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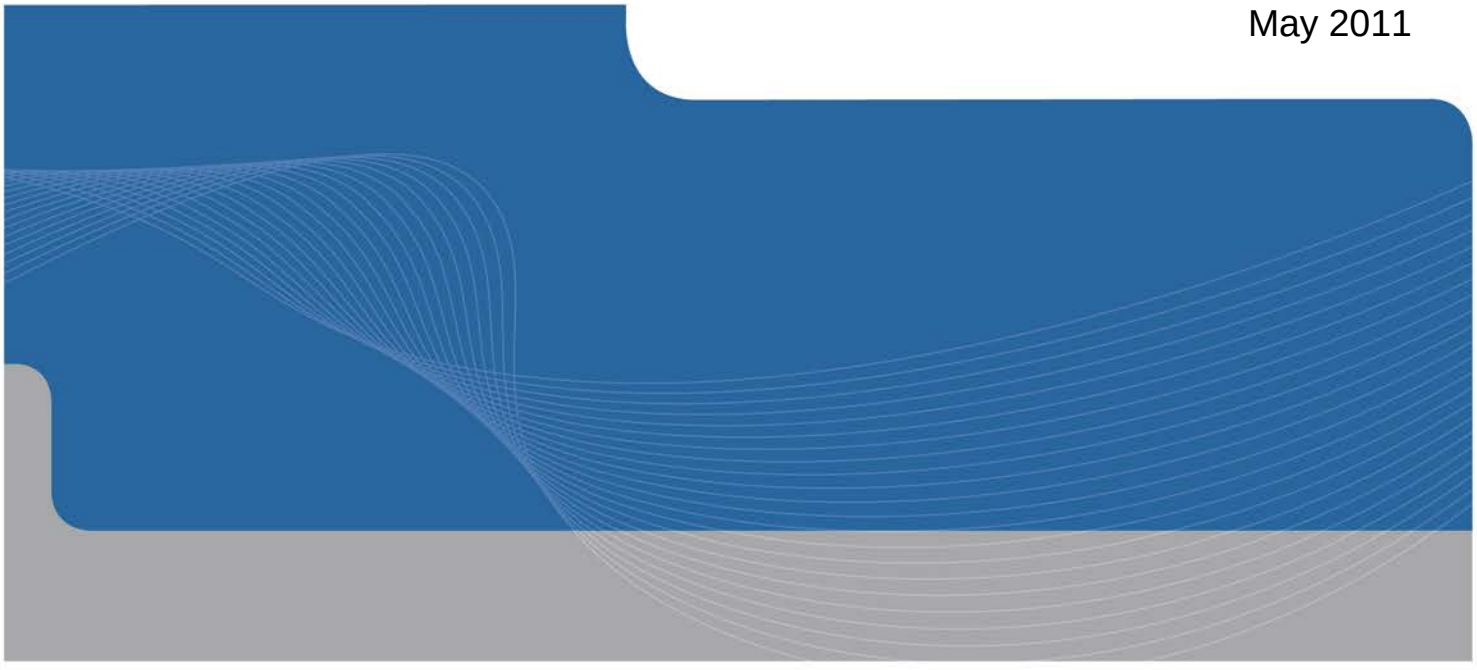
Department of Education and Training

Proposed Residential Use of Lot 1 DP 11244346, Roland Street, Greystanes

Application for Site Compatibility Certificate

May 2011



INFRASTRUCTURE | MINING & INDUSTRY | DEFENCE | PROPERTY & BUILDINGS | ENVIRONMENT

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- *were limited to those specifically detailed in section 1 of this Report;*

The opinions, conclusions and any recommendations in this Report are based on assumptions made by GHD when undertaking services and preparing the Report ("Assumptions"), including (but not limited to):

- *that the site is owned by the Department of Education and Training*

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1. Introduction

1.1 Overview

GHD Pty Ltd (GHD) has been engaged to prepare an application to the Director-General of the Department of Planning and Infrastructure for a Site Compatibility Certificate (SCC) for surplus Holroyd High School land at Lot 1 DP 11244346 Roland Street, Greystanes. The application is made on behalf of the Department of Education and Training (DET) under the provisions of section 19 of the *State Environmental Planning Policy (Infrastructure) 2007* (Infrastructure SEPP).

The purpose of the SCC is to permit the development of up to twenty four (24) dwellings on the site. Each dwelling would be sited on a separate lot ranging from 187m^2 to 254m^2 at a density of approximately 1 dwelling per 500m^2.

1.1.1 State Environmental Planning Policy (Infrastructure) 2007 (Infrastructure SEPP)

The provisions of *State Environmental Planning Policy (Infrastructure) 2007* (Infrastructure SEPP) apply to the site. The Infrastructure SEPP was introduced to facilitate the effective delivery of infrastructure across the State.

The provisions of clause 18 of the Infrastructure SEPP apply to the proposal as the site is State land owned by the Department of Education and Training.

Clause 18 (2) states that despite the zoning of the land on the site, development may be carried out which is permitted on adjacent land. The adjacent land is currently zoned 2(a) Residential land under the Holroyd LEP 1991 and medium density development is permissible. This is explained in more detail in Section 2.4 below.

Clause 18 (3) states that consent must not be granted for development that clause 18 provides may be carried out with consent unless the consent authority is satisfied that the Director-General has certified in a site compatibility certificate that, in the Director-General's opinion, the development is compatible with the surrounding land uses. Therefore a site comparability certificate (SCC) is required in accordance with this clause.

Clause 19 provides direction on how SCCs are to be made including applying for the SCC, consideration of any comments received from the Council and the consideration of the application including:

1. *existing uses and approved uses of land in the vicinity of the development,*
2. *the impact that the development (including its bulk and scale) is likely to have on the existing uses, approved uses and uses that, in the opinion of the Director-General, are likely to be the preferred future uses of that land,*
3. *the services and infrastructure that are or will be available to meet the demands arising from the development.*

Clause 19 also states that a SCC may certify the development is compatible with the surrounding land uses. In addition the SCC is valid for 5 years and it will continue to apply to the land in respect of which it was issued despite any change in the ownership of that land.

1.1.2 Structure of this Report

To support the SCC application, GHD has prepared this report with a description of the site and its context, the proposal and provided strategic justification for the development in accordance with the requirements of the Infrastructure SEPP. GHD has also undertaken a desktop review and site inspection to determine the potential environmental constraints and opportunities at the site. Possible management measures have also been identified where necessary. This report has been structured as follows:

Chapter 1 – Introduction

Chapter 2 – Site Analysis and Context

Chapter 3 – The Proposal

Chapter 4 – Strategic Justification

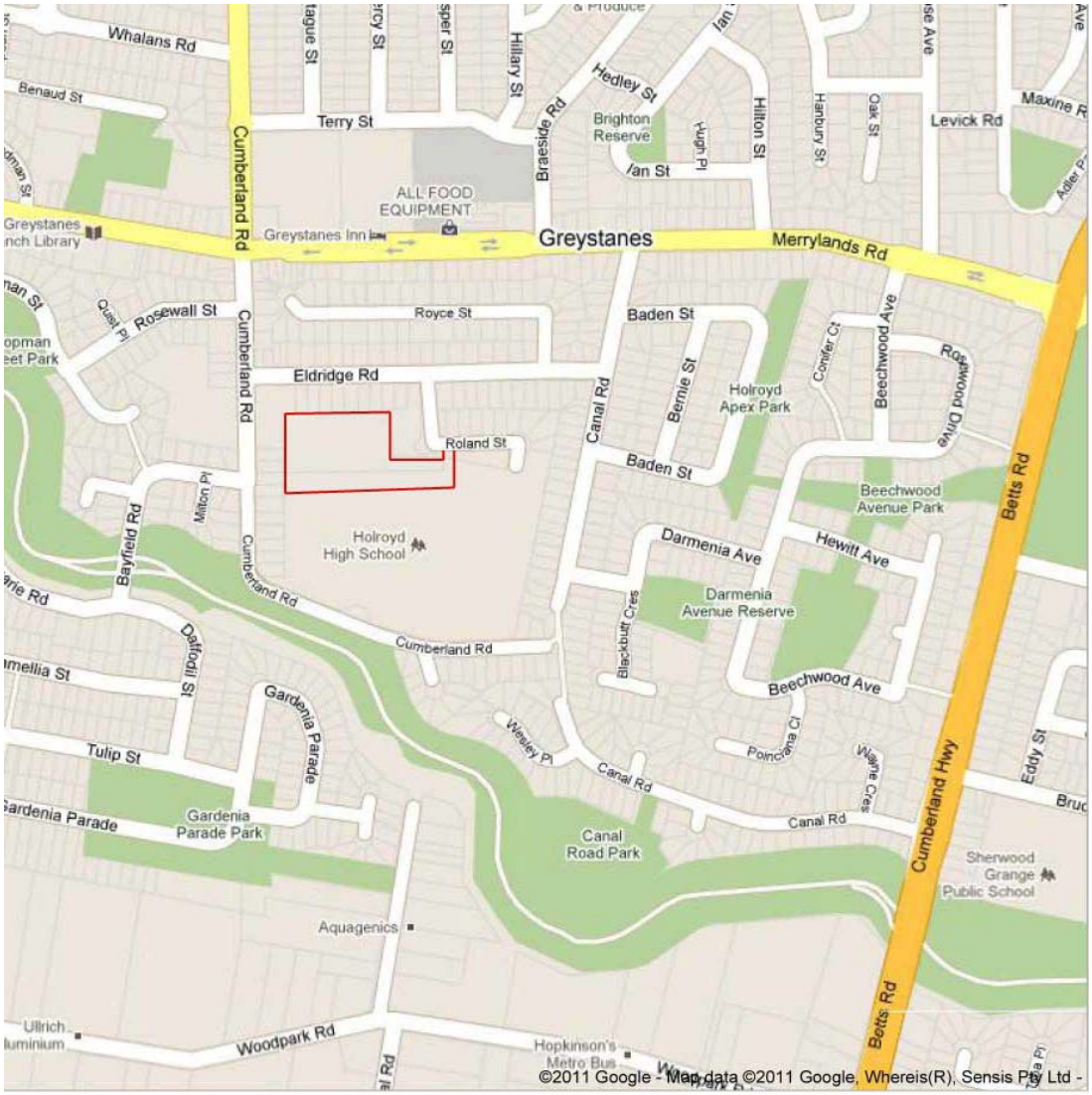
This report is intended to accompany, and should be read in conjunction with the completed SCC application form for the proposal.

2. Site Analysis and Context

2.1 Site Location

The site is referred to as Lot 1 DP 1124346. The site is located in the suburb of Greystanes in the local government area of Holroyd. The site is situated approximately 29 km west of the Sydney central business district and 6 km south west of Parramatta (refer to Figure 1 and Figure 2).

Figure 1 Site Location



Source: Google Maps

Figure 2 Aerial Photograph of the site

Source: Google Earth Pro

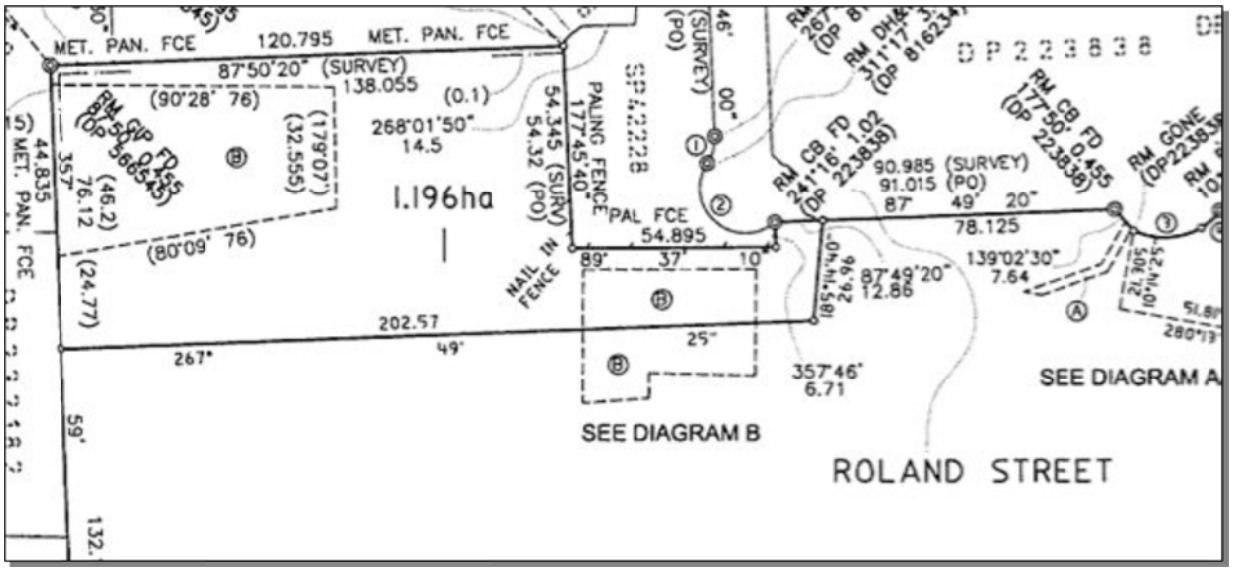
2.2 Site Description

The site used to form part of Holroyd High School located on Cumberland Road at Greystanes and used to comprise the most northern portion of the school site. The site was subdivided from the school in 2007 and covers an area of 1.196 ha with a frontage to Roland Street. The site was previously used for a sports court located in the south-western corner with the remainder unused. Since the site was subdivided it has remained vacant and unused. The site is relatively flat with only a gentle slope towards the north west. The site is predominantly rectangular in shape with the exception of a battleaxe access handle to Roland Street (refer to Appendix A for a site survey).

The site has been filled and is predominantly covered by grass with some vegetation in the north western portion. A small area (approximately 0.2 ha) of this vegetation includes Cumberland Plain Woodland (CPW) which is listed as an Endangered Ecological Community on the TSC and EPBC Acts.

Two Tree Protection Zones (TPZs) are located on the site, covering areas of 4,142m² in the north western corner and 757m² in the south eastern corner. A positive covenant exists over these areas. Figure 3 illustrates the TPZs as hatched lines.

Figure 3 TPZs



2.3 Surrounding Land Uses

The site is bound by one and two-storey residential dwellings to the north, villa residential housing and open space to the east, Holroyd High School including the sports oval and open space to the south and one and two-storey dwellings to the west.

2.4 Zoning

The site is currently zoned 5(a) Special Uses (School) under the *Holroyd Local Environmental Plan* (LEP) *1991*. A copy of the zoning map is shown in Figure 4 below.

Under the Holroyd City LEP, the proposal is likely to be defined as a 'medium density housing' which is not permissible under this zone.

However, (as shown in Section 1.1.1) Clause 18 (2) of the Infrastructure SEPP indicates that in regard to State land development may be carried out which is permitted on adjacent land, despite the zoning of the land on the site. This is subject to the issuing of a SCC by the Director-General (cl 18(3)). The adjacent land is currently zoned 2(a) Residential land under the Holroyd LEP 1991. The proposal is permissible in this zone.

The *Draft Holroyd Local Environmental Plan* (LEP) *2010* has recently been exhibited and as shown in Figure 5 the site is proposed to be zoned as R2 Low Density Residential. The draft LEP proposes to zone land to the north of Eldridge Road as R3 Medium Density Residential which surrounds the local centre. Under *Draft Holroyd LEP 2010,* the proposal would be defined as multi dwelling housing:

> ***multi dwelling housing*** *means 3 or more dwellings (whether attached or detached) on one lot of land (not being an individual lot in a strata plan or community title scheme) each with access at ground level, but does not include a residential flat building.*

Multi dwelling housing is not permitted in the R2 Low Density Residential zone under the Draft *Holroyd LEP 2010*.

