostly nocturnal, it spends most of the time on the ground, but may also climb to raid possum and glider dens and prey on roosting birds. Prey includes gliders, possums, small wallabies, rats, birds, bandicoots, rabbits and insects and also eats carrion and takes domestic fowl. Individual animals use hollow-bearing trees, fallen logs, small caves, rock crevices, boulder fields and rocky-cliff faces as den sites. Females occupy home ranges up to about 750 hectares and males up to 3500 hectares and usually traverse their ranges along densely vegetated creeklines.	Low. Subject site supports poor quality foraging habitat and is disjunct from larger areas of quality habitat.
Falco hypoleucos	Grey Falcons are sparsely distributed in NSW, chiefly throughout the Murray-Darling Basin, with the occasional vagrant east of the Great Dividing Range. The breeding range has contracted since the 1950s with most breeding now confined to arid parts of the range. There are possibly less than 5000 individuals left. Population trends are unclear, though it is believed to be extinct in areas with more than 500mm rainfall in NSW. Usually restricted to shrubland, grassland and wooded watercourses of arid and semi-arid regions, although it is occasionally found in open woodlands near the coast.	Nil. The subject site is not located within the species NSW distribution west of the Great Dividing Range. Moreover, the subject site does not support the preferred habitat type.
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.	Medium. The subject site supports potential foraging habitat and nesting habitat.
Glossopsitta pusilla	The Little Lorikeet is a small (16-19 cm; 40 g) bright green parrot, with a red face surrounding its black bill and extending to the eye. The undertail is olive-yellow with a partly concealed red base, and the underwing coverts are bright green. The mantle is imbued with light brown. The call in flight is diagnostically different from other lorikeets, being a shrill and rolling screech: ‘zit-zit’ or ‘zzet’. The Little Lorikeet is distributed widely across the coastal and Great Divide regions of eastern Australia from Cape York to South Australia. NSW provides a large portion of the species' core habitat, with lorikeets found westward as far as Dubbo and Albury. Forages primarily in the canopy of open Eucalyptus forest and woodland, yet also finds food in Angophoras, Melaleucas and other tree species. Riparian habitats are particularly used, due to higher soil fertility and hence greater productivity. Feeds mostly on nectar and pollen, occasionally on native fruits such as mistletoe, and only rarely in orchards. Roosts in treetops, often distant from feeding areas. Nests in proximity to feeding areas if possible, most typically selecting hollows in the limb or trunk of smooth-barked Eucalypts. Entrance is small (3 cm) and usually high above the ground (2–15 m). Riparian trees often chosen, including species like Allocasuarina.	Low - medium Subject site offers some foraging habitat.

Scientific Name	Species Habitat Preference	Likelihood of Species to Occur on Subject site
Hieraaetus morphnoides	Little Eagle are found throughout the Australian mainland except the most densely forested parts of the Dividing Range escarpment. They occur as a single population throughout NSW. The species occupies open eucalypt forest, woodland or open woodland. Sheoak or *Acacia* woodlands and riparian woodlands of interior NSW are also used. Little Eagles nest in tall living trees within a remnant patch, where pairs build a large stick nest in winter.	Low – Medium. The subject site contains limited foraging habitat as part of a wider resource. Nesting habitat may be located within the locality.
Ixobrychus flaveicollis	The Black Bittern is a heron, dark grey to black in colour, with buff streaks on the throat and a characteristic yellow streak on the sides of the head and down the neck. Inhabits both terrestrial and estuarine wetlands, generally in areas of permanent water and dense vegetation. Where permanent water is present, the species may occur in flooded grassland, forest, woodland, rainforest and mangroves. Feeds on frogs, reptiles, fish and invertebrates, including snails, dragonflies, shrimps and crayfish, with most feeding done at dusk and at night. During the day, roosts in trees or on the ground amongst dense reeds.	Nil. The subject site does not support the preferred habitat.
Lathamus discolor	Migrating 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. Breeding in Tasmania between September and February sometimes in small colonies the nest is an unlined tree hollow with three to five eggs laid. The species feeds mainly on nectar but also pollen and insects (NPWS 2003).	Low - Medium. The subject site supports marginal preferred habitat. Suitable habitat may be found within the locality.
Litoria aurea	The Green and Golden Bell Frog is a relatively large, stout frog, ranging in size from approximately 45 mm to approximately 100 mm snout to vent length. The colour varies. Usually a vivid pea-green, splotched with an almost metallic brassy brown or gold. Inhabits marshes, dams and stream-sides, particularly those containing bullrushes (*Typha spp*.) or spikerushes (*Eleocharis spp*.). Optimum habitat includes water-bodies that are unshaded, free of predatory fish such as Plague Minnow (*Gambusia holbrooki*), have a grassy area nearby and diurnal sheltering sites available. Some sites, particularly in the Greater Sydney region occur in highly disturbed areas. The species is active by day and usually breeds in summer when conditions are warm and wet.	Nil - Low. The subject site does not support the preferred habitat, although there is marginal habitat in the study area

Scientific Name	Species Habitat Preference	Likelihood of Species to Occur on Subject site
Melithreptus gularis gularis	The Black-chinned Honeyeater is the largest of its genus, reaching 17 cm in length. The Black-chinned Honeyeater has two subspecies, with only the nominate (gularis) occurring in NSW. The NSW subspecies is widespread, with records from the tablelands and western slopes of the Great Dividing Range to the north-west and central-west plains and the Riverina. It is rarely recorded east of the Great Dividing Range, although regularly observed from the Richmond and Clarence River areas. It has also been recorded at a few scattered sites in the Hunter, Central Coast and Illawarra regions, though it is very rare in the latter. Occupies mostly upper levels of drier open forests or woodlands dominated by box and ironbark eucalypts, especially Mugga Ironbark (*Eucalyptus sideroxylon*), White Box (*E. albens*), Inland Grey Box (*E. microcarpa*), Yellow Box (*E. melliodora*) and Forest Red Gum (*E. tereticornis*). Also inhabits open forests of smooth-barked gums, stringybarks, ironbarks and tea-trees. The nest is placed high in the crown of a tree, in the uppermost lateral branches, hidden by foliage. It is a compact, suspended, cup-shaped nest.	Nil - Low. Subject site supports little preferred habitat for the species.
Meridolum corneovirens	Cumberland Plain Land Snail lives in small areas on the Cumberland Plain west of Sydney, from Richmond and Windsor south to Picton and from Liverpool west to the Hawkesbury and Nepean Rivers at the base of the Blue Mountains. They are known from over 100 different locations, but not all are currently occupied, and they are usually isolated from each other as a result of land use patterns. Primarily inhabits Cumberland Plain Woodland (a critically endangered ecological community). This community is a grassy, open woodland with occasional dense patches of shrubs. It is also known from Shale Gravel Transition Forests, Castlereagh Swamp Woodlands and the margins of River-flat Eucalypt Forest, which are also listed communities. Lives under litter of bark, leaves and logs, or shelters in loose soil around grass clumps. Occasionally shelters under rubbish.	Nil – Low. There is the potential for the species to occur on site. The subject site is located on the edge of the Cumberland Plain, thus another species of Meridolum could occur onsite rather than *M. corneovirens*.
Miniopterus australis	Little Bentwing-bats are small dark chocolate brown insectivorous bats with a body length of about 45 mm. They occur from East coast and ranges of Australia from Cape York in Queensland to Wollongong in NSW. Little Bentwing-bats prefer moist eucalypt forest, rainforest, vine thicket, wet and dry sclerophyll forest, *Melaleuca* swamps, dense coastal forests and banksia scrub. Generally found in well-timbered areas. Little Bentwing-bats roost in caves, tunnels, tree hollows, abandoned mines, stormwater drains, culverts, bridges and sometimes buildings during the day, and at night forage for small insects beneath the canopy of densely vegetated habitats.	Low- Medium. The subject site supports a small amount of foraging habitat, however, roosting and breeding habitat is generally poor. Suitable habitat may be found within the locality.

Scientific Name	Species Habitat Preference	Likelihood of Species to Occur on Subject site
Miniopterus schreibersii oceanensis	The Eastern Bent-wing Bat has chocolate to reddish-brown fur on its back and slightly lighter coloured fur on its belly. The species occur along the east and north-west coasts of Australia. Caves are the primary roosting habitat but also use man-made structures. Form discrete populations centered on a maternity cave that is used annually in spring and summer for the birth and rearing of young. Maternity caves have very specific temperature and humidity regimes. At other times of the year, populations disperse within about 300 km range of maternity caves. Forage in forested areas, catching moths and other flying insects above the tree tops.	Medium. The subject site supports potential foraging habitat. Roosting and maternity habitat potential is not present onsite.
Mormopterus norfolkensis	The Eastern Freetail-bat is found along the east coast from south Queensland to southern NSW. It occurs in dry sclerophyll forest, woodland, swamp forests and mangrove forests east of the Great Dividing Range. This species roosts mainly in tree hollows but will also roost under bark or in man-made structures. Usually solitary but also recorded roosting communally, probably insectivorous	Medium. The subject site supports potential foraging habitat. Roosting and maternity habitat potential is not present onsite.
Myotis macropus	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. Forage over streams and pools catching insects and small fish by raking their feet across the water surface. In NSW females have one young each year usually in November or December.	Low - Medium. The subject site supports some foraging or roosting habitat.
Ninox connivens	The Barking Owl is a typical hawk-owl, with staring, yellow eyes and no facial-disc. It inhabits eucalypt woodland, open forest, swamp woodlands and, especially in inland areas, timber along watercourses. Dense vegetation is used occasionally for roosting. During the day they roost 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. Feeds on a variety of prey, with invertebrates predominant for most of the year, and birds and mammals such as smaller gliders, possums, rodents and rabbits becoming important during breeding. Three eggs are laid in nests in hollows of large, old eucalypts.	Medium. Subject site supports foraging habitat. Limited roosting or nesting habitat occur onsite but occurs within the study area and locality.

