Ecological Inventory Report

For
Northern Lands

Conservation Estates

Prepared for
Coal & Allied Operations
c/- Rio Tinto Coal Australia Pty Ltd
GPO Box 391
Brisbane QLD 4001

HARPER SOMERS O'SULLIVAN
PLANNING · SURVEYING · ECOLOGY
A member of RPS Group Plc

Job Reference 24530-2 - November 2008

Prepared By:
RPS Harper Somers O'Sullivan
PO Box 428
Hamilton NSW 2303
Tel: (02) 4961 6500
Fax: (02) 4961 6794
Web: www.rpshso.com.au

PROJECT: NORTHERN LANDS – CONSERVATION ESTATES ECOLOGICAL INVENTORY REPORT	
CLIENT:	*COAL & ALLIED OPERATIONS PTY LTD*
OUR REFERENCE:	*24530-2*
DATE:	*NOVEMBER 2008*
APPROVED BY:	*MATTHEW DOHERTY*
SIGNATURE:	
CHECKED BY:	*CRAIG ANDERSON*
SIGNATURE:	

EXECUTIVE SUMMARY

INTRODUCTION

RPS Harper Somers O'Sullivan Pty Ltd (RPS HSO) has been commissioned by Coal & Allied (C&A) Operations Pty Ltd to undertake an *Ecological Inventory Report* (EIR) over land within Stockrington, for conservation offsets for proposed developments at Minmi Link Road and Black Hill Development Estates as outlined within the Lower Hunter Regional Strategy. This report provides the results of field investigations made during this study as well as considering the results of studies undertaken in the immediate vicinity and other available information such as NSW NPWS Atlas data and Hunter Bird Observer Club (HBOC) records.

BACKGROUND

C&A owns approximately 4,187 hectares of land in the Lower Hunter Region located within the four local government areas of Newcastle, Cessnock, Lake Macquarie, and Wyong (located in Northern Central Coast region). The sites are not required for future mining or other operational purposes.

C&A's Lower Hunter lands, including Link Road Minmi and Black Hill Development Estates, are included in the LHRS for urban development and conservation. C&A is one of four major landowners within the region that play a significant role in achieving the LHRS's environmental and conservation outcomes and sustainable growth.

In finalising the LHRS, the NSW Government reached agreement with C&A for the dedication of 3,322 ha (80 per cent) of C&A land for conservation corridors and development rights on 848 ha (20 per cent).

The details of the negotiations are set out in a Memorandum of Understanding (MoU) (Appendix A) between C&A and the NSW Government (NSWG).

The proposed Conservation Estates include areas of high conservation value in the nominated regional green corridors that will be dedicated to the public. The Conservation Estates are similarly identified in the draft Lower Hunter Regional Conservation Plan (LHRCP) prepared by the DECC.

This *Ecological Inventory Report* aims to document the flora, fauna and habitat characteristics of the Conservation Estate. It is envisaged that the results of this study will supply detailed baseline data on the ecological characteristics of the Conservation Estate at Stockrington.

Although not restricted to such parameters, some emphasis has been placed upon locally and/or regionally significant species or ecological communities known from the vicinity of the site. These species or communities include those listed under the various schedules of the *Threatened Species Conservation (TSC) Act 1995* and the Commonwealth *Environment Protection and Biodiversity Conservation (EPBC) Act 1999.*

Methods

The methodology employed to survey the proposed Conservation Estates does not comply to DECC Guidelines. However, the vegetation mapping was to provide baseline knowledge pertaining to the broad scale distribution of ecological communities throughout these proposed conservation areas. This mapping has been based upon both aerial photograph interpretation and ground truthing. The ground truthing involved random meanders and driving over the site for approximately 6 days. The survey effort then consisted of detailed quadrats to sample the vegetation and provide data for non-parametric statistical analysis (PATN Ver. 3.11, Belbin 2006). This data was used within cluster analysis to assist in the delineation of the vegetation communities.

The fauna assessments within the Stockrington and Tank Paddock Conservation Estates consisted of mainly habitat assessment and opportunistic surveys throughout. No trapping was performed within the Conservation Estate. Targeted Swift Parrot surveys were undertaken with the Conservation Estates. This survey effort was performed due to the strategic location of this portion for a native corridor which links Hexham Swamp to the proposed Conservation Estates to the west of Tank Paddock. In brief the methods employed to assess the ecological merit of the site involved the following:

- Literature Review
- Preliminary (Desktop) Assessments
- Flora Assessment
    - Plant Identification and Vegetation Mapping
    - Floristic Structure Information
    - Targeted and Significant Flora Surveys
- Fauna Assessment
- Habitat Assessment and Mapping

Results

Flora

A total of 516 flora species were identified during the survey period over the Conservation Estates within the quadrats, transects and random meander surveys, including seven threatened flora species, two ROTAP species (Briggs & Leigh, 1996) and six Endangered Ecological Communities.

Threatened species include:

- *Arthropteris palisotii*

This species was recorded by EcoBiological (2006) when surveying the Subtropical Rainforest for the proposed Abel Underground Mine Operations. This species was tentatively identified within that report and this species is considered to be significant as sightings are extremely rare.

- *Eucalyptus nicholii*

Four (4) individuals of this species were recorded within the site. This species distribution has been recorded on shallow infertile soils such as slate, shales, granite and porphyrite from Niangala to Glen Innes on the northern tableland of NSW. As the distribution of this species is not naturally occurring in the Hunter Region it is most probable that this species has been introduced from land fill as it was recorded on a road edge.

- *Callistemon linearifolius*

At least 355 individuals of this species were located within the Lower Hunter Spotted Gum Ironbark Forest within the Conservation Estates. The counts of this species involved counting above ground stems, therefore the genetic individuals which may be present could be below this amount. This species is scattered throughout the main ridgetop within the north western portion of the site. Targeted surveys to gauge the extent of the population have not been completed and it is expected that the population may be considerably larger than what has been reported here.

- *Grevillea parviflora subsp. parviflora*

At least 105 individuals of this species have been located to the west of George Booth Drive. Above ground stems of this species were counted and as this species is clonal the genetic number of species may be smaller. Targeted surveys to gauge the extent of the population have not been completed and it is expected that the population may be considerably larger than what has been reported here. This species was recorded within the Coastal Plains Smooth-barked Apple Woodland.

- *Rutidosis heterogama*

It is estimated that 1000-1500 individual plants were recorded during field visits and the actual extant population is expected to be far greater. It should be noted that this species appeared to be more common within disturbed areas such as along track sides, near railway verges and amongst dumped refuse. There was also a large population within a power easement just outside of the site on the western slopes of the Sugarloaf Range. This species was recorded predominately within the Lower Hunter Spotted Gum Ironbark Forest vegetation community.