Figure 4 City of Holroyd Local Environmental Plan 1991 – Zoning Map

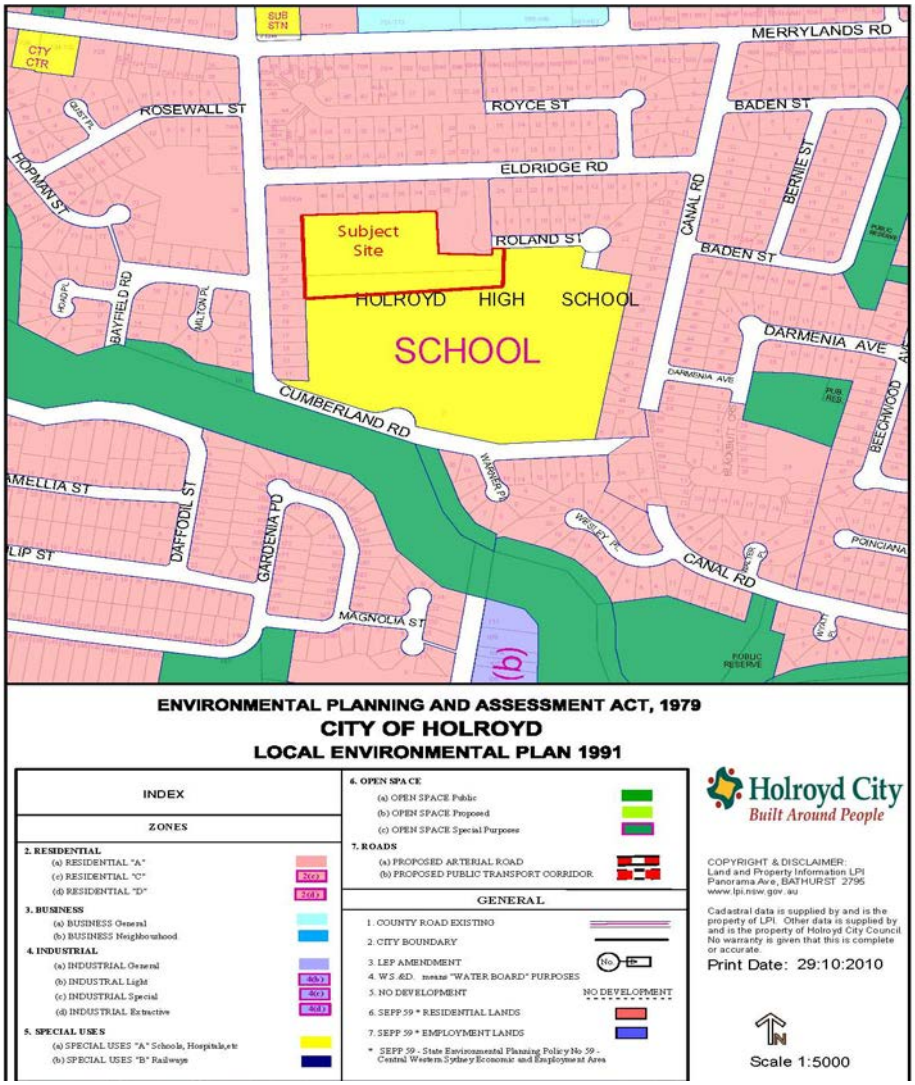
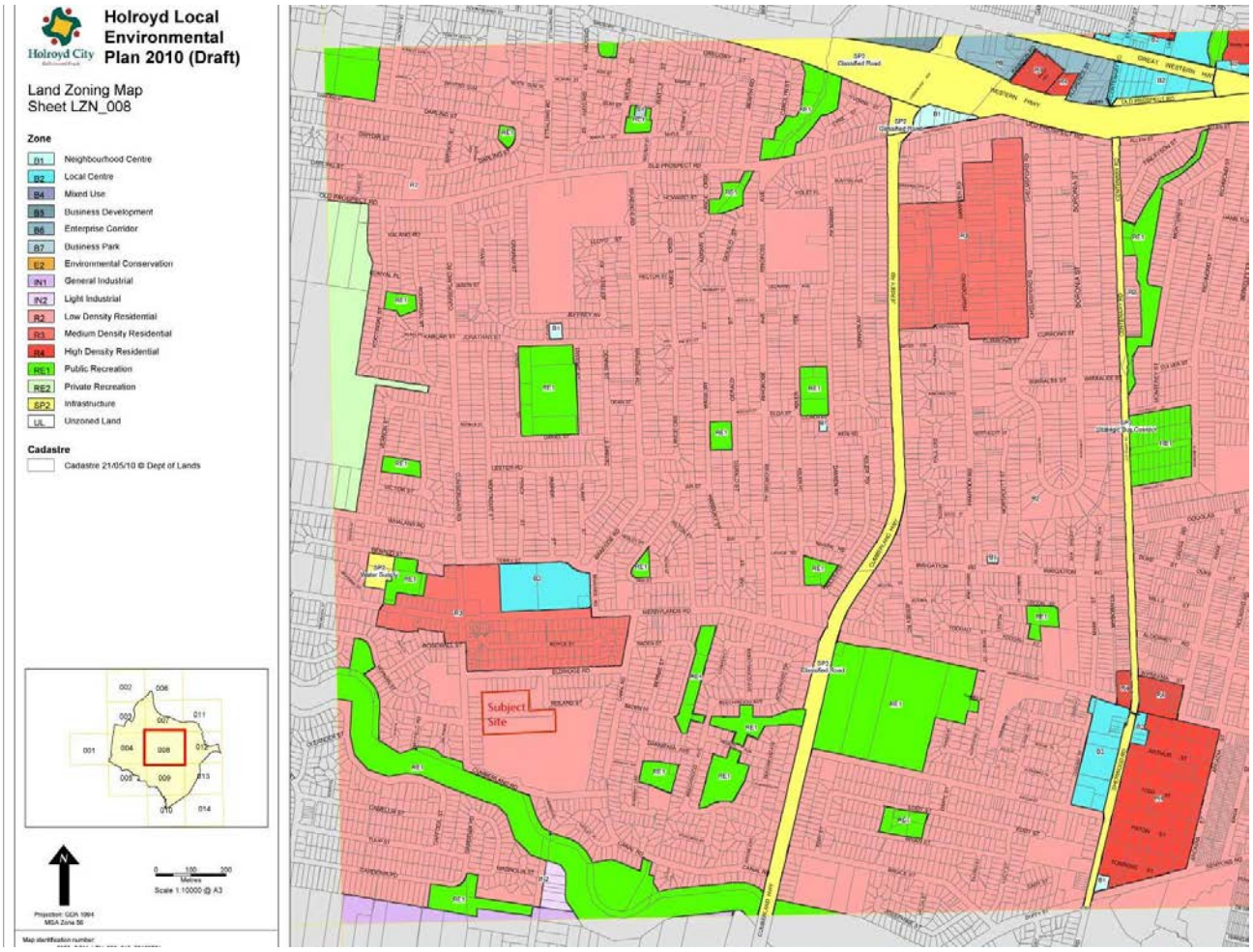


Figure 5 Draft Holroyd LEP 2010



2.5 Access to Services, Facilities and Transport

Pursuant to the requirements of the SCC application, consideration must be given to access to services, facilities and transport surrounding the site. Any proposed development of the site can be adequately serviced with reticulated water, sewer telecommunications and gas services.

The Greystanes Shopping Centre is located approximately 200m north of the site and provides the local community with a variety of commercial services including a supermarket, petrol station, general practitioner and small retail outlets. Paved footpaths for safe pedestrian access between Roland Street and Greystanes Shopping Centre are provided along Eldridge Road, Cumberland Road and Merrylands Road.

A larger commercial district is also located at Merrylands West approximately 1 km to the east of the site. This is a larger centre and includes a supermarket, commercial offices, takeaway food outlets and several other speciality stores.

Access to medical and paramedical services is available at Greystanes Shopping Centre and the Merryland West Shopping Centre. Westmead hospital is located approximately 6 kms north of the site which include 24 hour emergency response and ambulance dispatch.

Public open space is located in close proximity to the site including Hopkins Street Park (located approximately 200m to the west), Brighton Reserve, Holroyd Apex Park, Beechwood Avenue Park (all located approximately 200 m to the east of the site) as well as a regional park called Central Gardens (located approximately 500m to the east of the site). These areas are moderately vegetated and serviced by paved footpaths and children's play equipment. A shared paved pedestrian/cycle way is located approximately 150m south of the site and is accessible from Cumberland Road.

Education facilities within the area include Holroyd High School, abutting the southern boundary of the site, and Sherwood Grange Public School, located approximately 1km south east of the site on Bruce Street, across the Cumberland Highway.

All roads surrounding the site have footpaths providing easy pedestrian access to the site as well as vehicular access to the site via Roland Street. Public transport services operating in the Holroyd area include trains, buses, taxis and community buses. Two regular bus services (Route 806 – Parramatta to Liverpool and 810 – Merrylands to Parramatta) by WestBus operate in the vicinity of the site and provide access to local shopping centres and facilities and connections to the wider bus and rail network across Sydney. Both services operate seven days a week with regular half hourly and hourly stops.

3. The Proposal

3.1 Description

It is proposed to develop up to twenty four (24) dwellings on Lot 1 DP 1124346, Roland Street, Greystanes, NSW. It is proposed that each dwelling be sited on individual lots ranging from 187m^2 to 254m^2 at a density of approximately 1 dwelling per 500m^2. The development has also made provision for driveways, landscaping, and car parking.

A concept masterplan for the site has been prepared and is contained in Appendix B.

The development would be refined as part of the Development Application but would only occupy the unconstrained portion of the site excluding the Tree Protection Zones which cover an area of approximately 4,900m^2.

3.2 Site Planning

The dwellings would be positioned around a central car parking area in the centre of the site. Three blocks would be located either side of a car parking area. The central car parking area would provide car parking spaces for the residential development. An additional car parking area would also be provided adjacent to the access handle in close proximity to the residential dwellings.

Access to the proposal would be from Roland Street. A 6 metre wide access road is proposed from Roland Street which travels to the west towards the proposed site.

The site would not be visible from the street as it would be located at the rear of existing residential development to the north and west and a medium density development to the east.

As previously identified there is a positive covenant applicable to the site with regards to the Tree Protection Zones in the north western and eastern portions of the site. The delineation and future management of these TPZs would need to be addressed as part of any development application for the proposal.

3.2.1 Relationship with Existing Development

The site is surrounded by a number of residential uses. The streetscape is dominated by single-storey red brick / fibro detached dwellings with some two-storey residential multi dwelling developments.

The neighbouring properties directly north and west of the site are single and two storey single dwellings with a generally consistent palette of materials (red brick and tile roofs), front setback and landscape treatment of front gardens. Located directly to the northwest is an Anglican church with a childcare centre.

Directly north east of the site is a large villa development which extends to the corner of Roland Drive and Elridge Road. The proposal would be consistent with this development.

Further to the north of Elridge Road and surrounding Greystanes Shopping Centre is mostly large two storey dwellings as well as a large Department of Housing medium density development. The surrounding neighbourhoods to the south east and west are mostly dominated with single dwelling development with some scattered villa development throughout.

The proposal would be a combination of single and double storey elements constructed in a similar manner to surrounding development and consistent palette of materials. With an average density of approximately 1 dwelling per 500m^2 the proposal will be consistent with surrounding development. The proposal would also include setbacks and landscaping to protect the visual and acoustic privacy of neighbouring residences.

4. Strategic Justification

4.1 Consistency with Regional and Local Strategies

4.1.1 Sydney Metropolitan Plan (2010)

The NSW Government's Metropolitan Plan for Sydney 2036 provides a broad framework for managing growth and development of Sydney over a 25 year period. It aims to support continued economic growth for the Sydney region while balancing social and environmental aspects. It contains a range of policy directions including concentrating jobs in centres, ensuring sufficient housing to meet a growing population, protecting employment lands, increasing the proportion of trips made using public transport, responding to the challenges of climate change and improving environmental outcomes.

Housing targets for the West Central subregion of which the Holroyd LGA is part were set at 96,000 by 2036 to accommodate the needs of the existing and future Sydney population. The Metropolitan Plan aims to concentrate development to strengthen centres, towns, villages and neighbourhoods and establish a balanced approach to accommodating more residential growth in new release areas and existing urban areas.

The Plan identified the requirement for higher density housing with the West Central subregion. In 2004, the subregion had a higher than average amount of detached dwellings, comprising 66 percent of all dwellings, with flat and unit developments below Sydney averages at only 24 percent. Predicted ageing demographics for the subregion may also lead to declines in average household size; placing added pressure on housing supply and reinforcing the need for higher density housing.

The Plan also identifies the issue of housing affordability currently experienced within the local government areas of the West Central subregion. In 2001, residents of the West Central subregion recorded 66 percent of lower income households spending more than 30 percent of their weekly income on housing loan repayments; compared to 59 percent of persons for the Greater Metropolitan Region. To improve housing affordability in the West Central subregion, the Plan encourages Councils to plan for a greater range of housing types, especially in centres with good public transport.

The Sydney Metropolitan Plan does not have any direct implications for the redevelopment of this site, and the proposal does not raise any issues that conflict with the provisions of the Sydney Metropolitan Plan. However, the proposal is consistent with the objectives and housing targets of the Plan in terms of providing for less single dwellings and more medium density housing within the West Central region.

4.1.2 Holroyd City Council Urban Character Study – April 2007

The Holroyd City Council urban character study is for the entire Holroyd LGA. This study was aimed to provide the necessary background information and policy direction for a new Residential Strategy which will also inform the Council's Draft LEP 2010. The study involved street by street analysis of streetscape character, building interface and building typologies and architectural character as well as desktop analysis identifying movement networks, land use character, heritage items and existing urban structure. The outcome of this process was a precincts plan and future character statements that set the framework for future development. This project also delivered place-specific guidelines and controls, with particular regard to the desired future character of the area and its component precincts.

The proposal is within the Greystanes/ Girraween Residential area with an identified change capacity as minimal. The strategy identified the future character in context with the proposal as:

> *'While there are limited opportunities to develop to the north, due to the topography, block and lot layout, and established residential character, increased residential density is envisaged to the west and south of the shopping centre.'*

Future Land Uses in the context of the proposal include:

> *'Retain residential uses around the edges of the commercial core, permitting multi-unit development, for example in the form of terrace housing, semi-detached and zero lot housing, and townhouses/villas'*

A map identifying the targeted future character on Page 65 of the study (ad 2.2.2.1 targeted precinct analysis: Greystanes) identified the neighbourhood surrounding the school as '*Enable higher density - terraces/townhouses'*

Therefore, given the study targeted the future character of the surrounding area as medium density development, the proposal is consistent with the study.

4.2 Adequacy of Services and Infrastructure

The site is considered suitable for a medium density residential development given the surrounding similar forms of development and the availability of water, sewer, telecommunications and gas services.

Existing road infrastructure appears to be sufficient to cope with increased traffic activity associated with additional residents. Future development of the site will be able to access pedestrian facilities by taking advantage of paved footpaths along Roland Street. The existing pedestrian pathway network provides access to some of the existing local level community and commercial services and infrastructure, as well as providing opportunities for recreational pursuits.

4.3 Environmental Benefits and Constraints

4.3.1 Topography, Geology and Soils

Site topography is generally flat (maximum grade 10%) with the majority of the site sloping towards the north west.

The soil within the site is mapped as Blacktown (bt) soil type. Blacktown soil typically occurs on the Cumberland Lowlands. It occurs as gently undulating rises on Wianamatta Shale. Outcrops of shale do not occur naturally on the surface. Fertility is generally low to moderate and is generally highly acidic. Erosion is not a significant problem in this soil type but where vegetation has been cleared there may be minor sheet and gully erosion (Bannerman & Hazelton 1990).

According to Holroyd Draft LEP 2010 'Zone 008 - Combined Local Map 1: Acid Sulfate Soils Map, Salinity Map', the site is not affected by acid sulfate soils. The map also shows that the site has moderate salinity. However, this is unlikely to be a constraint to development on the site.

The topography, geology and soils at the site are not considered to represent a significant constraint to its development for medium density development.

4.3.2 Flora and Fauna

The north western proportion of the site has been designated as a Tree Restriction Zone due the vegetation present in this area identified as Cumberland Plain Woodland (CPW) which is listed as an Endangered Ecological Community on the TSC and EPBC Acts. The site also contains an area of mown grass.

Biosis Research prepared a *'Preliminary Flora and Fauna Assessment of Lot 3, Holroyd High School, Greystanes*' (2003). A copy of the report is contained in Appendix C.

The aims of the assessment was to undertake targeted field surveys for habitat of threatened flora and fauna species, populations or ecological communities that are listed on the TSC Act and the EPBC Act and have been identified as potentially occurring in the area, provide a brief assessment of the habitat values of the site and provide recommendations to minimise the environmental impacts of the proposal.

The report assessed the potential of threatened fauna species, populations and communities and their habitats to occur on the site but does not constitute an assessment under Section 5A of EP&A Act, the TSC Act and the EPBC Act.

The site contains a small area (approximately 0.2 ha) of poor quality Cumberland Plain Woodland which is listed as an Endangered Ecological Community on the TSC and EPBC Acts. This community is isolated, has low species diversity and weeds dominate the understorey. It is considered to be of low conservation significance.

The remainder of the site consists of mown lawn, which is not considered to represent natural vegetation.

One threatened species (*Acacia pubescens*) was recorded within the study site. *Acacia pubescens* is listed as Vulnerable on both the *TSC* and *EPBC*. Thirteen adult plants (including two dead and one senescing) and more than 65 immature or clonal ramets (to 0.5 m) were recorded. It is considered likely that the majority (if not all) of the immature plants are ramets, or clonal plants produced through vegetative reproduction.

The site does not contain potential habitat for any other threatened plant species populations listed on the TSC or EPBC Acts. The site is highly modified and provides habitat resources for mostly generalist and opportunistic native and exotic fauna species. Potential roosting habitat for three species of threatened microbat listed under the TSC Act occurs within the study site. Potential habitat for the remaining threatened species and communities recorded from the local area does not occur on this site.