Scientific Name	Species Habitat Preference	Likelihood of Species to Occur on Subject site
Ninox strenua	The Powerful Owl is the largest owl in Australasia and the species is endemic to eastern and south-eastern Australia, mainly on the coastal side of the Great Dividing Range. In NSW, it is widely distributed throughout the eastern forests from the coast inland to tablelands. Now uncommon throughout its range where it occurs at low densities. Inhabits a range of vegetation types, from woodland and open sclerophyll forest to tall open wet forest and rainforest and requires large tracts of forest or woodland habitat but can occur in fragmented landscapes as well. The species breeds and hunts in open or closed sclerophyll forest or woodlands and occasionally in open habitats. It roosts by day in dense vegetation. Preys on medium-sized arboreal mammals particularly the Greater Glider, Common Ringtail Possum, Sugar Glider and flying foxes. Have high fidelity to a small number of hollow-bearing nest trees.	Medium - High. Subject site supports foraging habitat and roosting habitat. Known nesting site is located close to the subject site in Cumberland State Forest.
Petroica boodang	Scarlet Robin are found from south east Queensland to south east South Australia and also in Tasmania and south west Western Australia. In NSW, it occurs from the coast to the inland slopes. After breeding, some Scarlet Robins disperse to the lower valleys and plains of the tablelands and slopes. Some birds may appear as far west as the eastern edges of the inland plains in autumn and winter. Scarlet Robins live in dry eucalypt forests and woodlands. The understorey is usually open and grassy with few scattered shrubs. This species lives in both mature and regrowth vegetation. It occasionally occurs in mallee or wet forest communities, or in wetlands and tea-tree swamps. Scarlet Robin habitat usually contains abundant logs and fallen timber: these are important components of its habitat.	Low. The subject site contains a small amount of low quality preferred habitat. Fallen logs and timber are sparse within the subject site.
Petroica phoenicea	Flame Robins are found in south-eastern Australia (Queensland border to Tasmania, western Victoria and south-east South Australia). In NSW it breeds in upland moist eucalypt forests and woodlands, often on ridges and slopes, in areas of open understorey. It migrates in winter to more open lowland habitats such as grassland with scattered trees and open woodland on the inland slopes and plains (Higgins and Peter 2002). Flame Robins forage from low perches, feeding on invertebrates taken from the ground, tree trunks, logs and other coarse woody debris. Robins build an open cup nest of plant fibres and cobweb, which is often near the ground in a sheltered niche, ledge or shallow cavity in a tree, stump or bank. Generation length has been estimated as 5 years (Garnett and Crowley 2000)	Low. The subject site contains a small amount of low quality preferred habitat. Better quality habitat may occur in the locality.
Petroica rodinogaster	Pink Robins are found in Tasmania and the uplands of eastern Victoria and far south-eastern NSW, almost as far north as Bombala. On the mainland, the species disperses north and west and into more open habitats in winter, regularly as far north as the ACT area, and sometimes being found as far north as the central coast of NSW. The species inhabits rainforest and tall, open eucalypt forest, particularly in densely vegetated gullies. It catches prey by the perch-and-pounce method, foraging more on the ground than the more flycatcher-like Rose Robin. Insects and spiders are the main dietary items.	Low. The subject site occurson the edge of the species NSW distribution. The subject site supports marginal preferred habitat type.

Scientific Name	Species Habitat Preference	Likelihood of Species to Occur on Subject site
Phascolarctos cinereus	The Koala is an arboreal marsupial with fur ranging from grey to brown above, and is white below. It has large furry ears, a prominent black nose, pink inter-digitary folds and no tail. It spends most of its time in trees and has long, sharp claws, adapted for climbing. Adult males weigh 6 - 12 kg and adult females weigh 5 - 8 kg. During breeding, males advertise with loud snarling coughs and bellows. The Koala has a fragmented distribution throughout eastern Australia from north-east Queensland to the Eyre Peninsula in South Australia. In NSW it mainly occurs on the central and north coasts with some populations in the west of the Great Dividing Range. It was briefly historically abundant in the 1890s in the Bega District on the south coast of NSW, although not elsewhere, but it now occurs in sparse and possibly disjunct populations. Koalas are also known from several sites on the southern tablelands. Koalas inhabit eucalypt woodlands and forests. They feed on the foliage of more than 70 eucalypt species and 30 non-eucalypt species, but in any one area will select preferred browse species. Inactive for most of the day, Koalas feed and move mostly at night. They spend most of their time in trees, but will descend and traverse open ground to move between trees. Home range size varies with quality of habitat, ranging from less than two ha to several hundred hectares in size. Koalas are generally solitary, but have complex social hierarchies based on a dominant male with a territory overlapping several females and sub-ordinate males on the periphery.Females breed at two years of age and produce one young per year.	Med – The subject site supports suitable foraging habitat with abundant feed trees. Koalas have been previously identified in the study area in the recent past.
Polytelis swainsonii	The Superb Parrot is a distinctive large, bright grass-green parrot with long, narrow tail. Males have yellow foreheads, throats, and red crescent that separates throat from green breast and belly. Found throughout eastern inland NSW. On the SW Slopes core breeding area is roughly bounded by Cowra and Yass in the east, and Grenfell, Cootamundra and Coolac in the west. Mainly absent during winter, when migrate north to upper Namoi and Gwydir Rivers. Other main breeding sites are Riverina along Murray, Edward and Murrumbidgee Rivers, with birds present all year. Inhabit Box-Gum, Box-Cypress-pine and Boree Woodlands and River Red Gum Forest. In Riverina birds nest in hollows of large trees (dead or alive) mainly in tall riparian River Red Gum Forest or Woodland. On the SW Slopes nest trees can be in open Box-Gum Woodland or isolated paddock trees. Species known to be used are Blakely's Red Gum, Yellow Box, Apple Box and Red Box.	Low. Subject site supports very limited preferred habitat. The subject site occurs outside the typical distribution for the species.
Pseudophryne australis	The Red-crowned Toadlet is an unmistakable small frog, usually measuring less than 30 mm long with distinctive reddish-orange patches, one between the eyes and one along the rump. The species has a restricted distribution and it is confined to the Sydney Basin, from Pokolbin in the north, the Nowra area to the south, and west to Mt Victoria in the Blue Mountains. The short, grating and "squelchy" call can be heard all year round. Occurs in open forests, mostly on Hawkesbury and Narrabeen Sandstones inhabiting periodically wet drainage lines below sandstone ridges that often have shale lenses or cappings. Shelters under rocks and amongst masses of dense vegetation or thick piles of leaf litter. Disperses outside the breeding period, when they are found under rocks and logs on sandstone ridges and forage amongst leaf-litter.	Nil. The subject site does not support the preferred habitat.

Scientific Name	Species Habitat Preference	Likelihood of Species to Occur on Subject site
Pteropus poliocephalus	The Grey-headed Flying-fox is the largest Australian bat. Grey-headed Flying-foxes are found within 200 km of the eastern coast of Australia, from Bundaberg in Queensland to Melbourne in Victoria. Occur in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops. Roosting camps are generally located within 20 km of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy. Travel up to 50 km to forage and feed on the nectar and pollen of native trees, in particular Eucalyptus, Melaleuca and Banksia, and fruits of rainforest trees and vines.	High – the subject site offers good habitat for foraging and good roosting habitat occurs in the study area. The locality is visited by this species most of the year.
Ptilinopus superbus	Superb Fruit-doves occur principally from north-eastern in Queensland to north-eastern NSW. It is much less common further south, where it is largely confined to pockets of suitable habitat as far south as Moruya. There are records of vagrants as far south as eastern Victoria and Tasmania. The species inhabits rainforest and similar closed forests where it forages high in the canopy, eating the fruits of many tree species such as figs and palms. It may also forage in eucalypt or acacia woodland where there are fruit-bearing trees.	Nil – low. The subject site does not support the preferred habitat.
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bats are a wide-ranging species found across northern and eastern Australia. In the most southerly part of its range - most of Victoria, south-western NSW and adjacent South Australia - it is a rare visitor in late summer and autumn. There are scattered records of this species across the New England Tablelands and North West Slopes. The species roosts singly or in groups of up to six, in tree hollows and buildings; in treeless areas they are known to utilise mammal burrows. When foraging for insects, flies high and fast over the forest canopy, but lower in more open country. Forages in most habitats across its very wide range, with and without trees; appears to defend an aerial territory.	Medium. Suitable foraging habitat occurs onsite.
Scoteanax rueppellii	The Greater Broad-nosed Bat is found mainly in the gullies and river systems that drain the Great Dividing Range, from north-eastern Victoria to the Atherton Tableland. It extends to the coast over much of its range. In NSW it is widespread on the New England Tablelands, however does not occur at altitudes above 500 m. 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. Forages after sunset, flying slowly and directly along creek and river corridors at an altitude of 3 - 6 m.	Medium. Subject site offers moderate foraging. Roosting habitat is likely to be present within the locality,

Scientific Name	Species Habitat Preference	Likelihood of Species to Occur on Subject site
Stagonopleura guttata	Diamond Firetails are endemic to south-eastern Australia, extending from central Queensland to the Eyre Peninsula in South Australia. They are widely distributed in NSW, with a concentration of records from the Northern, Central and Southern Tablelands, the Northern, Central and South Western Slopes and the North West Plains and Riverina. Not commonly found in coastal districts, though there are records from near Sydney, the Hunter Valley and the Bega Valley. This species has a scattered distribution over the rest of NSW, though is very rare west of the Darling River. Diamond Firetails are found in grassy eucalypt woodlands, including Box-Gum Woodlands and Snow Gum *Eucalyptus pauciflora* Woodlands, however, they also occur in open forest, mallee, Natural Temperate Grassland, and in secondary grassland derived from other communities. They are often found in riparian areas (rivers and creeks), and sometimes in lightly wooded farmland. Diamond Firetails feed exclusively on the ground, on ripe and partly-ripe grass and herb seeds and green leaves, and on insects.	Nil. The subject site does not support the preferred habitat.
Tyto novahollandiae	Masked Owls are a medium-sized owl to 40 - 50 cm long, with dark eyes set in a prominent flat, heart-shaped facial disc that is encircled by a dark border. The feet are large and powerful, with fully feathered legs down to the toes. The distribution of Masked Owls extends from the coast where it is most abundant to the western plains. Overall records for this species fall within approximately 90% of NSW, excluding the most arid north-western corner. There is no seasonal variation in its distribution. Masked Owls live in dry eucalypt forests and woodlands from sea level to 1100 m. They are forest owls, but often hunt along the edges of forests, including roadsides. The typical diet consists of tree-dwelling and ground mammals, especially rats. Pairs have a large home-range of 500 to 1000 hectares. Roosts and breeds in moist eucalypt forested gullies, using large tree hollows or sometimes caves for nesting.	Medium. Subject site supports foraging habitat. No roosting or nesting habitat occur onsite but may occur within the locality.
Xanthomyza phrygia	The Regent Honeyeater is a striking and distinctive, medium-sized, black and yellow honeyeater with a sturdy, curved bill. The Regent Honeyeater is a threatened woodland bird whose conservation will benefit a large suite of other threatened and declining woodland fauna. The species inhabits dry open forest and woodland, particularly Box-Ironbark woodland, and riparian forests of River Sheoak. Regent Honeyeaters inhabit woodlands that support a significantly high abundance and species richness of bird species. These woodlands have significantly large numbers of mature trees, high canopy cover and abundance of mistletoes.	Low. The subject site supports a small amount of poor quality potential foraging habitat and no nesting habitat.

5.4 Areas of General Conservation Significance

5.4.1 Flora

General Flora Conservation Significance was assessed taking into account background information, vegetation community type, size, shape, connectivity, and locations of threatened flora species and communities. This involved incorporating results of:

- locations of threatened vegetation communities and flora species;
- identification of broad land use classes within the study area;
- survey and amendments to vegetation communities types and boundaries as required; and
- condition of vegetation communities based on vegetation structure, species richness and diversity, resilience, and current and previous impacts.

