Appendix 1

Proposed Dwelling Sites
Environmental/Biodiversity Considerations
Including Preliminary Bushfire Assessment Report
Feasibility Report On-site Effluent Disposal

CONACHER ENVIRONMENTAL GROUP

EAST SOMERSBY LANDUSE INVESTIGATION TRUST
PROPOSED LAND REZONING

PROPOSED DWELLING SITES
ENVIRONMENTAL/BIODIVERSITY CONSIDERATIONS

JUNE 2012
(REF: 1131/2)

Suite E, 78 York Street, East Gosford NSW 2250
PO Box 4300, East Gosford NSW 2250

www.cegconsult.com

• Ph (02) 4324 7888 • Fax (02) 4324 7899

• Email cegconsult@bigpond.com

ABN 62 274 841 042

EAST SOMERSBY LANDUSE INVESTIGATION TRUST
PROPOSED LAND REZONING

PROPOSED DWELLING SITES
ENVIRONMENTAL/BIODIVERSITY CONSIDERATIONS

JUNE 2012

Conacher Environmental Group

Environmental and Land Management Consultants

Suite E, 78 York St East Gosford NSW 2250
PO Box 4300, East Gosford NSW 2250
Phone: 02 4324 7888 Fax: 02 43247899

TABLE OF CONTENTS

1. INTRODUCTION AND BACKGROUND

This Report provides details on the approach and methodology adopted to determine appropriate locations for future dwellings within the areas of proposed future allotments to obtain a sustainable ecological outcome for retention of biodiversity conservation areas as part of the overall site area. Previous ecological surveys and reviews by Andrews Neil (2008) provide detailed, site specific, ecological information which has been considered in further site analysis of the bio-physical characteristics of the study area.

A previous version of this Report was submitted to Council as part of the documentation for a Planning Proposal. Council required additional details in regard to the following matters:

- On-site Wastewater Disposal;
- Bushfire Hazard Assessment;
- Biodiversity planning;
- Biodiversity impacts.

The above details are provided in the Appendices of this Report and in appropriate sections of the Report.

2. SITE CHARACTERISTICS

2.1 Site Characteristics

The areas covered in this report include the lands described by Andrews Neil (2008) as being located within the Northern Precinct and Southern Precinct of the study area as shown in Figure 1. The planning and cadastral details of these Precincts are described in a separate planning proposal report prepared by Peter Andrews and Associates.

For descriptive and analysis purposes this report separates the Northern and Southern Precincts of the study area in relation to their respective planning, environmental and bio-physical characteristics, as outlined in Table 2.1 (Northern Precinct) and Table 2.2 (Southern Precinct).

A plan of the vegetation communities surveyed within the two Precincts (Andrews Neil 2008) is provided in Appendix 1.

Details of the vegetation communities present as described by Bell (2004) are provided below.

Exposed Hawkesbury Woodland (Map Unit E26 Bell, 2004)
The most common vegetation community within the study area. Comprises a low canopy (<15m) of *Eucalyptus haemastoma*, *Corymbia gummifera* and *Angophora costata* with a moderate to dense shrub layer of Banksia, Acacia and Grevillea species. Occurs on the upper and midslopes of the study area, particularly within the Southern Precinct.

Hawkesbury Banksia Shrub Woodland (Map Unit E29 Bell, 2004)
A woodland community dominated by tall, dense stands of *Banksia ericifolia* often occurring on small rock outcrops within larger patches of Exposed Hawkesbury Woodland. Lower strata is dominated by a variety of shrubs such as *Banksia oblongifolia*, *Hakea dactyloides* and

Lambertia formosa. This community is mapped by Bell (2004) as occurring in the Northern Precinct but is also present in small areas in the Southern Precinct.

Sandstone Hanging Swamps (Map Unit E54 Bell, 2004)
Small areas of upland swamps dominated by *Leptospermum polygalifolium* (Tea Tree), *Gleichenia dicarpa* (Coral Fern) and *Gahnia sieberiana* growing as dense vegetation over a highly organic sandy soil, often with shallow bed rock present below the hanging swamp. These hanging swamps occur along the upper and lower slopes of the Southern Precinct. Detailed site surveys and vegetation mapping by Andrews Neil (2008) identified that the actual occurrence of these Sandstone Hanging Swamps was less than the occurrences mapped by Bell (2004). The vegetation communities surveyed within the two Precincts (Andrews Neil 2008) are provided in Appendix 1.

Regrowth Vegetation
Regrowth vegetation is present throughout both the Northern and Southern Precinct where the previously cleared natural vegetation is regenerating. A large area of regrowth vegetation is located in the north-west corner of the Southern Precinct. This area is proposed for retention to provide habitat connectivity to lands north of the Southern Precinct.

TABLE 2.1
SITE CHARACTERISTICS – NORTHERN PRECINCT

SITE CHARACTERISTICS	PROPERTY DETAILS		COMMENTS
	LOT 12 DP 263427	LOT 41 DP 771535	
Area (ha)	21.53	9.95	31.48ha in total
Zone	1(a) Agriculture	7(b) Scenic Protection	
Topography			
Hill Top-Crest	√	-	
Mid-slopes (<5^{o})	√	√	
Drainage			
– Dams	√	√	
– Watercourse	Nil	Nil	
– 40m to watercourse	Nil	Nil	
Soil Landscape			
– Somersby	√	-	Seasonal waterlogging
– Sydney Town	√	√	Shallow soils, rock outcrops
Bushfire Prone Land Map			
Vegetation Category 1 or 2	√	√	Bushfire Prone Land
Vegetation Type			
– Hawkesbury Banksia Scrub Woodland	√	√	
– Exposed Hawkesbury Woodland	√	√	
– Disturbed Regrowth	√	√	
– Cleared Areas	√	√	
Threatened Species Recorded			
Giant Burrowing Frog	-	-	
Red-crowned Toadlet	-	√	

TABLE 2.1 SITE CHARACTERISTICS – NORTHERN PRECINCT			
SITE CHARACTERISTICS	**PROPERTY DETAILS**		**COMMENTS**
	LOT 12 DP 263427	**LOT 41 DP 771535**	
Glossy Black-cockatoo	√	√	
Eastern Pygmy-possum	√	√	
Microbats	√	√	
Somersby Mintbush	-	-	
Spreading Guinea Flower	-	-	
Leafless Tongue-orchid	-	√	

TABLE 2.2 SITE CHARACTERISTICS – SOUTHERN PRECINCT				
SITE CHARACTERISTICS	**PROPERTY DETAILS**			**COMMENTS**
	LOT 4 DP 261507	**LOT 3 (PART) DP 261507**	**LOT 2051 DP 559231**	
Area (ha)	30.55	30.25	17.14	77.94ha in Total
Zone	7(b) Scenic Protection	7(b) Scenic Protection	7(b) Scenic Protection	
Topography				
Hill Top-Crest	-	√	-	
Mid-slopes (<5^{o})	√	√	√	Low slope gradients
Drainage				
– Dams	-	-	-	
– Watercourse	√	√	√	
– 40m to watercourse	√	√	√	
Soil Landscape				
– Somersby	-	-	-	Shallow soils
– Sydney Town	√	√	√	Shallow soils, rock outcrops
Bushfire Prone Land Map				
Vegetation Category 1 or 2	√	√	√	Bushfire Prone Land
Vegetation Type				
– Sandstone Hanging Swamp*	√	√	√	*TSC Act EEC listing (Coastal Upland Swamp)
– Hawkesbury Banksia Scrub Woodland	-	√	-	
– Exposed Hawkesbury Woodland	√	√	√	
– Disturbed Regrowth	√	√	√	
– Cleared Areas	√	√	√	
Threatened Species Recorded				
Giant Burrowing Frog	-	√	-	
Red-crowned Toadlet	-	-	-	
Glossy Black-cockatoo	√	√	-	
Eastern Pygmy-possum	√	√	√	
Microbats	√	√	√	
Somersby Mintbush	√	√	√	
Spreading Guinea Flower	√	√	√	
Leafless Tongue-orchid	-	-	-	

2.2 Principal Bio-Physical Details

The principal bio-physical characteristics summarised in Tables 2.1 and 2.2 have been considered in determining the site constraints and suitable dwelling locations for both Precincts. In relation to the site characteristics the principal bio-physical matters influencing future scenarios for rural residential type allotments and dwelling locations are considered to be:

- Bushfire Hazard and Asset Protection Zone Requirements;
- Riparian Areas and buffer areas to riparian areas;
- Effluent Disposal Capability;
- Biodiversity Matters (eg. threatened species and EEC habitats, extent of vegetation and connectivity).

The following assessments and information has also been considered in relation to each identified site characteristics as outlined below.

2.3 Bushfire Hazard and Provision for Asset Protection Zones

A detailed Bushfire Hazard Assessment Report addressing the requirements of Planning for Bushfire Protection (RFS 2006) is provided in Appendix 2. A summary of relevant details is provided below.

Relevant Documents Considered

- Planning for Bushfire Protection (RFS 2006);
- Australian Standard 3959-2009 Guidelines for Construction of Buildings in Bushfire Prone Ares (Standards Australia 2009);
- Guidelines for Asset Protection Zones (Rural Fire Service);
- Bushfire Prone Land Maps (Gosford City Council).

Guidelines Incorporated into Selection of Dwelling Locations

- Asset Protection Zones of 20-25 metres required for future lots;
- Asset Protection Zone of 43 metres around each dwelling to achieve a Bushfire Attack Level 19 (BAL 19) construction standard for each dwelling or 32 metres for a BAL of 29;
- Separate on-site water supply of 20,000 litres per dwelling for bushfire fighting purposes;
- Access to be provided to each lot in accordance with Section 4.1.3 of RFS (2006).

2.4 Riparian Areas

Several drainage lines flow through the Southern Precinct as identified in Figure 3. These drainage lines and their associated vegetation provide habitat for a range of threatened fauna and flora species. It is proposed to retain all drainage lines with appropriate buffer areas and development setbacks.

Relevant Documents Considered

- Gosford 1:25,000 Topographic Map;
- Guidelines for Controlled Activities - Riparian Corridors (NSW Office of Water);

- Guidelines for Controlled Activities - Vegetation Management Plans (NSW Office of Water);
- Water Management Act (2005).

Guidelines Incorporated into Selection of Dwelling Locations

- All dwelling locations set back minimum distance of 100 metres from watercourse;
- No effluent disposal areas within 100 metres of a watercourse;
- No asset protection zones located within 40 metres of a watercourse.

2.5 Effluent Disposal

An On-site Wastewater Feasibility Report, as requested by Council, is provided in Appendix 3. This Feasibility Report has confirmed that the site topography and soils are suitable for on-site disposal of effluent following treatment by an aerated wastewater treatment system. The recommended method of on-site disposal is by a Shallow sub-surface drip irrigation system. A summary of details relevant to on-site disposal of wastewater is provided below.

Relevant Documents Considered

- On-site Sewage Management Strategy (Gosford City Council 2005);
- Australian Standard 1547-2012 On-site Domestic Wastewater Management (Standards Australia 2012);
- On-site Sewage Management for Single Household (Dept of Local Government 1998);
- Soil Landscapes of the Gosford 1:100,000 Map Sheet (Murphy 1992).

Guidelines Incorporated into Selection of Dwelling Locations

- No effluent disposal areas located within 100 metres of a watercourse or within 40 metres of a farm dam catchment area;
- Minimum on-site disposal area of 1332m^2 calculated (for a five bedroom dwelling) by shallow sub-surface drip irrigation;
- Alternative on-site disposal method by constructed mound system if shallow soils (<500mm in depth) present;
- Effluent disposal areas can be located in asset protection zones if no other suitable cleared areas are present.

2.6 Threatened Species Habitats

A range of threatened flora and fauna species have been recorded within both the Northern and Southern Precincts. Relevant details of these species are provided in Table 2.3. The locations of future dwelling sites in both the Northern and Southern Precincts have been determined so that minimum disturbance to potential habitat areas of these species results from future development. Large areas of forest vegetation (approximately 75 hectares) are proposed to be retained and managed in a manner which achieves biodiversity conservation outcomes, including protection of areas of threatened species habitat.

TABLE 2.3 THREATENED SPECIES INFORMATION			
Species	**Location of Habitats**	**Potential Impacts**	**Conservation Outcomes**
Giant Burrowing Frog	Riparian Areas. Sandstone Hanging Swamps. Recorded calling in creeklines of Southern Precinct.	Alterations to drainage systems across the site. Degradation of habitat areas due to increase weed invasion. Possible increase predation from feral predators.	Provision of vegetated buffers along drainage lines. Habitats retained are outside of proposed development zones. Formulation of land management practices to reduce impacts of weeds and feral animals on local native biota.
Red-crowned Toadlet	Riparian Areas Sandstone Hanging Swamps. Recorded calling in disturbed areas of the Northern Precinct.	Alterations to drainage systems across the site. Degradation of habitat areas due to increase weed invasion.	Provision of vegetated buffers along drainage lines. Habitats retained are outside of proposed development zones.
Glossy Black-Cockatoo	Exposed Hawkesbury Woodland. Recorded in both Northern and southern Precincts.	Clearing of preferred feed trees for bushfire asset protection.	Proposed development zones located in areas requiring minimal vegetation removal or modification.
Eastern Pygmy-possum	Exposed Hawkesbury Woodland. Hawkesbury Banksia Scrub-Woodland. Captured within Banksia scrub of the Southern Precinct and within forest with a more open understorey in the Northern Precinct.	Clearing of preferred habitats for bushfire asset protection. Degradation of habitat areas due to increase weed invasion. Possible increase predation from feral predators.	Proposed development zones located in areas requiring minimal vegetation removal or modification. Formulation of land management practices to reduce impacts of weeds and feral animals on local native biota.
Microbat spp.	Forested areas of both northern and southern Precincts. Little Bent-wing Bat recorded on site.	Clearing of preferred habitats for bushfire asset protection.	Proposed development zones located in areas requiring minimal vegetation removal or modification.
Prostanthera junonis Somersby Mintbush	Exposed Hawkesbury Woodland of the Southern Precinct. Recorded in the western section and eastern edge of the Southern Precinct.	Clearing of preferred habitats for bushfire asset protection. Degradation of habitat areas due to increase weed invasion. Alteration to soil hydrology.	Proposed development zones located in areas requiring minimal vegetation removal or modification. Formulation of land management practices to reduce impacts of weeds and feral animals on local native biota.

TABLE 2.3 THREATENED SPECIES INFORMATION			
Species	**Location of Habitats**	**Potential Impacts**	**Conservation Outcomes**
			Creation of buffers surrounding known populations of this species
Hibbertia procumbens Spreading Guinea Flower	Exposed Hawkesbury Woodland of both north and south Precincts. Recorded across the Southern Precinct.	Clearing of preferred habitats for bushfire asset protection. Degradation of habitat areas due to increase weed invasion. Alteration to soil hydrology.	Proposed development zones located in areas requiring minimal vegetation removal or modification. Formulation of land management practices to reduce impacts of weeds and feral animals on local native biota. Creation of buffers surrounding known populations of this species
Cryptostylis hunteriana Leafless Tongue-orchid	Exposed Hawkesbury Woodland. Identified within the north-eastern section of the Northern Precinct.	Clearing of preferred habitats for bushfire asset protection. Degradation of habitat areas due to increase weed invasion. Alteration to soil hydrology.	Proposed development zones located in areas requiring minimal vegetation removal or modification. Formulation of land management practices to reduce impacts of weeds and feral animals on local native biota. Creation of buffers surrounding known populations of this species.