- *Syzygium paniculatum*

One (1) plant was found within the Conservation Estates. Examination of the fruit of this plant found it to be 3 locular which is a distinguishing feature of this plant from other similar species (ie *Acmena smithii)*. This plant was growing in an area of high disturbance, adjoining Alluvial Tall Moist Forest and may have been brought in from another site in land fill. The plant is located near Blue Gum Creek and it is possible, however, that it has come from upstream in Alluvial Tall Moist Forest or Subtropical Rainforest. Whichever is the case it is considered that this species is significant as it is growing in suitable habitat (albeit disturbed). A search of this area was performed with no further specimens located within the vicinity.

- *Tetratheca juncea*

Approximately 352 *Tetratheca juncea* plant clumps were located during field visits in 2005, late 2007 and 2008. The population is estimated to be considerably larger as the majority of the surveys were performed outside of the flowering period for this species. It is estimated that 256 ha of suitable habitat, within the Conservation Estates, remains to be surveyed. Thus, it is considered that this population will be significantly larger than what has been recorded during the vegetation surveys.

A further fourteen threatened flora species were considered to have potential habitat. No targeted surveys for any of these species have been undertaken within the Conservation Estates, however all threatened flora have been recorded which were found during the Random Meanders and Quadrat surveys throughout the Conservation Estate.

Twelve vegetation communities have been delineated and described within the LHCCREMS framework for the Conservation Estates, including six EECs. These communities have been delineated utilising a combination of groundtruthing, aerial photography interpretation and the use of Cluster analysis (PATN statistical program). Variations occurred from the LHCCREMS descriptions in many of the vegetation communities and these are described within the description of each community.

- *Coastal Foothills Spotted Gum - Ironbark Forest*

This community occupies the majority of the Conservation Estates and covers approximately 1,209 ha. This vegetation community is commensurate with MU 15 Coastal Foothills Spotted Gum – Ironbark Forest as described by LHCCREMS (NPWS 2000; House 2003). This community is associated with the steep or south facing slopes across the site and was generally evident between Lower Hunter Spotted Gum Iron-bark Forest (LHSGIF) and Hunter Valley Moist Forest (HVMF). Two sub-variants were recorded within this community, namely a Moist Sheltered variant and aDry Exposed variant.

- *Coastal Plains Smooth-barked Apple Woodland*

This vegetation community occupies several patches throughout the Conservation Estates. This vegetation community encompasses 260 ha and occurs on the slopes and within the ridgetop in the north-eastern portion of the Conservation Estates. It is commensurate with MU 30 Coastal Plains Smooth-barked Apple Woodland as described by LHCCREMS (NPWS 2000; House 2003). The threatened flora species *Tetratheca juncea* and *Grevillea parviflora subsp. parviflora* were recorded within this community. One sub variant dry exposed, dominated by *Eucalyptus fibrosa* was recorded within this community.

- *Lower Hunter Spotted Gum Ironbark Forest (EEC – Lower Hunter Spotted Gum Ironbark Forest)*

This community occupies the western portion of the site and covers approximately 408 ha. This vegetation community is commensurate with MU 17 Lower Hunter Spotted Gum – Ironbark Forest (LHSGIF) as described by LHCCREMS (NPWS 2000; House 2003). This community varied in some areas with a dense shrub layer of *Melaleuca nodosa* and other areas a dense understorey of *Daviesia ulicifolia*. The remaining areas of the site have a grassy understorey dominated by *Joycea pallidea, Themeda australis, Entolasia stricta* and *Imperata cylindrica.*

- *Hunter Valley Moist Forest*

This vegetation community occurs within slopes above creeklines particularly on southern aspects, or where moisture retention occurs. This vegetation community covers approximately 139 ha and is commensurate with MU 12 Hunter Valley Moist Forest (HVMF) as described by LHCCREMS (NPWS 2000; House 2003). This community occurs on sheltered gullies and south facing slopes below steep sandstone outcrops. Often this community develops in the head drainage lines at a slightly elevated level. This vegetation community has a high diversity of natives and was at times difficult to delineate from the Alluvial Tall Moist Forest.

- *Alluvial Tall Moist Forest*

This vegetation community occurs within the creeklines within the Conservation Estates, these creeklines include Blue Gum Creek, Long Gully and Minmi Creek. Whilst weed infestations are present there are a number of natives still present throughout this vegetation community. This vegetation community covers approximately 192 ha and is commensurate with MU 5 Alluvial Tall Moist as described by LHCCREMS (NPWS 2000; House 2003). This community is very similar to HVMF across the site and is often hard to delineate. It was noted that in the ATMF within the site, tall thick stands of *Melaleuca styphelioides* often dominated the upper-mid stratum with species including *Eucalyptus saligna* and *Eucalyptus grandis* as the dominant canopy species. Whilst *Melaleuca styphelioides* occasionally occurred in HVMF it was not nearly as dense and not as tall as the stands in ATM. The dominant tree cover varied throughout this vegetation community. Two variants of this community were recorded within the site. Firstly, a broad-leaf understorey variant in which upper stratum included *Toona ciliata* (Red Cedar), *Alphitonia excelsa* (Red Ash) and *Eucalyptus salinga* (Blue Gum). Small *Dendroscnide excelsa* (Giant Stinging Tree), *Cryptocarya microneura* and *Commersonia fraserii* dominate the mid storey with a sparse understorey. The second variant *M. styphelioides/E. acmenoides* variant which occurs in drainage lines where the canopy is more open.

- *Subtropical Rainforest (EEC – Lowland Rainforest of the NSW North Coast and Sydney Basin Bioregion)*

This rainforest covers approximately 21 ha and occurs in the deep gullies of Long Gully and another one to the west of Long Gully. This community is commensurate with MU 1a Coastal Warm Temperate – Sub Tropical Rainforest as described by LHCCREMS (NPWS 2000; House 2003). EcoBiological (2006) have previously analysed this community in detail and concluded that this community is best described as Subtropical Rainforest and was closely related to *Ficus* spp. – *Dysoxylum fraserianum – Toonia – Dendrocnide* sub alliance 15 of Floyd (1990). The results of this survey concur with the EcoBiological (2006) due to the dominance of *Toonia ciliata*, *Dendrocnide excelsa, Dendrocnide photinophylla* and *Ficus* species which were identified within this community.