Conservation Significance Classes relevant to the subject site as per the hierarchy shown in Table 3 below are shown on Maps 6, 7 and 8 (Appendix B).

Table 3 Conservation Significance Classes - Flora

FEATURE	DETAILS	CONSERVATION SIGNIFICANCE CLASS				
		VERY HIGH	HIGH	MEDIUM	LOW	VERY LOW
EEC & Threatened Species	Located during field survey	X				
Potential threatened species habitat	Identified during field survey		X			
EEC habitat corridor	Areas of some EEC connectivity or recoverability			X		
Clear and disturbed	Negligible vegetation of any habitat value				X	X

Justifications for the assignment of Conservation Significance Classes are provided below:

- *Very High:* The BGHF across the subject site has been classified as having a very high conservation significance given its status as a Critically Endangered Ecological Community as per Table 3 above.

- *High:* This vegetation consists of potential habitat for the threatened plant species such as *Epacris purpurascens var. purpurascens*. This species is listed as Vulnerable under the NSW TSC Act. This species was not identified during the Preliminary Ecological Assessment, but may exist as cryptic individuals and/or soil stored seed. Further field work as part of a Flora and Fauna Assessment will be needed. As these areas of habitat are principally with areas mapped with the higher conservation significance class of Very High, these areas do not show on the maps in Appendix B as they are included within that higher conservation significance class which achieves precedence. These areas of habitat are most likely adjacent to 109 Staley Court.

- *Medium:* The areas between remnants of BGHF that show relatively intact soil profiles, some potential for seedling recruitment, active ecological process input and/or good connectivity between nearby extents are mapped here as having moderate conservation significance.

- *Low (not mapped):* Much of the remaining areas including gardens with no indigenous remnant vegetation communities, are of low conservation significance. The remnant native vegetation has been cleared and the soil disturbed. The sub-strata are dominated by exotic species. The canopy and midstorey contains a mixture of native (but not locally indigenous), and exotic species.

- *Very Low* (*not mapped):* These areas offer very little or no potential for vegetation communities or their recovery. These include soils heavily disturbed through built structures with foundations.

5.4.2 Fauna

General Fauna Conservation Significance was assessed taking into account background information, vegetation floristics, vegetation structure, patch size and shape, connectivity, critical habitat features, and locations of threatened fauna species. This involved incorporating results of:

- locations of threatened species;
- identification of broad land use classes within the study area;
- location of critical habitat features; and
- condition of vegetation communities based on vegetation structure, species richness, patch size and shape, connectivity, resilience and current and previous impacts.

General Fauna Conservation Significance Classes relevant to the subject site as per the hierarchy are shown in Table 4 below. Habitat requirements of faunal species vary dramatically thus Table 4 below is specific to the subject site and may not reflect all possible scenarios.

Table 4 Conservation Significance Classes - Fauna

FEATURE	DETAILS	CONSERVATION SIGNIFICANCE CLASS				
		VERY HIGH	HIGH	MEDIUM	LOW	VERY LOW
Specific habitat feature of threatened species occurring onsite	Identified during field survey	X				
General foraging habitat of Threatened Species occurring onsite	Located during field survey		X			
Vegetation onsite contiguous with vegetation of habitat value within locality	Identified during field survey			X		

Justifications for the assignment of Conservation Significance Classes are provided below:

- *Very High*: Specific habitat feature such as stags, tree hollows of suitable size, extensive decorticating bark, caves etc. None were identified on the subject site.

- *High:* Foraging habitat for Eastern Bent-wing Bat, Greater Broad-nosed Bat, Grey-headed Flying-fox, and Powerful Owl. Most of the subject site support suitable foraging habitat for these species.

- *Medium:* These areas provide limited foraging habitat for threatened species such as Eastern Bentwing-bats and Powerful Owls. These areas could potentially be revegetated and utilised as wildlife corridors for fauna; therefore their ranking reflects the importance of connectivity. These areas include those linking remnant vegetation both within and adjacent to the site.

Mapping of fauna habitat is complicated by the generalist and broad-ranging nature of many of the habitat requirements and behaviours of the threatened species identified as occurring or likely to utilise the site.

With reference to threatened fauna species, habitat features of local significance involved with activities such as breeding, hibernation/aestivation and localised obligate food sources (such as suitable hollows, stags, caves and standing water) were not observed in the study area. Generally widespread habitat features of less significance locally but still of importance on the site for visiting or resident threatened species, occur generally within areas identified above as having analogous Flora Conservation Significance. These features may include foraging and roosting/shelter habitat such as flyways, canopy connection of local and non-local species, riparian areas, grasslands, decorticating bark, food sources etc. As such, areas of habitat significance haven't been mapped but generally are commensurate with those areas mapped as having Flora Conservation Significance in Appendix B, maps 3, 4 and 5, although some disturbed areas may offer suitable foraging habitat.

6 DISCUSSION, OUTCOMES AND RECOMMENDATIONS.

Threatened Species Conservation Act (1995)

As stated above, 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.

In summary, the subject site contains some good quality remnant native vegetation, some fauna habitat value and some habitat connectivity to surrounding areas. All native vegetation communities mapped by TEC are identified as Blue Gum High Forest (BGHF) (Appendix B, Maps 2-5). Not all areas mapped as Blue Gum High Forest possess an intact groundcover, understorey, midstorey or canopy. There is evidence of significant disturbance over the majority of the subject site, particularly in the east. The western remnants of BGHF show greater resilience and species diversity although widespread activities such as mowing, weed infestation and grazing are occurring. There is therefore a very high scope for improvement of biodiversity values via the implementation of future management actions by utilising only remnant resilience on site, particularly in these areas. The historical extensive clearing around the existing dwellings and ongoing negative landscape activities, have had and continue to result in a significant reduction of ecological processes of BGHF and its species. BGHF mapped in the current study shows variation between being restricted to remnant canopy or midstorey trees, a generally mown groundcover of groundlayer and occasional shrub and tree species associated with adjacent remnant canopy trees, or fully structured BGHF with species present from all layers, although some of these layers may show structural or floristic modification. Previous mapping by Total Earth Care (TEC 2013) has mapped a large area of both fully structured and understorey BGHF at 10-12 Highs Road. A small area of fully structured BGHF has been mapped immediately east of 109 Staley Court, outside of the subject site but within the study area. It should be noted that not all lots within the Subject Site have been assessed as part of the current report (Appendix B, Map 1)

The extents of BGHF upon and adjacent to the site have imposed constraints upon the masterplan. Blue Gum High Forest is a Critically Endangered Ecological Community under the NSW Threatened Species Conservation Act (1995) and Critically Endangered under the EPBC Act (1999). As such any potential impacts upon this community or its habitat need to be considered under the *Environmental Planning and Assessment Act 1979* (EP&A Act). Consideration must be given to the likely environmental impacts of any future development, including potential impact of the proposed development on known or predicted presence of threatened species, populations and communities listed under the *Threatened Species Conservation Act 1995* (TSC Act). Applications to rezone land need to consider appropriateness of any rezoning to existing constraints against the proposed landuses of the rezoning. Demonstration that constraining entities listed under the TSC Act (including BGHF) can be protected from potential impacts brought about by rezoning (including all later developments within the rezoned land, not just those in the near future), add support to the appropriateness of a rezoning application. Demonstration of the improvement of overall habitat values, and specifically threatened entities' habitat values further support the appropriateness of a rezoning application.

As described by *Blue Gum High Forest in the Sydney Basin Bioregion – profile* (OEH, 2013) the threats upon BGHF on site may include:

- Further clearing for urban development, and the subsequent impacts from fragmentation. This is identified as the main threat to BGHF across its distribution.
- Habitat degradation from inappropriate access and disturbance from people, horses, trail bikes and other vehicles.
- Urban run-off, which leads to increased nutrients and sedimentation.
- Weed invasion, including listed weeds such as Lantana, exotic vines and scramblers, and exotic perennial grasses.
- Inappropriate fire regimes, which have altered the appropriate floristic and structural diversity.
- Loss of community structure particularly understorey species from under-scrubbing, landscaping and continual mowing.

All the above threats are currently active in the study area and are likely to accelerate without long-term measures put in place. Passive regenerative actions such as cessation of mowing may result in some immediate reduction to the rate of decline currently exerted by this active threat.

The subject site currently offers some medium to high habitat value for threatened species of fauna, including habitat for the four species identified during the current survey effort. This habitat is primarily offered by remnant and planted native trees and shrubs, planted exotic trees and shrubs and to a lesser or indirect degree by weedy trees and shrubs, other layers of native, exotic and weedy vegetation, built structures and open space flyways.

As noted above, Maps 6, 7 and 8 of Appendix B show generalised areas of Flora Conservation Significance. These areas have been mapped to generally indicate the areas that most constrain development within the subject site. It should be noted that other areas may be identified as having conservation significance during later more detailed study, during incidental recordings and as a result of cessation of widespread negative impacts such as mowing. Fauna habitat constraints are less easily directly mapped and are discussed above in SECTION 4.1.2. Generally, securing and improving the quality, extent and connectivity of areas of Flora Conservation Significance on site will have a similar effect upon generalised fauna habitat over the long term although stochastic events both inside and outside the subject site, such as sustainability of habitat and fauna population will have significant input to most fauna ecology.

Areas of Blue Gum High Forest will be directly impacted by the current proposal. Those areas of Blue Gum High Forest directly impacted by the proposal through development footprints and the highest rates of overshading have been mapped in Maps 9-11, Appendix B. The remaining areas of Blue Gum High Forest, potentially indirectly impacted by the proposal, are also shown in Maps 9-11, Appendix B. The impacts upon these areas cannot be as confidently assessed, and there may be scope for ecological improvement, depending upon the degree of final indirect impacts, and the ecological recoverability of those areas. Immediate to long term impacts as part of the proposal and future land-uses need to be taken into account in determining the scope for potential ecological improvement for any areas.

Environmental Planning and Assessment Act 1979

As noted above, the current proposal is to be considered under s55 (3) of Part 3 of the EP&A Act. The Relevant Planning Authority (RPA) is to consider any likely impacts of the proposal under section 5A (s.5A) of the EP&A Act (the Assessment of Significance or so called '7-part test'). The assessment of significance will determine whether there is any likelihood that critical habitat or threatened species, populations or ecological communities or their habitats will be adversely affected as a result of the proposal.

Notwithstanding the significance of the impact, any adverse impact will trigger the requirement under section 34A of the Act for the RPA to consult on the planning proposal with the relevant government agency. If required, this consultation does not need to take place until after the issuing of the initial Gateway determination.

This initial ecological constraints report has identified significant areas of threatened ecological communities and their habitats (Blue Gum High Forest) on site. Likewise, threatened fauna species and their habitats have been identified. Future survey efforts would likely build on the extent, makeup and nature of these and perhaps other threatened entities and their habitats listed under the TSC Act.