3. SELECTION OF DWELLING LOCATIONS

3.1 Bio-Physical Planning Approach

Background ecological reports relevant to the study area were accessed to supplement the results of the site specific ecological surveys and to determine important vegetation communities, fauna habitats and threatened flora/fauna species for biodiversity planning purposes.

The potential subdivision pattern was determined by identifying the most appropriate location for dwelling sites which are located either in previously cleared/disturbed areas, have close access to the existing road system and do not require disturbances to riparian buffer areas.

Consideration was given to the biodiversity conservation planning principles promoted by DECCW in the Regional Conservation Planning Process for regions to the north of the Central Coast. These biodiversity conservation planning principles are outlined in Table 3.1

Relevant Documents Considered

- Preliminary Ecological Review – East Somersby Investigation Area (Andrews Neil 2008);
- Threatened Flora and Fauna Species Database (NPWS 2011);
- Gosford City Council Biodiversity Strategy (Gosford City Council 2009);
- Linkages in the Landscape (Bennett 1999);
- Planning for Biodiversity (Peck 1998);
- Vegetation Mapping and Vegetation Maps for the Gosford Area (Bell 2004);
- Somersby Industrial Estate Plan of Management (Connell Wagner 2005).

Guidelines Incorporated into Selection of Dwelling Locations

- Areas of threatened species and threatened and significant ecological community habitats retained;
- Connectivity to adjoining vegetated areas retained;
- No development proposed within riparian corridors;
- Proposed dwelling sites predominantly located within cleared areas or previously disturbed (now regrowth) areas. This includes sixteen sites in cleared land, three in regrowth vegetation and two sites (Southern Precinct) in relatively intact bushland;
- Restrictions on future clearing outside of identified asset protection zones;
- Preparation of 'conservation agreements' for retained areas of bushland within lots and restrictions on future use of bushland areas within each lot.
- Retention of key habitat features including rock outcrops, large trees and hollow bearing trees within allotments.

TABLE 3.1
BIODIVERSITY CONSERVATION PLANNING PRINCIPLES*

Planning Principles	Outcomes
Principle 1: Protect high value environments by avoiding direct impacts on the biodiversity of these areas.	Reduces biodiversity loss and maintains important habitat. Ensures greatest biodiversity benefit and reduces costs associated with providing offsets and/or rehabilitation.
Principle 2: Mitigate indirect impacts (for example restricting access to conservation areas or weed control) or minimise direct impacts where Principle 1 cannot be achieved (for example refining subdivision layouts).	Achieving an 'improve or maintain' outcome requires minimisation and management of impacts, both direct and indirect, where some development may proceed which is anticipated to have limited impacts on biodiversity.
Principle 3: Provide offsets for unavoidable impacts on biodiversity.	Achieving an 'improve or maintain' outcome requires offsets that adequately compensate for the biodiversity values lost due to the development. Offsetting is guided by 13 principles. Several mechanisms can be used to secure offsets.

**Mid North Coast Regional Conservation Plan (Draft DECCW 2011)*

Following consideration of the various biodiversity planning principles utilised for this project the following objectives were developed in relation to biodiversity assessment and determination of suitable dwelling locations within the study area:

- Identify important naturally vegetated areas and fauna habitat areas;

- Retain natural vegetation in intact areas wherever possible;
- Retain main riparian areas within suitably sized riparian zones or corridors;
- Provide biodiversity linkages or habitat linkages through the study area to 'maintain or improve' connectivity to areas of retained habitat;
- Maintain or improve the condition of the vegetation and fauna habitats of retained riparian areas and biodiversity linkages;
- Develop and implement appropriate land, vegetation and habitat management practices for retained habitat areas, riparian zones or biodiversity linkage areas.

3.2 Proposed Dwelling Locations

The consideration of locations for future dwellings has incorporated the relevant site characteristics as well as the extent of land area or site disturbance required for a dwelling to be constructed and a reasonable area of land to be utilized around future dwellings for site amenity and general activities associated with large lot rural residential style living.

The provision of lot access, asset protection zones, effluent disposal areas and a suitable building envelope have been considered in conjunction with the bio-physical site characteristics to determine suitable locations for possible future dwellings, and then ultimately a subdivision layout for both the Northern and Southern Precincts within the study area, as detailed below.

Additional clearing of native vegetation outside of the identified access and development footprints is not proposed as part of this planning proposal. Future rural type activities such as stock grazing, farming, orchards or other farms of agricultural production are not proposed within areas that have not already been cleared. These activities are to be restricted to areas which contain established pasture land.

Northern Precinct
A total of twelve additional dwelling locations have been identified within the existing cleared areas of the Northern Precinct. Six additional dwelling sites have been identified within both Lot 41 and Lot 12.

Due to the fragmented nature of the remnant vegetation within the Northern Precinct and patches of existing cleared land the provision of bushfire asset protection zones around each dwelling can be implemented with low impact vegetation management of existing disturbed or regrowth vegetation within each lot. Effluent disposal areas can be located within existing cleared areas or within the APZ areas of each dwelling.

Identified building locations and possible future lot layouts for the Northern Precinct are shown in Figure 2.

Southern Precinct
A total of eight additional dwelling locations have been identified within the Southern Precinct. These comprise the following:

- Four dwelling locations in the cleared areas of Lot 4;
- One dwelling location in the disturbed/regrowth areas of the western part of Lot 3;
- Two dwelling locations in the naturally vegetated eastern part of Lot 3;
- One dwelling location in the naturally vegetated eastern part of Lot 2051.

Identified building locations and possible future lot layouts for the Southern Precinct are shown in Figure 3.

An APZ area of 43 metres (each direction from dwelling) has been incorporated around each proposed dwelling to provide opportunity to construct a future dwelling to BAL 19 construction standard. However the APZ could be reduced to 32 metres from the dwelling if the dwelling construction standard is increased to BAL 29.

Areas for effluent disposal can be accommodated within the APZ areas.

3.3 Biodiversity Conservation Considerations

Gosford City Council Biodiversity Strategy 2008
The main objectives of the strategy relevant to the proposal include requirements to ensure biodiversity is appropriately protected and managed, the maintenance and improvement of biodiversity for future generations, the identification and implementation of wildlife corridors and consistency between Council strategies and all relevant State & National Policies.

The main objectives of the Strategy have been considered through the bio-physical planning approach adopted and will be achieved through the identified biodiversity conservation outcomes of the proposal. Maintenance and improvement of biodiversity within the site will be attained through the Biodiversity Certification process, in accordance with the *TSC Act* (1995).

State Environmental Planning Policy 19 – Bushland in Urban Areas
Under the current zoning Council are required to give regard to the general and specific aims of the Policy and give priority to retaining bushland (other than rural land), unless it is satisfied that significant environmental, economic or social benefits will arise which outweigh the value of the bushland.

The bio-physical planning approach adopted to determine the potential subdivision of the site has given priority to retaining areas of high quality bushland and the positioning of dwelling sites in edge areas and previously cleared and disturbed areas. Overall approximately 75 hectares of bushland will be retained in large parcels subject to restrictions and ongoing management. Application of Biodiversity Certification is likely to result in significant environmental benefits for the site which outweigh the loss of disturbed habitats within proposed development areas. Further consideration of the general and specific aims of SEPP 19 will be undertaken at the site rezoning stage.

Natural Resource Sensitivity Biodiversity Map (under Draft Gosford LEP 2009)
The version of the Draft Gosford LEP (2009) released for public exhibition does not contain matters for consideration of relevance to the proposal under Clause 7.10 or Natural Resource Sensitivity Biodiversity Mapping. It is acknowledged that this information is contained in the Draft Gosford LEP 2009 lodged with the Department of Planning for Ministerial approval, however this information is not currently publicly available.

Through consultation, Gosford City Council has advised that relevant development proposals should consider provisions to ensure that no-net loss of listed threatened biodiversity will occur, in accordance with policy outlined within the lodged version of the Draft LEP. The biodiversity values of the site will be improved or maintained by the implementation of conservation measures through the Biodiversity Certification process, in accordance with Part 7AA of the *TSC Act* (1995).

Conservation / Development Outcomes
The proposed location of possible future dwellings (and associated development footprints) has resulted in the retention of extensive areas within both the Northern and Southern Precincts as undeveloped/undisturbed bushland areas within large lots. The extent of maximum possible development within each lot can be prescribed through site specific planning/conservation agreements. These agreements can be enacted through various land title or conservation planning mechanisms such as: Section 88B Instruments, voluntary conservation agreements, property vegetation management plans or similar mechanisms.

The biodiversity conservation outcomes to be achieved for the two Precincts are summarised below:

- Retention of riparian areas and buffer zones to riparian areas;
- Retention of key habitat areas for threatened species and significant ecological communities;
- Retention of connectivity and habitat linkages to adjoining naturally vegetated areas and areas to be incorporated into the Western Coastal Open Space System managed by Gosford City Council.
- Maintenance and improvement of areas retained and conserved for biodiversity outcomes throughout both the Northern and Southern Precincts.

The use of the Biodiversity Certification Process for developing biodiversity conservation outcomes in association with development options should be considered for this Planning Proposal as part of the rezoning process as a base for further analysis. The benefits of utilising the Biodiversity Certification Process for the areas covered in this Planning Proposal are that the areas identified for future development can be evaluated using established criteria against areas of higher biodiversity value with these areas off-set and protected for future conservation.

3.4 Management of Retained Areas

Areas of retained habitat, including the habitat linkages and riparian areas range from intact natural vegetation to cleared agricultural areas. Revegetation, rehabilitation and habitat enhancement measures will be required to be implemented so that these areas can continue to function as biodiversity conservation and linkage areas in the longer term.

Once the final recommendations for land use zones and development options have been determined the next stage of the biodiversity reporting is to focus on procedures and mechanisms for revegetating, rehabilitating and managing the areas to be retained for biodiversity conservation. These measures would then be integrated into a draft development control plan for the study area. A Vegetation and Habitat Management Strategy should then be

prepared for the conservation areas as a separate report from this Report. The Vegetation and Habitat Management Strategy should address the following matters:

- Weed Control;
- Access Control (Fencing, Signage, Maintenance Access);
- Bushfire Management;
- Habitat Enhancement (including nest boxes and ground hollow replacement);
- Feral Pest Management;
- Stormwater Quality;
- Revegetation, regeneration;
- Monitoring and Reporting.

4. CONCLUDING COMMENTS

The detailed ecological surveys completed for the site and information provided from the various databases and biodiversity reports for the local/regional areas indicate that the naturally vegetated areas within the study area provide a range of habitats for protected and threatened flora and fauna species including preliminary listed endangered ecological communities. Large areas within the study area have been cleared for rural and agricultural purposes. The potential to change the land-use towards an rural/environmental style land-use provides opportunities to integrate the conservation of the uncleared areas of natural vegetation with selective rehabilitation of previously cleared areas to achieve some significant biodiversity conservation outcomes for the study area and result in an overall improvement for conservation of native vegetation while providing for a sustainable level of development.

The retention, revegetation and rehabilitation of the various areas of retained natural vegetation will be critical to achieving a positive maintain and improve outcome for native vegetation and biodiversity conservation which is sustainable and compatible with future development within adjoining areas.

Areas of Retained Natural Vegetation in Habitat Areas

The habitat areas outside of the development footprints are recommended for retention of the existing natural vegetation and the resultant biodiversity values of these areas. Smaller patches of vegetation located along riparian areas or within habitat linkages should also be retained and enhanced as these provide suitable linkages through, and residual habitat value within, the study area.

Riparian Areas

The main riparian areas are recommended to be retained to provide locally important aquatic habitat and habitat linkages to larger habitat areas.

Habitat Linkages

The habitat linkage areas are recommended to be retained or maintained and improved to secure either existing connectivity between retained habitat areas or to provide future connectivity to these habitat areas once vegetation is re-established and/or rehabilitated.

The biodiversity conservation and planning objectives developed for this project in relation to the future zoning and possible development, in combination are considered to result in the following outcomes for the study area:

- identify suitable locations for low level, ecologically sustainable building areas;
- achieve a high level of conservation/retention of existing vegetation communities which retains areas of endangered ecological communities;
- retain important areas of habitat for threatened species;
- ensure that areas of retained habitat are not further fragmented or isolated by future developments of the area;
- provide opportunity to maintain or enhance habitat linkages to retained habitat areas

With the implementation of suitable conservation / biodiversity area land-use and management agreements it is considered that future development as indicated in Figure 2 and 3 for rural/environmental living lifestyles can be achieved for both the Northern Precinct and Southern Precinct of the study area.

Biocertification Approach

If this Planning Proposal proceeds to the detailed investigation stage (for rezoning or subdivision stage) an assessment under the Biodiversity Certification Criteria should be undertaken in accordance with the Biodiversity Certification Assessment Methodology applying at that time.

Flora and fauna survey locations are approximate and have not been fixed by land survey. *Subject Site boundary subject to final survey Plan for indicative purposes only. Not for detailed measurement.

N

1:20,000 Approximate at A4

0 250 500 750 1,000 m

Original plan produced in A4 colour

Legend

Northern Precinct

Southern Precinct

conacher environmental group

ABN: 62 274 841 042
PO Box 4300
78 York Street
East Gosford NSW 2250
Ph: (02) 4324 7888
Fax: (02) 4324 7899
cegconsult@bigpond.com

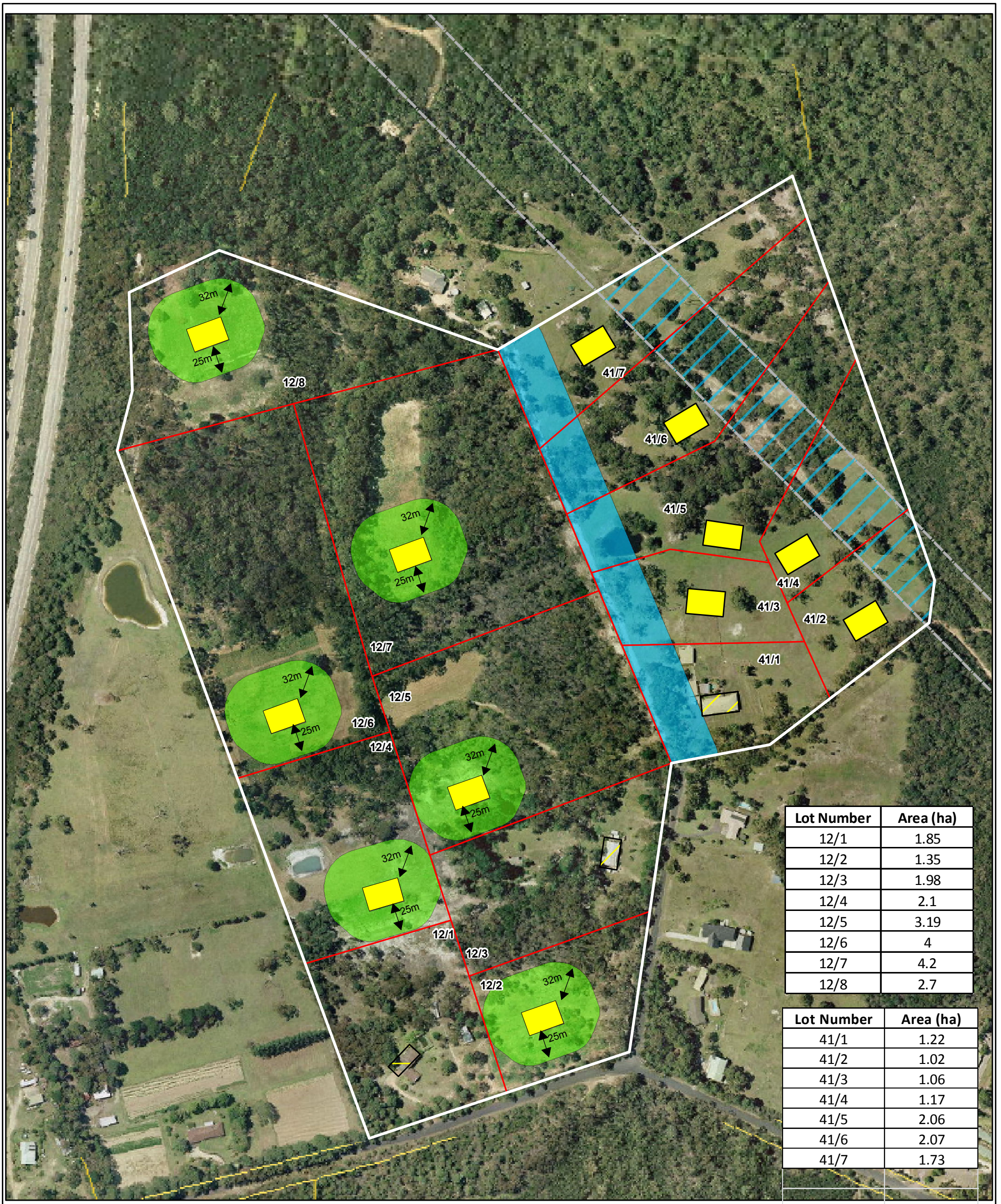
Figure 1

Site Locations

Reeves St, Somersby

By:DC
13/09/11
Ref.No.1131

Source: Aerial © Department of Lands (2011)