- *Hunter Lowland Redgum Forest (EEC – Hunter Lowland Redgum Forest in the Sydney Basin and the North Coast Bioregion)*

This vegetation community occurs in two small areas on the western side of the conservation area and in small patches of Tank paddock. This vegetation encompasses approximately 19 ha. The largest portion of this community follows a north – south drainage flat on the western side of the Conservation Estates and is

depicted by a dominance of large *Eucalyptus tereticornis* (Forest Red Gum) in the upper stratum. Two variants of this community were delineated, firstly a disturbed variant which was sampled in highly degraded areas in which the canopy was intact but the understorey was disturbed by weed infestation and clearing. The remaining variant is a *Melaleuca decora* variant in which this species is dominant in the understorey.

- *Swamp Oak Rushland Forest (EEC – Swamp Oak Floodplain Forest on Coastal Floodplains)*

This vegetation community occurs in two small areas within the low lying areas adjoining Hexham Swamp within Tank Paddock. This vegetation community encompasses approximately 0.57 ha and is commensurate MU 40 Swamp Oak Rushland Forest as described by LHCCREMS (NPWS 2000; House 2003). This community had a high incursion of *Lantana camara* and it was difficult to gain access.

- *Swamp Mahogany – Paperbark Forest (EEC – Swamp Sclerophyll Forest on Coastal Floodplains)*

This vegetation community in a small area in the northern portion of Tank Paddock, and is linked to a swamp which is located on the adjoining property. This vegetation community encompasses 0.23 ha. This vegetation community is commensurate with MU 37 Swamp Mahogany – Paperbark Forest as described by LHCCREMS (NPWS 2000; House 2003). This vegetation community fringes a swamp that occurs offsite and flows into Pambalong Swamp to the north west of the site.

- *Freshwater Wetland Complex (EEC – Freshwater Wetlands on Coastal Floodplains)*

This vegetation community occurs as two areas in the north east of Tank Paddock. These areas are connected to and drain into Hexham Swamp. This community is floristically diverse and provides habitat for a range of native flora and fauna. This vegetation community covers approximately 11 ha and is commensurate with MU 46 Freshwater Wetland Complex as described by LHCCREMS (NPWS 2000; House 2003).

- *Weeds and Cleared Areas*

This vegetation community occurs within the central area of the site and exists as a quarry. Smaller areas on the eastern and western side of the site are the result of clearing for the mining operations. The remaining areas are either unformed tracks or electricity easements. This community encompasses approximately 237 ha and is not commensurate with any vegetation communities that have been described by LHCCREMS (NPWS 2000; House 2003). These areas are highly disturbed and have high weed incursions.

- *Dams*

This vegetation community occurs as manmade dams within the cleared areas of the site, with the large dams in the north east of the site were utilised as water reservoirs for the mining operations. This community encompasses approximately 0.52 ha and is not commensurate with any vegetation communities that have been described by LHCCREMS (NWPS 2000; House 2003).

Fauna

A total of fifty-eight (58) threatened fauna species have been previously recorded within 10km (DECC Atlas of NSW Wildlife Data 2007) of the Conservation Estate (as per existing records). A total of 13 of these species are highly unlikely to occur within the Stockrington and Tank Paddock Conservation Estates due to the absence of suitable habitat. Of the remaining 45 species, four were recorded during fauna surveys or previous surveys (Atlas of NSW Wildlife data 2008). Assessment of habitat potential within Conservation Estates found that a further 24 species have a moderate or greater opportunity of occurring within the Conservation Estates.

Swift Parrot Target Survey Results

Although no Swift Parrots or Regent Honeyeaters were observed within the C&A lands during the 2008 survey these results are not considered to be a faithful indication of the capacity of these lands to support the Swift Parrot or Regent Honeyeaters. Overall the Conservation Estates exhibit greater habitat opportunities for these species, due to the greater extent of widespread habitat, predominantly Spotted Gum-Ironbark assemblages, ATMF, and the inclusion of riparian Forest Red Gum communities, which are likely to represent focal habitat points for these species during seasons when they occur within the locality. The absence of both of these species from the Conservation Estates during the winter of 2008 is consistent with the paucity of coastal and Lower Hunter records for both of these species during the 2008 season. There have been few Swift Parrot records within the region compared with previous years and no Regent Honeyeaters during the 2008 winter period. Evaluation of potential habitats within Conservation Estates suggests that there is a good probability that both of these species would use the Conservation Estates during favourable years within the region. However, the same assumptions are not considered to apply to the Development Estates, due to the smaller amounts of suitable habitat, lack of Forest Red Gum habitats and the somewhat isolated and to some extent fragmented nature of these lands in comparison with the extent of the Conservation Estates and their continuity to large significant forest areas in the regional context.

Flora Habitat

The vegetation communities present throughout the Conservation Estates at Stockrington and Tank Paddock offer a number of suitable habitat types for a relatively diverse representation of native flora communities and species occurring in the Lower Hunter Region. A number of geomorphologic factors contribute to those vegetation communities present within these lands. These factors include the geology, soils, elevation and rainfall patterns, and are further diversified by topological context in relation to slope, aspect and substrate permeability. The geomorphologic influences underlying these sites provide suitable conditions for ten native vegetation communities, being Coastal Foothills Spotted Gum - Ironbark Forest (CFSGIF), Coastal Plains Smooth-barked Apple Woodland (CPSBAW), Lower Hunter Spotted Gum Ironbark Forest (LHSGIF), Hunter Valley Moist Forest (HVMF), Alluvial Tall Moist Forest (ATMF), Subtropical Rainforest (STRF), Hunter Lowland Redgum Forest (HLRF), Swamp Oak Rushland Forest (SORF), Swamp Mahogany-Paperbark Forest (SMPF), and Freshwater Wetland Complex. Apart from these naturally occurring vegetation communities there are areas within the site that have been cleared to facilitate energy and transport infrastructure and road works material quarrying and associated maintenance and accessibility requirements. These cleared areas are characterised by disturbed substrates and high levels of light, which provide

opportunities for exotic weeds and colonists from adjacent native vegetation communities.

A number of threatened flora species and ROTAP listed flora are known to occur regionally within vegetation communities occurring within Conservation Estates at Stockrington and Tank Paddock.

The condition of the vegetation communities varies across the site with some areas exhibiting degradation with proximity to tracks, infrastructure easements and lands cleared for previous land-use practices. The edges of ATMF and HVMF offer opportunities for mesic vegetation, including serious introduced weeds like *Lantana camara* (Lantana). Other than those opportunities for weeds occurring within cleared easements, vegetation community disturbances within the site are by and large limited to edge effects associated with access tracks and small occasional incidences of rubbish dumping.

Fauna Habitat

Fauna potentially occurring within the site varies with respect to vegetation quality, density and community form. The site encompasses vegetation communities encompassing both wet and dry sclerophyll vegetation associations as well as rainforest community associations. The variation in vegetation within the site provides habitat for a diversity of common fauna species and opportunities for a moderate – high number of threatened fauna species.