The current proposal will have immediate impacts upon the areas mapped as BGHF within the initial ecological constraints. While the proposal has avoided impacts where feasible, areas of BGHF will be cleared for building footprints for the current proposal. Additional impacts will include overshading and changes to connectivity through isolation and fragmentation. Habitat for threatened fauna species, and any potential additional threatened fauna and flora species yet to be recorded for the site, will also be impacted by this clearing of BGHF, along with other habitat components that will be affected by the proposal. Potential impacts may also include listed Key Threatening Processes, including but not limited to:

- Aggressive exclusion of birds by Noisy Miners (*Manorina melanocephala*)
- Clearing of native vegetation
- Competition and grazing by the feral European rabbit (*Oryctolagus cuniculus*)
- Competition from Feral Honey Bees (*Apis mellifera*)
- Forest Eucalypt dieback associated with over-abundant psyllids and Bell Miners
- Infection of frogs by amphibian chytrid causing the disease chytridiomycosis
- Infection of native plants by *Phytophthora cinnamomi*
- Introduction and Establishment of Exotic Rust Fungi of the order Pucciniales pathogenic on plants of the family Myrtaceae
- Invasion and establishment of exotic vines and scramblers
- Invasion of native plant communities by African Olive *Olea europaea* L. subsp. *cuspidate*
- Invasion, establishment and spread of *Lantana camara*
- Invasion of native plant communities by exotic perennial grasses
- Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants
- Loss of hollow-bearing trees
- Loss or degradation (or both) of sites used for hill-topping by butterflies
- Predation by the feral cat (*Felis catus*)
- Removal of dead wood and dead trees

Some of these Key Threatening Processes are currently active on the site. Mitigation of these KTP currently occurring will need to be considered as well as mitigation of those KTP increased, adapted or introduced as part of the proposal.

As the current pre-Gateway masterplan cannot accurately predict the full scale of impacts to threatened entities listed under the TSC Act, and as impacts are currently expected to BGHF, and some suitable habitat for threatened fauna species already identified, it must be presumed, under 5A of the Act and the 'Threatened Species Assessment Guidelines' (DECC 2007), that any 7-part Tests would find, at this stage, that there would be significant impacts for those entities:

> *"All factors should be considered as well as any other information deemed relevant to the assessment. The assessment of significance should not be used as a substitute for a species impact statement. Application of the precautionary principle requires that a lack of scientific certainty about the potential impacts of an action does not itself justify a decision that the action is not likely to have a significant impact. If information is not available to conclusively determine that there will not be a significant impact on a threatened species, population or ecological community, or its habitat, then it should be assumed that a significant impact is likely and a species impact statement should be prepared."*

It is proposed that the biodiversity assessment process and any biodiversity offsetting, be applied using the Biodiversity Banking and Offsets Scheme (or 'BioBanking') set up by the NSW Government.

Section 117 of the Act enables the Minister to issue directions regarding the content of LEPs to the extent that the content must achieve or give effect to particular principles, aims, objectives or policies set out in those directions.

The directions listed under point *2*. (*Environment and Heritage*), directly relate to ecological constraints, specifically point 2.1(*Environment Protection Zones Objective*):

> (1) The objective of this direction is to protect and conserve environmentally sensitive areas.

Where this direction applies
(2) This direction applies to all relevant planning authorities.
When this direction applies
(3) This direction applies when a relevant planning authority prepares a planning proposal.
What a relevant planning authority must do if this direction applies
4. (4) A planning proposal must include provisions that facilitate the protection and conservation of environmentally sensitive areas.
5. (5) A planning proposal that applies to land within an environment protection zone or land otherwise identified for environment protection purposes in a LEP must not reduce the environmental protection standards that apply to the land (including by modifying development standards that apply to the land). This requirement does not apply to a change to a development standard for minimum lot size for a dwelling in accordance with clause (5) of Direction 1.5 "Rural Lands".
Consistency
(6) A planning proposal may be inconsistent with the terms of this direction only if the relevant planning authority can satisfy the Director-General of the Department of Planning (or an officer of the Department nominated by the Director-General) that the provisions of the planning proposal that are inconsistent are:

(b) (c) (d)
b.
justified by a strategy which:
i. gives consideration to the objectives of this direction,
ii identifies the land which is the subject of the planning proposal (if the planning proposal relates to a particular site or sites), and
iii. is approved by the Director-General of the Department of Planning, or
justified by a study prepared in support of the planning proposal which gives consideration to the objectives of this direction, or
in accordance with the relevant Regional Strategy or Sub-Regional Strategy prepared by the Department of Planning which gives consideration to the objective of this direction, or
is of minor significance.

- *(Direction 2.1 – issued 1 July 2009)*

Under the Hills Local Environment Plan (2012), the subject site does not contain any of the following areas listed as an "Environmentally Sensitive Area":

(a) the coastal waters of the State,
(b) a coastal lake,
(c) land to which *State Environmental Planning Policy No 14—Coastal Wetlands* or *State Environmental Planning Policy No 26—Littoral Rainforests* applies,
(d) land reserved as an aquatic reserve under the *Fisheries Management Act 1994* or as a marine park under the *Marine Parks Act 1997*,
(e) land within a wetland of international significance declared under the Ramsar Convention on Wetlands or within a World heritage area declared under the World Heritage Convention,
(f) land within 100 metres of land to which paragraph (c), (d) or (e) applies,
(g) land identified in this or any other environmental planning instrument as being of high Aboriginal cultural significance or high biodiversity significance,
(h) land reserved under the *National Parks and Wildlife Act 1974*,
(i) land reserved or dedicated under the *Crown Lands Act 1989* for the preservation of flora, fauna, geological formations or for other environmental protection purposes,
(j) land identified as being critical habitat under the *Threatened Species Conservation Act 1995* or Part 7A of the *Fisheries Management Act 1994*.

The subject site does not contain any land within an environment protection zone or land otherwise identified for environment protection purposes in the LEP.

The subject site, as discussed above, supports mapped extent and habitat for Critically Endangered Blue Gum High Forest (BGHF) and various threatened fauna species. Approximately 1.8 hectares of BGHF will be directly impacted by the proposal; additional areas are likely to be impacted by indirect impacts. While the proposal is not strictly in accordance with the 117 directive, the current study gives consideration to the objective of the 117 directive and recommends BioBanking as a method to ameliorate these impacts.

As stated above, it is proposed that the biodiversity assessment process and any biodiversity offsetting, be applied using the Biodiversity Banking and Offsets Scheme (or 'BioBanking') set up by the NSW Government. BioBanking, if feasible and approved, will streamline the biodiversity assessment process, allow for measurable impacts and offsets, allow for permanent, costed and demonstrable ecological conservation offsets and give levels of planning certainty for development outcomes.

BioBanking offers several advantages for developers:
• It can reduce costs and time associated with biodiversity assessments.
• It provides a transparent and consistent rule-based approach for determining offsets, enabling offset requirements to be assessed even in the initial stages of project design.
• It allows credit requirements to be estimated and purchased at any stage of the project proposal.
• It enables offset sites to be managed by biobank site land owners interested in conservation rather than by developers.
• It enables greater flexibility in project management and costs.

Under the assumption that a BioBanking statement is issued, this will be submitted with the Development Application. The BioBanking statement sets out the credit requirements. The statement satisfies the biodiversity assessment requirements, and exempts the developer from needing an Assessment of Significance or Species Impact Statement for the proposal. The consent authority incorporates a condition in the development consent (if granted) that requires retirement of credits in accordance with the statement, before the work commences.

BioBanking can allow the Gateway process greater confidence that offset requirements to be assessed can be established early on in the design process, and if a statement is issued, that it is enforceable.

7 EXECUTIVE SUMMARY.

This Preliminary Ecological Assessment for the proposed rezoning application highlights a number of ecological constraints and considerations that have informed the current stage of the proposal. Principal ecological constraints include the Critically Endangered Ecological Community Blue Gum High Forest, and a number of threatened fauna species that were recorded utilising the site including

- Eastern Bentwing Bat Miniopterus schreibersii oceanensis: Listed as Vulnerable on the NSW Threatened Species Conservation Act 1995 (TSC Act)
- Greater Broad-nosed Bat Scoteanax rueppellii: Listed as Vulnerable on the NSW Threatened Species Conservation Act 1995 (TSC Act)
- Powerful Owl Ninox strenua: Listed as Vulnerable on the NSW Threatened Species Conservation Act 1995 (TSC Act);
- Grey-headed Flying-fox Pteropus poliocephalus: Listed as Vulnerable on the NSW Threatened Species Conservation Act 1995 (TSC Act) and Commonwealth Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Act

Additional threatened fauna species , including other microchichiropteran bat species, may be identified after additional ANABAT data analysis as part of this preliminary ecological assessment.

The proposal has considered ecological requirements under the EP&A Act (1979) and the TSC Act (1995).

The proposal intends to apply the Biodiversity Banking and Offsets Scheme (or 'BioBanking') for biodiversity assessment for the rezoning process and any biodiversity offsetting.

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Appendix A

Flora Species Inventories

Naturally Occurring Locally Indigenous Flora Species in Study Area

Note this is a complete list of all occurrences of naturally occurring locally indigenous species observed during field observations within those parts of the proposal

General Status

*	Exotic (not native to Australia)
N( )	Noxious weeds and 'Control Class' as listed on the NSW Noxious Weeds Act 1993 for the Hills LGA
ni	Non - indigenous native species (does not naturally occur at this locality)
BGHF	Considered remnant component of BGHF

Conservation Status

CE	Critically Endangered - listed under Schedule 1A of the TSC Act
E	Endangered - listed under Schedule 1 of the TSC Act
V	Vulnerable - listed under Schedule 2 of the TSC Act

Abundance

c	Common, species occur all over the site
o	Occasional, species occur over the survey area but not in large numbers at any occurrence
u	Uncommon, species occur only once or twice during the survey