Lot Number	Area (ha)
12/1	1.85
12/2	1.35
12/3	1.98
12/4	2.1
12/5	3.19
12/6	4
12/7	4.2
12/8	2.7

Lot Number	Area (ha)
41/1	1.22
41/2	1.02
41/3	1.06
41/4	1.17
41/5	2.06
41/6	2.07
41/7	1.73

N

1:3,000 Approximate at A3

0 50 100 150 200 m

Original plan produced in A3 colour

Legend

- Northern Precinct
- Porposed Subdivision Layout
- Existing Dwelling
- Approximate House Footprint
- Power Line
- 39m APZ
- APZ Created by Power Line Clearing

Flora and fauna survey locations are approximate and have not been fixed by land survey.

*Subject Site boundary subject to final survey

Plan for indicative purposes only. Not for detailed measurement.

conacher environmental group

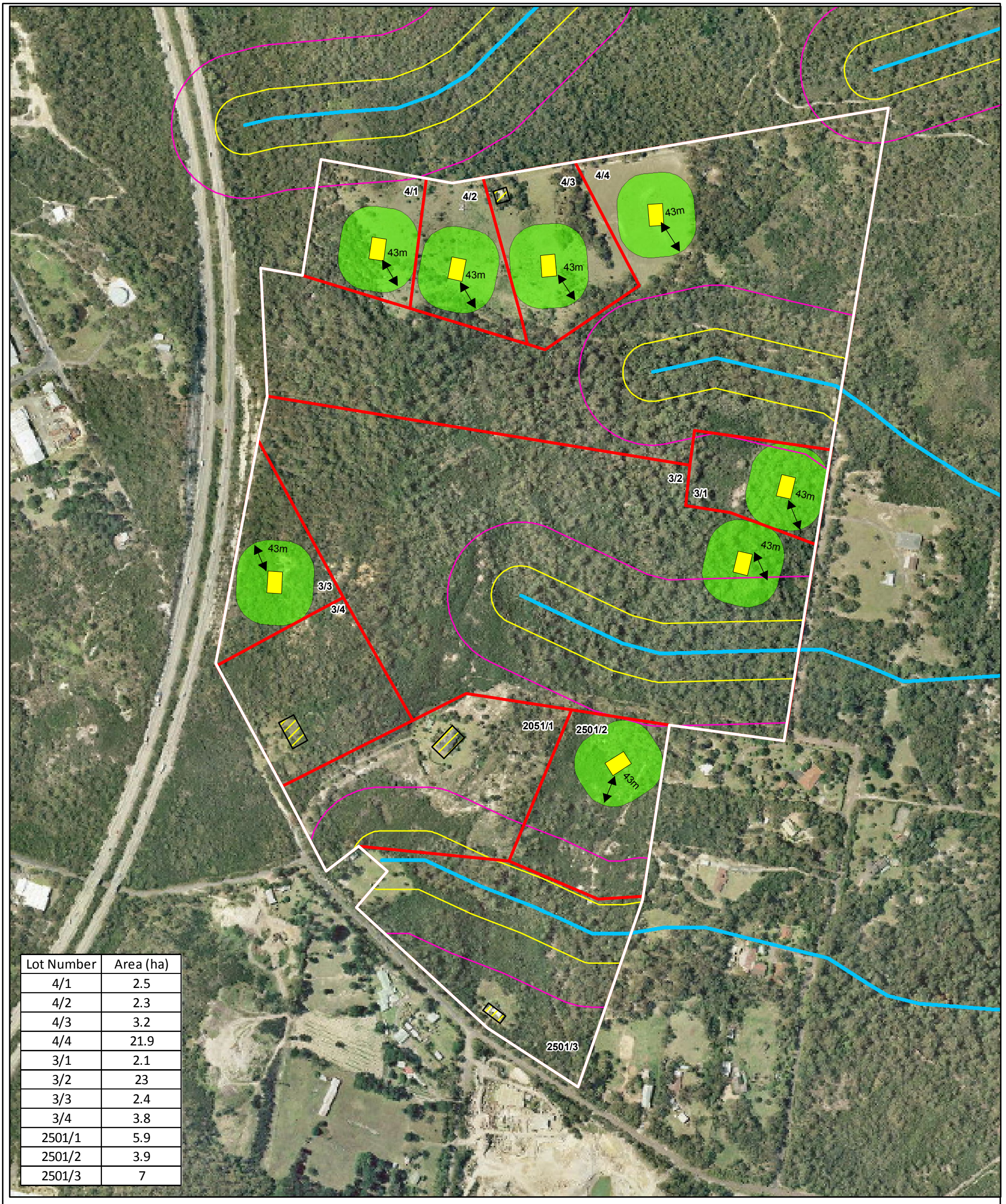
ABN: 62 274 841 042
PO Box 4300
78 York Street
East Gosford NSW 2250
Ph: (02) 4324 7888
Fax: (02) 4324 7899
cegconsult@bigpond.com

Figure 2

Potential Lot Layout - Dwelling Locations
Northern Layout
(Existing Lot 41 DP 771535)

By.DC
13/09/11
Ref.No.1131E

Source: Aerial © Department of Lands (2011)



Lot Number	Area (ha)
4/1	2.5
4/2	2.3
4/3	3.2
4/4	21.9
3/1	2.1
3/2	23
3/3	2.4
3/4	3.8
2501/1	5.9
2501/2	3.9
2501/3	7

N

1:5,000 Approximate at A3

0 100 200 300 m

Original plan produced in A3 colour

Legend

- Subject Site Boundary
- Proposed Subdivision Boundary
- Existing Dwelling
- Approximate House Footprint
- 43m House Asset Protection Zone
- **Buffer from Creekline**
- 100m for Effluent Disposal
- 40m for Controlled Activities

Flora and fauna survey locations are approximate and have not been fixed by land survey. *Subject Site boundary subject to final survey

Plan for indicative purposes only. Not for detailed measurement.

conacher environmental group

ABN: 62 274 841 042
PO Box 4300
78 York Street
East Gosford NSW 2250
Ph: (02) 4324 7888
Fax: (02) 4324 7899
cegconsult@bigpond.com

Figure 3

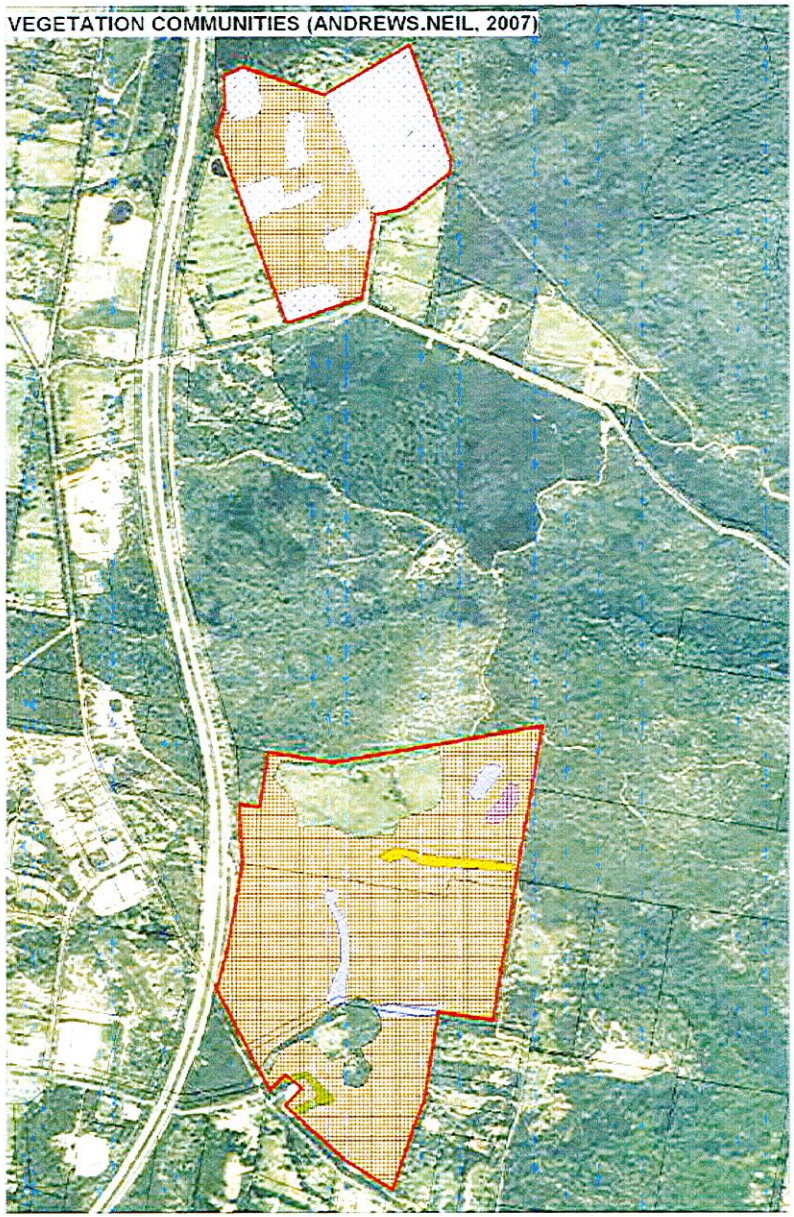
Potential Lot Layout - Dwelling Locations
Southern Recinct
(Existing Lots 3, 4, 2051)

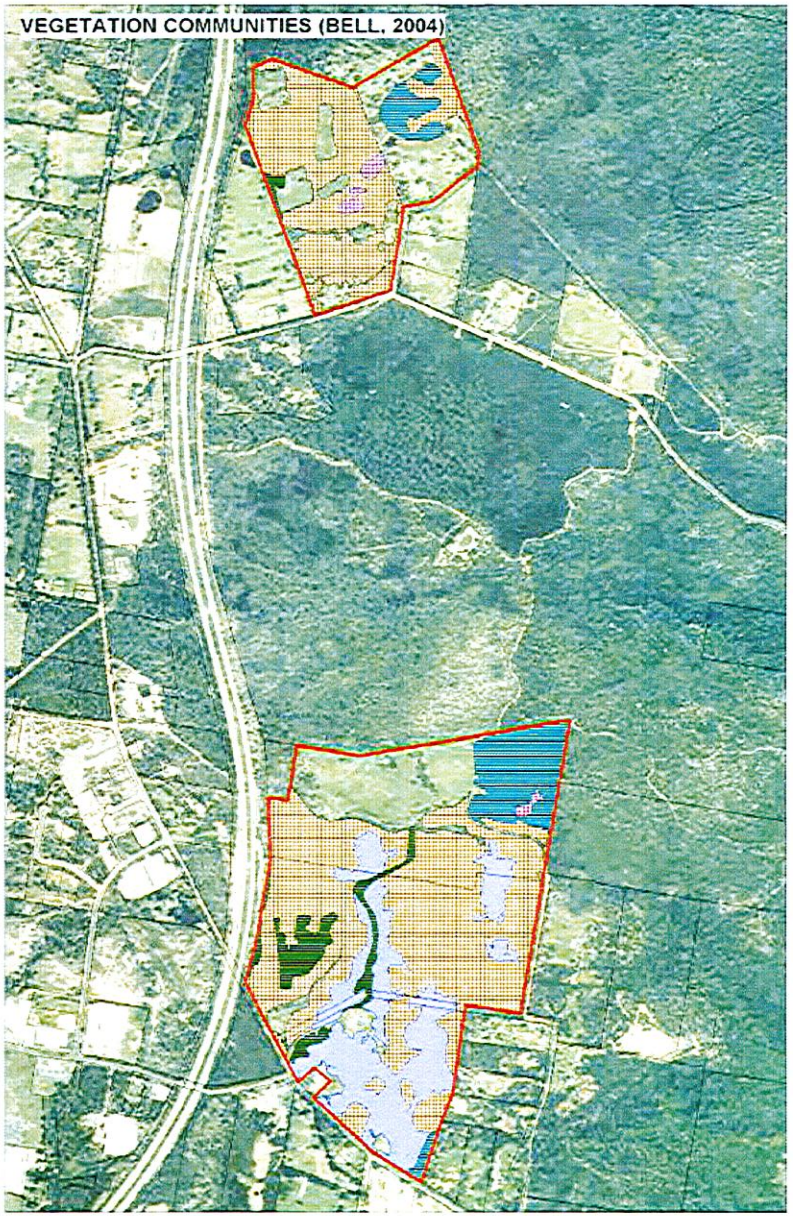
By.DC
12/09/11
Ref.No.1131E

Source: Aerial © Department of Lands (2011)

APPENDIX 1

VEGETATION COMMUNITIES PLAN
(ANDREWS NEIL 2008)





LEGEND

- Study Area

Vegetation Communities (Andrews Neil, 2007)

- Sandstone Hanging Swamps
- Riparian
- Hawkesbury Banksia Scrub-Woodland
- Exposed Hawkesbury Woodland
- Cleared
- Banksia/Callitris Forest

Vegetation Communities (Bell, 2004)

- Sandstone Hanging Swamps
- Hawkesbury Banksia Scrub - Woodland
- Exposed Hawkesbury Woodland
- Disturbed Regrowth
- Disturbed - Canopy Only

NORTH

Figure 4 - Vegetation Communities

Andrews Neil

APPENDIX 2

PRELIMINARY BUSHFIRE ASSESSMENT REPORT

PRELIMINARY
BUSHFIRE ASSESSMENT REPORT

PROPOSED PLANNING PROPOSAL
FOR RURAL LOT SUBDIVISION
DEBENHAM ROAD – REEVES ROAD
SOMERSBY

JUNE 2012
(REF: 1131B)

Suite E, 78 York Street, East Gosford NSW 2250
PO Box 4300, East Gosford NSW 2250

www.cegconsult.com

• Ph (02) 4324 7888 • Fax (02) 4324 7899

• Email cegconsult@bigpond.com

ABN 62 274 841 042

PRELIMINARY
BUSHFIRE ASSESSMENT REPORT

PROPOSED PLANNING PROPOSAL
FOR RURAL LOT SUBDIVISION
DEBENHAM ROAD – REEVES ROAD
SOMERSBY

JUNE 2012

Conacher Environmental Group

Environmental and Land Management Consultants

Suite E, 78 York Street East Gosford NSW 2251
PO Box 4300, East Gosford NSW 2251
Phone: 02 4324 7888 Fax: 02 43247899

TABLE OF CONTENTS

BUSHFIRE ASSESSMENT REPORT

PREFACE

This document prepared by *Conacher Environmental Group* provides an assessment of the bushfire attack potential and the necessary bushfire protection strategies for the proposed future lots following subdivision of the land at Reeves Road and Debenham Road, Somersby. Aspects considered in relation to the Bushfire Assessment Report include; vegetation type, slopes, water supplies, entry and egress access, provision of asset protection zones or defendable space and construction standards for the proposed dwelling.