The report recommends the following:

- If possible the development plan should avoid or minimise the impacts to the area of CPW within the site;
- Prior to development, undertake Eight Part Tests for Cumberland Plain Woodland and *Acacia pubescens*;
- Prior to development undertake EPBC significance assessments for Cumberland Plain Woodland and *Acacia pubescens*;
- Council should advise NPWS about the subdivision application and any future development applications for the site, as these are likely to affect the population of *Acacia pubescens.* This requirement is outlined in the *A. pubescens* recovery plan (NPWS 2003);
- A weed management program should be undertaken within the CPW;

- As part of the impact assessment, further recommendations for the management of the *A. pubescens* population or compensation for its removal/disturbance should be obtained in consultation with NPWS and Holroyd City Council; and,
- Eight part tests (Section 5A of the EP&A Act) should be prepared for the three species of hollow-dependant threatened microbat if the proposal removes hollow-bearing trees.

As a consequence of the recommendation the existing woodland areas have been excluded from the development area. These areas are located on the north western section of the site and along the south eastern boundary of the access handle. These trees would be retained.

A Tree Protection Zones & Weed Management Programme was prepared by Dennis Marsden in 2008 and is contained in Appendix D. The report recommends:

'*The trees in Blocks A and B presented as being in acceptable health at the time of inspection. Structurally, the condition of the trees may be said to be typical of trees that have grown in forest or near-forest conditions……. To ensure the successful protection of the trees and vegetation during construction works, it will be prudent for the developer to appoint an arborist to oversee the tree protection measures, and a bush regenerator to oversee the weed management programme'*

4.3.3 Flooding and Stormwater

The site is not affected by the 1 in 100 year flood event. Stormwater flows from the school buildings are conveyed via two separate pipes to stormwater pits located on the southern side of Roland Street. The first and larger of the two pipes (525 mm diameter) drains to a pit in the cul de sac end of Roland Street. The second pipe (250 mm diameter) drains to a pit located on the southern side of Roland Street, immediately after the 90 degree bend in Roland Street.

Runoff from the grassed school ovals is conveyed as overland flow via informal natural depressions in the existing landform to the cul de sac end of Roland Street. When the capacity of the existing piped drainage systems are exceeded, overland flow from the school buildings and hardstand areas will also travel via the same overland flow path. Before discharging into Roland Street the overland flow passes through an informal detention basin consisting of a low earth embankment. The 525 mm diameter pipe system and overland flow continues in a north westerly direction across the cul de sac and between 27 and 28 Roland Street. An existing 2.43 m easement for drainage is located within Lot 1.

To address Council's requirements and ensure that run off post development is limited to pre-development flows, a stormwater management plan will be prepared which addresses the above issues at the development application assessment stage. Therefore, stormwater and drainage is not considered a constraint to the site's development

4.3.4 Heritage

Indigenous Heritage

To determine if any items of Aboriginal heritage are located within the vicinity of the site, a search of the Department of Environment, Climate Change and Water's Aboriginal Heritage Information Management System (AHIMS) was undertaken. The search revealed that there are no Aboriginal sites located within the site. A search of the Australian Heritage Database was also undertaken and this also indicated that there are no Aboriginal sites located within the site.

Non-Indigenous Heritage

To determine if any items of non-indigenous heritage are located within the site, a search of the following documents and databases was undertaken; Holroyd LEP 1991, the NSW State Heritage Register; and the Australian Heritage Database.

The searches indicated that there are no records of any items of non-indigenous heritage at the site.

4.3.5 Bulk and Density

The proposal would create a bulk and density which is appropriate within the neighbourhood. The proposal will be a similar development to that situated to the north east. The predominant building form is a mix of single and two storey dwelling houses and villa homes and there are a number of two storey medium density developments within the locality.

The use of three blocks will break the building mass and result in a development with bulk scale comparable to the majority of development in the locality. The proposal would use materials similar to that of the locality as well as other techniques such as predominant framing of windows to break the apparent bulk of the development. The proposed bulk suits the scale of the street and is generally consistent with the existing housing density with the area.

4.3.6 Visual Impact

There are no significant view corridors from the site. The proposal would be of a comfortable scale and layout appropriate to the surrounding neighbourhood. The development would locate well designed residential housing within a residential environment. Landscaping can be incorporated at the front of the development to present an appealing entry to the development. Plantings and fencing would also be used throughout the site to soften the impact of the built form and improve the visual impact of the development.

4.3.7 Traffic Impacts

Car parking for residents would be available on-site within the curtilage of each dwelling. Approximately 20 visitor car parking spaces are currently proposed for the development. This would likely be modified once the number of dwellings are confirmed during the development application stage.

Roland Street is a residential street. It is a local street with limited opportunity for on-street car parking.

During construction, some traffic will be generated including workers at the site and delivery of materials. These traffic impacts are expected to be short term only and restricted to standard construction hours, as such, no significant impact is expected.

The development is expected to generate moderate amounts amount of traffic. The RTA Guide to Traffic Generating Developments (2002) provides a traffic generation rate for medium density housing of 4 -5 daily movements per dwelling and weekday peak hour vehicle trips of 0.4 -0.5 per dwelling. This means that the proposal could create an additional 96 to 120 daily movements or 9.6 to 12 evening peak hourly movements.

As such, and in the context of existing traffic volumes and available capacity on Roland Street and the surrounding network, this increase is not considered to be significant.

4.4 Public Benefits

The proposal would allow vacant and unused land to be developed for high quality and sustainable housing in an area that is well serviced with commercial and community facilities and infrastructure and that is currently experiencing high demand for new residential development. It would also provide greater housing choice for current and future residents. It would generate economic and employment opportunities during construction and ensures that areas of significant environment value are protected.

5. Conclusion

The proposal contributes to achieving the strategic objectives for population growth in the LGA in a manner that is consistent with the objectives of the Sydney Metropolitan Plan and Holroyd Urban Character Study. It will also provide additional housing choice for Western Sydney residents. The proposed development would be undertaken on the unconstrained portion of the site, therefore avoiding the Cumberland Plain Woodland on the site.

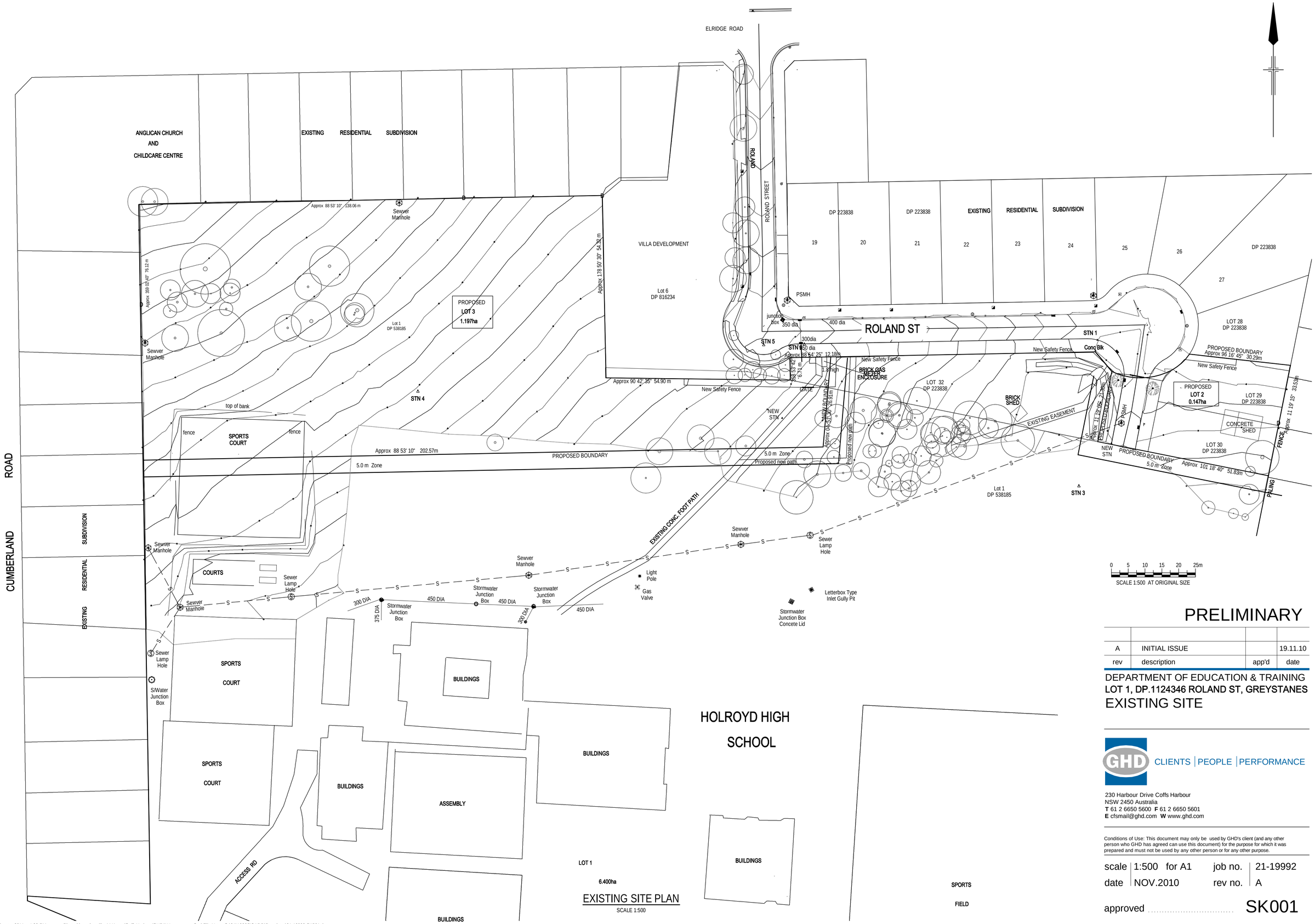
In summary, it is considered that the proposal would have a positive environmental, social and economic benefit in that it would:

- Provide land for high quality and sustainable housing in the area that is growing and where there is high demand for new residential development;
- Provides greater housing choice for current and future residents;
- Generates economic and employment opportunities during construction;
- Ensures that areas of significant environment of value are protected; and
- Generates additional demand for local retail and business services.

No significant adverse environmental, social or economic impacts have been identified which would preclude the site being developed for medium density residential development.

Appendix A

Existing Site Characteristics and Survey



EXISTING SITE PLAN
SCALE 1:500

0 5 10 15 20 25m
SCALE 1:500 AT ORIGINAL SIZE

PRELIMINARY

rev	description	app'd	date
A	INITIAL ISSUE		19.11.10

DEPARTMENT OF EDUCATION & TRAINING
LOT 1, DP.1124346 ROLAND ST, GREYSTANES
EXISTING SITE

GHD CLIENTS | PEOPLE | PERFORMANCE

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NSW 2450 Australia
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E cfsmail@ghd.com **W** www.ghd.com

scale 1:500 for A1 | job no. 21-19992
date NOV.2010 | rev no. A

approved SK001

Plot Date: 23 February 2011 - 4:22 PM Plotted by: Junnifer M Kama/CoffsHarbour/GHD/AU Cad File No: G:\21\19992\CADD\Drawings\21-19992-SK001.dwg

Appendix B

Proposed Master Plan

EXISTING WOODLAND ZONE

APPROX.3000m²

65

PARKING

1 207 m²
2 200 m²
3 200 m²
4 200 m²
5 200 m²
6 200 m²
7 200 m²
8 200 m²
9 187 m²
10 187 m²
11 187 m²
12 191 m²
13 200 m²
14 199 m²
15 200 m²
16 200 m²
17 253 m²
18 254 m²
19 254 m²
20 254 m²
21 254 m²
22 253 m²
23 253 m²
24 236 m²

5m WIDE DRIVEWAY

6m WIDE ACCESS ROAD

ROLAND ST

PARKING

PROPOSED LAYOUT PLAN

SCALE 1:250

0 2.5 5 7.5 10 12.5m

SCALE 1:250 AT ORIGINAL SIZE

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DEPARTMENT OF EDUCATION & TRAINING

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Appendix C

Preliminary Flora and Fauna Assessment

BIOSIS
RESEARCH

Preliminary flora and fauna assessment of Lot 3, Holroyd High School, Greystanes

August 2003

Rhidian Harrington and

Selga Harrington

Natural & Cultural Heritage Consultants 10 Bartley St Chippendale NSW 2008

BIOSIS
RESEARCH

Report for GHD

Preliminary flora and fauna assessment of Lot 3, Holroyd High School Greystanes

2003

Rhidian Harrington and

Selga Harrington

Project no: s3902

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ABBREVIATIONS

ANW	Atlas of NSW Wildlife
EIS	Environmental Impact Statement
EP&A Act	*Environmental Planning and Protection Act 1979*
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
LGA	Local Government Area
MNES	Matter of National Environmental Significance
NPWS	National Parks and Wildlife Service
REF	Review of Environmental Factors
ROTAP	Rare or Threatened Australian Plant as listed by Briggs and Leigh (1995)
SIS	Species Impact Statement
SEPP	State Environmental Planning Policy
TSC Act	*Threatened Species Conservation Act 1995*
sp.	Species (singular)
spp.	Species (plural)
ssp.	Subspecies
var.	Variety

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SUMMARY

Biosis Research Pty Ltd was commissioned by GHD to undertake a preliminary terrestrial flora and fauna assessment of Lot 3 at Holroyd High School (study site). This report assesses the ecological significance of threatened species, populations and communities and their habitats that occur, or have the potential to occur, on the site. It is proposed to subdivide and redevelop the property, although the ultimate development is not known.

The study area contains a small area (approximately 0.2 ha) of poor quality Cumberland Plain Woodland (CPW) which is listed as an Endangered Ecological Community on the *TSC* and *EPBC Acts*. This community is isolated, has low species diversity and weeds dominate the understorey. It is considered to be of low conservation significance.

While the site contains tree and shrub canopies that are structurally similar (at least in part) to that of native woodland communities, changes to the vegetation, limited microhabitat features (e.g. ground cover and tree-hollow development) and isolation, have meant that the site would only provide limited opportunities for mostly commonly occurring species.

Only one threatened species (*Acacia pubescens*) was recorded within the study site, although 18 threatened plant and 30 threatened animal species listed under the *Threatened Species Conservation Act 1995* (*TSC Act*) and/or *Environment Protection and Biodiversity Conservation Act 1999* (*EPBC Act*) have been recorded within 10 km of the study site. With the possible exception of hollow-dependent microbats, habitat resources within the study site were generally unsuitable or very limited for the remaining threatened species.

Recommendations for the study site include the retention of mature hollow-bearing trees, minimising the impacts to CPW, undertaking Eight Part Tests and EPBC significance assessments for CPW and *Acacia pubescens* prior to development and a weed management program within the CPW.

1.0 INTRODUCTION

Biosis Research was commissioned by GHD to undertake a preliminary flora and fauna assessment of Lot 3 at Holroyd High School (study site)(Figure 1 and Figure 2).

This report has been prepared to address terrestrial flora and fauna issues raised following the lodging of a subdivision application for the site with Holroyd City Council. A public meeting is to be held on Thursday 14th August to address community concerns regarding this application. The proposed development will consist of a subdivision DA of Holroyd High School, although the final development has not yet been determined.

This report assesses the potential of threatened fauna species, populations and communities and their habitats to occur on the site, but does not constitute an assessment under Section 5A of the *Environmental Planning and Assessment Act 1979* (*EP&A Act*), the *Threatened Species Conservation Act 1995* (*TSC Act*) and the *Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)*.

The study site consists of a small patch (approximately 0.2 ha) of Shale Plains Woodland and mown lawns, which is surrounded by residential subdivisions. The site lies within the Holroyd City Council Local Government Area (LGA) and is currently zoned 5(a) Special Uses (school). Historically, Shale Plains Woodland (a sub-unit of Cumberland Plain Woodland) would have covered much of the local area, which is listed as an Endangered Ecological Community (EEC) under both the *TSC Act* and *EPBC Act*. The broad purpose of this assessment is to identify any ecological constraints to development.

1.1 Aims

The general aim of this report is to undertake a preliminary flora and fauna assessment of the study site.

The specific aims are to:

1. conduct a literature review and database search for the area surrounding the study site;
2. undertake targeted field surveys for habitat of threatened flora and fauna species, populations or ecological communities that are listed on the *TSC Act* and the *EPBC Act* and have been identified as potentially occurring in the area;
3. provide a brief assessment of the habitat values of the site;

4. assess the need for Eight Part Test assessments (for threatened species listed on the *TSC Act*) and Assessment of Significance (for threatened species listed on the *EPBC Act)* for significant flora and fauna species, populations and ecological communities existing or potentially occurring in the study area; and,

5. provide recommendations to minimise the environmental impacts of the proposed development.

2.0 METHODS

The study site was inspected on 7 August 2003. The general condition of the site was assessed and observations of flora and fauna species and vegetation communities were made (as detailed below). During the site visit the temperature was about 20^{o}C and there was no cloud cover.

2.1 Taxonomy

The plant taxonomy (method of classification) used in this report follows Harden (1990, 1992, 1993, 2002), Fairley and Moore (2000), Robinson (1994) and subsequent advice from the National Herbarium of NSW.

Names of vertebrates follow the Census of Australian Vertebrates (CAVs) maintained by Environment Australia.