The Open Forest communities within the site provide suitable habitat for a number of common terrestrial mammals, including small marsupials, rodents and the Echidna. General understorey density variations within the site largely follow a pattern of more open understoreys on dry or north facing ridges and slopes and higher densities on south facing and lower slopes where dry communities merge with riparian and wet forest communities in the gullies and flats. Open forest habitats offer grazing opportunities for herbivorous fauna, such as Macropods and Wombats.

Habitats for terrestrial mammals within the Conservation Estates (particularly Stockrington) are of considerably greater quality than those occurring within the Development Estates at Black Hill and Minmi-Link Road. This is due to a number of factors not the least of which is the large and continuous stand of vegetation these lands represent and the broad continuous linkages they possess to more southerly areas of the Sugarloaf Range and as a consequence the Watagans further to the south.

There are extensive areas of dry and mesic forest within the proposed Conservation Estates that exhibit a diversity of age cohort within canopy tree species, suggesting that these areas of the site have not been cleared in the recent past. Consequently large areas of these lands are covered in forests containing trees of sufficient maturity to develop hollows, which provide shelter and nesting opportunities for arboreal mammals.

The wooded and adjacent open areas within the site provide extensive insectivorous foraging habitat for Microchiropteran bat species. Furthermore, there are substantial areas of both wet and dry forest communities offering a wide diversity of hunting niche for the majority of Microchiropteran species that have been recorded within the Lower Hunter Valley. The Stockrington Conservation Estate offers roosting opportunities for both hollow-dwelling and cave-dwelling bats and is adjacent to cave-dwelling opportunities of the Sugarloaf Range.

Canopy trees within the site offer abundant blossom foraging opportunities for Grey-headed Flying-foxes and rainforest trees occurring in the gullies provide seasonal fruit resources for this species. No roosting camps were observed but some of the rainforest gullies appear to offer suitable roosting sites for this species.

Stockrington Conservation Estates encompass the headwaters of Buttai and Surveyors Creeks in the west and the western tributaries of Blue Gum Creek in the east including Long Gully. These creek heads represent relatively steep and relatively small catchments offering largely ephemeral water flows, although there are flat areas where more permanent pools persist. The wet nature of these gullies would make them highly suitable sites for frog species including potential habitat for locally occurring threatened frog species. The Tank Paddock Conservation Estate occurs on the south western fringe of the Hexham floodplain with areas of wetland habitat entering the site where mesic forested drainage lines interface with floodplain habitats. Floodplain habitats and lower mesic drainage lines are likely to provide a diversity of habitat niches for common frog species.

Habitat within the site has potential for representing significant shelter and foraging opportunities for a diversity of reptile species. This can be attributed to the complexity of understorey strata and the high incidence of forest debris in the ground cover layer.

A diversity of continuous dry forest and woodland habitats interspersed with wet gullies containing mesic vegetation and at times well-developed rainforest offer abundant habitat opportunities for a wide range of common bird species within the Stockrington Conservation Estate. The occurrence of wetland habitat adjacent to dry and alluvial forests at Tank Paddock also offers a diverse suite of habitat opportunities for a wide range of bird species.

Key Habitat and Corridors

The Conservation Estates represent important components of a number of regional and sub-regional corridors, such that their integrity is important to fauna movements within the wider locality. The Stockrington Conservation Estate also represents areas of Key Habitat in the southwest and southeast with small areas also represented in the east and south as mapped within KHC. Locally the site has relatively unbroken linkages with lands to the north and northwest and tentative linkages to larger areas of vegetation broadly continuous with the Sugarloaf Range to the southwest. Vegetation within the site represents the most significant bushland linkages between forests to the south and remnant bushlands to its east across the F3 Freeway. Corridor mapping for the area is currently under review within “The Western Corridor Lands Study”, although this work is limited to desktop assessments by the DoP of work already undertaken and results have not been released at the time of writing this report.

Conservation Outcomes

The Lower Hunter Region’s vegetation is of bio-geographic significance as it supports a transition between the northern and southern plant and animal assemblages. This north-south link is not evident elsewhere in the Hunter Valley. The Region also forms an east-west migratory pathway and a drought refuge for inland species.

The preservation of large vegetated areas that are linked to other similar areas has been recognised as fundamentally important to achieving long term regional biodiversity outcomes in the Lower Hunter region. The two most valued of these

areas in the Lower Hunter contain large land areas owned and controlled by C&A. The first is the green corridor that links the Watagans and Yengo National Parks with the coastal plains of the Tomago Sandbeds, Stockton Bight and Port Stephens and secondly, the Wallarah Peninsula lands provide a regionally significant break between urban areas, and contain areas of high biodiversity, scenic amenity and heritage value.

The C&A lands to be dedicated form both large areas of vegetation in their own right, and complete linkage of identified regional corridors in key areas.

In addition to their important strategic location in a wider landscape context, the Conservation Estates contain valuable biodiversity resources. They contain and will conserve a range of important vegetation communities, including areas of Endangered Ecological Communities (EEC) and other vegetation types that have been depleted in the region. Several threatened plant species have been recorded within the Conservation Estates, including *Arthropteris palisotii, Tetratheca juncea* (Black-eyed Susan), *Grevillea parviflora* subsp. *parviflora*, *Eucalyptus nicholii, Rutidosis heterogama, Syzygium paniculatum* and *Callistemon linearifolius*. Two of the threatened flora species recorded in the Conservation Estates are considered to be planted specimens and not naturally occurring, being *Eucalyptus nicholii* and *Syzygium paniculatum*, although *S. paniculatum* may have been transported to its position in a disturbed area by natural means. In addition to these threatened species two rare (ROTAP) species *Callistemon shiressii* and *Eucalyptus fergusonii* subsp. *dorsiventralis* were also identified within the Conservation Estates.

The diverse nature of both the landform settings, varying from coastal ranges forests and woodlands to wetlands, provides a diverse array of habitats and resources for native fauna. The Conservation Estates are known to contain important populations of numerous threatened fauna species, including birds, mammals and herpetofauna. The conservation of these lands will provide secure regional biodiversity gene pools, and also through linkages facilitate valuable genetic material exchange and other key processes associated with sustainable ecological population dynamics.

In summary, the C&A conservation dedications provide outcomes that contribute to meeting the Environmental Protection goals outlined in the Sustainability Criteria contained within the Lower Hunter Regional Strategy. Such includes:

- Outcomes consistent with the Draft Lower Hunter Regional Conservation Plan;
- Maintains/improves areas of regionally significant biodiversity;
- Maintains environmental areas for air & water quality; and
- Protects areas of Aboriginal cultural heritage value and historical heritage value.