Report Prepared by:

PHILLIP ANTHONY CONACHER B.Sc.(Hons), Dip.Urb Reg Planning, M.Nat.Res.
Director
Conacher Environmental Group

SECTION 1

BACKGROUND DETAILS

1.1 INTRODUCTION

This Bushfire Assessment Report has been prepared by *Conacher Environmental Group* on behalf of the landowners, for a planning proposal to rezone the land to allow for creation of additional lots for future dwellings. This Report is a preliminary style report for initial planning assessment purposes. A more detailed report would be prepared for subdivision assessment purposes.

The objectives of this Report are to:

i) Detail the assessment of the site in relation to bushfire hazard and attack;
ii) Address the relevant requirements of Planning for Bushfire Protection (Rural Fire Service, 2006);
iii) Identify if the development complies with the aims and objectives of Planning for Bushfire Protection (RFS, 2006);
iv) Prepare a Report that supplies the relevant information for the Rural Fire Service and Council to consider as part of the Planning Proposal Assessments.

1.2 SITE DETAILS

The site is located within rural residential area of Somersby with direct access from Reeves Road, Goldsmiths Road and Debenham Road.

1.3 PROPOSED DEVELOPMENT

The Planning Proposal is for the creation of additional lots within the study area to allow for future dwellings in a rural/bushland style environment. The study area and planning proposal is separated into two precincts as outlined below.

Northern Precinct

Lot 12 DP 263427
- 21.53ha in area
- 8 lots proposed
- 6 new dwelling sites (2 existing dwellings)

Lot 41 DP 771535
- 9.95ha in area
- 7 lots proposed
- 6 new dwelling sites (1 existing dwellings)

Southern Precinct

Lot 4 DP 261507
- 30.55ha in area
- 4 lots proposed
- 4 new dwelling sites (1 existing dwellings)

Lot 3 (Part) DP 261507
- 30.25ha in area
- 4 lots proposed
- 3 new dwelling sites (one approved dwelling)

Lot 2051 DP 559231
- 17.14ha in area
- 3 lots proposed
- 1 new dwelling site (2 existing dwellings)

1.4 BUSHFIRE ASSESSMENT CRITERIA

Bushfire Prone Land Map
The subject land is mapped as occurring within Bushfire Prone Land (Category 1 vegetation) as shown in Figure 1.

Forest Fire Danger Index
The subject site is located within the Gosford City Council Local Government Area in the Greater Sydney Region. The Forest Fire Danger Index for the Greater Sydney Region is rated at 100 for use in determining asset protection zone requirements and categories for bushfire attack.

Vegetation Classification
The site and adjoining lands to north, south, east and west to a distance of 140 metres from the proposed dwelling site generally contains forested vegetation.

Development Category
Any future subdivision of land within the proposal area would be classified as integrated development under the provisions of the EP&A Act. Consent from Council and a Bushfire Safety Authority would be required for any future subdivision of land.

Planning for Bushfire Protection (RFS, 2006)
Due to the presence of bush fire prone land on and adjoining the site the development application is required to include a Bushfire Assessment Report prepared in accordance with the requirements of *Planning for Bushfire Protection* (RFS, 2006).

SECTION 2

BUSHFIRE ATTACK ASSESSMENT

2.1 ADJOINING AND SURROUNDING DEVELOPMENT

The site is adjoined to the north, south, east and west bushland within several rural residential allotments. The F3 Freeway is located to the west of the site.

2.2 VEGETATION IN RELATION TO BUSHFIRE ASSESSMENT

The vegetation surrounding the proposed building within future lots area contains predominantly forest with a shrub understorey. For bushfire assessment purposes the vegetation has been classified as forest vegetation structure.

2.3 SLOPE GRADIENTS IN RELATION TO BUSHFIRE ASSESSMENT

The topography of the site consists of low relief upper slopes. Slope gradients are in the vicinity of 2-5 degrees with a north to north-east aspect.

2.4 BUSHFIRE ATTACK ASSESSMENT

An assessment of the bushfire attack in relation to the adjoining lands, vegetation and slope gradients is provided in Tables 2.1 to 2.5.

TABLE 3.1 - LOT 12 DP 263427
ASSET PROTECTION ZONE ASSESSMENT
(AS PER TABLE A2.4 RFS 2006)

Lot N^{o}.	Direction	Vegetation within 140m	Slope	APZ Distance (metres	Comments
Lot 12/2	North	Forest	0-5^{o} downslope	25	
	South	Forest	upslope	20	
	East	Forest	upslope	20	
	West	Managed Land	0-5^{o} downslope	25	
Lot 12/4	North	Forest	0-5^{o} downslope	25	
	South	Forest	upslope	20	
	East	Forest	upslope	20	
	West	Managed Land	upslope	20	
Lot 12/5	North	Forest	0-5^{o} downslope	25	
	South	Forest	upslope	20	
	East	Forest	upslope	20	
	West	Managed Land	upslope	20	
Lot 12/6	North	Forest	0-5^{o} downslope	25	
	South	Forest	upslope	20	
	East	Forest	0-5^{o} downslope	25	
	West	Managed Land	upslope	20	
Lot 12/7	North	Forest	0-5^{o} downslope	25	
	South	Forest	upslope	20	
	East	Forest	upslope	20	
	West	Forest	upslope	20	
Lot 12/8	North	Forest	0-5^{o} downslope	25	
	South	Forest	upslope	20	
	East	Forest	0-5^{o} downslope	25	
	West	Forest	upslope	20	

TABLE 3.2 - LOT 41 DP 771535 ASSET PROTECTION ZONE ASSESSMENT (AS PER TABLE A2.4 RFS 2006)					
Lot N^{o}.	**Direction**	**Vegetation within 140m**	**Slope**	**APZ Distance (metres**	**Comments**
Lot 41/2	North	Managed Land	0-5^{o} downslope	NR	1
	South	Forest	upslope	20	
	East	Forest	0-5^{o} downslope	25	
	West	Forest	0-5^{o} downslope	25	
Lot 41/3	North	Managed Land	0-5^{o} downslope	NR	1
	South	Managed Land	upslope	NR	1
	East	Managed Land	0-5^{o} downslope	NR	1
	West	Forest	0-5^{o} downslope	25	
Lot 41/4	North	Forest/Managed Land	0-5^{o} downslope	25	1
	South	Managed Land	upslope	NR	
	East	Forest	upslope	20	
	West	Forest	upslope	20	
Lot 41/5	North	Forest/Managed Land	0-5^{o} downslope	25	
	South	Managed Land	upslope	NR	
	East	Forest/Managed Land	0-5^{o} downslope	25	
	West	Managed Land	upslope	NR	
Lot 41/6	North	Forest/Managed Land	0-5^{o} downslope	25	
	South	Forest/Managed Land	upslope	20	
	East	Forest	upslope	20	
	West	Forest	0-5^{o} downslope	25	
Lot 41/7	North	Managed Land	0-5^{o} downslope	NR	
	South	Forest	upslope	20	
	East	Forest	0-5^{o} downslope	25	
	West	Forest	0-5^{o} downslope	25	
1) Reduced vegetation in managed land provided by adjoining future lots or powerline clearing					

TABLE 3.3 - LOT 3 DP 261507 ASSET PROTECTION ZONE ASSESSMENT (AS PER TABLE A2.4 RFS 2006)					
Lot N^{o}.	**Direction**	**Vegetation within 140m**	**Slope**	**APZ Distance (metres**	**Comments**
Lot 3/1	North	Forest	0-5^{o} downslope	25	
	South	Forest	0-5^{o} downslope	25	
	East	Forest	0-5^{o} downslope	25	
	West	Forest	upslope	20	
Lot 3/2	North	Forest	0-5^{o} downslope	25	
	South	Forest	0-5^{o} downslope	25	
	East	Forest	0-5^{o} downslope	25	
	West	Forest	upslope	20	
Lot 3/3	North	Forest	upslope	20	
	South	Forest	0-5^{o} downslope	25	
	East	Forest	0-5^{o} downslope	25	
	West	Forest	upslope	25	

TABLE 3.4 - LOT 4 DP 261507 ASSET PROTECTION ZONE ASSESSMENT (AS PER TABLE A2.4 RFS 2006)					
Lot N^{o}.	**Direction**	**Vegetation within 140m**	**Slope**	**APZ Distance (metres**	**Comments**
Lot 4/1	North South East West	Forest Forest Managed Land Forest	0-5^{o} downslope upslope 0-5^{o} downslope 0-5^{o} downslope	25 20 NR 25	
Lot 4/2	North South East West	Forest Forest Managed Land Managed Land	0-5^{o} downslope upslope 0-5^{o} downslope upslope	25 20 NR NR	
Lot 4/3	North South East West	Forest Forest Managed Land Managed Land	0-5^{o} downslope upslope 0-5^{o} downslope upslope	25 20 NR NR	
Lot 4/4	North South East West	Forest Forest Managed Land Forest	0-5^{o} downslope upslope 0-5^{o} downslope upslope	25 20 NR 20	

TABLE 3.5 - LOT 2051 DP 559231 ASSET PROTECTION ZONE ASSESSMENT (AS PER TABLE A2.4 RFS 2006)					
Lot N^{o}.	**Direction**	**Vegetation within 140m**	**Slope**	**APZ Distance (metres**	**Comments**
Lot 2051/2	North South East West	Forest Forest Forest Forest	0-5^{o} downslope 0-5^{o} downslope 0-5^{o} downslope upslope	25 25 25 20	

SECTION 3

BUSHFIRE PROTECTION MATTERS

3.1 ASSET PROTECTION ZONE AND BUSHFIRE HAZARD MANAGEMENT

The assessment of Asset Protections Zones for the subdivision stage (Table A2.4 of RFS 2006) has determined that a Asset Protection Zones (APZ) of 20-25 metres width around future dwellings are required.

The inner 20 metres of the APZ surrounding the future buildings should be managed and maintained in accordance with the standards described in Section 4.1.3 of PBP (RFS, 2006) as an inner protection area as part of the ongoing land management practices implemented for any future dwelling.

3.2 BUILDING CONSTRUCTION LEVEL – FUTURE DWELLINGS

A building construction standard to BAL 19 for the future dwellings has been modelled for this site due to the extent of forest land within the vicinity of the dwelling site which contains the bushfire hazard. It is considered that the construction standard of BAL 19 for future dwellings would be appropriate for future lots as the APZ area also provides opportunity for on-site effluent disposal, site amenity and activities.

Construction to BAL 19 (dwelling) in relation to AS3959-2009 can be achieved for future lots. This can be achieved by the continued maintenance of bushfire Asset Protection Zones (APZs) managed to the condition of an inner protection area (20m) and outer protection area (outside of the 20 metre IPA). Figures 2 and 3 show a building area with the APZ for a BAL 19 constructed dwelling within each of the future lots where a new dwelling might be constructed.

3.3 ACCESS

The proposed access to each proposed lots are outlined below:

Northern Precinct
Lot 12 DP 263427

Lot 12/1	Direct from Reeves Road;
Lot 12/2	Direct from Reeves Road/Goldsmiths Road;
Lot 12/3	Direct from Goldsmith Road;
Lot 12/4	Right of Carriageway over Lot 1;
Lot 12/5	Direct from new road;
Lot 12/6	Right of Carriageway over Lots 1, 4;
Lot 12/7	Direct from new road;
Lot 12/8	Direct from new road.

The existing accessway along the western side of Lot 41 will require upgrading and designation as a public road because this access will service more than three dwellings. The laneway along the southern side of Lot 41 will provide access to proposed Lots 4/2 and 4/4.

Lot 41 DP 771535

Lot 41/1	Direct from Goldsmiths Road;
Lot 41/2	Right of Carriageway over Lot 41 DP 771535 (from laneway);
Lot 41/3	Direct from new road;
Lot 41/4	Right of Carriageway over Lot 41 DP 771535 (from laneway);
Lot 41/5	Direct access from new road;
Lot 41/6	Direct access from new road;
Lot 41/7	Direct access from new road.

Lots 12/7 and 12/8 will obtain access from the upgraded road along the western edge of Lot 41.

Southern Precinct

Lot 4 DP 261507

Lot 4/1	Direct from Reeves Road;
Lot 4/2	Direct from Reeves Road/Goldsmiths Road;
Lot 4/3	Direct from Goldsmith Road;
Lot 4/4	Right of Carriageway over Lot 1.

The existing access from Kowara Road will be required to be upgraded to a public road standard to provide direct access to Lots 4/3 and 4/4. Access to Lots 4/1 and 4/2 can then be provided by Right of Carriageway to the public road.

Lot 3 DP 261507

Lot 3/1	Direct to Kowara Road;
Lot 3/2	Direct to Kowara Road;
Lot 3/3	Direct from Debenham Road;
Lot 3/4	Direct from Debenham Road.

All future lots in Lot 261507 will have direct road access to Kowara Road or Debenham Road.

Lot 2051 DP 559231

Lot 2051/1	Direct from Debenham Road;
Lot 2051/2	Direct from Kowara Road;
Lot 2051/3	Direct from Debenham Road.

All future lots in Lot 2051 will have direct road access to Kowara Road or Debenham Road.

3.4 WATER SERVICES

The existing developments and dwellings in the local area are not connected to reticulated water mains. Therefore it is considered that a dedicated fire fighting water supply should be provided.

The future dwellings should be provided with a dedicated bushfire water supply tank of 20,000 litres capacity (concrete or metal tank) to be installed and maintained. A diesel driven pump should be connected to the tank by metal pipes capable of adequate flows for fire fighting purposes with an attached hose reel. A 65mm Storz outlet should be connected to the bushfire water supply tank.

3.5 ENVIRONMENT AND HERITAGE ISSUES

The site contains areas of threatened species habitats, endangered ecological communities and archaeological areas of interest. The dwelling locations have been selected to minimise and reduce potential impacts on matters of biodiversity and archaeological significance. These matters are addressed in separate reports prepared for the Planning Proposal.

SECTION 4

CONCLUSIONS AND RECOMMENDATIONS

4.1 AIM AND OBJECTIVES OF PLANNING FOR BUSHFIRE PROTECTION

"*The aim of Planning for Bushfire Protection is to use the NSW development assessment system to provide for the protection of human life and to minimise impacts on property form the threat of bushfire, while having due regard to development potential, on site amenity and protection of the environment" (PBP pg 1).*

The preparation of this Bushfire Assessment Report and subsequent assessment by Council and the Rural Fire Service ensures compliance with the aim of Planning for Bushfire Protection.