2.2 Literature and Database Review

Records of threatened species, populations and communities were obtained from the National Parks and Wildlife Service (NPWS) Atlas of NSW Wildlife within a 10 km radius of the study site, using the Penrith and Sydney 1:100 000 map sheets (NPWS 2002). Records for threatened species, populations and communities listed on the *EPBC Act* were obtained from the Environment Australia EPBC Online Database (Environment Australia 2003) within a 10 km radius of the study site. Database searches were conducted in August 2003.

2.3 Flora Survey

Species of plant growing in the study area were surveyed by undertaking a general habitat assessment as well as targeted searches for habitat of threatened species. Incidental observations of other species were recorded.

2.3.1 Flora Habitat Assessment

The condition of the vegetation was assessed according to the degree to which it resembled relatively natural, undisturbed vegetation using the following criteria:

- species composition (species richness, degree of weed invasion); and,
- vegetation structure (representation of each of the original layers of vegetation).

Three categories were used to evaluate general habitat value; Good, Moderate or Poor, as detailed below:

Good: containing a high number of indigenous species; no weeds present or weed invasion restricted to edges and track margins; vegetation community contains original layers of vegetation; vegetation layers (ground, shrub, canopy etc) are intact.

Moderate: containing a moderate number of indigenous species; moderate level of weed invasion; weeds occurring in isolated patches or scattered throughout; one or more of original layers of vegetation are modified; vegetation layers (ground, shrub, canopy etc) are largely intact.

Poor: containing a low number of indigenous species; high level of weed invasion; weeds occurring in dense patches or scattered throughout; one or more of the original layers of vegetation are highly modified; one or more original vegetation layers (ground, shrub, canopy etc) are modified or missing.

2.4 Fauna Survey

Fauna species using the site were surveyed by undertaking active searches and listening, as well as recording incidental observations.

2.4.1 Fauna Habitat assessment

The three categories used to evaluate habitat value were Good, Moderate or Poor, as detailed below:

Good: ground flora containing a high number of indigenous species; vegetation community structure, ground, log and litter layer intact and undisturbed; a high level of breeding, nesting, feeding and roosting resources available; a high richness and diversity of native fauna species.

Moderate: ground flora containing a moderate number of indigenous species; vegetation community structure, ground log and litter layer moderately intact and undisturbed; a moderate level of breeding, nesting, feeding and roosting resources available; a moderate richness and diversity of native fauna species.

Poor: ground flora containing a low number of indigenous species, vegetation community structure, ground log and litter layer disturbed and modified; a low level of breeding, nesting, feeding and roosting resources available; a low richness and diversity of native fauna species.

Other habitat features such the value of the study area as a habitat corridor, the presence of remnant communities or unusual ecological vegetation community structure were also used to assess habitat quality.

2.5 Limitations

This study was by design a brief and preliminary habitat assessment and was conducted in accordance to methodology that would be employed for an assessment in accordance with Section 5A of the *EP&A Act*. Eight Part Tests and Assessment of Significance under the *EPBC Act* are outside the scope of works of this report. No trapping, spotlighting, call playback or vegetation quadrat sampling techniques were used.

3.0 RESULTS

A list of the flora and fauna species recorded during the survey are provided in *Appendix 1* and *Appendix 2* respectively.

3.1 Soil

The soil within the study area is mapped as Blacktown (bt) soil type. Blacktown soil typically occurs on the Cumberland Lowlands. It occurs as gently undulating rises on Wianamatta Shale. Outcrops of shale do not occur naturally on the surface. Fertility is generally low to moderate and is generally highly acidic. Erosion is not a significant problem in this soil type but where vegetation has been cleared there may be minor sheet and gully erosion (Bannerman & Hazelton 1990).

The vegetation on this soil type is almost completely cleared but typically consists of open dry sclerophyll forest/woodland. Typical species include *Eucalyptus tereticornis, E. crebra, E. mollucana* and *E. maculata*. Between Liverpool sand St Marys, the dominant species are *E. globoidea* and *E. fibrosa* with *E. longifolia* in the understorey (Bannerman & Hazelton 1990).

3.2 Vegetation Communities

The study site has been previously mapped as cleared (Benson 1992). However, in more detailed vegetation mapping, the study site has been mapped as an agricultural area with no major development containing Shale Plains Woodland with less than 10% canopy cover (NPWS 2000a). Shale Plains Woodland is a subset of Cumberland Plain Woodland, which is listed as an Endangered Ecological Community on both the *TSC* and *EPBC Acts*.

The study site also contains an area of mown grass. A brief description of both communities within the site is provided below.

Cumberland Plain Woodland (CPW)

The study site contains 18 trees (Draper & Shields 2003) to approximately 15-20 m tall. The canopy is sparse (approximately 20% cover) and consists of native species including *Eucalyptus mollucana* and *E. tereticornis*. The shrub layer (to 3m) is very sparse (less than 1% cover) and consists of *Acacia pubescens* (11 extant planted individuals) and *Acacia decurrens* (two individuals). The ground cover (to 1 m high) consists almost exclusively of weeds particularly *Chloris virgata* and various Asteraceae species such as *Bidens pilosa* and *Senecio*

madagascariensis. Only two native ground cover species (less than 1 % cover) were recorded (*Danthonia tenuior* and *Panicum simile*).

This vegetation community is in poor condition, although the community did contain *Acacia pubescens*, which is listed as a Vulnerable species on both the *TSC* and *EPBC Acts*. Despite the presence of *A. pubescens*, the study site is considered to be of low-moderate conservation significance due to its small size, high degree of weed invasion, low species diversity and isolation.

Mown Lawn

The majority of the study site consists of mown lawn. This area is dominated by introduced grass and herb species. Five remnant trees (*E. mollucana* and *E. tereticornis*) are located toward the eastern margin. This vegetation is not representative of any natural vegetation community and is therefore considered to be of low conservation significance.

3.2.1 Significant vegetation communities

The study site contains Shale Plains Woodland, which is a subset of CPW. As CPW is listed as an Endangered Ecological Community on the TSC Act, an Eight Part Test would be required for this community prior to development.

3.3 Flora

Twenty three vascular plant species were recorded from this area, comprising eight (35%) locally indigenous species and 15 (65%) introduced species.

3.3.1 Significant Flora

Sixteen threatened plant species and one endangered plant population (within Holroyd City Council LGA) are listed on the *TSC Act* (Figure 2) and 13 threatened flora species from the *EPBC Act*, or their habitat have been recorded within the local area (NPWS Atlas of NSW Wildlife, Environment Australia Online Database, (Table 1). A total of 18 threatened flora species are considered in this report.

Table 1: Threatened flora listed on the *TSC Act* or *EPBC Act* that have the potential to occur in the local area.

Scientific Name (Common Name)	*TSC Act*[1]	*EPBC Act*[2]	ROTAP[3]	Habitat	Potential habitat
Acacia pubescens (Downy Wattle)	V	V	3Va	Grows in open sclerophyll forest or woodland on clay soils (Harden 1991,	Recorded

Scientific Name **(Common Name)**	***TSC Act***[1]	***EPBC Act***[2]	**ROTAP**[3]	**Habitat**	**Potential habitat**
				Robinson 1994), usually on gravelly clay containing ironstones (NPWS 1999a, Fairley & Moore 2000). This species typically occurs at the integrade between shales and sandstones (NPWS 1999a).	
Bothriochloa biloba (Lobed Blue-grass)	V	V	3V	Found in woodland on nutrient poor soils (Harden 1993). This species has a strong preference for heavier textured soils and has previously been recorded on volcanic soils. Restricted levels of grazing and growth of Aristida ramosa have been found to cause reduction and exclusion of this species (Bean 1999).	No
Caladenia tessellata (Thick Lip Spider Orchid)	E	V	3V	Low open forest with heath or sometimes grass understorey – this species only grows in very dense shrubbery in coastal areas (Bishop 1996)	No
Cryptostylis hunteriana (Leafless Tongue Orchid)	V	V	3V	This species typically grows in swamp-heath on sandy soils chiefly in coastal districts (Harden 1993) but has also been recorded on steep bare hillsides (Bishop 1996). Within the Central Coast bioregion, this species has been recorded within Coastal Plains Smooth-barked Apple Woodland (mu 30) and Coastal Plains Scribbly Gum Woodland (mu 31) (Bell 2001).	No
Cynanchum elegans	E	E	3Ei	Rainforest gullies scrub and scree slopes in Gloucester and Wollongong districts (Harden 1992)	No
Dillwynia tenuifolia	V EP*	V	2Vi	Occurs in the Cumberland Plain and Blue Mountains to Howes Valley area where it grows in dry sclerophyll woodland on sandstone, shale or laterite (Harden 2002). Typically it forms large populations within a restricted distribution and specific habitat (Castlereagh Ironbark Forest) (Rymer *et al.* 2002).	No
Diuris aequalis (Buttercup Doubletail)	E	V	3V	Occurs mainly in the ranges and tablelands from Braidwood to Kanangra and Liverpool where it grows among grass in sclerophyll forest (Harden 1993)	No
Epacris purpurascens var. purpurascens	V	-	2K	Sclerophyll forest, scrub and swamps – from Gosford and Sydney districts (Harden 1992)specifically this species is thought to require wet heath vegetation (T. James pers. comm.)	No
Marsdenia viridiflora ssp. viridiflora (Native Pear)	EP	-	-	This species has a wide distribution in subcoastal and southern Queensland but has been recorded rarely in NSW and from a disjunct occurrence near Sydney where it occurs as occurs as very scattered plants in areas of remnant vegetation (NSW Scientific Committee 2003). Grows in woodland and scrub	No

***Scientific Name* (Common Name)**	***TSC Act*[1]**	***EPBC Act*[2]**	**ROTAP[3]**	**Habitat**	**Potential habitat**
				(Harden 1992).	
Persoonia nutans	E	E	2Ei	Grows in Woodland to dry sclerophyll forest on clay soils and old alluviums on the Cumberland Plain (Harden 1991, Robinson 1994)	No
Pimelea curviflora var. curviflora	V	V	-	Restricted to coastal areas on sandstone (Harden 1990, Fairley & Moore 2000) and laterite where it is often found amongst dense grasses and sedges (NSW Scientific Committee 1998).	No
Pimelea spicata	E	E	3Ei	In western Sydney, *P. spicata* grows in Grey Box- Ironbark Woodland with an understorey of *Bursaria spinosa* and *Themeda australis*. In the Illawarra, it grows on clay soils in grassland or open woodland (NPWS 2000b).	No
Pomaderris brunnea (Rufous Pomaderris)	V	V	2V	Open forest confined to the Colo River & upper Nepean River (Harden 1990), on clay & alluvial soils (Fairley & Moore 1995)	No
Pomaderris prunifolia var. prunifolia	EP*	-	-	Mainly occurs south of the Hunter Valley but also occurs at the western extremity of the Nandewar Range and Chandler River Gorge. It is found on rocky slopes, often near creeks (Harden & Murray 2000).	No
Pterostylis saxicola (Sydney Plains Greenhood)	E	E	-	Shallow soils over sandstone sheets often near streams – Picnic Point to Picton (Harden 1993)). Occurs where vegetation up-slope of potential habitat is shale derived – preference for shale sandstone interface (T. James pers. comm.)	No
Pultenaea pedunculata	E	-	-	Restricted to Wianamatta Shale on the Cumberland Plane and near Merimbula where it grows in dry sclerophyll forest and disturbed sites (Harden 2002).	No
Tetratheca glandulosa	V	V	2V	Found on sandy or rocky soils in heath, scrub (Harden 1992) or woodland (Robinson 1994)	No
Wilsonia backhousei	V	-	-	Found in coastal saltmarshes (Harden 1992, Robinson 1994)	No

Key: 1) Listed on the *TSC Act* as Endangered (E), Vulnerable (V) or (EP) Endangered Population) * not listed as an Endangered Population within Holroyd City Council LGA, therefor does not apply to the study area
2) Listed on the *EPBC Act* as Endangered (E) or Vulnerable (V)
3) ROTAP= Rare or Threatened Australian Plant (Briggs & Leigh 1995); for description of codes see Appendix 4

Acacia pubescens (listed as Vulnerable on both the *TSC* and *EPBC Acts*) was recorded within the site. Individuals of this species were planted on site within remnant CPW in 1994 (Trezise 2003). As such an Eight Part Test would be required for this species prior to development. A brief description of the population is provided below.

No other significant flora species or their habitats were recorded within the study area (Table 1).

Acacia pubescens

Acacia pubescens is a spreading shrub 1-5 m tall with bipinnate leaves and conspicuously hairy branches. It produces inflorescences of bright yellow globular heads of flowers between August and October.

There are currently six extant populations of *Acacia pubescens* within Holroyd City Council (not including the planted population within the study site). Within the study site, a total of 10 healthy, one senescent and two dead adult plants were recorded (to 2.5 m tall). None of the *A. pubescens* plants were flowering or fruiting at the time of the survey.

Surrounding each adult plant (including the 'dead plants') were several small immature plants (to 50 cm tall). More than 65 immature plants were recorded within the site and all found were within approximately 2 m of an adult plant. Given that *Acacia pubescens* was planted within the site in 1994, the adult plants would be approximately 9 years old. Since individuals are thought to reach reproductive maturity within 3-5 years (NPWS 2003), the plants are likely to have had 3-6 reproductive years. Given that seed set is very low (NPWS 2003), it is considered likely that the majority (if not all) of the seedlings are actually clonal ramets produced through vegetative reproduction.

The population is considered to be of low conservation value due to the small size of available habitat (800 m^2), the poor quality of the habitat, ongoing disturbances and the isolated nature of the site, which limits the site as a corridor.

3.4 Fauna Habitats

The fauna habitat types within the study site broadly correspond with the vegetation type described in section 3.2. Main habitat features included native tree and shrub canopies, which provide refuge and nesting opportunities for commonly occurring native and exotic bird species. One larger eucalypt specimen has developed some small to medium sized hollows and could provide habitat for hollow-dependent fauna, including hollow nesting birds (e.g. parrots and cockatoos) and mammals (brushtail possums and possibly microbats). However, these resources are limited to one tree and competition between hollow-dwelling species for this resource is likely to be intense. A breeding pair of galah occupied the main hollow of the only hollow-bearing tree.

The study site contains highly altered vegetation (both in structure and composition) that is isolated from other patches of vegetation within the local area. While some sedentary native species may use the site on a permanent basis other species, specifically dispersive and eruptive species (birds and bats) may use the study site on a transitory or temporary basis. However, there are no feasible opportunities for movement for native ground dwelling fauna between the study site and other local habitats.

The study site is consistent with that of a tree lined 'park' setting that provides habitat for mostly commonly occurring, opportunistic native fauna. However changes to native vegetation, isolation and site maintenance have limited the resource opportunities for most native species, such that the habitat is considered to be in poor condition. Although some microhabitat components (tree hollows) might, at best, provide moderate habitat resources, principally for common avifauna and possibly microbats.

The study site and surrounding areas would also provide food resources for common birds, which prey upon insects, invertebrates, small reptiles and introduced rodents. Foraging resource for nectivorous birds (e.g. family Meliphagidae) could be obtained from the trees within the study site, but these resources mostly flower in spring or early summer. There were no winter flowering eucalypts present. The site therefore is unlikely to provide sufficient food resources for two threatened species of nectivorous birds, the Regent Honeyeater *Xanthomyza phrygia* and Swift Parrot *Lathamus discolor*.

3.5 Fauna Species

A detailed fauna survey was not undertaken for this assessment. Incidental observations of fauna species utilising the study site are listed in Appendix 2 and include 15 bird species (three introduced). The low species count reflects the limited survey period and the restricted habitat opportunities across the site. No doubt additional species would be recorded at other times. All avifauna observed were common to the urban Sydney area (see Appendix 2).

The only arboreal mammal expected to occur is the Common Brushtail Possum *Trichosurus vulpecula*. However, tree markings and scats typical of this species were not detected.

3.6 Significant Fauna

Based on the NPWS Atlas of NSW Wildlife data and the EPBC database of Environment Australia, there are 23 threatened animal species that must be

considered under the *TSC Act* (Figure 3) and 22 species that must be considered under the *EPBC Act.* Fifteen of these species must be considered under both Acts (Table 2).

The existence of one hollow-bearing tree provides potential habitat opportunities for three species of hollow-dependent microbat:

- Greater Broad-nosed Bat *Scoteanax rueppellii*
- Eastern False Pipistrelle *Falsistrellus tasmaniensis*
- East Coast Freetail Bat *Mormopterus norfolkensis*

Table 2: Terrestrial fauna listed on the *TSC Act* or *EPBC Act* hat may occur in the local area.