Status	Family	Genus species	Common Name	2-4 Highs Road 20x20m	2-4 Highs Road BGHF random meander (excl. quadrat)	Southern part of 141 Castlehill Road, 20x20m	BGHF 141, 142 Castle Hill Road, Random Meander (excl. quadrat)	10 Highs Road BGHF Understorey & Canopy Random Meander	10 Highs Road BGHF understorey only Random Meander	10 and 12 Highs Road isolated BGHF trees	BGHF adjacent to 109 Staley Court, Random Meander	BGHF on Subject Site east of 141 Castle Hill Road, Random Meander
BGHF	Fabaceae - Mimosoideae	*Acacia decurrens*	Black Wattle	o	o		o	u	u			
BGHF	Fabaceae - Mimosoideae	*Acacia floribunda*	White Sally Wattle	o	o			u				
BGHF	Fabaceae - Mimosoideae	*Acacia implexa*	Hickory Wattle	o	o			c	o		c	o
BGHF	Fabaceae - Mimosoideae	*Acacia parramattensis*	Sydney Green Wattle	o	u	o	o	c	u			
BGHF	Myrtaceae	*Angophora costata*	Sydney Red Gum									u
BGHF	Myrtaceae	*Angophora floribunda*	Apple								c	o
* N(4)	Asparagaceae	*Asparagus aethiopicus*	Asparagus Fern		o							
*	Asteraceae	*Bidens bipinnata*	Bipinnate Beggar's Ticks					o				
BGHF	Poaceae	*Bothriochloa sp.*							u			
BGHF	Sterculiaceae	*Brachychiton populneus ssp*	Kurrajong							u		
BGHF	Pittosporaceae	*Bursaria spinosa*	Blackthorn		o				u		c	
BGHF	Vitaceae	*Cayratia clematidea*	Native Grape	o				o				
BGHF	Apiaceae	*Centella asiatica*	Indian Pennywort				u					
*	Anthericaceae	*Chlorophytum comosum*	Spider Plant		o							
*	Asteraceae	*Cirsium vulgare*	Spear Thistle					o				
BGHF	Ranunculaceae	*Clematis sp*	Old Man's Beard		u						o	
BGHF	Verbenaceae	*Clerodendrum tomentosum*	Hairy Clerodendrum			u	o	u				
BGHF	Phormiaceae	*Dianella longifolia*	Blueberry Lily					u				
BGHF	Poaceae	*Dichelachne ?rara*							u			
BGHF	Convolvulaceae	*Dichondra repens*	Kidney Weed	c	o		c	c				u
BGHF	Poaceae	*Echinopogon caespitosus*	Tufted Hedgehog-grass						u			
BGHF	Poaceae	*Echinopogon ovatus*	Forest Hedgehog Grass	o	c				u			
*	Poaceae	*Ehrharta erecta*	Panic Veldtgrass	o	o			u	u			

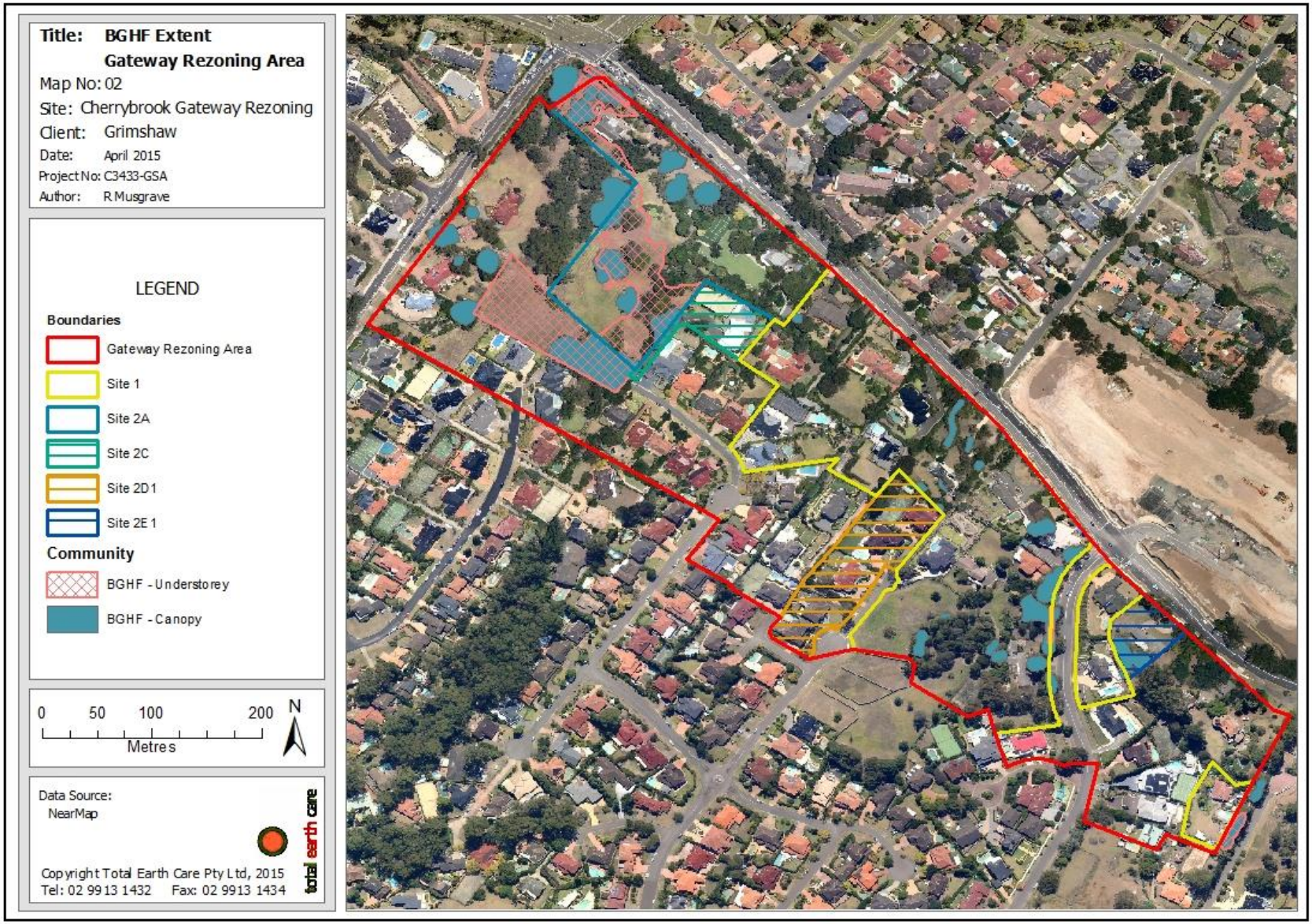
BGHF	Chenopodiaceae	*Einadia hastata*	Berry Saltbush		o			u				
BGHF	Poaceae	*Entolasia marginata*	Bordered Panic						o			
*	Fabaceae - Faboideae	*Erythrina sykesii*	Coral Tree					o				
ni	Myrtaceae	*Eucalyptus grandis*	Rose Gum	o	o							
BGHF	Myrtaceae	*Eucalyptus pilularis*	Blackbutt	u	u							
BGHF	Myrtaceae	*Eucalyptus punctata*	Grey Gum									u
BGHF	Myrtaceae	*Eucalyptus resinifera*	Red Mahogany			u	u					
BGHF	Myrtaceae	*Eucalyptus saligna*	Sydney Blue Gum	c	o	o	o	c	u	c		c
BGHF	Myrtaceae	*Eucalyptus tereticornis*	Forest Red Gum	o	c		u				c	c
BGHF	Luzuriagaceae	*Eustrephus latifolius*	Wombat Berry		c							
BGHF	Geraniaceae	*Geranium homeanum*	Native Geranium	o	o			o				
BGHF	Fabaceae - Faboideae	*Glycine clandestina*		o	o		u					
*	Apocynaceae	*Gomphocarpus sp*	Narrow-leaved Cotton Bush					u				
ni	Proteaceae	*Grevillea robusta*	Silky Oak	u	u							
BGHF	Fabaceae - Faboideae	*Hardenbergia violacea*	Purple Coral Pea		o						o	
BGHF	Euphorbiaceae	*Homalanthus populifolius*	Bleeding Heart		o							
*	Bignoniaceae	*Jacaranda mimosifolia*	Jacaranda	o	u							
*	Oleaceae	*Jasminum mesnyi*	Primrose Jasmine						u			
*	Oleaceae	*Jasminum polyanthum*	White Jasmine	o	u			u				
BGHF	Juncaceae	*Juncus usitatus*	Common Rush					o	u			
BGHF	Fabaceae - Faboideae	*Kennedia rubicunda*	Dusky Coral Pea									u
* N(4)	Verbenaceae	*Lantana camara*	Lantana	c				c	u			
* N(4)	Oleaceae	*Ligustrum lucidum*	Large Leaved Privet	o	u			c	u			
* N(4)	Oleaceae	*Ligustrum sinense*	Small Leaved Privet	o	o			c	u			
*	Caprifoliaceae	*Lonicera japonica*	Japanese Honeysuckle					u				
* N(3)	Onagraceae	*Ludwigia peruviana*						o				
ni	Meliaceae	*Melia azedarach*	White Cedar					o				
BGHF	Poaceae	*Microlaena stipoides var stipoides*	Weeping Grass	c	c	o	o		vc			u
BGHF	Poaceae	*Oplismenus aemulus*	Oplismenus	vc	c	c	c					u

BGHF	Poaceae	*Oplismenus imbecillis*	Oplismenus	o	o	c	c					
BGHF	Bignoniaceae	*Pandorea pandorana*	Wonga Wonga Vine					o				
*	Poaceae	*Paspalum dilatatum*	Paspalum	o	u			u				
BGHF	Adiantaceae	*Pellaea falcata*	Sickle Fern						u			u
*	Poaceae	*Pennisetum clandestinum*	Kikuyu Grass	c	u		c		u			
BGHF	Polygonaceae	*Persicaria lapathifolia*	Pale Knotweed					u				
* N(4)	Poaceae	*Phyllostachys aurea*	Fishpole Bamboo	o	u							
*	Phytolaccaceae	*Phytolacca americana*	Poke Root					o				
*	Pinaceae	*Pinus radiata*	Radiata Pine		u							
BGHF	Pittosporaceae	*Pittosporum undulatum*	Sweet Pittosporum	o	o			o		o		c
*	Plantaginaceae	*Plantago lanceolata*	Lamb's Tongues					u	u			
BGHF	Lobeliaceae	*Pratia purpurascens*	Whiteroot	c								
BGHF	Lobeliaceae	*Pratia purpurascens*	Whiteroot		u	o						u
*	Ranunculaceae	*Ranunculus repens*	Creeping Buttercup					u				
* N(4)	Rosaceae	*Rubus fruticosus agg sp*	Blackberry	o	o			c				
* N(4)	Asteraceae	*Senecio madagascariensis*	Fireweed					u				
*	Fabaceae - Caesalpinioideae	*Senna pendula var glabrata*						u				
BGHF	Asteraceae	*Sigesbeckia orientalis ssp orientalis*		o	c		u	o				
*	Solanaceae	*Solanum nigrum*	Black-berry Nightshade	u	u							
*	Asteraceae	*Sonchus oleraceus*	Common Sowthistle					u				
BGHF	Menispermaceae	*Stephania japonica var discolor*	Snake Vine			c	o	c	o			u
BGHF	Myrtaceae	*Syncarpia glomulifera ssp glomulifera*	Turpentine									o
ni	Myrtaceae	*Syzygium australe*	Brush Cherry			u						
BGHF	Poaceae	*Themeda australis*	Kangaroo Grass					u	u			
*	Commelinaceae	*Tradescantia fluminensis*	Wandering Jew					o				
BGHF	Apocynaceae	*Tylophora barbata*	Bearded Tylophora					o				
*	Verbenaceae	*Verbena bonariensis*	Purpletop	o				o				