The following comments are provided in relation to satisfying the objectives of PBP.

Objective 1
(i) afford occupants of any building adequate protection from exposure to a bush fire;

Measures have been identified which can be implemented within the proposed development in regard to the future dwelling which is to comply with BAL 19 Construction Standards (AS3959-2009) while a 20-25 metre APZ has been assessed for subdivision purposes.

Objective 2
(ii) provide for a defendable space to be located around buildings;

A defendable space is available within the proposed APZ of each future lot. A separate distance of 43 metres has also been determined for future dwellings if they are constructed to BAL 19 standard.

Objective 3
(iii) provide appropriate separation between a hazard and buildings which, in combination with other measures, prevent direct flame contact and material ignition;

The proposed APZ and separation distance will provide appropriate separation distance (of 43 metres) between future dwellings and the bushfire hazard for a future dwelling constructed to BAL 19.

Objective 4
(iv) ensure that safe operational access and egress for emergency service personnel and residents is available;

Access and egress to the future lots is to be provided by the local road system and lot accessways which are to meet the requirements of Planning for Bushfire Protection (RFS 2006).

Objective 5
(v) provide for ongoing management and maintenance of bush fire protection measures, including fuel loads in the asset protection zone (APZ);

The occupants (or their agents) are to undertake regular inspections and undertake management of the site to maintain overall fuel levels. This will include maintenance of the vegetation and fuel loads within household gardens in accordance with PBP (RFS, 2006).

Objective 6

(vi) ensure that utility services are adequate to meet the needs of fire fighters (and others assisting in bush fire fighting)

With respect to the adequate supply of water services the proposed dwelling will require a 20,000 litre water tank dedicated to fire fighting purposes only in addition to supply of reticulated water. This tank should have the necessary connections (a 65mm Storz outlet with a gate or ball valve) to allow connection by fire fighting vehicles. This will ensure that utility (water) services are adequate to meet the needs of fire fighters and others assisting in bush fire fighting.

4.2 CONCLUDING COMMENTS

With the implementation of the measures recommended, and outlined in Section 3 of this Report, the overall aims and objectives of Planning for Bushfire Protection (RFS, 2006) can be achieved for the proposed development.

4.3 RECOMMENDATIONS

The following recommendations are provided in relation to reducing the potential for loss of life and property by the impact of bushfire.

i) A defendable space (APZ) of between 35 and 43 metres is to be maintained within the future lots for a dwelling constructed to BAL 19;

ii) Any future dwelling is constructed to BAL 19 Construction Standards (AS3959-2009) on all aspects;

iii) Any access provided to future lots to meet the standards of Section 4.1 of Planning for Bushfire Protection (RFS 2006);

iv) Regular inspections and maintenance of the future asset protection zone within the subject site is to be undertaken by the occupant according to PBP (RFS, 2006);

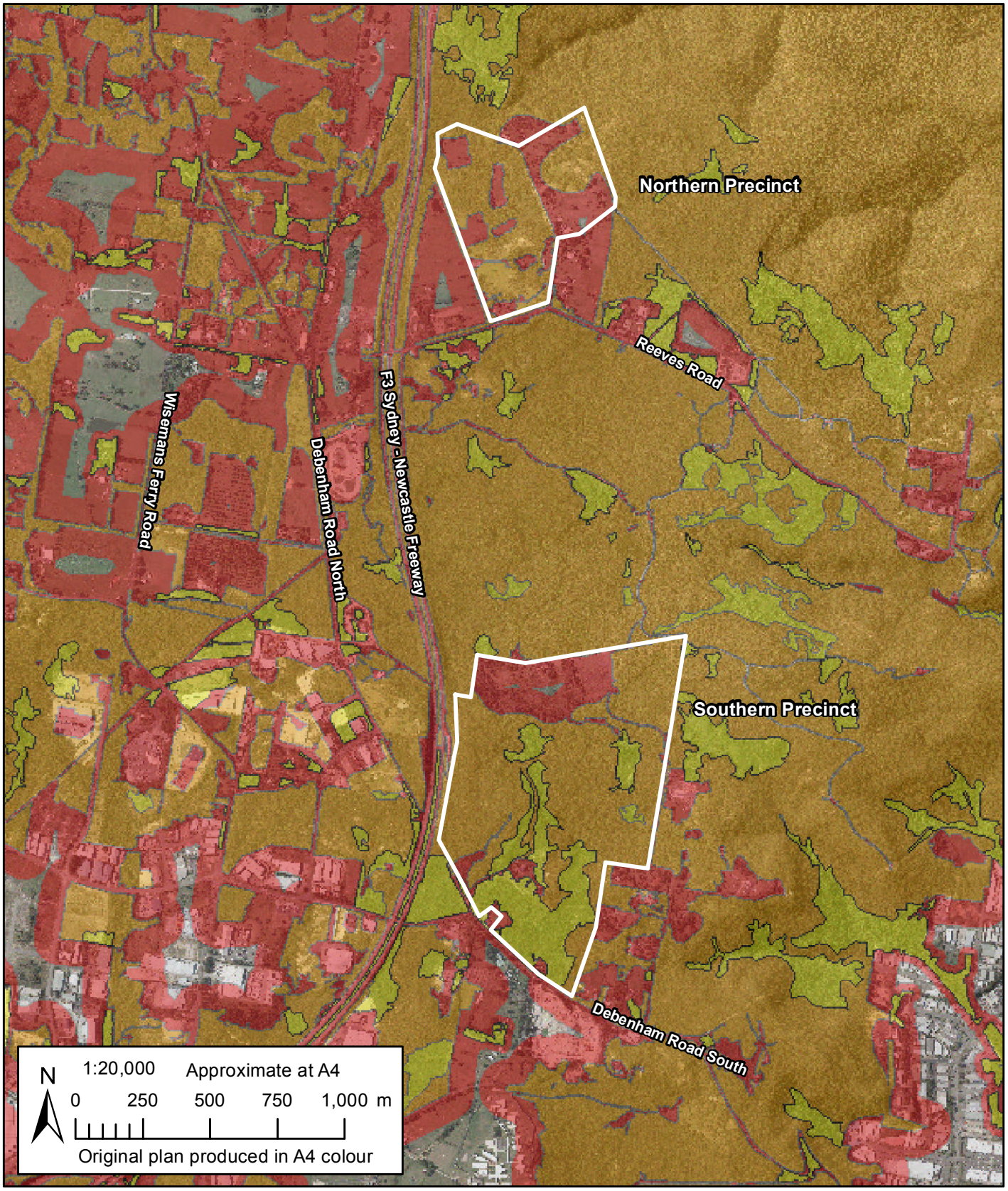
v) Provision of a dedicated water supply for bushfire purposes comprising a 20,000 litre tank storage Storz fittings and diesel pump and fire hoses.

REFERENCES

Rural Fire Service (2006) Planning for Bushfire Protection.

Standards Australia (2009) Australian Standard (AS3959-2009) Construction of Buildings in Bushfire Prone Areas.

Standards Australia (2005) Australian Standard (AS2419.1 2005) Fire hydrant installations – System Design, Installation and Commissioning.



Flora and fauna survey locations are approximate and have not been fixed by land survey. *Subject Site boundary subject to final survey*
Plan for indicative purposes only. Not for detailed measurement.

Legend

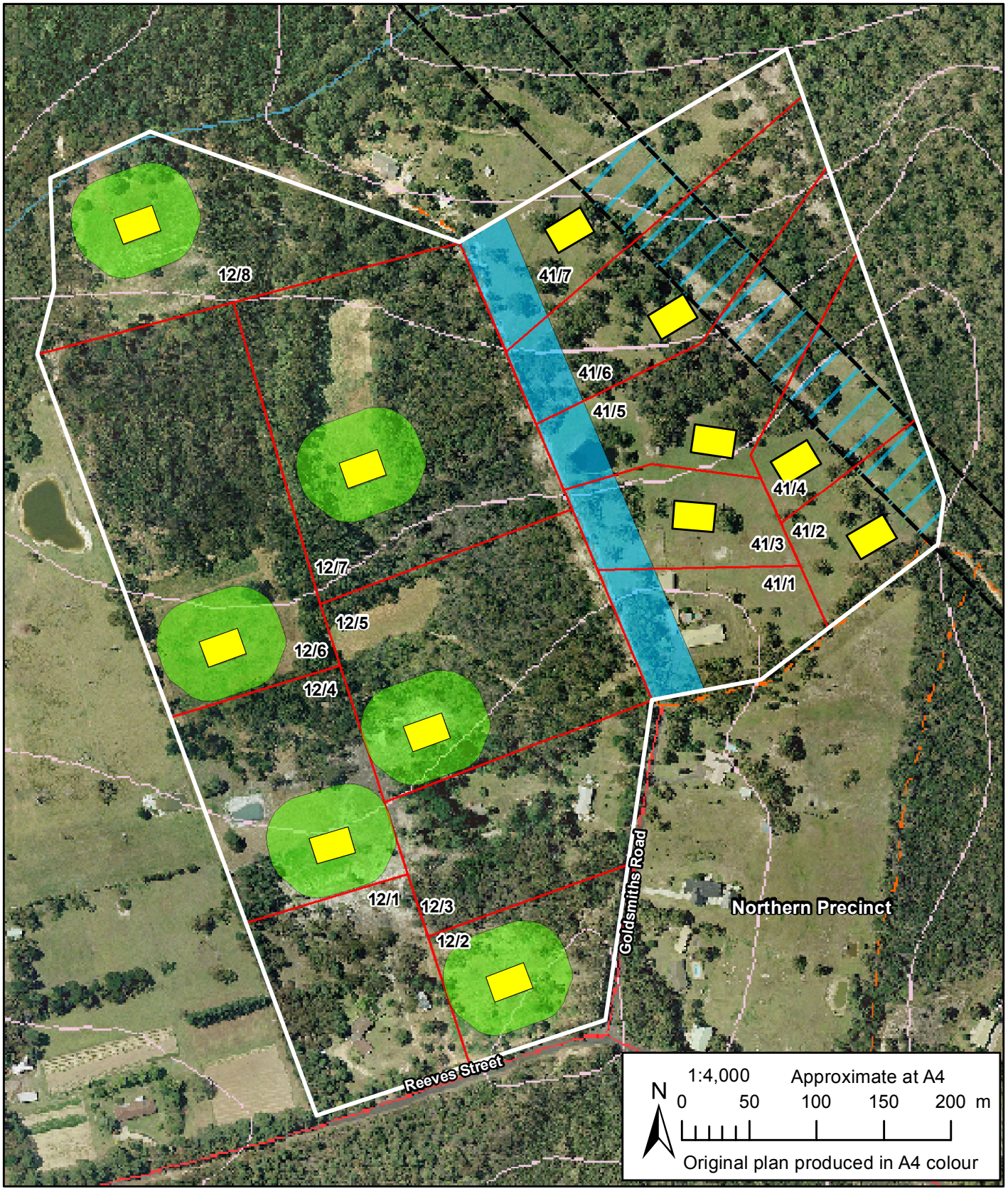
- Northern Precinct
- Southern Precinct
- Bushfire Prone Land - Vegetation Catagory 1
- Bushfire Prone Land - Vegetation Catagory 2
- Bushfire Prone land - Vegetation Buffer-100m & 30m

conacher environmental group
ABN: 62 274 841 042
PO Box 4300
78 York Street
East Gosford NSW 2250
Ph: (02) 4324 7888
Fax: (02) 4324 7899
cegconsult@bigpond.com

Figure 1
Bushfire Prone Land
Reeves St, Somersby

By.DC
13/09/11
Ref.No.1131

Source: Aerial © Gosford Council (2012)



Flora and fauna survey locations are approximate and have not been fixed by land survey. *Subject Site boundary subject to final survey
Plan for indicative purposes only. Not for detailed measurement.

Legend

- Northern Precinct
- Proposed Subdivision Layout
- 39m APZ
- Approximate House Footprint
- Power Line
- APZ Created by Power Line Clearing
- Asset Protection Zone

conacher environmental group
ABN: 62 274 841 042
PO Box 4300
78 York Street
East Gosford NSW 2250
Ph: (02) 4324 7888
Fax: (02) 4324 7899
cegconsult@bigpond.com

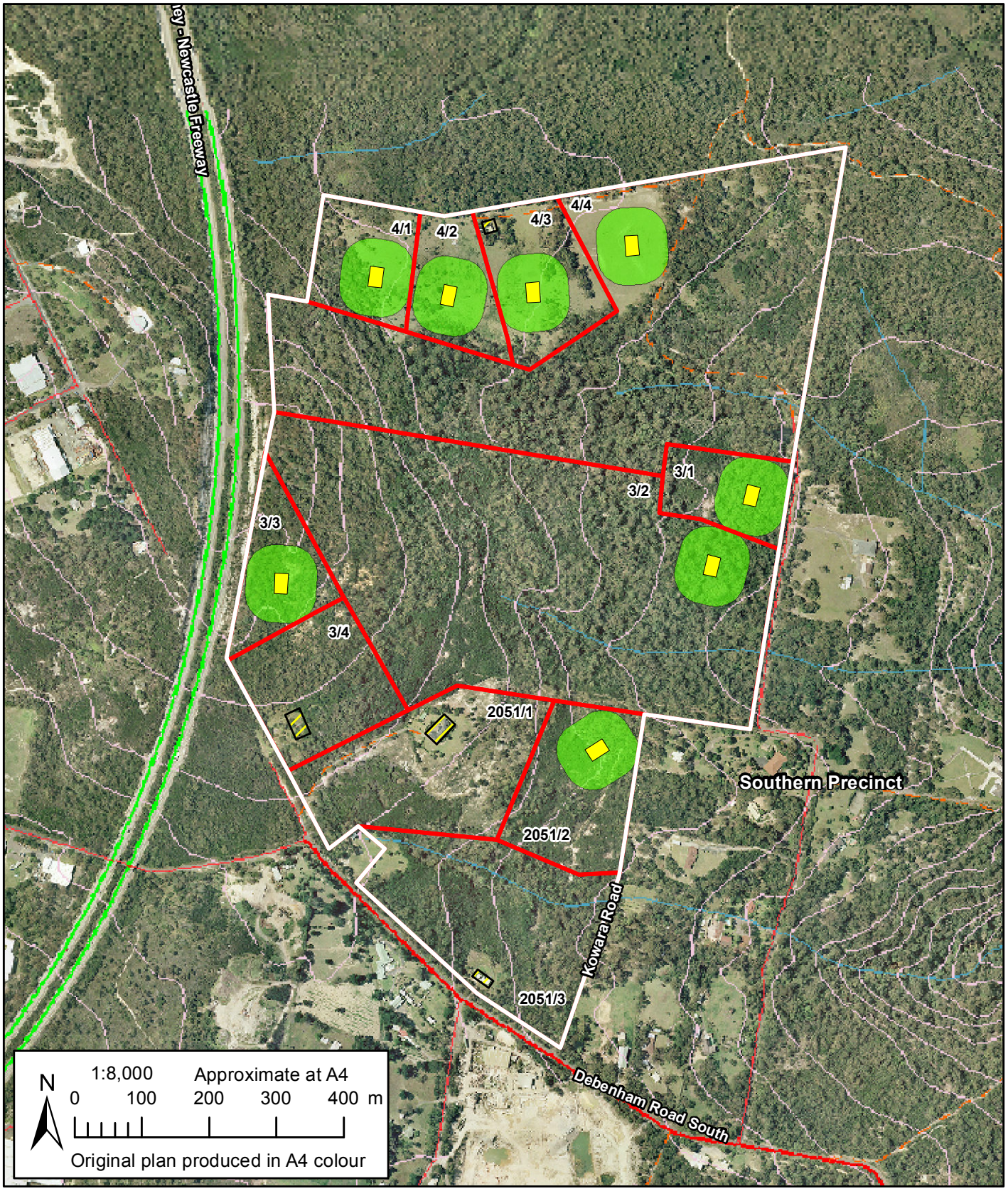
By:DC
13/06/12
Ref.No.1131

Figure 2

Bushfire APZ Northern Precinct

Reeves St, Somersby

Source: Aerial © Department of Lands (2011)



Flora and fauna survey locations are approximate and have not been fixed by land survey. *Subject Site boundary subject to final survey*
Plan for indicative purposes only. Not for detailed measurement.