Class Name	Latin Name	Common Name	*TSC Act*	*EPBC Act*	Habitat	Potential habitat
Mollusc	*Meridolum corneovirens*	Cumberland Plain Land Snail	E1		Favours habitats on clay soils associated with Cumberland Plain. Found in Cumberland Plain Woodland vegetation types.	No
Amphibians	*Heleioporus australiacus*	Giant Burrowing Frog	V	V	Prefers hanging swamps on sandstone shelves adjacent to perennial non-flooding creeks (Daly 1996, Recsei 1996). Can also occur within shale outcrops within sandstone formations. In the southern part of its range can occur in wet and dry forests, montane sclerophyll woodland and montane riparian woodland (Daly 1996). Individuals can be found around sandy creek banks or foraging along ridge-tops during or directly after heavy rain. Males often call from burrows located in sandy banks next to water (Barker *et al.* 1995).	No
	Litoria aurea	Green and Golden Bell Frog	E1	V	Found in marshes, dams and stream sides, particularly those containing bullrushes or spikerushes (NPWS 1999b). Preferred habitat contains water bodies that are unshaded, are free of predatory fish, have a grassy area nearby and have diurnal sheltering sites nearby such as vegetation or rocks (White & Pyke 1996, NPWS 1999b).	No
	Mixophyes balbus	Stuttering Frog	E1	V	This species is usually associated with mountain streams, wet mountain forests and rainforests (Barker *et al.* 1995). It rarely wanders very far from the banks of permanent forest streams, although it will forage on nearby forest floors. Eggs are deposited in leaf litter on the banks of streams and are washed into the water during heavy rains (Barker *et al.* 1995).	No
	Mixophyes iteratus	Giant Barred Frog	E1	E	Usually found in coastal riverine rainforest and upland areas such ass the Border Ranges (Barker *et al.* 1995).	No
Birds	*Gallinago hardwickii*	Latham's Snipe		M	Typically found on wet soft ground or shallow water with good cover of tussocks. Often found in wet paddocks, seepage areas below dams (Pizzey & Knight 1997).	No

Class Name	Latin Name	Common Name	*TSC Act*	*EPBC Act*	Habitat	Potential habitat
	Haliaeetus leucogaster	White-bellied Sea-Eagle		M	A migratory species that is resident to Australia. Found in terrestrial and coastal wetlands; favoring deep freshwater swamps, lakes and reservoirs; shallow coastal lagoons and saltmarshes (English & Predavec 2001).	No
	Hirundapus caudacutus	White-throated Needletail		M	An aerial species found in feeding concentrations over cities, hilltops and timbered ranges (Pizzey 1983).	No
	Lathamus discolor	Swift Parrot	E1	EM	The Swift Parrot occurs in woodlands and forests of New South Wales from May to August, where it feeds on eucalypt nectar, pollen an associated insects (Forshaw & Cooper 1981). The Swift Parrot is dependent on flowering resources across a wide range of habitat in its wintering grounds in New South Wales (Shields & Crome 1992). This species is migratory breeding in Tasmania and also nomadic moving about in response to changing food availability (Pizzey 1983).	No
	Melithreptus gularis gularis	Black-chinned Honeyeater	V		Found mostly in open forests and woodlands dominated by box and ironbark eucalypts (Higgins *et al.* 2001). It is rarely recorded east of the Great Dividing Range (Higgins *et al.* 2001).	No
	Monarcha melanopsis	Black-faced Monarch		M	A migratory species found during the breeding season in damp gullies in temperate rainforests. Disperses after breeding into more open woodland (Pizzey 1983).	No
	Myiagra cyanoleuca	Satin Flycatcher		M	Migratory species that occurs in coastal forests, woodlands and scrubs during migration. Breeds in heavily vegetated gullies (Pizzey 1983).	No
	Pluvialis fulva	Pacific Golden Plover		M		No
	Polytelis swainsonii	Superb Parrot	V	V	Found mainly in open, tall riparian River Red Gum forest or woodland. Often found in farmland including grazing land with patches of remnant vegetation. Breed in hollow branches of tall Eucalypt tress within 9 km of feeding areas (Higgins 1999).	No
	Rhipidura rufifrons	Rufous Fantail		M	Migratory species that prefers dense, moist undergrowth of tropical rainforests and scrubs. During migration it can stray into gardens and more open areas (Pizzey 1983).	No
	Rostratula benghalensis	Painted Snipe	V	M	Found in the fringes of swamps, dams, sewage farms, marshy areas, generally with cover of grasses, lignum or open timber (Pizzey & Knight 1997).	No
	Xanthomyza phrygia	Regent Honeyeater	E1	EM	A semi-nomadic species occurring in temperature eucalypt woodlands and open forests. Most records are from box-ironbark eucalypt forests associations and wet lowland coastal forests (Pizzey 1983, NPWS 1999c).	No
Mammals	*Cercartetus*	Eastern Pygmy-	V		Inhabits rainforest through sclerophyll forest to tree heath. Banksias and myrtaceous shrubs	No

Class Name	Latin Name	Common Name	*TSC Act*	*EPBC Act*	Habitat	Potential habitat
	nanus	possum			and trees are a favoured food source. Will often nest in tree hollows, but can also construct its own nest (Turner & Ward 1995). Because of its small size it is able to utilise a range of hollow sizes including very small hollows (Gibbons & Lindenmayer 1997). Individuals will use a number of different hollows and an individual has been recorded using up to 9 nest sites within a 0.5ha area over a 5 month period (Ward 1990).	
	Chalinolobus dwyeri	Large-eared Pied Bat	V	V	Located in a variety of drier habitats, including the dry sclerophyll forests and woodlands to the east and west of the Great Dividing Range (Hoye & Dwyer 1995). Can also be found on the edges of rainforests and in wet sclerophyll forests (Churchill 1998). This species roosts in caves and mines in groups of between 3 and 37 individuals (Churchill 1998).	No
	Dasyurus maculatus	Spotted-tailed Quoll	V	V	Uses a range of habitats including sclerophyll forests and woodlands, coastal heathlands and rainforests (Dickman & Read 1992). Habitat requirements include suitable den sites, including hollow logs, rock crevices and caves, and abundance of food and an area of intact vegetation in which to forage (Edgar & Belcher 1995).	No
	Falsistrellus tasmaniensis	Eastern False Pipistrelle	V		Inhabit sclerophyll forests, preferring wet habitats where trees are more than 20 m high (Churchill 1998). Two observations have been made of roosts in stem holes of living eucalypts (Phillips 1995). There is debate about whether or not this species moves to lower altitudes during winter, or whether they remain sedentary but enter torpor (Menkhorst & Lumsden 1995). This species also appears to be highly mobile and records showing movements of up to 12 km between roosting and foraging sites (Menkhorst & Lumsden 1995).	No
	Miniopterus schreibersii	Common Bent-wing Bat	V	C	Uses a broad range of habitats including rainforests, wet and dry sclerophyll forests, open woodlands and open grasslands (Churchill 1998). Roosts in caves, but can also use manmade structures such as mines and road culverts (Dwyer 1995, Churchill 1998). Specific caves are used as nursery caves, containing a large number of individuals, which can be used year after year (Dwyer 1995, Churchill 1998).	No
	Mormopterus norfolkensis	East Coast Freetail Bat	V		Most records are from dry eucalypt forests and woodlands to the east of the Great Dividing Range. Appears to roost in trees, but little is known of this species habits (Allison & Hoye 1995, Churchill 1998).	No
	Myotis adversus	Large-footed Myotis	V		Occurs in most habitat types as long as they are near permanent water bodies, including streams, lakes and reservoirs. Commonly roost in caves, but can also roost in tree hollows, under bridges and in mines (Richards 1995, Churchill 1998).	No
	Petaurus	Squirrel Glider	V		Generally occurs in dry sclerophyll forests and woodlands but is absent from dense coastal	No

Class Name	Latin Name	Common Name	*TSC Act*	*EPBC Act*	Habitat	Potential habitat
	norfolcensis				ranges in the southern part of its range (Suckling 1995). Requires abundant hollow bearing trees and a mix of eucalypts, banksias and acacias (Quin 1995). There is only limited information available on den tree use by Squirrel gliders, but it has been observed using both living and dead trees as well as hollow stumps (Gibbons & Lindenmayer 1997). Within a suitable vegetation community at least one species should flower heavily in winter and one species of eucalypt should be smooth barked (Menkhorst *et al.* 1988).	
	Petrogale penicillata	Brush-tailed Rock-wallaby	V	V	Found in rocky areas in a wide variety of habitats including rainforest gullies, wet and dry sclerophyll forest, open woodland and rocky outcrops in semi-arid country. Commonly sites have a northerly aspect with numerous ledges, caves and crevices (Eldridge & Close 1995).	No
	Potorous tridactylus	Long-nosed Potoroo	V	V	Inhabits coastal heath and wet and dry sclerophyll forests. Generally found in areas with rainfall greater than 760 mm. Requires relatively thick ground cover where the soil is light and sandy (Johnston 1995).	No
	Pteropus poliocephalus	Grey-headed Flying-fox	V	V	This species is a canopy-feeding frugivore and nectarivore of rainforests, open forests, woodlands, Melaleuca swamps and Banksia woodlands. Bats commute daily to foraging areas, usually within 15 km of the day roost (Tidemann 1995) although some individuals may travel up to 70 km (Augee & Ford 1999).	No
	Scoteanax rueppellii	Greater Broad-nosed Bat	V		Prefer moist gullies in mature coastal forests and rainforests, between the Great Dividing Range and the coast. They are only found at low altitudes below 500 m (Churchill 1998)In dense environments they utilise natural and human-made opening in the forest for flight paths. Creeks and small rivers are favoured foraging habitat (Hoye & Richards 1995). This species roosts in hollow tree trunks and branches (Churchill 1998).	No
Reptiles	*Hoplocephalus bungaroides*	Broad-headed Snake	E1	V	Mainly occurs in association with communities occurring on Triassic sandstone within the Sydney Basin. Typically found among exposed sandstone outcrops with vegetation types ranging from woodland to heath. Within these habitat they generally use rock crevices and exfoliating rock during the cooler months and tree hollows during summer (Webb 1996, Webb & Shine 1998).	No

Key: E = Endangered; V = Vulnerable; M= Migratory; CD = Conservation Dependent

No threatened fauna species were recorded during the current survey. However, the wider study area contains potential habitat for three threatened species listed on the *TSC Act* (Swift Parrot, Regent Honeyeater and Black-chinned Honeyeater) and two threatened species listed on the *EPBC Act* (Swift Parrot and Regent Honeyeater).

3.6.1 Koala Habitat (SEPP44)

This Policy aims to encourage the proper conservation and management of areas of natural vegetation that provide habitat for Koalas, ensuring a permanent free-living population over their present range and attempting to reverse the current trend of koala population decline.

SEPP 44 applies to land within Local Government Areas listed in SEPP 44, Schedule 1 (Holroyd City Council LGA is not listed) for which a development application has been made (SEPP 44, Section 6) and Council is the determining authority. Under this policy the distinction is made between 'potential' and 'core' Koala habitat.

"Potential Koala habitat" means areas of native vegetation where the trees of the types listed in Schedule 2 of the Policy constitute at least 15% of the total number of trees in the upper or lower strata of the tree component.

"Core Koala habitat" means an area of land with a resident population of Koalas, evidenced by attributes such as breeding females (that is, females with young) and recent sightings of and historical records of a population.

Eucalyptus tereticornis is the only listed Koala feed tree present in the study site and appears in densities less than 15%. As such the study area cannot be considered 'potential' Koala habitat. A SEPP 44 Assessment is therefore not recommended.

3.7 Endangered populations

Endangered populations are listed on Schedule 1 (part 2) of the *TSC Act* 1995. There are no endangered populations within the study site.

4.0 CONCLUSION

Biosis Research was commissioned by GHD to undertake a preliminary flora and fauna assessment of Lot 3 of Holroyd High School. This report has been prepared to address terrestrial flora and fauna issues raised following the lodging of a subdivision application for the site with Holroyd City Council.

This report assessed the potential of threatened fauna species, populations and communities and their habitats to occur on the site but does not constitute an assessment under Section 5A of *EP&A Act*, the *TSC Act* and the *EPBC Act*.

The study site contains a small area (approximately 0.2 ha) of poor quality Cumberland Plain Woodland which is listed as an Endangered Ecological Community on the *TSC* and *EPBC Acts*. This community is isolated, has low species diversity and weeds dominate the understorey. It is considered to be of low conservation significance.

The remainder of the study site consists of mown lawn, which is not considered to represent natural vegetation.

One threatened species (*Acacia pubescens*) was recorded within the study site. *Acacia pubescens* is listed as Vulnerable on both the *TSC* and *EPBC*. Thirteen adult plants (including two dead and one senescing) and more than 65 immature or clonal ramets (to 0.5 m) were recorded. It is considered likely that the majority (if not all) of the immature plants are ramets, or clonal plants produced through vegetative reproduction.

The study site does not contain potential habitat for any other threatened plant species populations listed on the *TSC* or *EPBC Acts*.

The site is highly modified and provides habitat resources for mostly generalist and opportunistic native and exotic fauna species. Potential roosting habitat for three species of threatened microbat listed under the *TSC Act* occurs within the study site. Potential habitat for the remaining threatened species and communities recorded from the local area does not occur on this site.

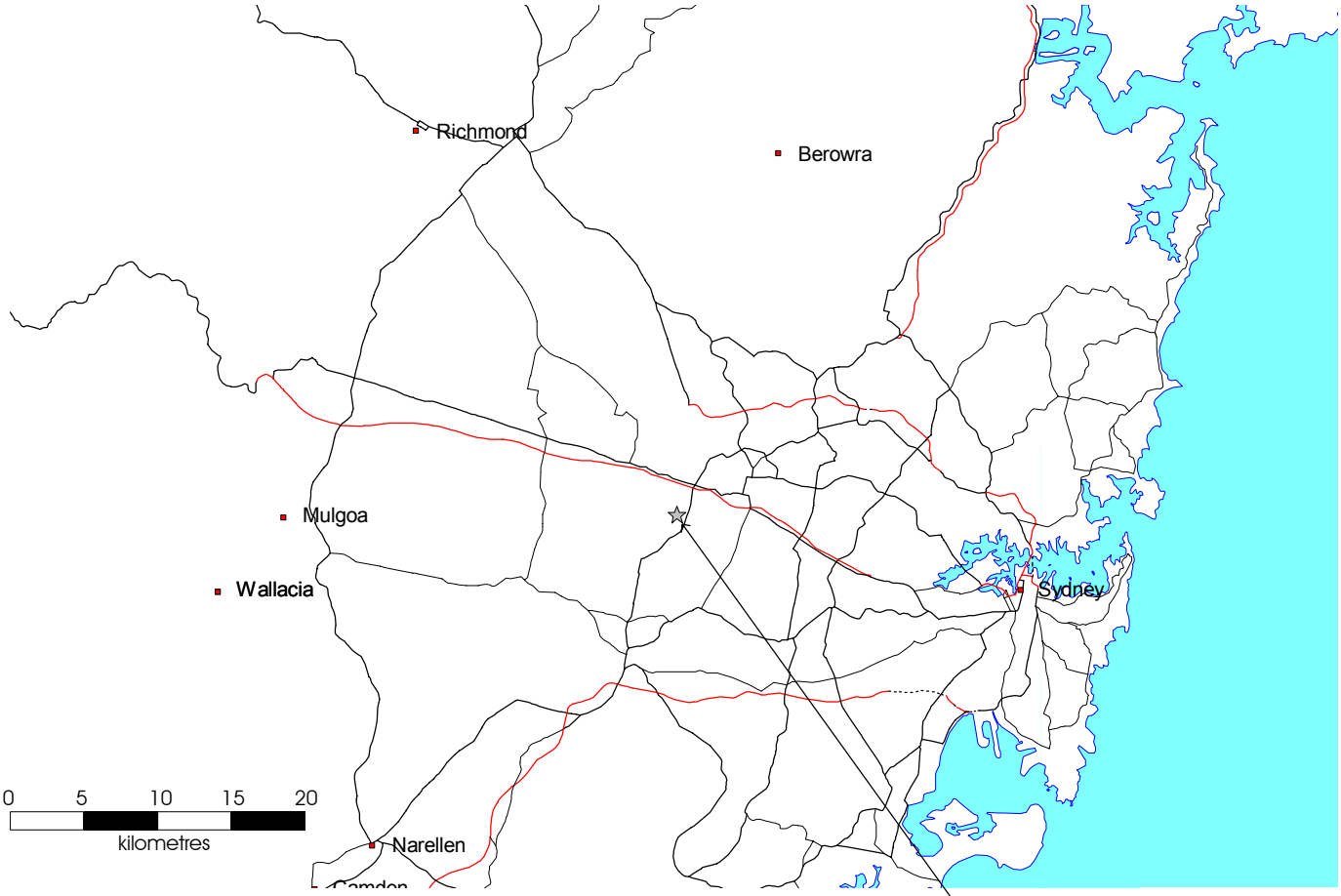
Recommendations:

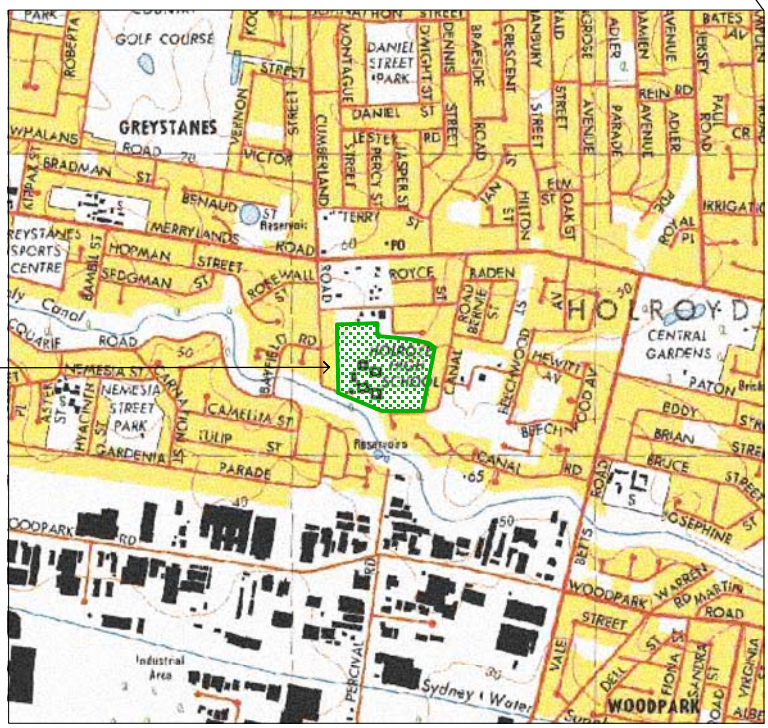
- If possible the development plan should avoid or minimise the impacts to the area of CPW within the site;
- Care should be taken with mowing to ensure that young *A. pubescens* plants are not damaged. Currently the grass is mown up to the trunks of some

individuals and it is likely that this is removing young plants. Mowing should be excluded in the area at least 3m from each trunk;

- Prior to development, undertake Eight Part Tests for Cumberland Plain Woodland and *Acacia pubescens*;
- Prior to development undertake EPBC significance assessments for Cumberland Plain Woodland and *Acacia pubescens*;
- Council should advise NPWS about the subdivision application and any future development applications for the site, as these are likely to affect the population of *Acacia pubescens.* This requirement is outlined in the *A. pubescens* recovery plan (NPWS 2003);
- A weed management program should be undertaken within the CPW;
- As part of the impact assessment, further recommendations for the management of the *A. pubescens* population or compensation for its removal/disturbance should be obtained in consultation with NPWS and Holroyd City Council; and,
- Eight part tests (Section 5A of the *EP&A Act*) should be prepared for the three species of hollow-dependant threatened microbat if the proposed development removes hollow-bearing trees.