Appendix B

Maps


Title: Masterplan
Map No: 01
Site: Cherrybrook Gateway Rezoning
Client: Grimshaw
Date: April 2015
Project No: C3433-GSA
Author: R Musgrave
LEGEND
Boundaries
Gateway Rezoning Area
Site 1
Site 2A
Site 2C
Site 2D1
Site 2E1
Assessment Date
June 2014
April 2015
Field survey 2013 (not included in 2014 report)
Not Assessed
0 50 100 200
Metres
N
Data Source:
Copyright Total Earth Care Pty Ltd, 2005
Tel: 02 9913 1432 Fax: 02 9913 1434
total earth care


Title: BGHF Extent
Gateway Rezoning Area
Map No: 02
Site: Cherrybrook Gateway Rezoning
Client: Grimshaw
Date: April 2015
Project No: C3433-GSA
Author: R Musgrave
LEGEND
Boundaries
Gateway Rezoning Area
Site 1
Site 2A
Site 2C
Site 2D1
Site 2E1
Community
BGHF - Understorey
BGHF - Canopy
0 50 100 200
Metres
N
Data Source:
NearMap
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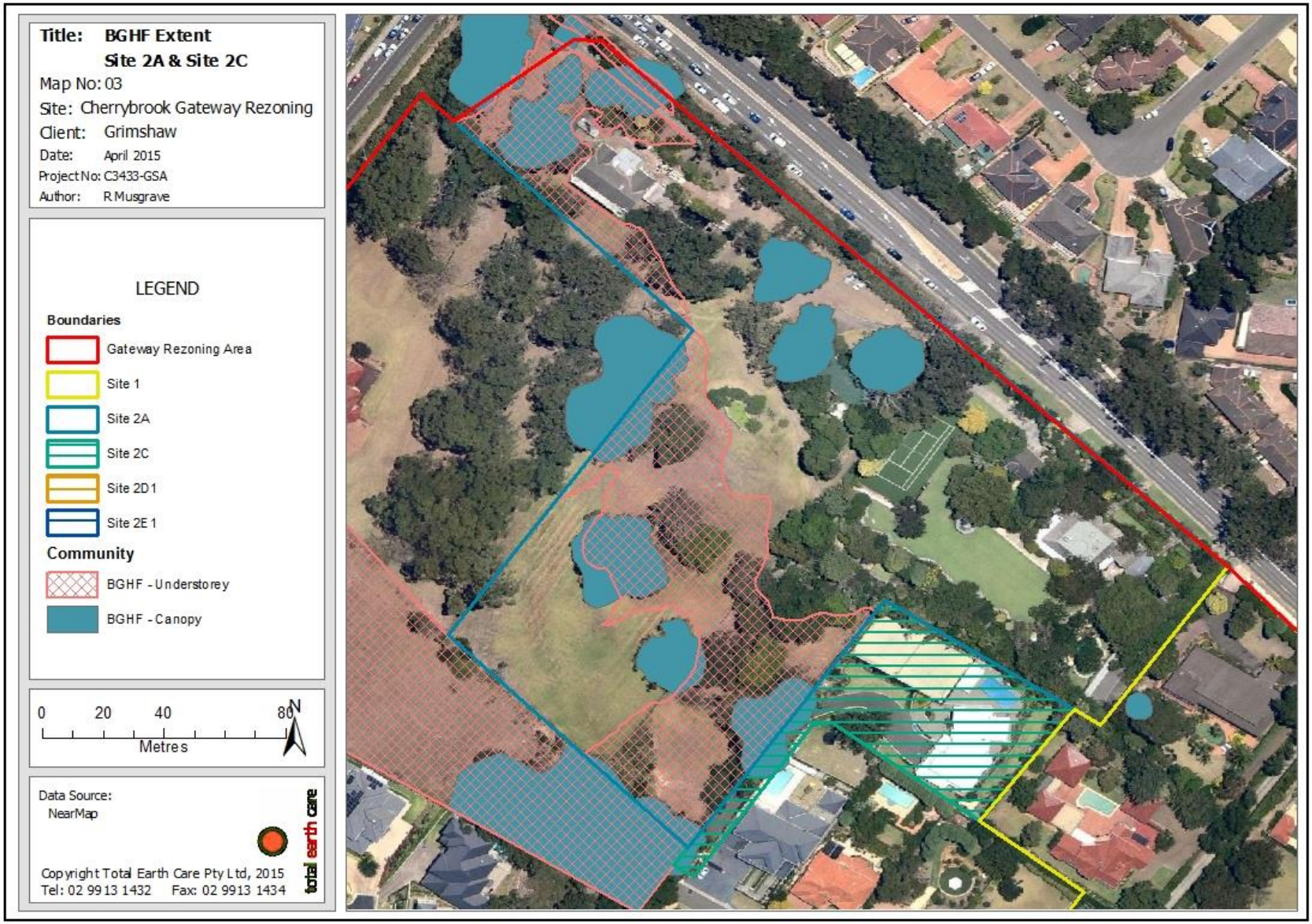
Title: BGHF Extent
Site 2A & Site 2C
Map No: 03
Site: Cherrybrook Gateway Rezoning
Client: Grimshaw
Date: April 2015
Project No: C3433-GSA
Author: R Musgrave
LEGEND
Boundaries
Gateway Rezoning Area
Site 1
Site 2A
Site 2C
Site 2D1
Site 2E1
Community
BGHF - Understorey
BGHF - Canopy
0 20 40 80
Metres
N
Data Source:
NearMap
Copyright Total Earth Care Pty Ltd, 2015
Tel: 02 9913 1432 Fax: 02 9913 1434
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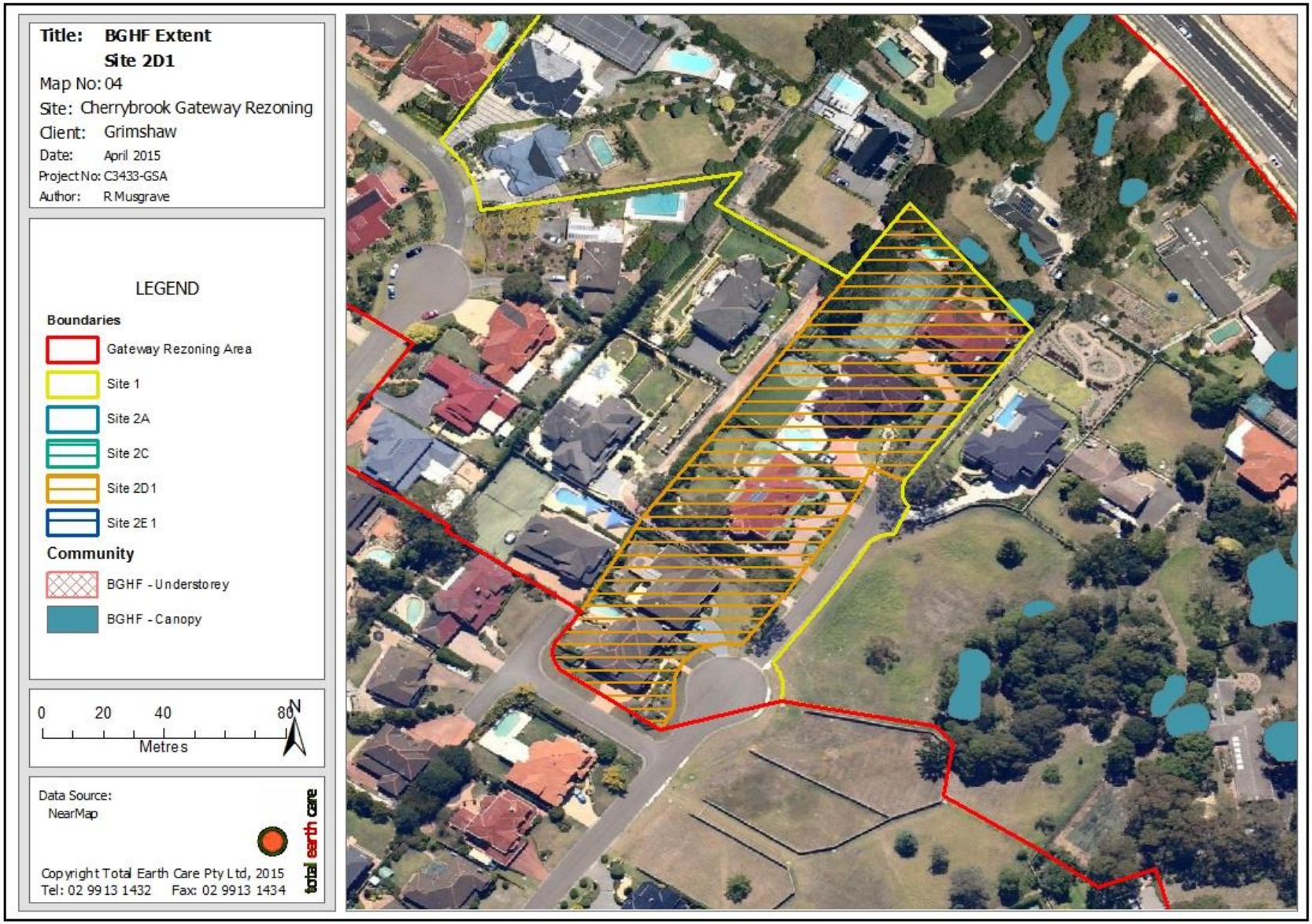
Title: BGHF Extent
Site 2D1
Map No: 04
Site: Cherrybrook Gateway Rezoning
Client: Grimshaw
Date: April 2015
Project No: C3433-GSA
Author: R Musgrave
LEGEND
Boundaries
Gateway Rezoning Area
Site 1
Site 2A
Site 2C
Site 2D1
Site 2E1
Community
BGHF - Understorey
BGHF - Canopy
0 20 40 80
Metres
N
Data Source:
NearMap
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total earth care