Legend

- Southern Precinct
- Proposed Subdivision Boundary
- Approximate House Footprint
- 43m House Asset Protection Zone
- Existing Dwelling

conacher environmental group
ABN: 62 274 841 042
PO Box 4300
78 York Street
East Gosford NSW 2250
Ph: (02) 4324 7888
Fax: (02) 4324 7899
cegconsult@bigpond.com

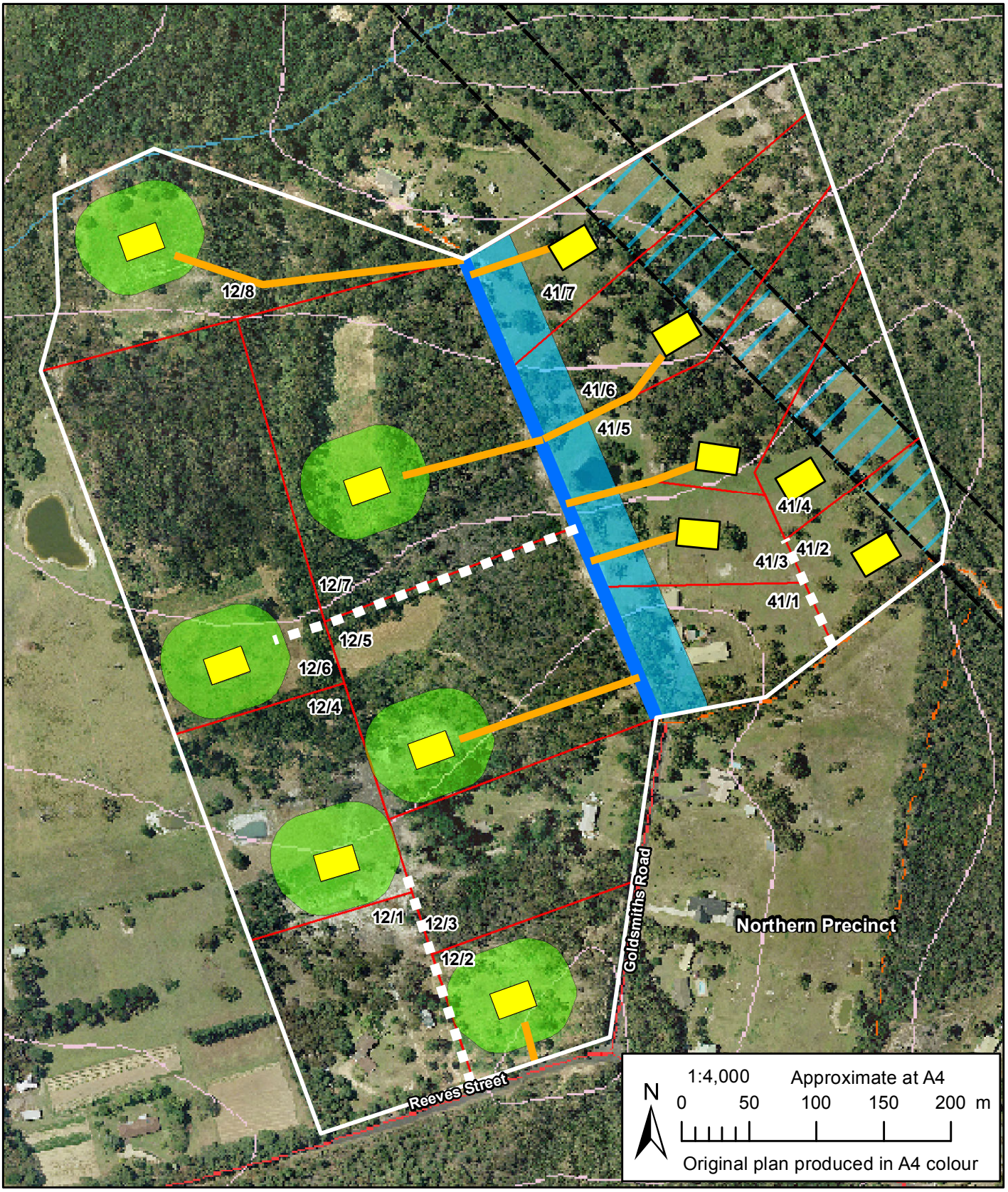
Figure 3

Bushfire APZ Southern Precinct

Reeves St, Somersby

By:DC
13/06/12
Ref.No.1131

Source: Aerial © Department of Lands (2011)



Flora and fauna survey locations are approximate and have not been fixed by land survey. *Subject Site boundary subject to final survey Plan for indicative purposes only. Not for detailed measurement.

- Northern Precinct
- Approximate House Footprint
- Asset Protection Zone
- Proposed Subdivision Layout
- Power Line
- 39m APZ
- APZ Created by Power Line Clearing
- Public Road
- Right of Carriageway
- Driveway

conacher environmental group
ABN: 62 274 841 042
PO Box 4300
78 York Street
East Gosford NSW 2250
Ph: (02) 4324 7888
Fax: (02) 4324 7899
cegconsult@bigpond.com

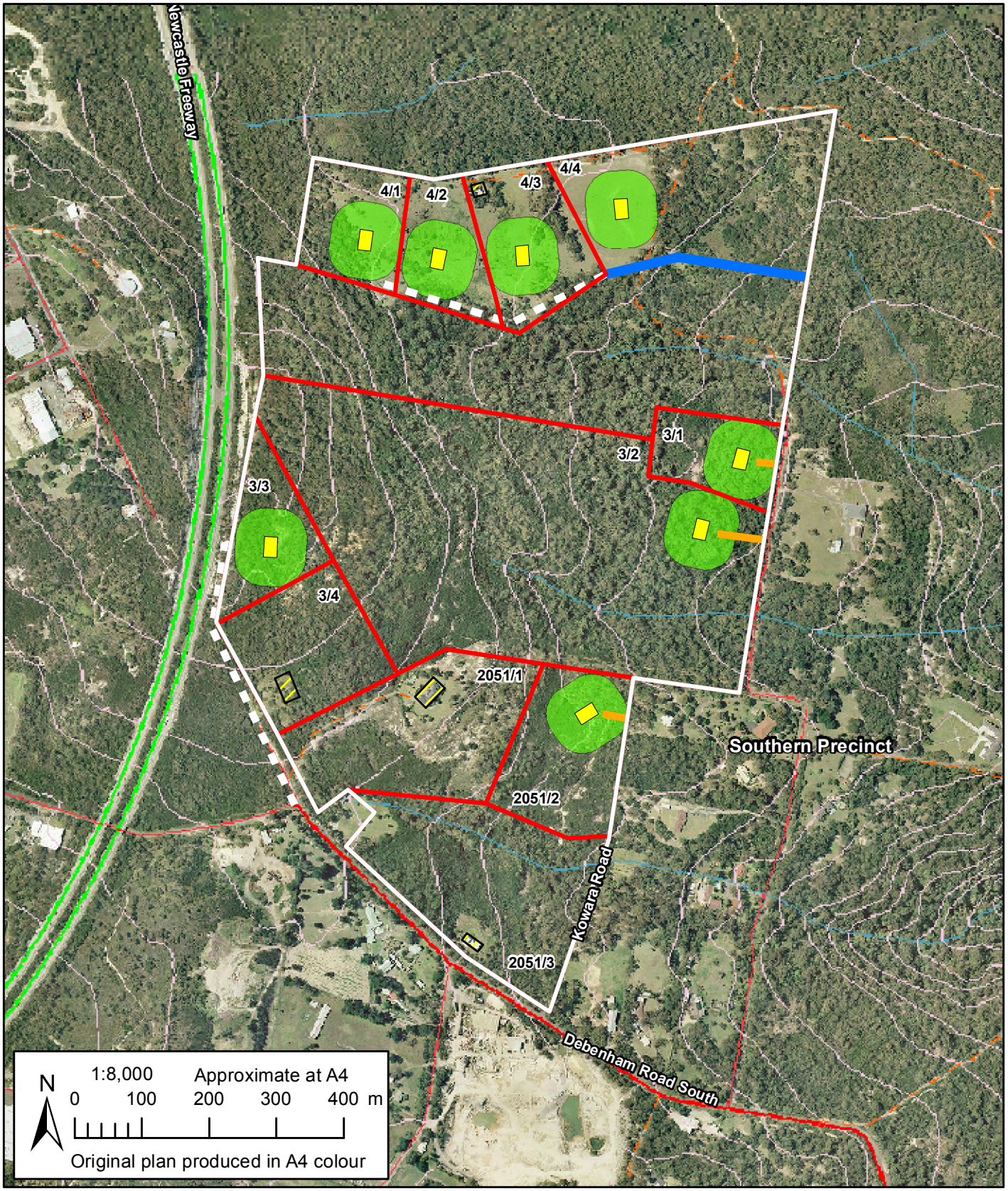
By.DC
13/06/12
Ref.No.1131

Figure 4

Lot Access and Bushfire APZ Northern Precinct

Reeves St, Somersby

Source: Aerial © Department of Lands (2011)



Flora and fauna survey locations are approximate and have not been fixed by land survey. *Subject Site boundary subject to final survey Plan for indicative purposes only. Not for detailed measurement.

Legend

- Southern Precinct
- Proposed Subdivision Boundary
- Approximate House Footprint
- 43m House Asset Protection Zone
- Existing Dwelling
- Public Road
- Right of Carriageway
- Driveway

conacher environmental group
ABN: 62 274 841 042
PO Box 4300
78 York Street
East Gosford NSW 2250
Ph: (02) 4324 7888
Fax: (02) 4324 7899
cegconsult@bigpond.com

By.DC
13/06/12
Ref.No.1131

Figure 5

Lot Access and Bushfire APZ Southern Precinct

Reeves St, Somersby

Source: Aerial © Department of Lands (2011)

APPENDIX 3

FEASIBILITY REPORT – ONSITE EFFLUENT DISPOSAL

FEASIBILITY REPORT
ON-SITE EFFLUENT DISPOSAL

PROPOSED DWELLINGS
SOMERSBY

JUNE 2012
(REF:1131/E)

Suite E, 78 York Street, East Gosford NSW 2250
PO Box 4300, East Gosford NSW 2250

www.cegconsult.com

• Ph (02) 4324 7888 • Fax (02) 4324 7899

• Email cegconsult@bigpond.com

ABN 62 274 841 042

FEASIBILITY REPORT
ON-SITE EFFLUENT DISPOSAL

PROPOSED DWELLINGS
SOMERSBY

JUNE 2012

Conacher Environmental Group

Environmental and Land Management Consultants

Suite E, 78 York Street East Gosford NSW 2251
PO Box 4300, East Gosford NSW 2251
Phone: 02 4324 7888 Fax: 02 43247899

PREFACE

This On-site Effluent Disposal Feasibility Report has been completed by *Conacher Environmental Group* to assess the site capability for effluent disposal for proposed future dwellings within the areas covered by the Planning Proposal.

This Report has been completed by utilising the site and soil assessment methodology recommended in the Department of Local Government Publication “On-site Sewage Management for Single Households” with inclusion of relevant disposal area assessments from AS/NZS 1547:2012 “On-Site Domestic-Wastewater Management”.

The purpose of this Assessment Report is to assess the capability of the area for on-site disposal of effluent and to provide a recommendation for the most appropriate sewage treatment system and disposal method. This Report does not provide design details in relation to the recommended system or disposal area. Such details are provided with future applications for the on-site system.

Report and Site Assessment completed by:

PHILLIP ANTHONY CONACHER B.Sc.(Hons), Dip.Urb Reg Planning, M.Nat.Res.
Director
Conacher Environmental Group

TABLE OF CONTENTS

1. INTRODUCTION

This Report has been prepared to assess the overall feasibility or capability of the areas covered in a Planning Proposal for a future rural residential style subdivision of several large allotments in the Somersby area.

Detailed lot by lot assessments have not been completed as these would be undertaken as part of the detailed investigations for a subdivision proposal following initial support for the Planning Proposal.

Possible future development following support for the Planning Proposal and future development application would be for future dwellings on large lots.

The Planning Proposal is for the creation of additional lots within the study area to allow for future dwellings in a rural/bushland style environment. The study area and planning proposal is separated into two precincts as outlined below.

Northern Precinct

Lot 12 DP 263427
- 21.53ha in area
- 8 lots proposed
- 6 new dwelling sites (2 existing dwellings)

Lot 41 DP 771535
- 9.95ha in area
- 7 lots proposed
- 6 new dwelling sites (1 existing dwellings)

Southern Precinct

Lot 4 DP 261507
- 30.55ha in area
- 4 lots proposed
- 4 new dwelling sites (1 existing dwellings)

Lot 3 (Part) DP 261507
- 30.25ha in area
- 4 lots proposed
- 3 new dwelling sites (one approved dwelling)

Lot 2051 DP 559231
- 17.14ha in area
- 3 lots proposed
- 1 new dwelling site (2 existing dwellings).

Due to the broad nature of this Feasibility Assessment lot specific investigations have not been completed. However the broader assessment of assessing if the site topography, drainage and soil types pose any significant constraints to future on-site disposal of treated wastewater has been completed. Detailed investigations of individual lots would be completed for the future subdivision applications.

2. SITE ASSESSMENT – FEASIBILITY OF EFFLUENT DISPOSAL AREAS

2.1 Site Characteristics

Location:	Areas downslope of future dwelling within cleared areas of future lots.
Slope:	2-5^{o} with a north to north-east aspect. Elevations of approximately 150 to 220 metres AHD.
Topography:	Mid to upper slopes of a local hill.
Drainage:	Site runoff by overland flow onto downslope land. Drainage lines present throughout site.
Vegetation:	Cleared lands, Partial disturbed Open Forest with shrub understorey.
Groundwater:	Not tested but not expected to be within 5 metres of surface due to local topography and elevation.

Comments:

The possible disposal areas have been assessed with consideration to available area and site constraints. An assessment of the site characteristics in relation to Table 4 of the Department of Local Government (1998) (Appendix I of this Report) identifies that the major limitation for on-site disposal are the rock outcrops and shallow soils which occur in some locations. However effluent disposal is not proposed within these areas.

2.2 Soil Characteristics

An assessment of the soil characteristics in accordance with Table 6 of Department of Local Government (1998) is provided in Appendix 1. Details of the soils present are provided below.

Soil Landscape:	Included within the Somersby and Sydney Town Soil Landscape Units (Chapman & Murphy 1989) as identified in Figures 1 and 2.	
Soil Type:	Grey loose sand to loamy sand topsoil with sandy clay subsoil mapped in Somersby and Sydney Town Soil Landscape.	
Soil Description:	Topsoil 0mm to 400mm. (Dark grey Loose Loamy Sand). Subsoil 400mm to 500mm light grey light sandy clay.	
Soil Texture:	Topsoil: Subsoil:	Loamy Sand (field texture). Sandy Clay (field texture).