FIGURES





Study area

Acknowledgements: Geoscience Australia (1:250000 - Sydney).

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NEW SOUTH WALES 2008

Figure 1: Location of the study area, Holroyd.

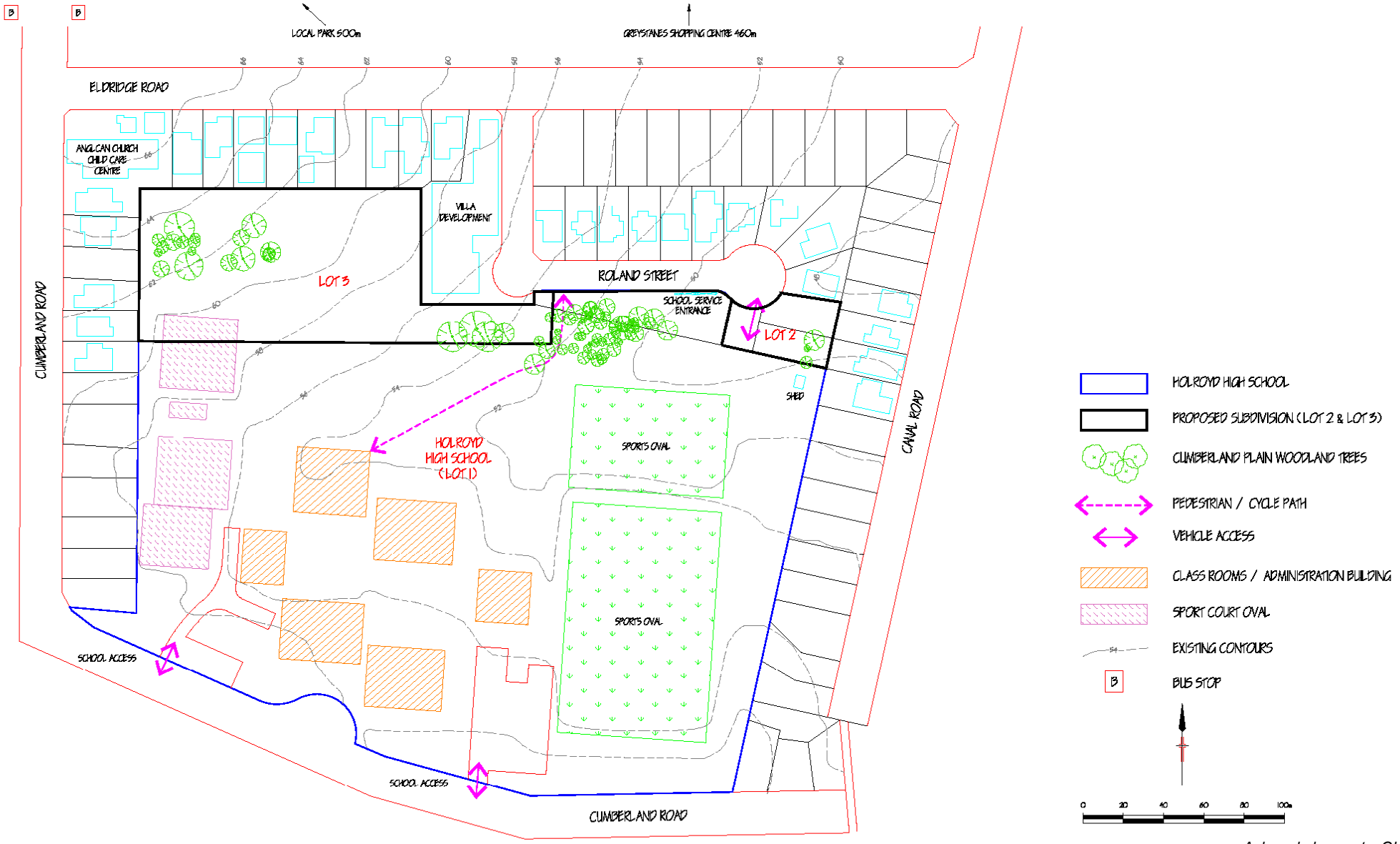
DATE: 07 August 2003

Checked by: SH | File number: S3902

Location:... \projects\3000s\3900s\3902\Mapping\S3902 Fig1.wor

Scale: 0 250 500 750 1000 metres

N W E S



Acknowledgements: GHD.

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Figure 2: Site plan.

DATE: 07 August 2003

Checked by: SH | File number: S3902

Location:...\projects\3000s\3900s\3902\Mapping\S3902 Fig2.wor

N W E S

Legend

Threatened flora species

- Acacia pubescens
- Diuris aequalis
- Epacris purpurascens var. purpurascens
- Marsdenia viridiflora subsp. viridiflora
- Persoonia nutans
- Pimelea curviflora var. curviflora
- Pimelea spicata
- Pomaderris prunifolia var. prunifolia
- Pterostylis saxicola
- Pultenaea pedunculata
- Tetratheca glandulosa
- Wilsonia backhousei

Site location

10 kilometre radius of the study site

Acknowledgements: Land and Property Information (1:25000 - Riverstone, Prospect, Liverpool, Hornsby, Parramatta River and Botany Bay).

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Figure 3: Threatened flora species.

DATE: 07 August 2003

Checked by: SH | File number: S3902

Location: ...\projects\3000s\3900s\3902\Mapping\S3902 Fig3.wor

Scale: 1 0 1 2 3 4 kilometres

N W E S

Figure 3: Threatened flora species.

Legend

Threatened fauna species

- Barking Owl
- Black-chinned Honeyeater (eastern subsp.)
- Common Bentwing-bat
- Cumberland Plain Land Snail
- Eastern False Pipistrelle
- Eastern Freetail-bat
- Eastern Pygmy-possum
- Greater Broad-nosed Bat
- Green and Golden Bell Frog
- Grey-headed Flying-fox
- Large-eared Pied Bat
- Large-footed Myotis
- Regent Honeyeater
- Spotted-tailed Quoll
- Squirrel Glider
- Superb Parrot
- Swift Parrot

Site location

10 kilometre radius of the study site

Acknowledgements: Land and Property Information (1:25000 - Riverstone, Prospect, Liverpool, Hornsby, Parramatta River and Botany Bay).

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Figure 4: Threatened fauna species.

DATE: 07 August 2003

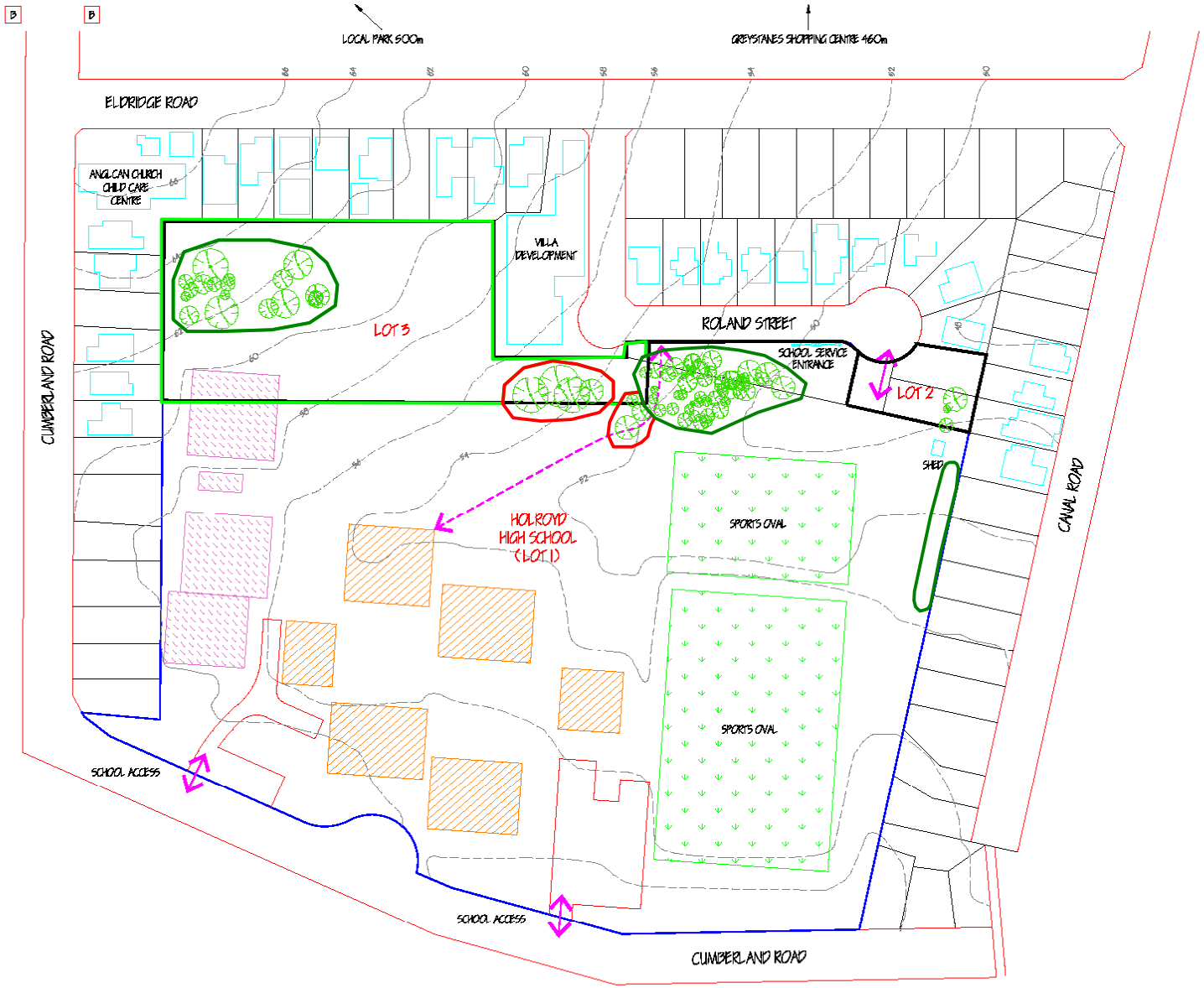
Checked by: SH | File number: S3902

Location: ...\projects\3000s\3900s\3902\Mapping\S3902 Fig4.wor

Scale: 1 0 1 2 3 4 kilometres

N W E S

Figure 4: Threatened fauna species.



LEGEND

- Cumberland Plain Woodland trees
- Scattered trees
- Mown lawn
- Holroyd High School
- Proposed Subdivision (Lot 2 & Lot
- Trees
- Pedestrians/Cycle Path
- Vehicle Access
- Class Rooms/Administration Build
- Sport Court Oval
- Existing contours
- Bus stop

0 20 40 60 80 100m

Acknowledgements: GHD.

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Figure 5: Vegetation mapping of the site.

DATE: 08 August 2003

Checked by: SH | File number: S3902

Location:...\projects\3000s\3900s\3902\Mapping\S3902 Fig5.wor

N W E S

APPENDICES

APPENDIX 1

Flora Results

Flora recorded within the study area.

Class Name	Scientific Name	Common Name	Native/ Introduced
Asparagaceae			
	Asparagus asparagoides	Florist's smilax	I
Asteraceae			
	Bidens pilosa	Cobbler's Pegs	I
	Cineraria lyrata	African Marigold	I
	Crepis capillaris	Smooth Hawksbeard	I
	Galinsoga parviflora	Potato Weed	I
	Hypochaeris radicata	Catsear	I
	Senecio madagascariensis	Fireweed	I
	Taraxacum officinale	Dandelion	I
Fabaceae (Mimosoideae)			
	Acacia parramattensis	Parramatta Wattle	N
	Acacia pubescens	Downy Wattle	N
Geraniaceae			
	Geranium sp.	Geranium	N
Lamiaceae			
	Stachys arvensis	Stagger Weed	I
Malvaceae			
	Sida rhombifolia	Paddy's Lucerne	I
Myrtaceae			
	Eucalyptus amplifolia	Cabbage Gum	N
	Eucalyptus moluccana	Grey Box	N
	Eucalyptus tereticornis	Forest Red Gum	N
Poaceae			
	Chloris virgata	Feathertop Rhodes Grass	I
	Cynodon dactylon	Common Couch	I
	Danthonia tenuior	Wallaby grass	N
	Panicum simile	Two-colour Panic	N
	Pennisetum clandestinum	Kikuyu Grass	I
Solanaceae			
	Lycium ferocissimum	African Boxthorn	I
	Solanum nigrum	Black-berry Nightshade	I

Key: N- Native; I- Introduced Species.

APPENDIX 2
Fauna Results

Fauna recorded within the study area.

Class	Family	Common Name	Scientific Name	Type of Record
Birds	Artamidae	Australian Magpie	*Gymnorhina tibicen*	O
		Pied Currawong	*Strepera graculina*	O
	Cacatuidae	Galah	*Cacatua roseicapilla*	O
	Columbidae	Spotted Turtle-Dove*	*Streptopelia chinensis*	O
		Crested Pigeon	*Ocyphaps lophotes*	O
	Corvidae	Australian Raven	*Corvus coronoides*	O
	Dicruridae	Magpie-lark	*Grallina cyanoleuca*	O
	Hirundinidae	Welcome Swallow	*Hirundo neoxena*	O
	Meliphagidae	Noisy Miner	*Manorina melanocephala*	O
	Psittacidae	Eastern Rosella	*Platycercus eximius*	O
		Musk Lorikeet	*Glossopsitta concinna*	O
		Rainbow Lorikeet	*Trichoglossus haematodus*	O
	Threskiornithidae	Straw-necked Ibis	*Threskiornis spinicollis*	O
	Sturnidae	Common Myna*	*Acridotheres tristis*	O
		Common Starling*	*Sturnus vulgaris*	O

Key: O = observed on site; * = Introduced Species

APPENDIX 3

Conservation Rating According to Briggs and Leigh (1996)

Conservation Rating According to Briggs and Leigh (1996)

Briggs and Leigh (1996) list over 5,031 species, subspecies and varieties of plants (5% of native vascular flora of Australia) that have been ranked according to their conservation status. While many of these species are contained within the schedules of various state and federal threatened species legislation (e.g. *TSC Act* and *EPBC* Act), and are subject to legislative provisions under those acts, a great many more do not and as a such are extraneous to statutory assessment processes.

The modified list below presents the range of codes that are, in various combinations, applied to each listed plant species.

- **1** Species only known from one collection
- **2** Species with a geographic range of less than 100km in Australia
- **3** Species with a geographic range of more than 100km in Australia
- **X** Species presumed extinct; no new collections for at least 50 years
- **E** Endangered species at risk of disappearing from the wild state if present land use and other causal factors continue to operate
- **V** Vulnerable species at risk of long-term disappearance through continued depletion.
- **R** Rare but not currently considered to be endangered.
- **K** Poorly known species that are suspected to be threatened.
- **C** Known to be represented within a conserved area.
- **a** At least 1,000 plants are known to occur within a conservation reserve(s).
- **i** Less than 1,000 plants are known to occur within a conservation reserve(s).
- **-** The reserved population size is unknown.
- **t** The total known population is reserved.
- + The species has a natural occurrence overseas.