Title: BGHF Extent
Site 2E1
Map No: 05
Site: Cherrybrook Gateway Rezoning
Client: Grimshaw
Date: April 2015
Project No: C3433-GSA
Author: R Musgrave
LEGEND
Boundaries
Gateway Rezoning Area
Site 1
Site 2A
Site 2C
Site 2D1
Site 2E1
Community
BGHF - Understorey
BGHF - Canopy
0 20 40 80
Metres
N
Data Source:
NearMap
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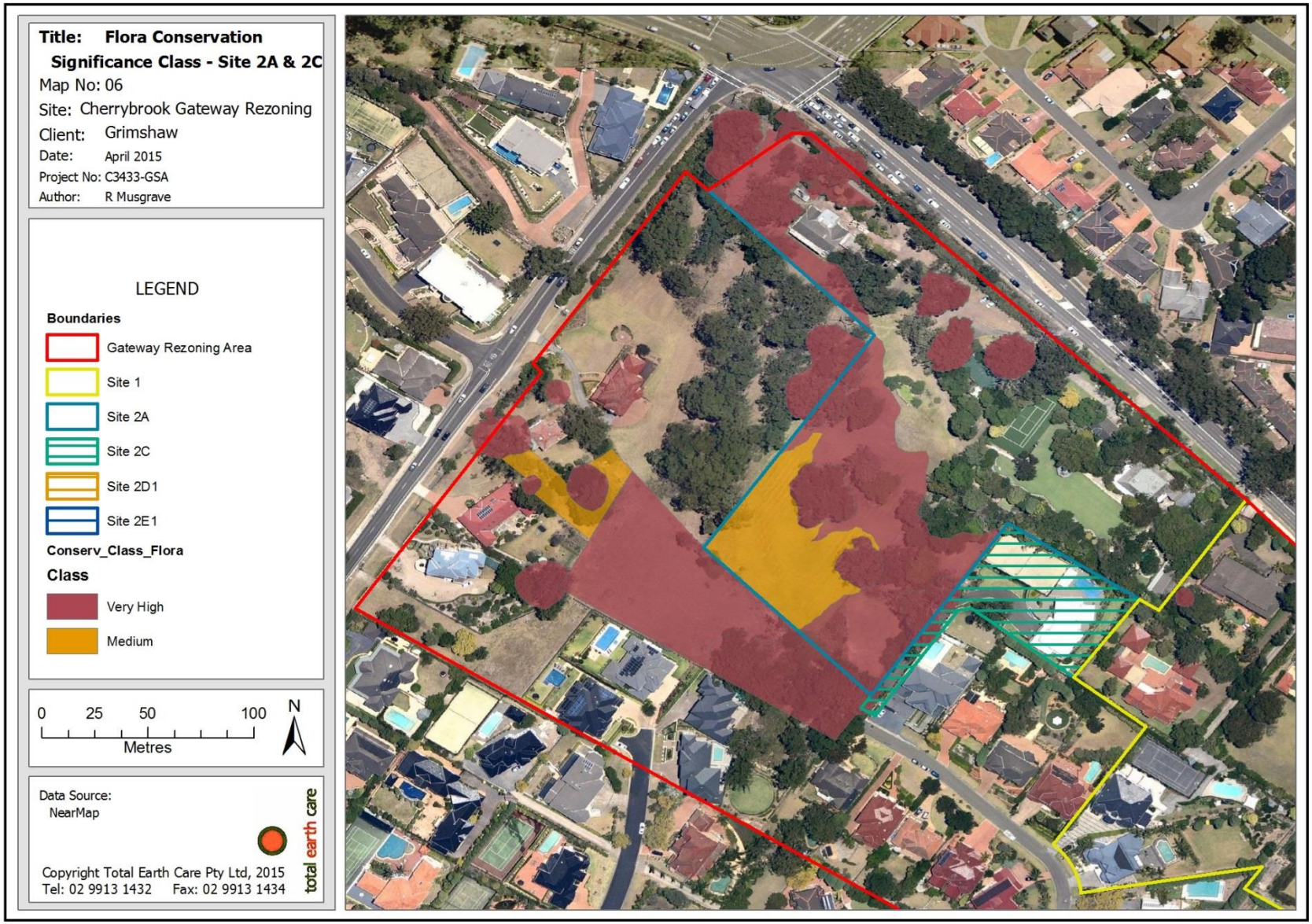
Title: Flora Conservation Significance Class - Site 2A & 2C
Map No: 06
Site: Cherrybrook Gateway Rezoning
Client: Grimshaw
Date: April 2015
Project No: C3433-GSA
Author: R Musgrave
LEGEND
Boundaries
Gateway Rezoning Area
Site 1
Site 2A
Site 2C
Site 2D1
Site 2E1
Conserv_Class_Flora
Class
Very High
Medium
0 25 50 100
Metres
N
Data Source:
NearMap
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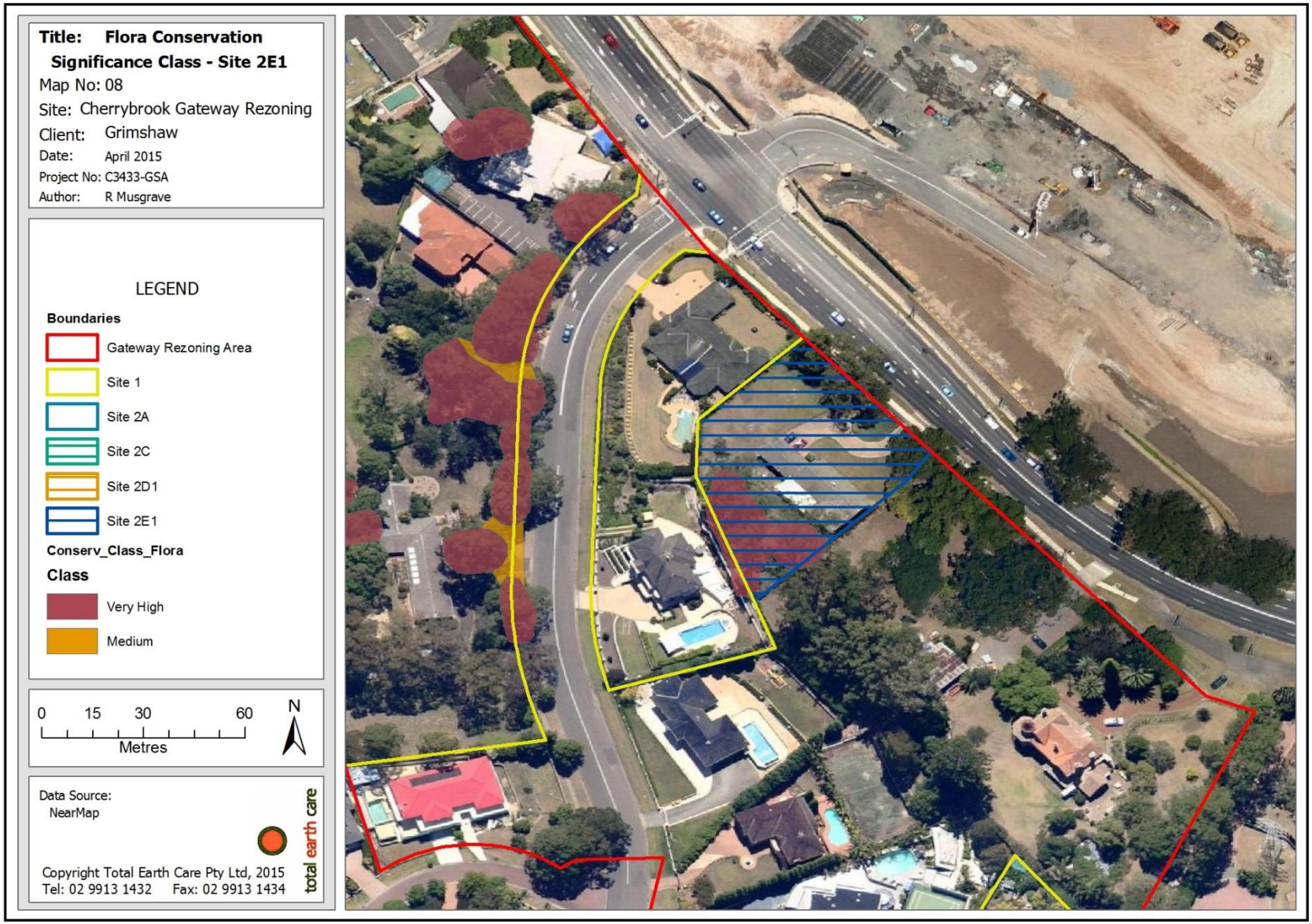
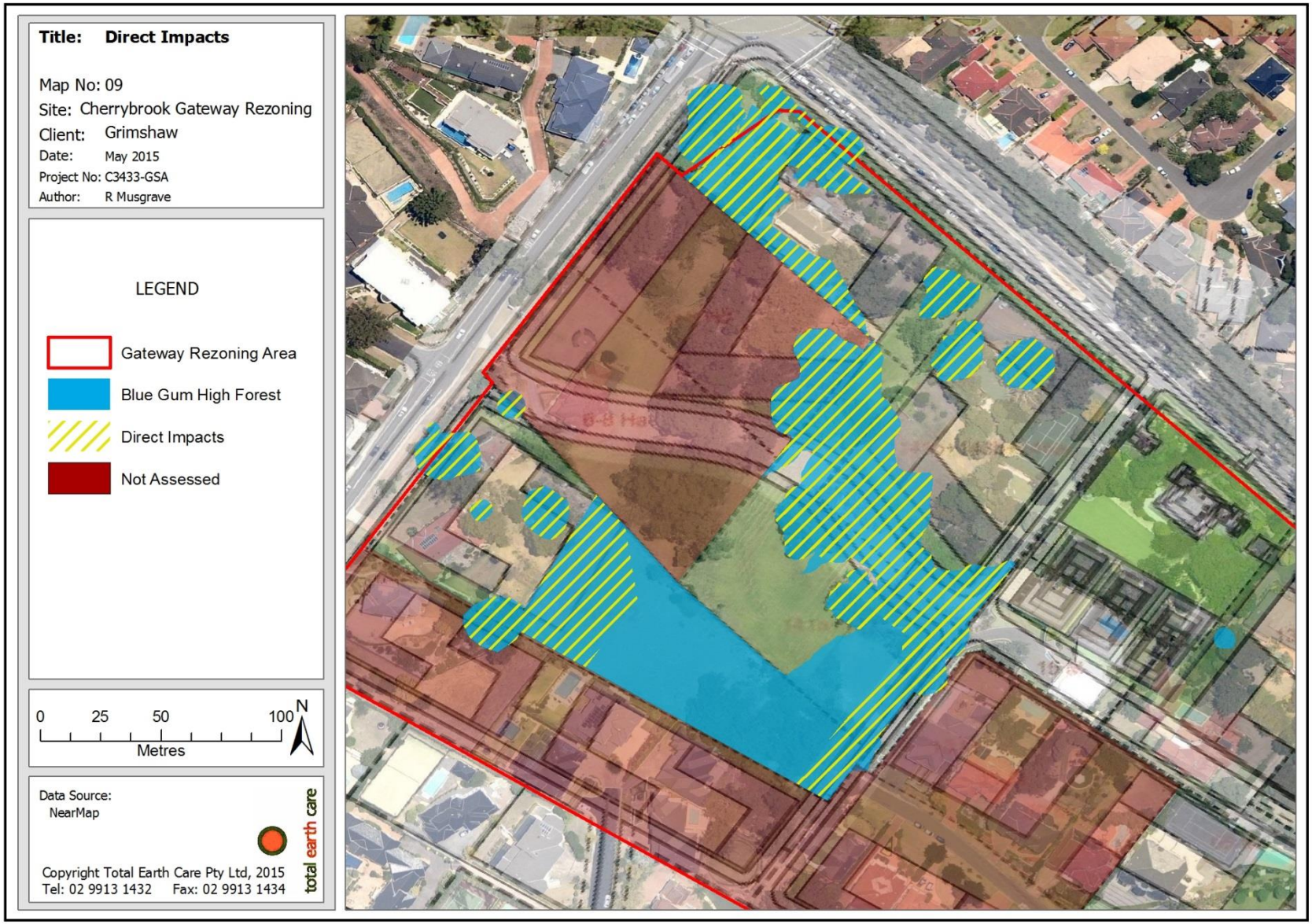
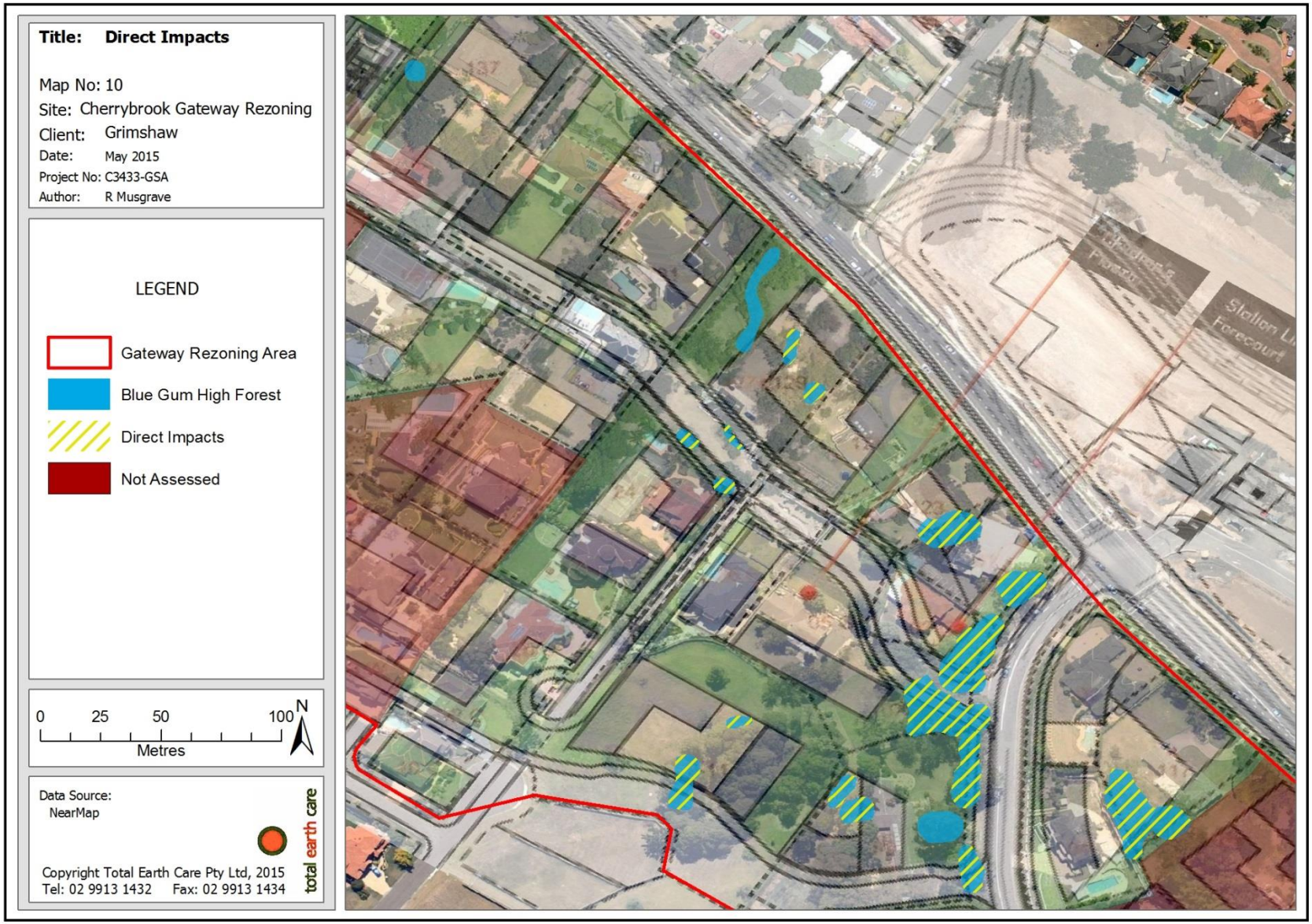
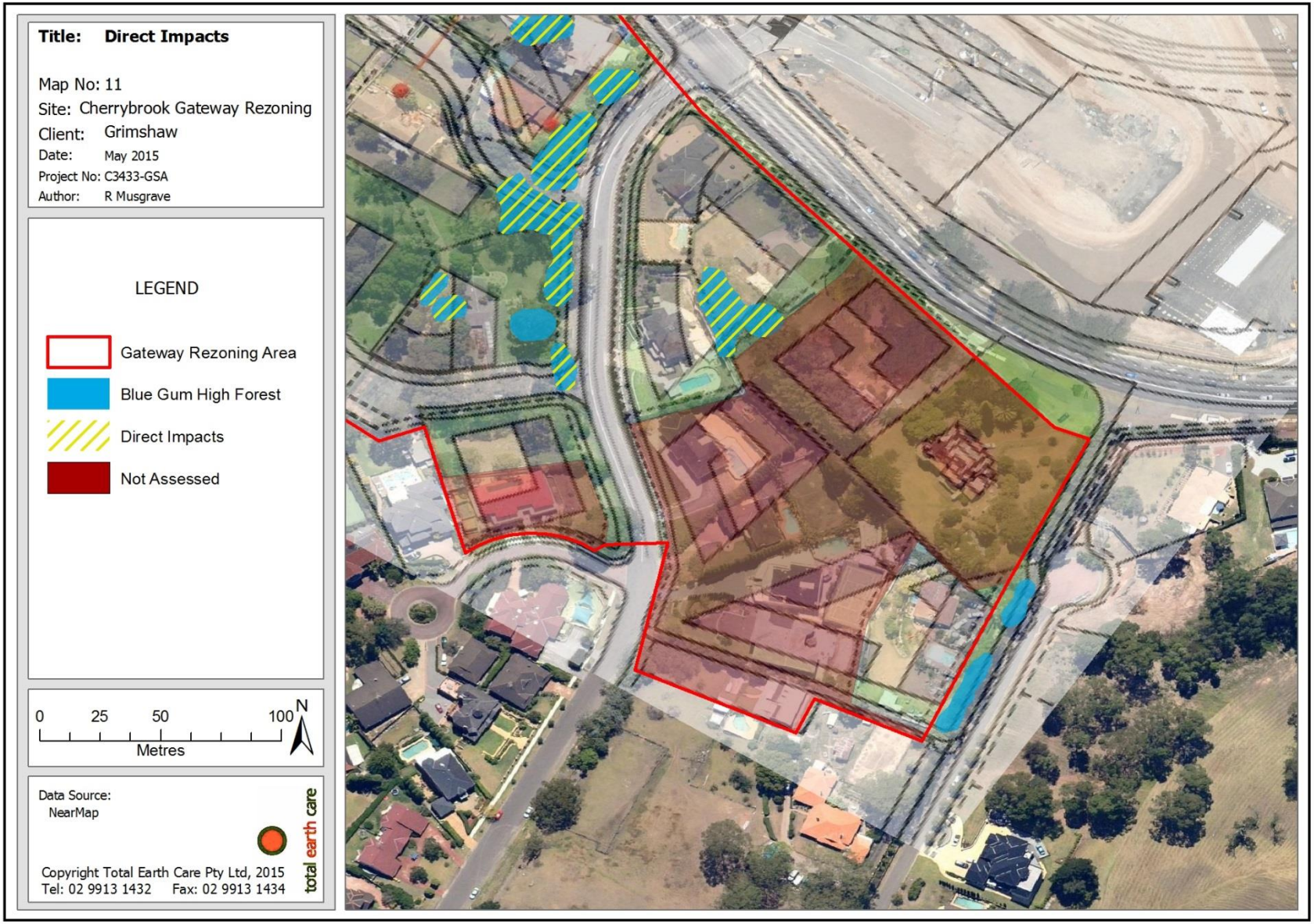
total earth care