Soil Drainage:	Category 2(b) to Sandy Loam soils (Dept of Local Government (1998)). Well drained permeable soils with massive structure. Some localised areas of shallow soils over rock layers.
Dispersibility:	Subsoils within the Somersby and Sydney Town Soil Landscape are generally recognised as stable subsoils not prone to dispersion but are highly erodible soil.

Comments:

Refer to soil assessment criteria in Appendices for specific information on the soil characteristics of this site.

2.3 On-site Disposal Method Considerations

The lower slope gradients (2-5^{o}) of the site provide favourable conditions for on-site effluent disposal. The shallow soil (less than one metre depth) in some areas of the site provides a moderate limitation to on-site effluent disposal (Table 6 Appendix 1) particularly for deeper absorption trenches. However the selection of building sites and possible disposal areas has avoided areas with these limitations.

However, a site investigation has identified that selected areas have soil characteristics which indicate that areas within the site could be suited for effluent disposal using a sub-surface drip irrigation system.

3. DISPOSAL AREA ASSESSMENT

3.1 Assessment Details

The following assessment and assessment details provided within the Appendices is based on the matters identified in AS1547-2012 (Standards Australia 2012) and 'On-site Sewage Management for Single Households' (Department of Local Government 1998) in order to determine the suitability of the site and the size of disposal area for covered surface drip irrigation.

In order to determine the extent of the area for effluent disposal, calculations are based on the expected wastewater volume for a dwelling based on the following parameters.

Dwelling characteristics

N^{o} of bedrooms:	5
N^{o} of persons assessed:	7.5
Water supply:	On-site Supply
Standard Water reduction fixtures/plumbing:	No
Wastewater generation rate: (from Table H1 ASNZ1547/2012)	
Per Person:	120 litres (115 litres if water reduction fixtures used)
Household per day:	900 litres/day

3.2 Assessment for Extent of Disposal Area

The method of on-site disposal proposed for this site is the covered Shallow sub-surface drip irrigation system. As described in AS1547:2012 the use of a Shallow sub-surface drip irrigation system enables effluent to be applied directly to the upper layer of the soil under a cover of grass/turf.

Soil Hydrological Balance

On a hydrological basis the area required for disposal of effluent by covered Shallow sub-surface drip irrigation is determined by the total weekly wastewater generated being divided by the Design Irrigation Rate (mm/day) for the relevant soil type as identified in Table M1 of AS1547:2012.

On this basis the following parameters are of relevance:

$$\text{Area of Disposal} = \frac{\text{Daily Wastewater Generation}}{\text{Design Irrigation Rate}}$$

Daily Wastewater Generation = 900 litres/day

Design Irrigation Rate = 5mm/day (per square metre)

$$\text{Disposal Area} = \frac{900}{5}$$

= 180 square metres.

Nutrient Balance Method

To assess the required area for on-site disposal using covered Shallow sub-surface drip irrigation a nutrient balance assessment is required for both nitrogen and phosphorus, according to the details provided in Appendix 6 of Department of Local Government (1998). The following calculations are based on the use of an aerated wastewater treatment system with effluent treated to secondary treatment standards, as required in Appendix M2.1 of AS1547:2012.

The standard nutrient concentrations of 37mg/litre for Nitrogen and 12mg/litre for Phosphorus as identified in DLG (1998) have been used for calculation purposes. These nutrient concentrations could be reduced if specific system manufacturers testing results were available and applied to the analysis. This more refined level of analysis can be completed in future documentation accompanying an Application to Install a Sewage Management System.

Disposal Area based on Nitrogen Balance

The formula used to determine disposal area requirements based on organic matter and nutrient loads is as follows:

$$A = \frac{C \times Q}{L}$$

Where: A = Land area (m^2)

C = Concentration of nitrogen (App 6 of Guidelines)
= 37mg/l

Q = treated wastewater flow rate (l/d)
= 900 l/d

L = critical loading rate nitrogen (from App 6 of Guidelines)
= 25 $mg/m^2/d$

Nitrogen Loading:

A = m^2 minimum area for total nitrogen

$$= \frac{37 \times 900}{25}$$

= $1332m^2$

Disposal Area Based on Phosphorus Loading

Assuming figures provided in Appendix 6 of Department of Local Government (1998) Total Phosphorus concentration in treated wastewater (12mg/litre), critical loading of $3mg/m^2$/day and phosphorous absorption capacity of 965 kg/hectare (soil test results) the amount of phosphorus absorbed into the soil over a 50 year period is provided below:

P absorbed = 6000 x 1/3
= 200 kg/ha
= 0.2 kg/m^2

Determine the amount of vegetation uptake.

P uptake = 3 x 365 x 50
= 54 750 mg/m^2
= 0.055 kg/m^2

Determine the amount of phosphorus generated over that time (50 years).

P generated = total phosphorus concentration
= 12 x 900 litres x 365 x 50
= 197kg

Irrigation area = P generated P/absorbed + P uptake)

= 0.2 + 0.055 = 197

= 773m^2

The area required for effective absorption and uptake of nitrogen (1332m^2) is larger than the area required for phosphorus removal (773m^2) therefore the nitrogen balance should be considered as the limiting factor for determining the size of the disposal area.

3.3 Buffer Distances to Disposal Area

The buffer distances recommended in Table 5 of Environmental & Health Protection Guidelines – Onsite Sewage Management for Single Households (Dept of Local Government 1998) applicable to this site are:

– Permanent Surface Waters	>100 metres
– Drainage Channels	> 40 metres
– Up gradient property boundaries and buildings	> 6 metres
– Down gradient property boundaries	> 3 metres

These recommended buffer distances can be achieved within each future lot as shown in Figure 1.

4. CONCLUSIONS

The slope gradients of approximately 2-5^o provide a suitable gradient to on-site effluent disposal by Shallow sub-surface drip irrigation.

The soil types indicate that the subject site has areas suitable for disposal of wastewater, from a house containing five bedrooms connected to on-site water supply system by Shallow sub-surface drip irrigation system of at least 1332m^2. Alternative site areas for disposal are present.

The effluent disposal areas should be situated below future dwellings. Detailed designs and site levels will need to be provided with any future application to install or upgrade an on-site sewage management system within this site.

Details of the site in relation to the Site and Soil Assessment Ratings identified in the Department of Local Government Publication “On-site Sewage Management for Single Households” is provided in the following Appendices. This provides details on soil analysis and site assessment.

REFERENCES

Chapman, G.A and Murphy, C.L (1989) Soil Landscapes of the Sydney 1:100000 Sheet. Soil Conservation service of NSW., Sydney.

Department of Local Government (1998) Environment and Health Protection Guidelines On-site Sewage Management for Single Households

Standards Australia (2012) Australian/New Zealand Standard 1547:2012 On-site Domestic Wastewater Management SAI Global.

APPENDIX 1

SITE AND SOIL ASSESSMENT PROFORMAS

Table 4: Site Assessment: Rating for On-site Systems

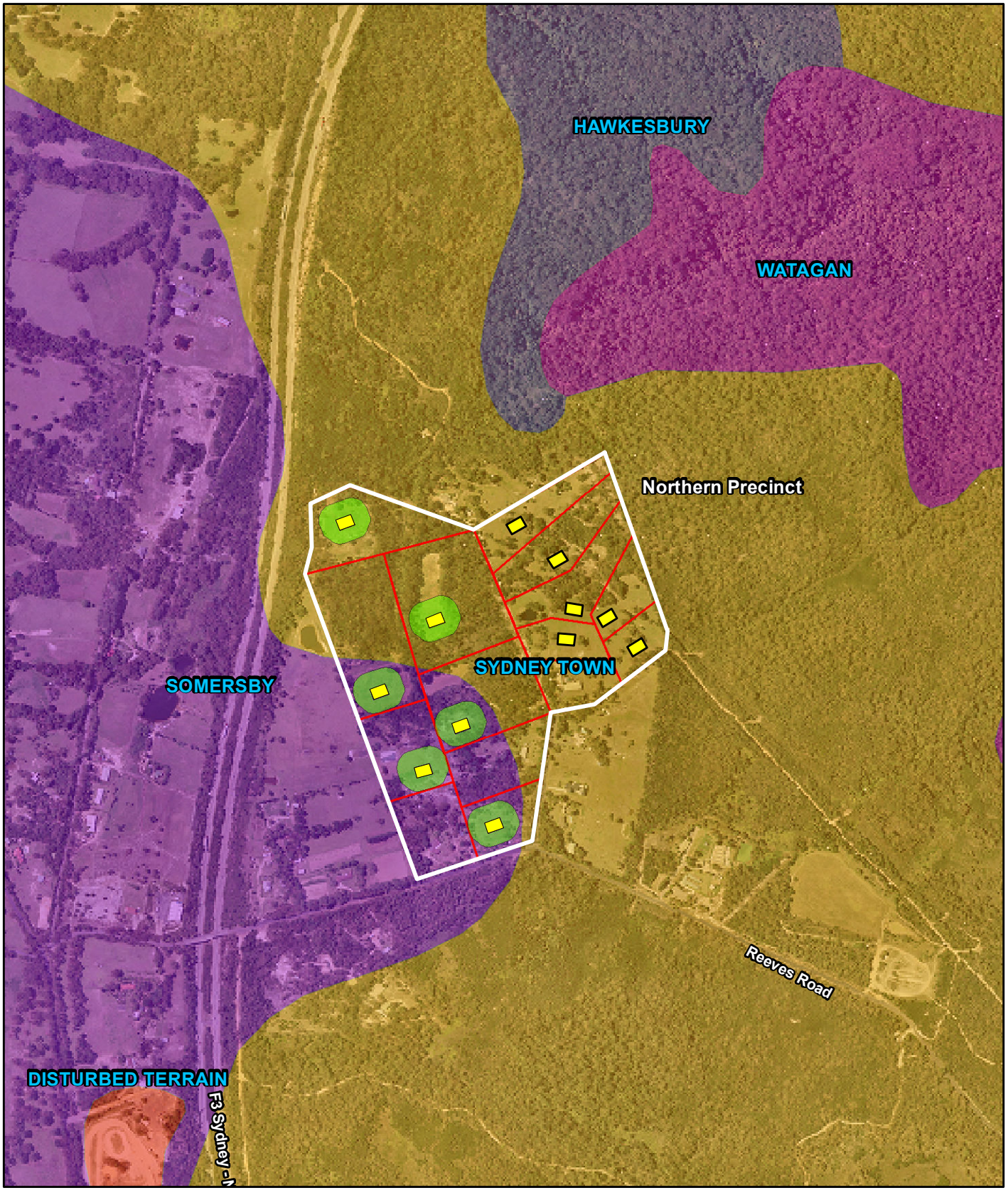
Site Feature	Relevant System(s)	Minor Limitation	Moderate Limitation	Major Limitation	Restrictive Feature
Flood potential	All land application systems	Rare, above 1 in 20 year flood contour ☑		Frequent, below 1 in 20 year flood contour	Transport of wastewater off-site
	All treatment systems	Vents, openings, and electrical components above 1 in 100 year flood contour ☑	1:100 flood level not known	Vents, openings, and electrical components above 1 in 100 year flood contour	Transport of wastewater off-site. System failure and electrocution hazard
Exposure	All land application systems	High sun and wind exposure ☑	Shading from vegetation Good aspect	Low sun and wind exposure	Poor evapotranspiration
Slope %	Surface irrigation	0-6	6-12	>12	Run-off, erosion
	Sub-surface irrigation	0-10 ☑	10-20	>20	Run-off, erosion
	Absorption system	0-10	10-20	>20	Run-off, erosion
Landform	All systems	Hill crest, convex side slopes and plains ☑	Concave side slopes and footslopes	Drainage plains and incised channels	Groundwater pollution hazard Resurfacing hazard
Run-on and upslope seepage	All land application systems	None-low	Moderate ☑	High-diversion not practical	Transport of wastewater off-site
Erosion potential	All land application systems	No signs of erosion potential present	Erosion along access tracks and where runoff concentration ☑	Signs of erosion, eg. rills, mass movement and slope failure, present	Soil degradation and transport system failure
Site drainage	All land application systems	No visible signs of surface dampness	Low slope may impede surface drainage ☑	Visible signs of surface dampness, such as moisture-tolerant vegetation (sedges and ferns) and seepages, soaks and springs	Groundwater pollution hazard Resurfacing hazard
Fill	All systems	No fill ☑	Fill present		Subsidence Variable permeability
Buffer distance	All land application systems	Comply ☑		30 metres to watercourse & dam	Health and pollution risks
Land area	All systems	Area is available ☑		Area is not available	Health and pollution risks
Rocks and rock outcrops (% of land surface containing rocks >200mm diameter)	All land application systems	<10% ☑	10-20%	>20%	Limits system performance
Geology/ Regolith	All land application systems	No rock outcrops present	Areas of shallow soil Rock outcrop ☑	Major geological discontinuities fractured or highly porous regolith	Groundwater pollution hazard

(From Department of Local Government (1998) “On-site Sewage Management for Single Households”)
* Note - Flood levels to be confirmed.

Table 6: Soil Assessment: Rating for On-site Systems

Soil Feature	Relevant System(s)	Minor Limitation	Moderate Limitation	Major Limitation	Restrictive Feature
Depth to bedrock or hardpan (m)	Surface irrigation Sub-surface irrigation	>1.0	0.5-1.0 ☑	<0.5	Restricts plant growth (trees), excessive runoff, waterlogging
	Absorption system	>1.5	1.0-1.5	<1.0	Groundwater pollution hazard Resurfacing hazard
Depth to high episodic/seasonal watertable (m)	Surface irrigation Sub-surface irrigation	>1.0 ☑	0.5-1.0	<0.5	Groundwater pollution hazard Resurfacing hazard
	Absorption system	>1.5	1.0-1.5[2]	<1.0	Potential for groundwater pollution
Soil permeability Category [3]	Surface irrigation Sub-surface irrigation	2b, 3 and 4 ☑	2a, 5	1 and 6	Excessive run-off, waterlogging, percolation
	Absorption system[4]	3 and 4		1,2,5 and 6	
Course fragments (%)	All land application systems	0-20 ☑	20-40	>40	May restrict plant growth, affect trench installation
Bulk density (gm/ml) Sandy Loam Loam & clay loam Clay	All land application systems 1.57	 <1.8 <1.6 <1.4 ☑		 <1.8 <1.6 <1.4	Restricts plant growth, indicator or permeability
pH CaCl	All land application systems	>6.0	4.5-6.0 ☑	<4.5	Reduces optimum plant growth
Electrical conductivity (dS/m)	All land application systems	<4 ☑	4-8	>8	Excessive salt may restrict plant growth
Sodicity (exchangeable sodium percentage)[5]	Surface irrigation Sub-surface irrigation (0-40cm) Absorption system (0-1.2m)	0-5	5-10 ☑	>10	Potential for structural degradation
Cation exchange capacity ($cmol^{+}/kg$)(0-40cm)	Surface irrigation Sub-surface irrigation	>15	5-15[6] ☑	<5	Unable to hold plant nutrients
Phosphorus sorption (kg/ha) (0-100cm for irrigation) (100cm below intended base of trench)	All land application systems	<6000	2000-6000 ☑	<2000	Unable to immobilise any excess P
Modified Emerson Aggregate Test (dispersiveness)	All land application systems	Class 7 ☑	Class 5	Class 3,4	Potential for structural degradation

(From Department of Local Government (1998) "On-site Sewage Management for Single Households")
* Note - Flood levels to be confirmed.