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Appendix D

Tree Protection Zones & Weed Management Programme

Report

Holroyd High School, Greystanes

Proposed Subdivision

Tree Protection Zones & Weed Management Programme

Prepared for

GHD Pty Ltd

By

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1 Introduction

This report was commissioned by Mr Tom Irga, Senior Project Manager of GHD Pty Ltd. The report concerns the proposed sub-division of land held by Holroyd High School, and two stands of remnant Shale Plains Woodland (a sub-set of Cumberland Plains Woodland) within the Lot proposed for sale. The purchaser and specific proposals for development of the sub-divided Lot are at present unknown. The requirement for the provision of this report is derived from clauses 16, 33, 34, and 35 of the Conditions of Consent formulated by Holroyd City Council for Development Application # 2003/296.

The aims of this report are to:

1. Outline a general plan of management for Tree Protection Zones, including a weed management programme, for the remnant stands of Shale Plains Woodland contained in Lot 1.

2. Describe the health and condition of the retained trees, setting out remedial works if necessary.

3. Verify the extent of the Tree Protection Zones as surveyed by Hard & Forester, registered surveyors.

4. Plug the holes in the trees that were drilled by a pest controller and provide documentary evidence of such.

The site was inspected on 4 March 2008.

The report recommends that an arborist be appointed to oversee the implementation of the tree protection measures, and that an appropriately qualified Bush Regenerator be appointed to carry out weed control.

2 The Site

The site is Holroyd High School, Cumberland Road Greystanes. The proposal is to subdivide the land into two Lots, with Lot 1 to be sold and Lot 2 retained as school grounds. The Plan of Subdivision is given in Appendix C.

Lot 1 contains two groups of trees referred to in documentation held by Council as ‘Block A’ and ‘Block B’. The location of these is shown in Appendix C ‘Plan of Subdivision’ and appendix D ‘Tree Location Plan’. Three of the trees in Block B are within the Lot being retained by the School; as such, methods of tree protection and weed management do not apply to those three trees.

3 Methodology

The trees were visually inspected from ground level only. No climbing, aerial, or subterranean investigations were carried out. Core-testing, resistance drilling and so forth were not within the scope of assessment.

The trees are described in the Schedule in Appendix B.

The heights and spreads of the trees were estimated. Stem diameter was recorded by tape at 1.4m above ground level, or on the largest stem for multi-stemmed trees.

Trees species, maturity, and vigour were noted. Maturity was recorded as being either Young (Y), Semi-mature (S), Mature (M), or Over mature (OM).

Vigour was recorded as being either Good (G), Normal (N), or Poor (P).

The condition of the trees was assigned a Rating of between 1 and 5, where 1 = dead, declining or hazardous; 2 = stressed or damaged, or poor form; 3 = average condition; 4 = good with relatively few defects; 5 = outstanding example of the species.

The method of Condition Rating was adapted from Table 5.2 of Matheny and Clark[i].

The lower part of the stem of each tree was checked for the drill holes referred to in DA Condition 35 and where found were filled with acrylic caulk.

4 The Trees

The main tree species comprise Grey Box *Eucalyptus moluccana* (13 in total) and Forest Red Gum *Eucalyptus tereticornis* (8 in total), and one Cabbage Gum *Eucalyptus amplifolia*. The majority of the trees are mature specimens of between 20 and 24 metres height.

We are given to understand that the tree and soil composition constitutes Shale Plains Woodland, a subset of Cumberland Plains Woodland, listed as an Endangered Ecological Community under the *Threatened Species Conservation Act (1995)*[ii]. Lot 1 also contains the Vulnerable species *Acacia pubescens* (Downy Wattle).

Block B contains five trees, three within Lot 2 and two trees within Lot 1. Trees in Block B are those numbered 8 to 12. Trees 8 and 10 are within Lot 3; Trees 9, 11, and 12 are within Lot 2 (being retained by the School).

Block A contains twenty-one trees, 17 of which are shown on the survey plan prepared from the field survey carried out in July 2002 and September 2003, although one tree (#18) is no longer extant. The Trees in Block A are those numbered 13 to 29.

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[i] Matheny, N. P and Clark, J. R (1998) *'Trees and Development – A Technical Guide to Preservation of Trees During Land Development'* International Society of Arboriculture, Champaign, Illinois.

[ii] Harrington, R and Harrington, S (2003) *"Flora & Fauna Assessment of Lot 3, Holroyd High School, Greystanes"* Biosis Research, prepared for GHD Pty Ltd.

Broadly speaking, the trees were in acceptable health at the time of inspection and appeared free of major pests and diseases. Crown condition was typical for mature eucalypts in that the majority of the trees carried small to medium deadwood, while few trees carried larger sections of deadwood (>20cm diameter).

Individual tree structure was typical of eucalypts having grown under forest competition, i.e. several trees had developed co-dominant form with acute angles of attachment between stems or between stem and branch which were often characterised by included bark. Some of the larger trees displayed the stem arrangement more commonly known as 'compression fork'[iii].

Five of the trees contained open cavities. Trees 11 and 24 contained the larger cavities (as viewed from ground level). Trees 10 and 16 each contained a small cavity. Tree 27 contained a cavity in the form of an open, spiral wound on the lower stem. Other trees carried wounds on the lower stem which, while not open, returned a hollow sound when tested with an acoustic mallet.

In respect of remedial works, it is understood that the trees are to be maintained as a form of Forest Conservation Area. In this case the usual maintenance of amenity trees such as deadwooding *etc* would not be carried out, in order to conserve the various habitat that comprises a forest ecosystem.

In respect of the drill holes mentioned in Clause 35 of the DA conditions, no drill holes were found on the lower part of the tree's trunks. Presumably these holes have closed over in the five or so years since Condition 35 was first drafted, however, stems should be checked again once the weed growth has been removed.

One 25mm diameter drill hole was found near the base of a branch approximately 1.5m above ground on Tree 19, and was subsequently filled with acrylic caulk. The drill hole appeared to have been fairly recently made as the exposed wood was not highly discoloured or weathered.

[iii] Mattheck, C, and Breloer, H (1994) *'The Body Language of Trees - A Handbook for Failure Analysis.'* HMSO, London.

5 Tree Protection Zones

It is understood that Lot 1 is to be sold with a 'Restriction as to Use' placed on Blocks A and Block B, in the form of an easement enclosing the Blocks. Note that Block B straddles Lots 1 and 2.

Clause 34 of the DA conditions requires the creation of a Tree Protection Zone (TPZ) to enclose trees in Blocks A and B out to the drip-line. The drip-line is a line superimposed on the ground by the lateral extent of the canopy.

This is shown on the survey plan in Appendix E, Plan of Tree Protection Zones.

At present there are no specifics of proposed development within Lot 1. As such, tree protection can be discussed in general terms at this stage and, pending receipt of a specific proposal for development, some refinement of tree protection measures may be necessary.

The primary function of a Tree Protection Zone is to protect trees against construction injury; in particular, to protect tree roots from damage such as occurs in trenching, cutting and filling, compaction, and contamination.

The boundary of the TPZ will typically be delineated by 1.8m high chain-mesh fencing with 2.4m wide panels, on posts with concrete feet, for example, the temporary fencing commonly used in the construction industry. The fence should incorporate erosion control. The panels should be bolted together to prevent easy removal, although it will be necessary to provide the occasional panel to function as a gateway to allow tree maintenance and weed management works to be carried out within the TPZs.

Every second panel should be fitted with signage that reads: "Tree Protection Zone – Keep Out" and display the contact details of the site supervisor should further information be sought.

Protection for individual trees is recommended in the Weed Management Programme, to facilitate hand-weeding/mulching near retained trees and mowing to control weed growth elsewhere within the TPZs.

All works not related to the maintenance of the trees and vegetation are to be excluded from the TPZs for the duration of the construction works. This area must not be used for siting of sheds, stockpiling, storage of materials, preparation of mixes, cleaning of tools and equipment, pedestrian or vehicular activity and so forth, as soil contamination, compaction and often tree root, trunk and limb damage could result from this.

The developer must plan for a cement washout pit and designate a chemical holding area, if necessary, both away from tree protection areas. Refuelling and maintenance areas must also be well away from trees and native soils.

The trees should be watered during dry spells, i.e. two to three weeks without adequate rainfall. The root zone should be thoroughly watered and then left to drain. A temporary irrigation system may be necessary for sites where works longer than 6 weeks in duration are planned.

All site entry points should bear signage stating that tree protection zones are in place, and warning of the need to observe the protection requirements.

Site personnel must be made aware of tree protection requirements and measures, the actions that constitute a breach of development consent and the penalties that apply. A site induction meeting may be necessary to promote this aim.

It would be prudent for the developer to appoint an arborist to oversee all works in relation to the Tree Protection Zones. Note that Clause 33 of the current DA consent requires that an arborist is "to provide documentary evidence that the tree protection conditions were complied with throughout the construction phase, in the form of notes and site photographs as applicable."

A typical sequence for the incorporation of a Tree Protection Zone is as follows:

1. Engage an arborist to oversee the works.

2. Prior to other site works commencing, install the Tree Protection fencing to enclose the trees in Block B and the two trees in Block A within Lot 1.

3. Implement the Weed Management Programme (including protection for individual trees).

4. Maintain the integrity of the Tree Protection Zones during the course of construction works. Monthly inspections and reports by the site arborist are recommended.

5. Prior to Practical Completion, evaluate the trees and carry out any remedial works as necessary.

6. At Practical Completion, remove the Tree Protection fencing and prepare the final report to Council.

Note that Council may impose additional conditions on subsequent development applications and, pending specific details of proposed development, some refinement or modification of the conditions of tree protection may be necessary.

6 Weed Management Programme

The Flora & Fauna report prepared by Biosis Research notes thirteen Downy Wattle *Acacia pubescens* (including two dead and one senescing) present within the study area in 2003, plus two Green Wattle *Acacia decurrens*. Downy Wattle is listed as a 'Vulnerable' species. The report by Biosis Research found a further 65 immature Downy Wattle within approximately two metres of an adult plant. The report recommended against mowing within a three metres radius of the trunk of each adult plant and called for a weed management programme to be undertaken within the forested area as part of any future developments that require the removal of native vegetation.

At the time of the inspection (4 March 2008) there were few wattles remaining in Block A and none in Block B.

Weed removal should only be carried out by those holding as qualification a Certificate in Bush Regeneration. It will be necessary to procure the services of a bushland management company for this component. The primary objectives are to locate and conserve adult wattles and nearby juvenile wattles.

Weed removal by hand should also be carried out within a three metres radius of the eucalypts, to minimise the potential for damage by mowing equipment and also to provide space for mulching.

Weed removal will need to be ongoing during the construction phase, to continuously suppress growth of non-native plants within the individual protection zones for *Acacia pubescens.*

Mowing equipment should be restricted to small, light-weight machinery such as hand-mowers and small ride-on mowers. Heavier equipment that could cause soil compaction should be avoided.

Components of a Weed Management Programme are as follows:

- Locate all adult Downy Wattle and Green Wattle within Block A and Block B. Install star-pickets to form a 6 metre x 6 metre square around each adult plant, and fit para-webbing to the pickets.

- Install star-pickets fitted with para-webbing to form a 6 metre x 6 metre square around each of the trees in Blocks A and B, with the exception of Trees numbered 9, 11, and 12.

- Use continuous fencing where trees are within approximately 7 metres of one-another.

- Carry out hand-weeding within these picketed areas to remove non-native vegetation. Remove weeded material from site and dispose of elsewhere.

- Once the areas enclosed by star-pickets are free of weeds, install mulch to a depth of 100mm to cover exposed soil. Use well-composted leaf litter as mulch. Keep mulch back from the stems of trees and shrubs.

- Periodically top-up mulch levels as necessary to maintain depth to 100mm.
- Maintain the individual Acacia protection zones in a weed-free state.
- Carry out mowing to control weed growth in other parts of the Tree Protections Zones.
- Arrange for monthly inspections by the site arborist and bush regenerator, who are to document inspections in the form of notes and photographs.
- Dismantle all fencing at Practical Completion, carry out any final works and prepare the Final Reports.

7 Conclusions & Recommendations

The trees in Blocks A and B presented as being in acceptable health at the time of inspection. Structurally, the condition of the trees may be said to be typical of trees that have grown in forest or near-forest conditions. Drill-holes which were present on some trees at the time the Conditions of Development Consent were first drafted appear to have now closed over, although this should be double-checked after weed growth has been removed and any drill-holes treated accordingly.

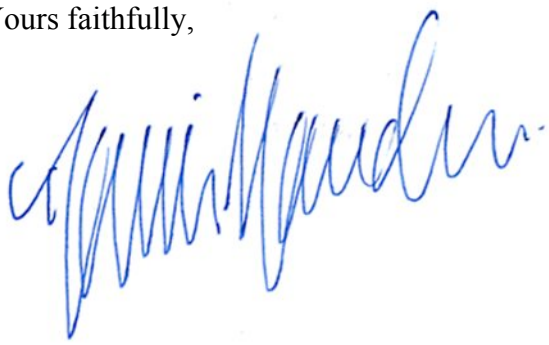
The Lot proposed for subdivision contains the vulnerable species *Acacia pubescens* (Downy Wattle). The pre-construction phase should include a survey to locate this and other wattle species noted in the 2003 survey, with individual specimens subsequently fenced off to allow for hand-weeding within a three metres radius of adult plants.

The methodology of tree and vegetation protection may require some refinement to address specific details of proposed development submitted in any future development application for the subdivided Lot.

To ensure the successful protection of the trees and vegetation during construction works, it will be prudent for the developer to appoint an arborist to oversee the tree protection measures, and a bush regenerator to oversee the weed management programme.

Further liaison with the National Parks & Wildlife Service could be required, as future development applications may affect the population of *Acacia pubescens.*

Yours faithfully,



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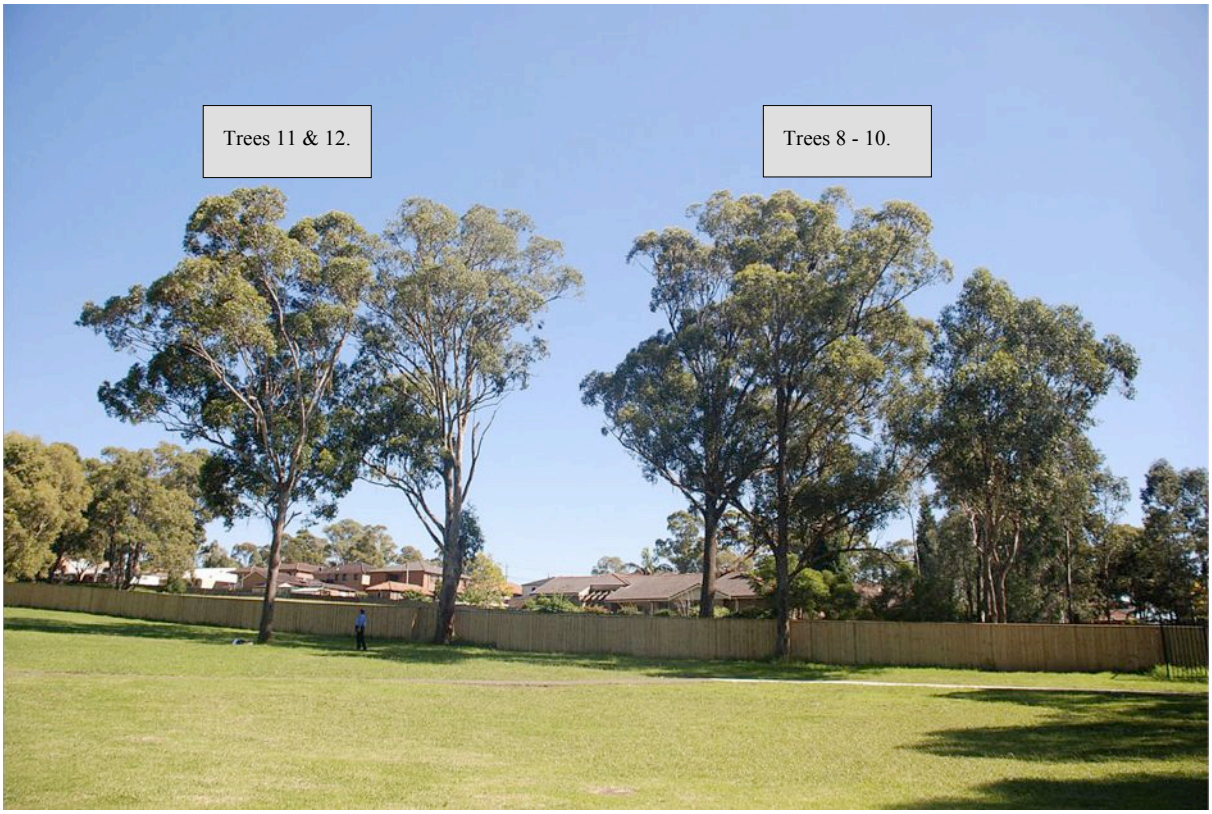
Photograph 1. Trees in Block A, viewed from south.