These outcomes:

- Conserve in perpetuity key strategic parcels of land that complete long sought after regional biodiversity conservation corridors and buffer areas;
- Provide large intact areas of conserved habitat that will function as regional biodiversity gene pools;

- Protect an important array of vegetation communities, flora and fauna species, and natural landscape assets, including threatened species and EEC's and

- Contribute significantly to the successful implementation of the Lower Hunter Regional Conservation Plan.

Conclusion

This ecological inventory of the Stockrington and Tank Paddock Conservation Estates has been undertaken to support the Link Road Minmi and Black Hill Development Estates as part of the proposal for C&A surplus Northern Estates. The Stockrington and Tank Paddock Conservation Estates are an integral part of the Watagan to Stockton Corridor which will achieve regional conservation outcomes. Furthermore, suitable actions are proposed to minimise potentially deleterious permanent and ongoing impacts to the conservation lands.

The field and desktop studies have recorded the following parameters of ecological significance within the Conservation Estates:

- native vegetation commensurate with those listed as EEC's;
- threatened flora species recorded within and adjacent to the proposed development;
- threatened fauna species recorded within and adjacent to the proposed development;
- habitat for threatened flora and fauna species known from within and adjacent to the proposed development; and
- other areas containing native vegetation with varying degrees of modification / degradation.

The large areas of Conservation Estates at Stockrington and Tank Paddock that will be set aside as part of the development provide excellent ecological outcomes across the site. The Stockrington Conservation Estates will contribute a large portion of land to conservation in perpetuity, which will in essence formalise the Watagan to Stockton Corridor. The importance of the conservation of Tank Paddock as part of the Conservation Estates will result maintaining a vegetation corridor from Hexham Swamp and the Hunter Estuary to the Watagan Mountains and the Sugarloaf Range. This large tract of native vegetation will provide habitat for a wide variety of native flora and fauna.

CONTENTS

FIGURES

TABLES

APPENDICES

GLOSSARY OF TERMS AND ABBREVIATIONS

aff. – Affinity

CEEC – Critically Endangered Ecological Community

CMA – Catchment Management Authority

C&A – Coal & Allied

Conservation OR Offset Lands – Land proposed for dedication to NSW Government (as per MoU)

Development Estate – Proposed Development Lands

DBH – Diameter (centimetres) at Breast Height

DECC – NSW Department of Environment and Climate Change (formerly NSW Department of Environment and Conservation)

DEWHA – Commonwealth Department of Environment, Water, Heritage and the Arts (formerly Department of Environment and Heritage)

DGEAR's - Director General's Environmental Assessment Requirements

DNR – NSW Department of Natural Resources (formerly Department of Infrastructure, Planning and Natural Resources)

DoP- Department of Planning

EAR – Ecological Assessment Report

EEC – Endangered Ecological Community

EIR – Ecological Inventory Report

EMP – Environmental Management Plan

EPA Act – NSW Environmental Planning and Assessment Act 1979

EPBC Act – Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

FM Act – NSW *Fisheries Management Act 1994*

ha – hectare

HBOC – Hunter Bird Observers Club

Hwy – Highway

LGA – Local Government Area

LHCCREMS – Lower Hunter and Central Coast Regional Biodiveristy Strategy (NPWS 2000; House 2003)

LHRCP – Draft Lower Hunter Regional Conservation Plan

LHRS - Lower Hunter Regional Strategy

MoU – Memorandum of Understanding

NPWS – NSW National Parks and Wildlife Service

NSWG – NSW Government

PFC – Projected Foliage Cover

RPS HSO – RPS Harper Somers O'Sullivan

ROTAP – Rare or Threatened Australian Plants (Briggs & Leigh 1995)

ROTAP Codes are as follows:-
2 = Geographic Range in Australia is less than 100 km
R = Rare
C = Conserved
- = Reserved population unknown

SEPP 14 – State Environmental Planning Policy 14 “Coastal wetlands”

SEPP 44 – State Environmental Planning Policy 44 “Koala Habitat Protection”

Ssp. or subsp. – Subspecies

Sp – Singular Species

Spp – Multiple Species

SSS - State Significant Site

TSC Act – NSW *Threatened Species Conservation Act 1995*

Var. – Variety

1 INTRODUCTION

RPS Harper Somers O'Sullivan Pty Ltd (RPS HSO) has been commissioned by Coal & Allied (C&A) Operations Pty Ltd to undertake an *Ecological Inventory Report* (EIR) over land within Stockrington and Tank Paddock, as a component of the Lower Hunter Lands Project where these lands will be utilised as conservation offsets for proposed greenfield developments at Minmi Link Road and Black Hill as outlined within the Lower Hunter Regional Strategy. The proposal is to be assessed under Part 3A of the *Environmental Planning and Assessment Act 1979*. Due recognition and consideration of the *Threatened Species Conservation Act 1995*, *Environmental Protection, Biodiversity and Conservation Act 1999*, *Water Management Act 2000* and the *Fisheries Management Act 1994* have been made throughout this assessment.

This report specifically provides an inventory of the field investigation results made during this study as well as considering the results of studies undertaken in the immediate vicinity and other available information such as NSW NPWS Atlas data and Hunter Bird Observer Club (HBOC) records.

This *Ecological Inventory Report* aims to document the flora, fauna and habitat characteristics of the Conservation Estate. It is envisaged that the results of this study will supply detailed baseline data on the ecological characteristics of the Conservation Estate at Stockrington. This data will be utilised to assess the relative merits of the sites as conservation offsets and to inform the future end user management.

1.1 Background

Harper Somers O'Sullivan (2005) has previously undertaken Preliminary Vegetation Mapping over various holdings administered by C&A in the Lower Hunter Valley / Central Coast Region. This preliminary mapping was undertaken to provide a baseline dataset pertaining to the broad-scale distribution of ecological communities throughout the land holdings. This assessment was largely undertaken at a desktop level relying on aerial photography combined with existing regional mapping datasets and limited ground-truthing.

In January 2007 additional ecological investigations were undertaken following negotiations between C&A and the NSW Ministers for Planning, Environment and Lands, prior to the release of the Lower Hunter Regional Strategy.

These investigations were intended to provide a brief assessment of the conservation status of previously delineated vegetation communities.

Although not restricted to such parameters, some emphasis has been placed upon locally and/or regionally significant species or ecological communities known from the vicinity of the site. These species or communities include those listed under the various schedules of the *Threatened Species Conservation (TSC) Act 1995* and the Commonwealth *Environment Protection and Biodiversity Conservation (EPBC) Act 1999.*

At the state level, the proposal is to be assessed pursuant to Part 3A of the EPA Act. To this end, in April 2008, the DGEAR's were issued for the site. To ensure completeness, ecological fieldwork and assessment has covered the full extent of the C&A surplus lands, including all development and Conservation Estates.