Flora and fauna survey locations are approximate and have not been fixed by land survey. *Subject Site boundary subject to final survey Plan for indicative purposes only. Not for detailed measurement.

N

1:10,000 Approximate at A4

0 100 200 300 400 500 m

Original plan produced in A4 colour

Legend

- Approximate House Footprint
- Proposed Subdivision Layout
- Asset Protection Zone

conacher environmental group

ABN: 62 274 841 042
PO Box 4300
78 York Street
East Gosford NSW 2250
Ph: (02) 4324 7888
Fax: (02) 4324 7899
cegconsult@bigpond.com

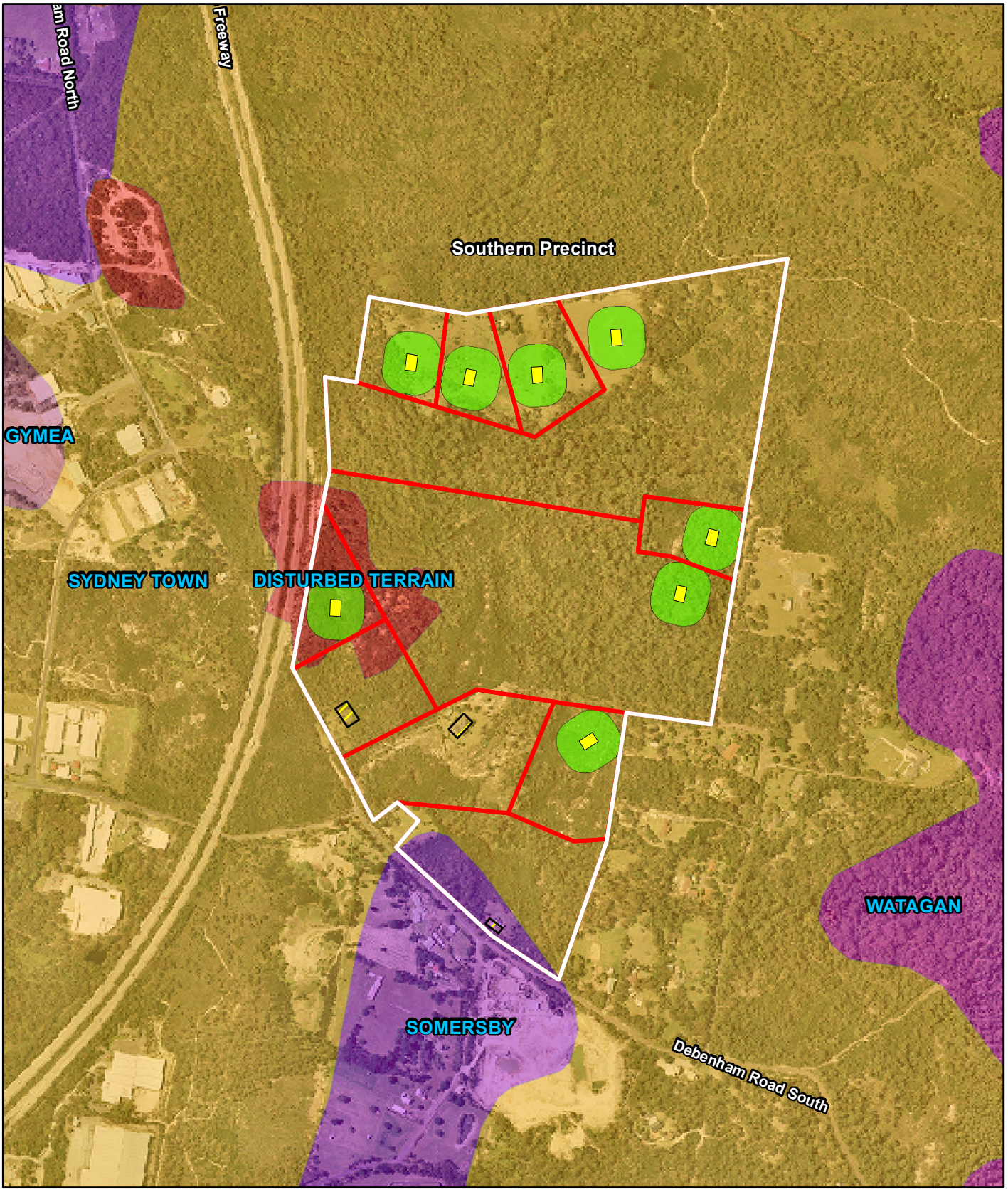
By:DC
13/09/11
Ref No.1131E

Figure 1

Soil Landscape Units Northern Precinct

Reeves St, Somersby

Source: Aerial © Department of Lands (2011)



Flora and fauna survey locations are approximate and have not been fixed by land survey. *Subject Site boundary subject to final survey*
Plan for indicative purposes only. Not for detailed measurement.

N

1:10,000 Approximate at A4

0 100 200 300 400 500 m

Original plan produced in A4 colour

Legend

- Proposed Subdivision Boundary
- Existing Dwelling
- Approximate House Footprint
- 43m House Asset Protection Zone

conacher environmental group

ABN: 62 274 841 042
PO Box 4300
78 York Street
East Gosford NSW 2250
Ph: (02) 4324 7888
Fax: (02) 4324 7899
cegconsult@bigpond.com

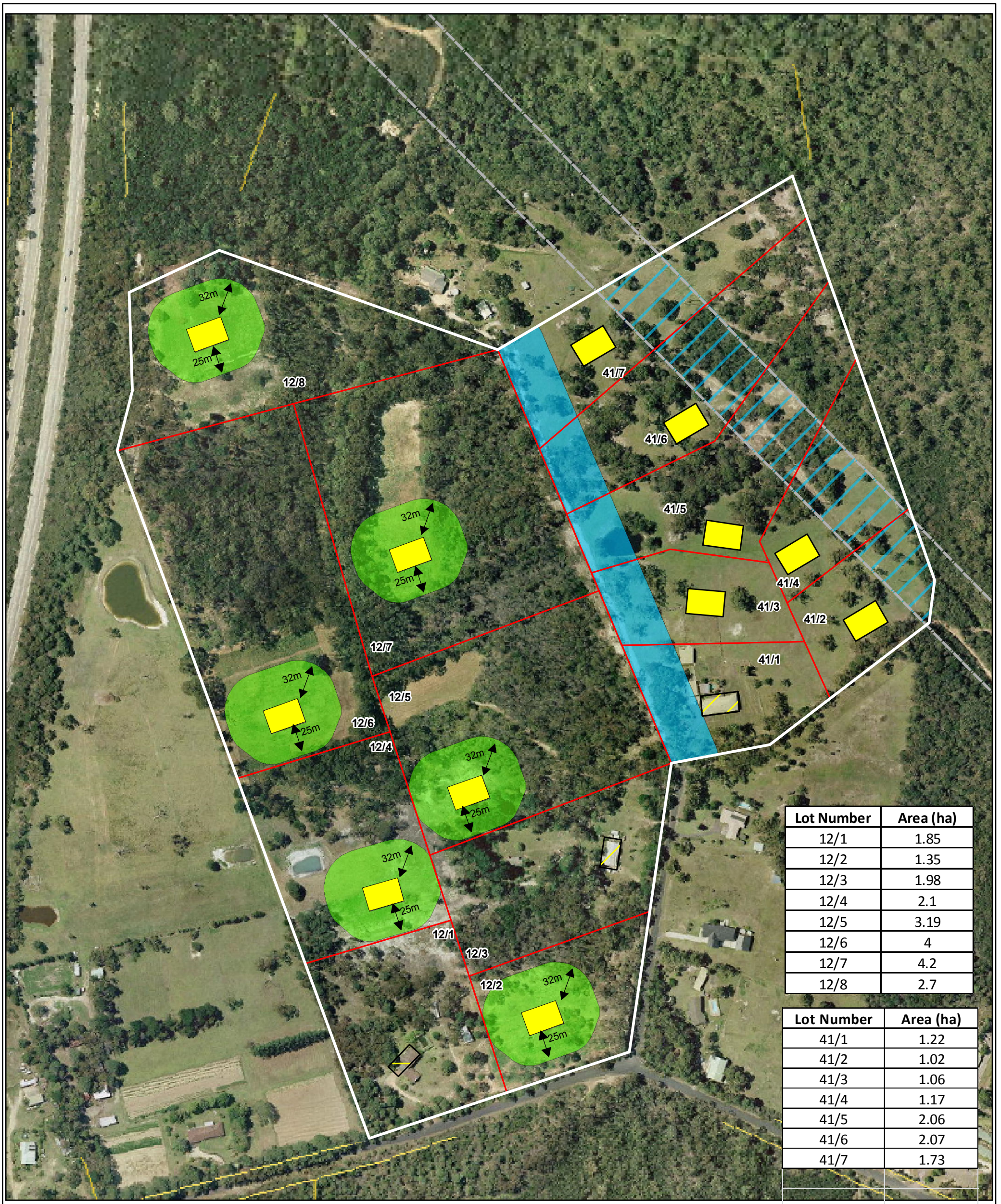
Figure 2

Soil Landscape Units Southern Precinct

Reeves St, Somersby

By:DC
13/09/11
Ref.No.1131E

Source: Aerial © Department of Lands (2011)



Lot Number	Area (ha)
12/1	1.85
12/2	1.35
12/3	1.98
12/4	2.1
12/5	3.19
12/6	4
12/7	4.2
12/8	2.7

Lot Number	Area (ha)
41/1	1.22
41/2	1.02
41/3	1.06
41/4	1.17
41/5	2.06
41/6	2.07
41/7	1.73

N

1:3,000 Approximate at A3

0 50 100 150 200 m

Original plan produced in A3 colour

Legend

- Northern Precinct
- Porposed Subdivision Layout
- Existing Dwelling
- Approximate House Footprint
- Power Line
- 39m APZ
- APZ Created by Power Line Clearing

Flora and fauna survey locations are approximate and have not been fixed by land survey.

*Subject Site boundary subject to final survey

Plan for indicative purposes only. Not for detailed measurement.

conacher environmental group

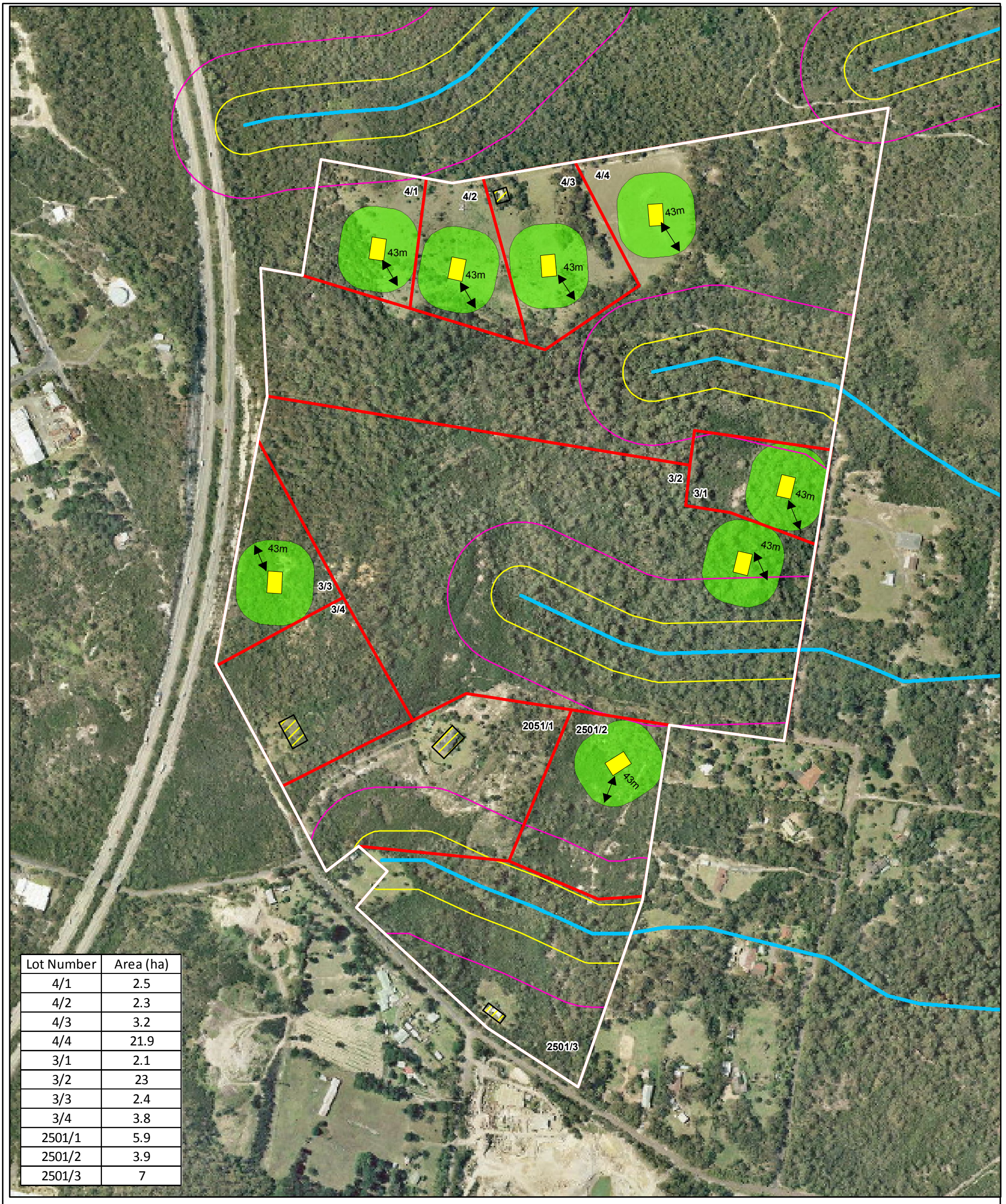
ABN: 62 274 841 042
PO Box 4300
78 York Street
East Gosford NSW 2250
Ph: (02) 4324 7888
Fax: (02) 4324 7899
cegconsult@bigpond.com

Figure 3

Potential Lot Layout - Dwelling Locations
Northern Layout
(Existing Lot 41 DP 771535)

By.DC
13/09/11
Ref.No.1131E

Source: Aerial © Department of Lands (2011)



Lot Number	Area (ha)
4/1	2.5
4/2	2.3
4/3	3.2
4/4	21.9
3/1	2.1
3/2	23
3/3	2.4
3/4	3.8
2501/1	5.9
2501/2	3.9
2501/3	7

N

1:5,000 Approximate at A3

0 100 200 300 m

Original plan produced in A3 colour

Legend

- Subject Site Boundary
- Proposed Subdivision Boundary
- Existing Dwelling
- Approximate House Footprint
- 43m House Asset Protection Zone
- **Buffer from Creekline**
- 100m for Effluent Disposal
- 40m for Controlled Activities

Flora and fauna survey locations are approximate and have not been fixed by land survey. *Subject Site boundary subject to final survey

Plan for indicative purposes only. Not for detailed measurement.

conacher environmental group

ABN: 62 274 841 042
PO Box 4300
78 York Street
East Gosford NSW 2250
Ph: (02) 4324 7888
Fax: (02) 4324 7899
egconsult@bigpond.com

Figure 4

Potential Lot Layout - Dwelling Locations
Southern Recinct
(Existing Lots 3, 4, 2051)

By.DC
12/09/11
Ref.No.1131E

Source: Aerial © Department of Lands (2011)