Title: Flora Conservation Significance Class - Site 2D1
Map No: 07
Site: Cherrybrook Gateway Rezoning
Client: Grimshaw
Date: April 2015
Project No: C3433-GSA
Author: R Musgrave
LEGEND
Boundaries
Gateway Rezoning Area
Site 1
Site 2A
Site 2C
Site 2D1
Site 2E1
Conserv_Class_Flora
Class
Very High
Medium
0 15 30 60
Metres
N
Data Source:
NearMap
Copyright Total Earth Care Pty Ltd, 2015
Tel: 02 9913 1432 Fax: 02 9913 1434
total earth care


Title: Flora Conservation Significance Class - Site 2E1
Map No: 08
Site: Cherrybrook Gateway Rezoning
Client: Grimshaw
Date: April 2015
Project No: C3433-GSA
Author: R Musgrave
LEGEND
Boundaries
Gateway Rezoning Area
Site 1
Site 2A
Site 2C
Site 2D1
Site 2E1
Conserv_Class_Flora
Class
Very High
Medium
0 15 30 60
Metres
N
Data Source:
NearMap
Copyright Total Earth Care Pty Ltd, 2015
Tel: 02 9913 1432 Fax: 02 9913 1434
total earth care


Title: Direct Impacts
Map No: 09
Site: Cherrybrook Gateway Rezoning
Client: Grimshaw
Date: May 2015
Project No: C3433-GSA
Author: R Musgrave
LEGEND
Gateway Rezoning Area
Blue Gum High Forest
Direct Impacts
Not Assessed
0 25 50 100
Metres
N
Data Source:
NearMap
Copyright Total Earth Care Pty Ltd, 2015
Tel: 02 9913 1432 Fax: 02 9913 1434
total earth care


Title: Direct Impacts
Map No: 10
Site: Cherrybrook Gateway Rezoning
Client: Grimshaw
Date: May 2015
Project No: C3433-GSA
Author: R Musgrave
LEGEND
Gateway Rezoning Area
Blue Gum High Forest
Direct Impacts
Not Assessed
0 25 50 100
Metres
N
Data Source:
NearMap
Copyright Total Earth Care Pty Ltd, 2015
Tel: 02 9913 1432 Fax: 02 9913 1434
total earth care


Title: Direct Impacts
Map No: 11
Site: Cherrybrook Gateway Rezoning
Client: Grimshaw
Date: May 2015
Project No: C3433-GSA
Author: R Musgrave
LEGEND
Gateway Rezoning Area
Blue Gum High Forest
Direct Impacts
Not Assessed
0 25 50 100
Metres
N
Data Source:
NearMap
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Tel: 02 9913 1432 Fax: 02 9913 1434
total earth care