1.2 Site Particulars

Locality – The site is on the eastern side of the F3 freeway to the north of Minmi and to the west of the F3 freeway which include lands surrounding Stockrington and George Booth Drive to the east of Mt Sugarloaf.

LGA – Cessnock City Council, Newcastle City Council and Lake Macquarie City Council.

Title(s) –
Stockrington –

Lot 1 Sec 83 DP 755260	Lot 1 Sec 71 DP 1065169
Lot 1 Sec 30 DP 1051995	Lot 1 Sec 2 DP 250339
Lot 1 Sec 84 DP 755260	Lot 1 Sec 2 DP 124209
Lot 1 Sec 1 DP 726037	Lot 1 Sec 1 DP 155446
Lot 2 Sec 8 DP 755260	Lot 1 Sec 1 DP 503566
Lot 1 Sec 5 DP 977096	Lot 1 Sec 3 DP 977096
Lot 1 Sec 32 DP 1051995	Lot 1 Sec 2 DP 877416
Lot 1 Sec 89 DP 755260	Lot 1 Sec 23 DP 1051995
Lot 1 Sec 77 DP 755260	Lot 1 Sec 1 DP 1039968
Lot 1 Sec 72 DP 755260	Lot 1 Sec 8 DP 807908
Lot 1 Sec 1 DP 433355	Lot 1 Sec 4 DP 977096
Lot 1 Sec 125 DP 755260	Lot 1 Sec 1 DP 119630
Lot 1 Sec 1 DP 124209	Lot 1 Sec 101 DP 881099
Lot 1 Sec 2 DP 551917	Lot 1 Sec 2 DP 34957
Lot 1 Sec 2 DP 844313	DP 1 Sec 1 DP 250339
Lot 2 Sec 96 DP 755260	Lot 2 Sec 82 DP 755260
Lot 1 Sec 3 DP 250339	Lot 1 Sec 1 DP 877416
Lot 1 Sec 24 DP 1051995	Lot 1 Sec 31 DP 1051995
Lot 1 Sec 79 DP 755260	Lot 1 Sec 26 DP 1051995
Lot 1 Sec 2 DP 1039968	Lot 1 Sec 1 DP 505578
Lot 1 Sec 25 DP 1051995	Lot 1 Sec 4 DP 877416
Lot 1 Sec 1 DP 123945	Lot 1 Sec 126 DP 755262
Lot 1 Sec 5 DP 250339	Lot 1 Sec 20 DP 1051995

Tank Paddock – Lot 1 DP 1007615
Area – The area of the Conservation Estate is approximately 2,394 hectares.

Zoning – Stockrington – 1(a) Rural "A" Zone, 5(6) Special Uses (Railways) Zone, 7(2) Conservation (Secondary) and 5 Infrastructure
Tank Paddock – 7(b) Environmental Protection Zone and 7(c) Environmental Investigation.

Boundaries – The site is bounded to the North by the Black Hill and extends as far south as Seahampton. To the west by Mount Sugarloaf and to the north-east by Hexham Swamp and bounded by the F3 freeway to the south east, and Seahampton to the south.

Current Land Use – The majority of the site is natural bushland with weed infestations evident, particularly in the drainage lines and gullies. A quarry is currently being operated at Stockrington to extract gravel. The remainder of the site is criss crossed with unformed tracks which are illegally been used by 4WD vehicles and Motorbikes.

Topography – The Conservation Estate occurs across undulating topography ranging in elevation from 210m on the footslopes of Mt Sugarloaf to 10m in Blue Gum Creek. In the south the lands straddle the eastern foothills of the Sugarloaf Range and encompass the watersheds of south-western feeder creeks of the Hexham flood plain, including Blue Gum Creek. The lands to the north west flow into Surveyors Creek, while the land to the north flows into Buttai Creek. Both of these creeks are part of the Wallis Creek Catchment.

Soils and Geology - There are at least 10 different categories of soils across the site according to Soils Landscapes of the Newcastle region (Matthei 2005).

The majority of the soil across the site is classified as erosional soil landscape of Killingworth. This soil type is typical across the rolling hills around Minmi and Stockrington. This type of soil has low to very low fertility and high erosion potential. The topsoils of this classification are typically brownish black sand or silt loams and the subsoils are usually sand or silt clays. Other erosional soil landscapes which have been mapped by Matthei (2005) include Bolwarra Heights. The coalluival soil landscapes include Cedar Hill, Stockrington and Sugarloaf. Residual landscape of Beresfield has also been mapped within the conservation estate.

Surveyors Creek and Blue Gum Creek have been mapped as alluival soil landscapes of Wyong and Cockle Creek. The remainder of the conservation estate has been mapped as a mixture of Coalluival and Alluival soil Landscapes.

The majority of the Conservation is underlain by the Newcastle Coal Measures of Permian Age with the northern section including Tank Paddock is underlain by the Tomago Coal Measures of Permian Age.