Photograph 2. Trees in Block B, viewed from south.

Photograph 3. Former stem cut to stump, Tree #8.

Photograph 4. Northern stem cut to stub, cavity at interface of stems, Tree # 11.

Photograph 5. Drill hole in Tree #19.

Photograph 6. Filled hole, Tree #19.

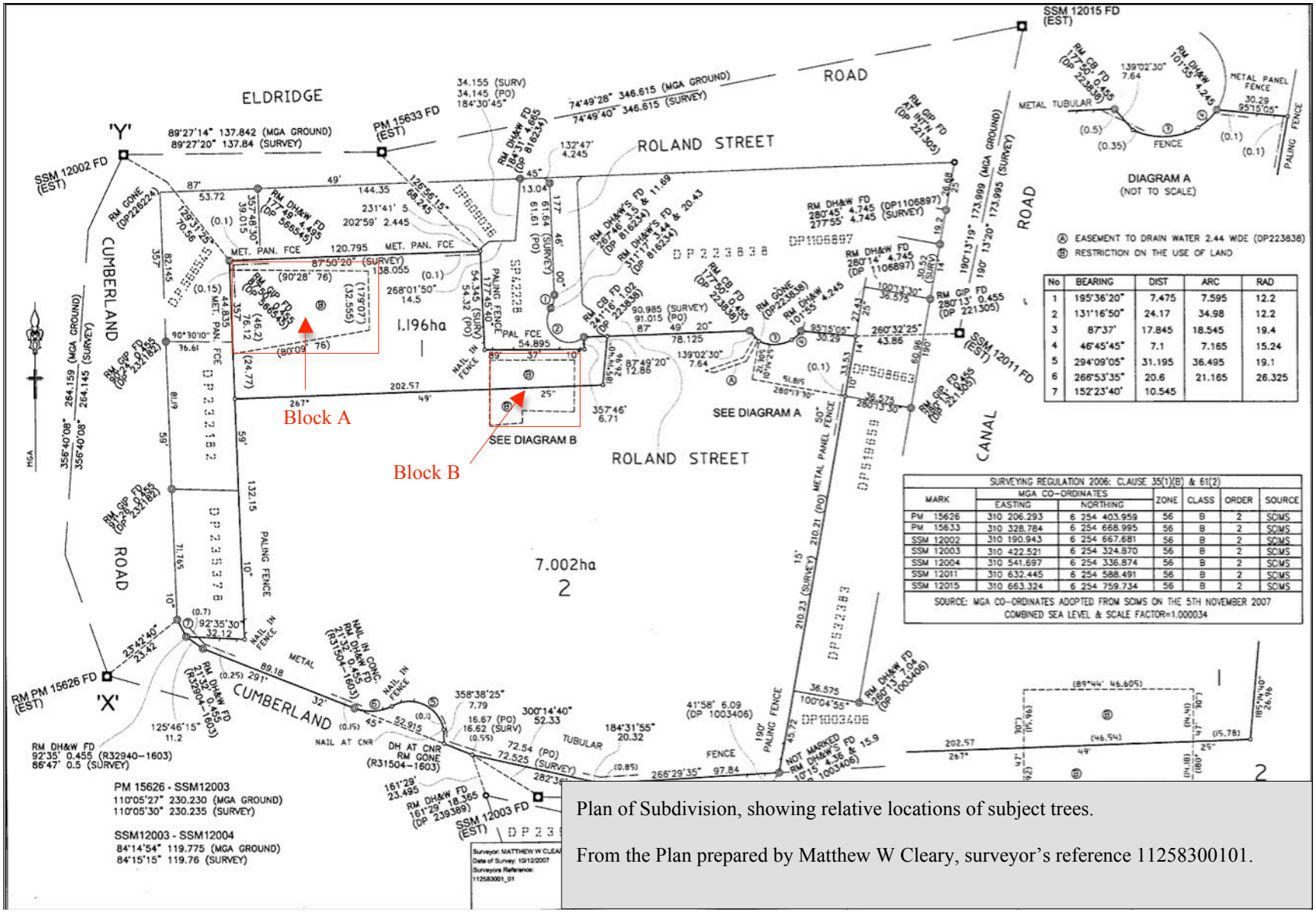
Photograph 7. Tree #24. Compression fork, cavity at interface.

Photograph 8, left. Tree #27, spiral wound on stem.

Schedule of Trees

Tree #	Species	Height (m)	Spread (m)	Trunk ∅ (cm)	Maturity	Vigour	Condition Rating	Drill Holes?	Comments
	Block B								
8	Grey Box *Eucalyptus moluccana*	16	12	25 & 30	S	N	2	No	Youngish tree, two stems, co-dominant with included bark. Growing as sprouts from previously cut stump. Photograph 3.
9	Grey Box *Eucalyptus moluccana*	22	16	50	M	N	2	No	Epicormic shoots topside lower scaffolds. Small & medium deadwood. Crown v. epicormic.
10	Grey Box *Eucalyptus moluccana*	22	16	50	M	N	3	No	Crown good, minor deadwood, few epicormics. Small cavity at base scaffold on northeast @ 7m. Basal wound on east extends to 1.8m high, 30cm wide, small internal hollow.
11	Forest Red Gum *Eucalyptus tereticornis*	24	19	75	M	P	2	No	Compression fork @ 4m although previous stem cut to stub. Cavity at interface. One section large deadwood 25cm ø, small volume other deadwood. Many epicormics through crown. Photograph 4.
12	Grey Box *Eucalyptus moluccana*	22	16	50	M	N	3	No	Generally okay; previous branch failure 15cmø. Carries minor deadwood.
	Block A								
13	Forest Red Gum *Eucalyptus tereticornis*	22	18	~95	M	N	2	No	Copse, 1 large, 2 smaller trees. Main tree multi-stemmed, co-dominant, included bark. Tall wound on sub-stem. Small & medium deadwood throughout.
14	Grey Box *Eucalyptus moluccana*	22	20	70	M	N	3	No	Small & medium deadwood throughout; some epicormics through crown; some congested branches.
15	Forest Red Gum *Eucalyptus tereticornis*	22	12	50	M	N	3	No	Intermediate crown form. Small and medium deadwood throughout. Small *E. moluccana* adjacent, not on plan.
16	Grey Box *Eucalyptus moluccana*	22	16	50 & 45	M	N	2	No	Two trees, close together. Stump near base contains active, aggressive European bees, poss. cavity in stem. Small cavity on sub-stem. Small & medium deadwood.
17	Forest Red Gum *Eucalyptus tereticornis*	20	12	45	M	N	3	No	Generally okay. Intermediate crown form, small and medium deadwood throughout.
18	(Grey Box *Eucalyptus moluccana*)								No longer extant. Given as *E. moluccana* on original survey in 2003, this location now occupied by small acacia.

Tree #	Species	Height (m)	Spread (m)	Trunk ∅ (cm)	Maturity	Vigour	Condition Rating	Drill Holes?	Comments
19	Grey Box *Eucalyptus moluccana*	22	18	75	M	N	3	Yes	Two trees close together. Smaller tree leaning, suppressed crown. Main tree small & med. deadwood, some tight forks. Small branch 1.5m above ground with fresh looking drill hole, 25mm ø, now filled. Photographs 5 & 6.
20	Grey Box *Eucalyptus moluccana*	16	12	35	S	N	3	No	Small and medium deadwood; some epicormics on lower section of stem. Otherwise generally okay.
21	Grey Box *Eucalyptus moluccana*	22	12	40	M	N	2	No	Wound on west side stem extends to secondary leader, possible ring-barking effect with more time. Small hollow within wound. Small & med. deadwood; stub from branch failure 12cm ø.
22	Grey Box *Eucalyptus moluccana*	22	14	40	M	N	3	No	Small and medium deadwood throughout crown; some mistletoe.
23	Grey Box *Eucalyptus moluccana*	12	10	20	S	N	3	No	Small, suppressed tree. Small deadwood.
24	Grey Box *Eucalyptus moluccana*	26	24	110	M	N	2	No	Compression fork @ 7m, stems slightly swayed apart, cavity at interface. Stems co-dominant, included bark @1.7m. Other tight forks higher up. Wounds on some scaffolds. Crossing & rubbing branches. Small & medium deadwood throughout. Photograph 7.
25	Grey Box *Eucalyptus moluccana*	18	8	30	S	N	3	No	Intermediate crown form. Dead hanger suspended in crown. Small and medium deadwood. Small sub-stem on lower trunk with included bark.
26	Forest Red Gum *Eucalyptus tereticornis*	18	12	45	S	N	2	No	Small & medium deadwood. Some tight forks, co-dominant, included bark.
27	Grey Box *Eucalyptus moluccana*	20	12	45	M	N	2	No	Stem with open spiral wound, small hollow within. Small & medium deadwood. Problematic fork development. Photograph 8.
28	Cabbage Gum *Eucalyptus amplifolia*	14	10	35	S	N	3	No	Small deadwood, intermediate crown. Generally okay.
29	Forest Red Gum *Eucalyptus tereticornis*	18	14	50	M	N	3	No	Asymmetric crown, some epicormics. Small and medium deadwood.

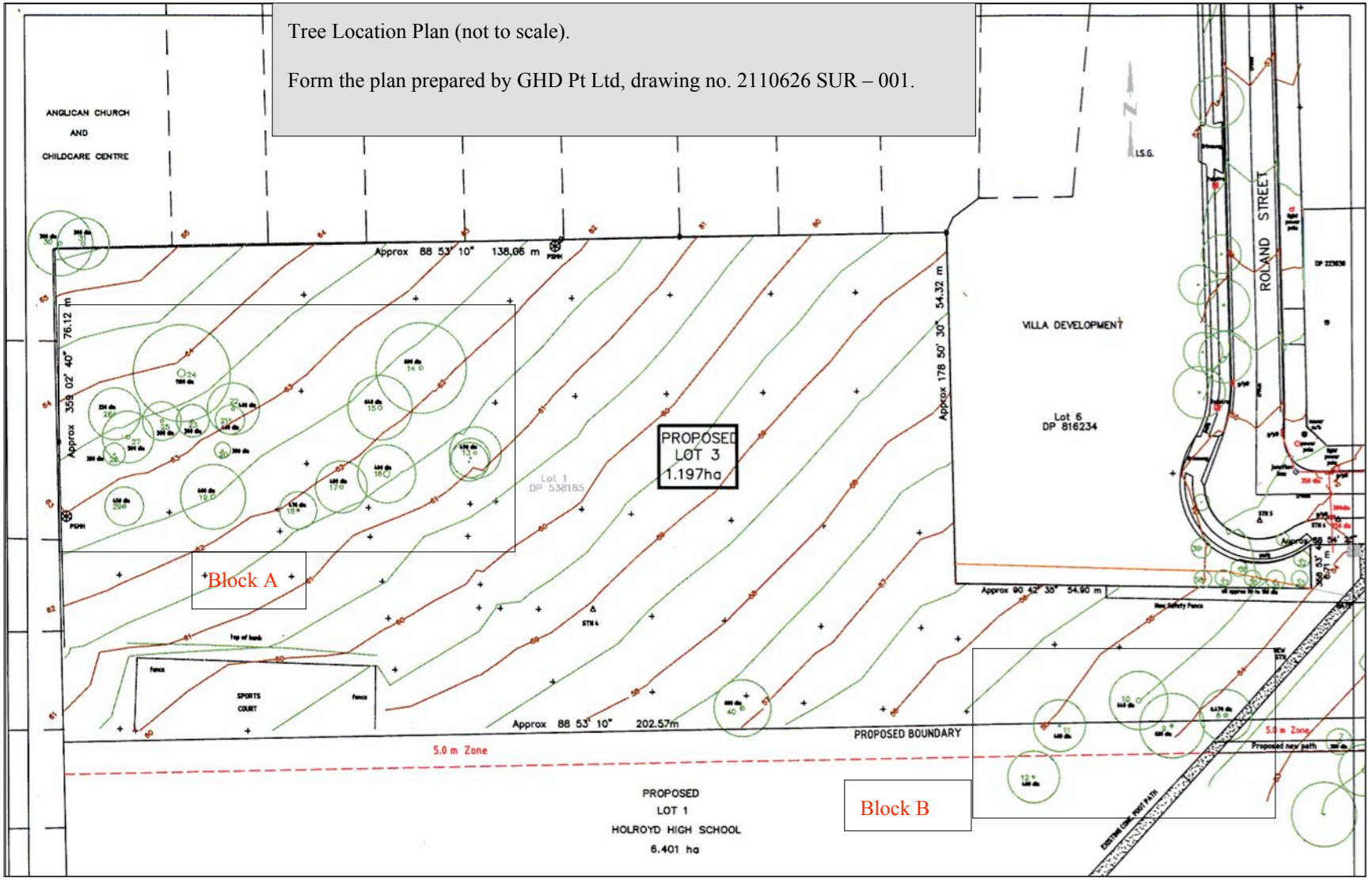


Plan of Subdivision, showing relative locations of subject trees.

From the Plan prepared by Matthew W Cleary, surveyor's reference 11258300101.

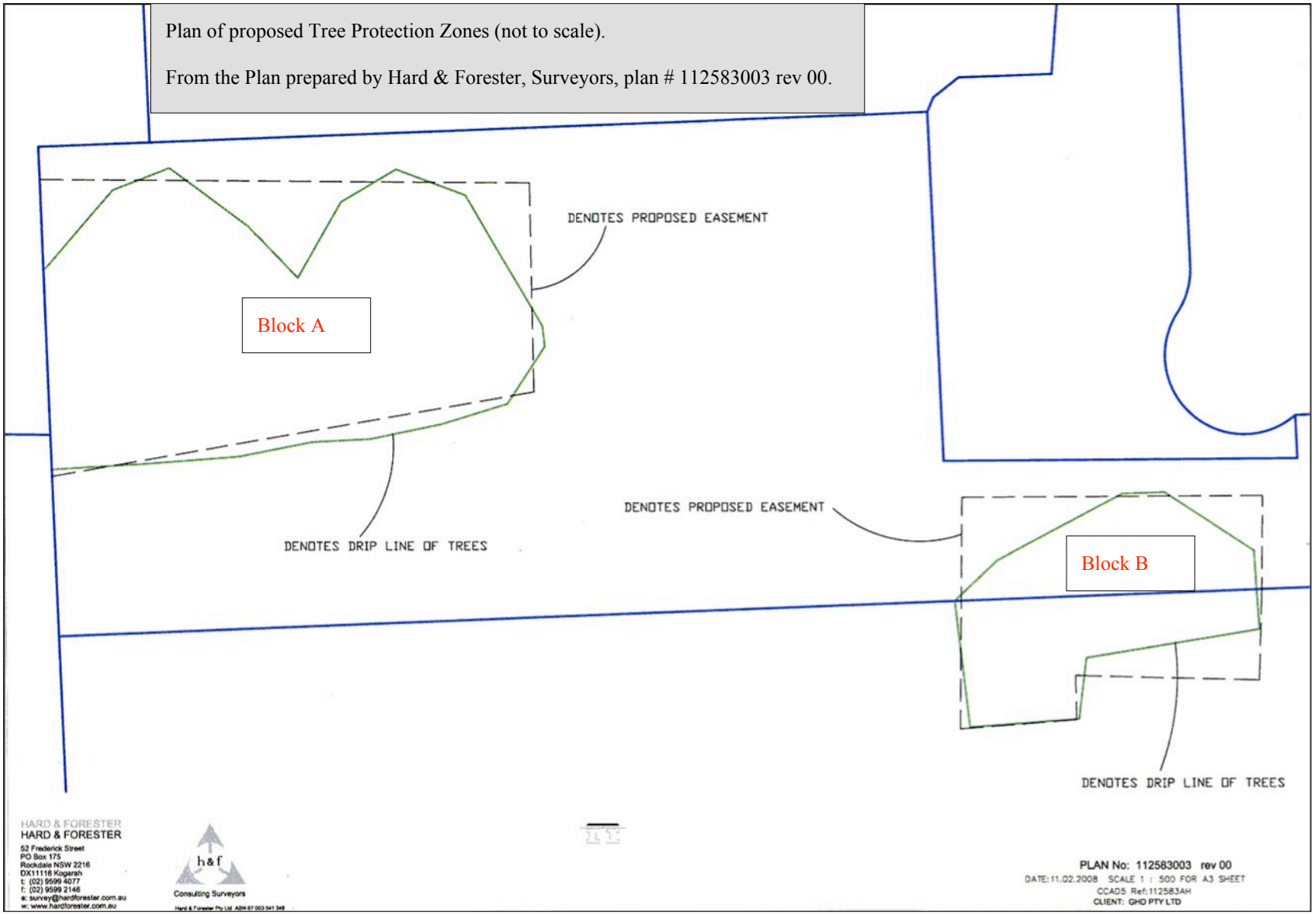
Tree Location Plan (not to scale).

Form the plan prepared by GHD Pt Ltd, drawing no. 2110626 SUR – 001.



Plan of proposed Tree Protection Zones (not to scale).

From the Plan prepared by Hard & Forester, Surveyors, plan # 112583003 rev 00.



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Document Status

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