1.3 Description of the Proposal

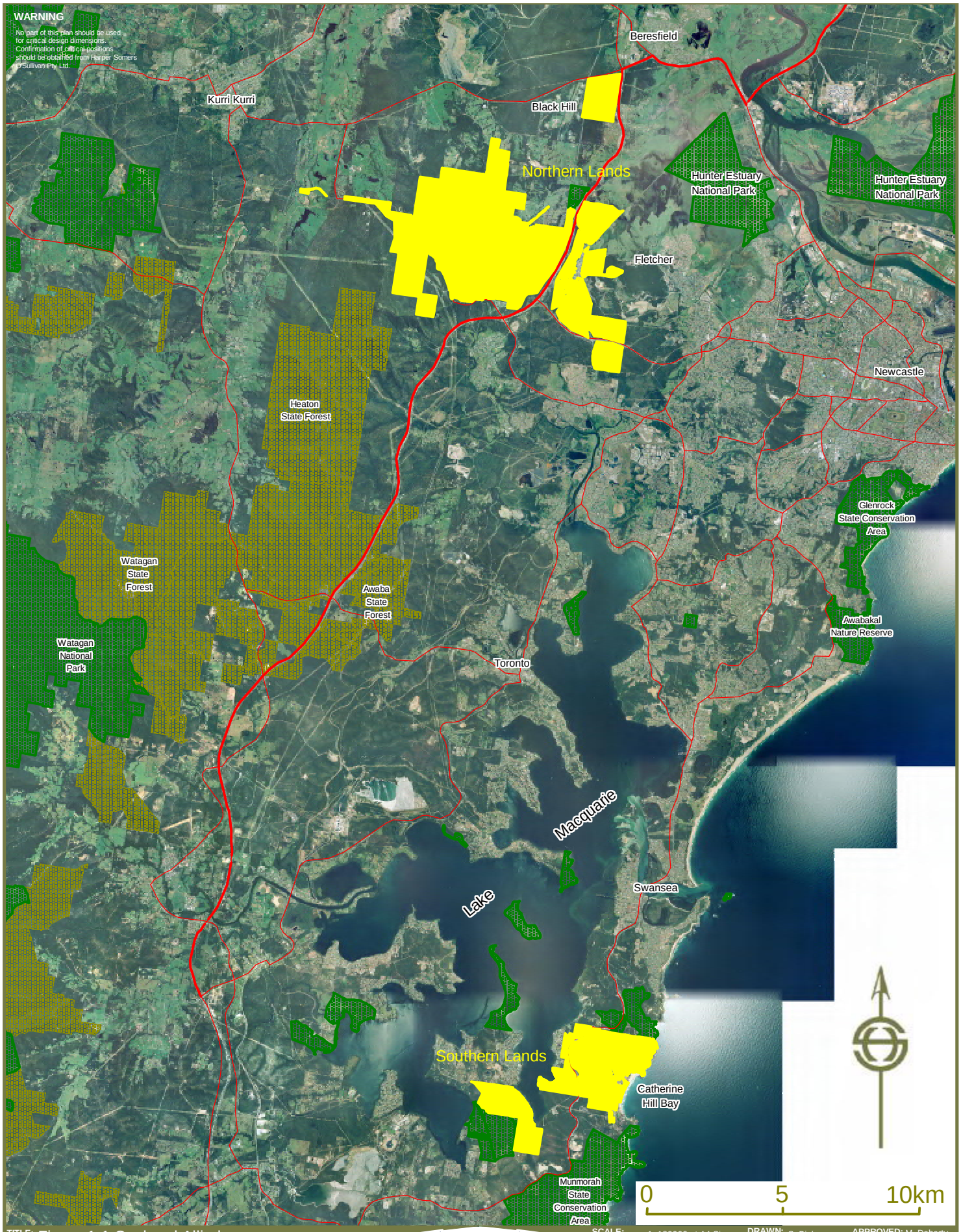
C&A owns approximately 4,187 hectares of land in the Lower Hunter Region located within the four local government areas of Newcastle, Cessnock, Lake Macquarie, and Wyong (located in Northern Central Coast region). The sites are not required for future mining or other operational purposes. Refer to Figure 1-1, Figure 1-2 and Figure 1-3.

C&A's Lower Hunter lands, including Conservation Estates, are included in the LHRS for urban development and conservation. C&A is one of four major landowners within the region that play a significant role in achieving the LHRS's environmental and conservation outcomes and sustainable growth.

In finalising the LHRS, the NSWG reached agreement with C&A for the dedication of 3,322 ha (80%) of C&A land for conservation corridors upon receipt of development rights on 848 ha (20%).

This agreement was formalised in a MoU signed by the Minister for Planning, the Minister for Environment and the Minister for Lands, October 2007 (Appendix A). The MoU details the development and conservation of the C&A land holdings, collectively classified into 'Southern Lands' and 'Northern Lands' (Refer to Figure 1-1). The Northern Lands encompass the Minmi Link Road and Black Hill Development Estates and the Stockrington and Tank Paddock Conservation Estates (Refer to Figure 1-2).

The proposed Conservation Estates include areas of high conservation value in the nominated regional green corridors that will be dedicated to the public. The Conservation Estates are similarly identified in the draft LHRCP prepared by the DECC. Refer to Figure 1-4.



TITLE: Figure 1-1 Coal and Allied Surplus Lands

CLIENT: Coal and Allied Operations Pty Ltd

SCALE: 1: 180000 at A4 Size

DRAWN: S. Bishop

APPROVED: M. Doherty

DATUM: MGA Zone 56 (GDA 94)

DATE: 16/8/2007

LAYOUT REF: J:\JOBS\24\24530 Hunter Valley\Draft ... ology\Southern Lan
ALL WORKSPACES\24530 C&A Lands FIGURE 1-1 A-A4.wo

CONTOUR INTERVAL: N/A

JOB REF: 24530-2

PLANNING SURVEYING ECOLOGY

HARPER SOMERS O'SULLIVAN
241 DENISON STREET BROADMEADOW PO BOX 428 HAMILTON NSW 2303
T: 02 4961 6500 F: 02 4961 6794 E: survey@hso.com.au W:www.hso.com.au ABN 11 093 343 858

WARNING

No part of this plan should be used for critical design dimensions. Confirmation of critical positions should be obtained from Harper Somers O'Sullivan Pty Ltd.

BLACK HILL DEVELOPMENT ESTATE

HEXHAM SWAMP NATURE RESERVE

PAMBALONG NATURE RESERVE

TANK PADDOCK CONSERVATION LANDS

STOCKRINGTON CONSERVATION LANDS

FLETCHER

MINMI

F3

SUGARLOAF STATE CONSERVATION AREA

SEAHAMPTON

BLUE GUM HILLS REGIONAL PARK

LINK ROAD-MINMI DEVELOPMENT ESTATE

NEWCASTLE LINK ROAD

WEST WALLSEND

HOLMESVILLE

LEGEND

- Proposed Conservation Estate
- Proposed Development Estate
- Conservation Reserves

0 1.5 3km

TITLE: Figure 1-2 Northern Lands

CLIENT: Coal and Allied Operations Pty Ltd

PLANNING SURVEYING ECOLOGY

HARPER SOMERS O'SULLIVAN

SCALE: 1: 46000 at A3 Size **DRAWN:** A. McConville **APPROVED:** M. Doherty

DATUM: MGA Zone 56 (GDA 94) **DATE:** 13/02/2008

LAYOUT REF: J:\JOBS\24k\24530 Hunter Valley\Draft\Ecology\Northern Lands\ALL WORKSPACES\24530 Northern Lands Location FIGURE 1-2 A-A3.wor

CONTOUR INTERVAL: N/A

JOB REF: 24530-2

241 DENISON STREET BROADMEADOW PO BOX 428 HAMILTON NSW 2303
T: 02 4961 6500 F: 02 4961 6794 E: survey@hso.com.au W:www.hso.com.au ABN 11 093 343 858

WARNING
No part of this plan should be used for critical design dimensions. Confirmation of critical positions should be obtained from Harper Somers O'Sullivan Pty Ltd.

HEXHAM SWAMP NATURE RESERVE

PAMBALONG NATURE RESERVE

TANK PADDOCK CONSERVATION LANDS

STOCKRINGTON CONSERVATION LANDS

FLETCHER

MINMI

SUGARLOAF STATE CONSERVATION AREA

BLUE GUM HILLS REGIONAL PARK

NEWCASTLE LINK ROAD

WEST WALLSEND

LEGEND
- Proposed Conservation Estate
- Conservation Reserves

0 1 2km

TITLE: Figure 1-3 Site Location Conservation Estate

CLIENT: Coal and Allied Operations Pty Ltd

PLANNING SURVEYING ECOLOGY

HARPER SOMERS O'SULLIVAN

SCALE: 1: 40000 at A3 Size **DRAWN:** S. Bishop **APPROVED:** M. Doherty

DATUM: MGA Zone 56 (GDA 94) **DATE:** 13/02/2008

LAYOUT REF: J:\JOBS\24k\24530 Hunter Valley\Draft\Ecology\Northern Lands\ALL WORKSPACES\24530 Conservation Estate Location FIGURE 1-4 A-A3.wor

CONTOUR INTERVAL: N/A

JOB REF: 24530-2

241 DENISON STREET BROADMEADOW PO BOX 428 HAMILTON NSW 2303
T: 02 4961 6500 F: 02 4961 6794 E: survey@hso.com.au W:www.hso.com.au ABN 11 093 343 858

WARNING

No part of this plan should be used for critical design dimensions. Confirmation of critical positions should be obtained from Harper Somers O'Sullivan Pty Ltd.
Map Source: Draft Lower Hunter Conservation Strategy

Consolidation of Watagans to Stockton habitat linkage

Western Lake Macquarie: very diverse vegetation, large forest owl habitat

Stockton coastal heath and wetland vegetation

Regionally significant Squirrel Glider population

Corridor linking Olney State Forest and western shore of Lake Macquarie

Wallarah-Munmorah Sensitive coastal and lake foreshore environments Regional north-south wildlife

Maitland
Raymond Terrace
Kurri Kurri
Cessnock
Newcastle
Morisset

Important Wildlife Corridors
Main Towns
Local Government Areas
National Park Estate
State Forest Estate
Extant vegetation
Marine Park (Approximate boundary)
Northern Estates

0 0.5 1km

TITLE: Figure 1-4 Regional Corridor (Draft Lower Hunter Conservation Plan)

CLIENT: Coal & Allied Operations Pty Ltd

SCALE: 1: 30000 at A3 Size **DRAWN:** A. McConville **APPROVED:** M. Doherty

DATUM: MGA Zone 56 (GDA 94) **DATE:** 3/11/2008

LAYOUT REF: J:\JOBS\24k\24530 Hunter Valley\Drafting\Ecology\Northern Lands\ALL WORKSPACES\REPORTS\EPBC Report\24530 FIGURE 4 Nth Lands Regional Corridors A-A3.wor

CONTOUR INTERVAL: N/A

JOB REF: 24530

HARPER SOMERS O'SULLIVAN

PLANNING SURVEYING ECOLOGY

241 DENISON STREET BROADMEADOW PO BOX 428 HAMILTON NSW 2303
T: 02 4961 6500 F: 02 4961 6794 E: survey@hso.com.au W:www.hso.com.au ABN 11 093 343 858

1.4 Definitions

The definitions given below are relevant to the Director-General's requirements:

'development' has the same meaning as in the NSW *Environmental Planning and Assessment Act 1979*.

'activity' has the same meaning as in the NSW *Environmental Planning and Assessment Act 1979*.

'proposal' is the development, activity or action proposed. Other terminology used for the 'proposal' includes the **'current proposal'** or **'development proposal'**.

The **'Site'** refers to the entire land holding, inclusive of development and conservation areas.

The **'Development Estate'** refers to the area(s) scheduled for development.

The **'Conservation Estates'** refers to the area(s) scheduled for dedication to the NSW Government. Other terminology used for the 'Conservation Estates' includes the **'Offset Lands'** or **'Dedication Lands'**.

Due to the size and separation of land holdings proposed for development and conservation under the NSW Government MoU, and for assessment purposes, the land holdings have been broken down into two distinct geographical components. As such the sites have been condensed into the **'Southern Lands'** and **'Northern Lands'**.

All other definitions are the same as those contained in the NSW *TSC Act*.

1.5 Qualifications and Licensing

1.5.1 Qualifications

The principal author of this report was Matthew Doherty BLMC of RPS Harper Somers O'Sullivan Pty Ltd, with additional input from Craig Anderson BAppSc (EAM), Deborah Landenberger BSc (Hons), Allan Richardson BEnvSc (Hons), Sam Bishop BEnvSc, Alex Saddington BAppSc, Shaun Corry Dip Cons & Lnd Mgt, and Anna McConville BEnvSc. The academic qualifications and professional experience of all RPS HSO ecologists involved in the project are documented in Appendix E.

1.5.2 Licensing

Research was conducted under the following licences:

- NSW National Parks and Wildlife Service Scientific Investigation Licence S10300 (Valid 30 November 2008);
- Animal Research Authority (Trim File No: 01/1142) issued by NSW Agriculture (Valid 12 March 2009);
- Animal Care and Ethics Committee Certificate of Approval (Trim File No: 01/1142) issued by NSW Agriculture (Valid 12 March 2010); and
- Certificate of Accreditation of a Corporation as an Animal Research Establishment (Trim File No: 01/1522 & Ref No: AW2001/014) issued by NSW Agriculture (Valid 22 May 2011).

1.6 Sub-consultants, Personal Communications and Observations

1.6.1 Sub-consultants

RPS HSO used the following organisations during this study where appropriate input was required.

Plant Species Identification:
(for *Callistemon linearifolius*)

Royal Botanic Gardens
National Herbarium of NSW
The Domain
Mrs Macquaries Road
SYDNEY NSW 2000
P: (02) 92318111

Hair and Scat Analysis:

Barbara Triggs
"Dead Finish"
GENOA VIC 3981
Tel. / Fax. (03) 51580445

1.6.2 Personal Observations

Relevant observations made by the authors or other RPS HSO ecologists outside of the project or other published studies have been included within this report as 'personal observations' (pers. obs.).

1.6.3 Agency/ Group/ Organisation Consultation

The following agencies were consulted during the preparation of this EIR. Note this list is not comprehensive. For a full account of the consultation undertake during the project (Charette) process, refer to the Charette outputs document included within the wider EA submission.

DECC (Lucas Grenadier)	NPWS (Tom Bagnat)
WSC (Deb Mckenzie)	LMCC (Robbie Economos/Greg Gilles)
Hunter-Central Rivers CMA	Green Corridor Coalition (Brian Purdue)
Lake Macquarie Coastal and Wetlands Alliance	The Newcastle Wilderness Society
Department of Primary Industries	Hunter Environment Lobby