

- investigate registers and undertake searches to determine any existing identified sites;
- consultation with local Aboriginal community in accordance with DECC requirements outlined in *Interim Community Consultation Requirements for Applicants*;
- carry out field work within the study area;
- assess the significance of any Aboriginal heritage evidence;
- make recommendations for the management of any identified Aboriginal heritage evidence; and
- Make recommendations, including opportunities for impact mitigation and site protection.

#### **5.5.2.2 Cultural and Archaeological Context**

The AHA prepared by SEA examined a study area of some 71.33 ha, and which included the subject site. According to SEA, the area was close to the boundary of the Wodi Wodi and the Wandandian people. In the vicinity of the subject site, the Wodi Wodi people occupied lands generally north of the Shoalhaven River, whilst the Wandandian people occupied lands extending from the lower Shoalhaven to Ulladulla.

According to SEA, both the Wodi Wodi and Wandandian peoples would have relied upon a range of fauna (aquatic, mammal and reptile) and floral species as feed resource. These feed resources are found within ten kilometres of the coast.

The South Coast is presently home to an energetic and large Aboriginal population, including within the Nowra area, who are actively engaged in the identification and management of indigenous cultural heritage.

#### **5.5.2.3 Survey Results and Predictive Modelling**

##### **Aboriginal Heritage Information Management Systems (AHIMS)**

A search of the Aboriginal Information Management System (AHIMS) database, managed by the NSW Department of Environment & Climate Change (DECC) was undertaken by SEA as part of the AHA in September 2007.

The search found that there are no known sites located within the subject site or study area.

The search found that there are two sites within several hundred metres from the subject site, as follows (**Table 11**):

**Table 11**  
**Items of Indigenous Significance**

<i>Site Number</i>	<i>Description</i>
52-5-25	Rock shelter with deposit and art
52-5-26	Rock shelter with art

The location of these sites is shown in Figure 1 of the SEA Report.

#### ***Previous Surveys in the Study Area***

Previous surveys within the immediate vicinity of the study area have included:

- Survey of the route of the Eastern Gas Pipeline by Kuskie, Navin and Officer within 1 kilometre to the west of the Mundamia area which found several sites including:
  - 52-5-0304 / scarred tree.
  - 52-5-0305 / rock shelter with deposit adjacent to Cabbage Tree Creek.
  - 52-5-0306 / artefact scatter on a low broad crest on the southern side of the Shoalhaven River.
  - 52-5-0307 / artefact scatter on northern side of Shoalhaven River.
- Extension to the West Nowra Waste Depot by Rich which did not detect any evidence of aboriginal heritage.
- Investigations undertaken for the Shoalhaven Water Supply Augmentation Scheme by Paton to the south of the Mundamia area which detected no sites.
- Attenbrow undertook investigations concerning proposed pipeline works undertaken by SCC including a section which traverses the Mundamia Study Area and did not detect any evidence of Aboriginal heritage near the subject site.

#### ***Predictive Modelling***

Clarke and Kuskie have developed a spatial model using key environmental variables in order to predict Aboriginal site occurrence, and this results in the classification of sites into a number of resource zones. Predictive modelling undertaken by SEA utilising this system has indicated that the subject site was assessed as being an *“area outside of a primary or secondary resource zone”* and occupation of these area would have been for *“hunting and/or gathering (without camping) and transitory movement and is likely to have been sporadic and very short in duration”*.

#### **5.5.2.4     *Surveys***

The field survey was undertaken by SEA on 28 to 30 May 2007 following consultation with Mr Henry (Sonny) Simms of the Nowra Local Aboriginal Land Council (NALC). Whilst arrangements were made for NALC to attend they were unable to supply a representative at the time of the survey, however they were satisfied with the survey methodology and agreed for it to be conducted in their absence.

The study area was divided up based on environmental variables that were assumed to relate to the usage of the study area. These units, termed archaeological terrain units by SEA, were based on landform element and class of slope. This strategy enables areas more likely to contain evidence of aboriginal cultural heritage being targeted and receiving greater attention, than areas that are unlikely to contain any evidence. For example, the former quarry on SCC land is highly modified and not expected to contain any evidence. Results of the survey were recorded on survey record forms to detail relevant environmental variables and heritage resources that were identified.

During the survey, surface visibility was generally moderate to high, however, pasture grasses reduced visibility in certain areas.

Surveys were undertaken on foot by an archaeologist, with emphasis on areas that afforded higher ground visibility.

During the field surveys, a total of 24,000 m<sup>2</sup> of the site was inspected, which amounts to 5.1% of the study area, based on a 2 m wide strip per person over the transects that were investigated, which enables a much greater survey area for obtrusive sites, such as scarred trees.

According to SEA, this survey that was undertaken is considered to represent a reasonably high sample of visible ground present at the site and enables an effective assessment of the heritage resources identified as potentially present at the site. This provides a valid basis to determine the probable impacts of the proposal, and formulation of management recommendations of the identified and potential heritage resources.

The survey undertaken by SEA did not detect any evidence of aboriginal heritage sites (deposits/scars), or other cultural evidence or values during the period of their assessment.

#### **5.5.2.5     *Consultation***

The preparation of the Aboriginal Heritage Assessment included a comprehensive program of consultation that is consistent with the requirements of the DECC and which

are outlined in their *Interim Community Consultation Requirements for Applicant's* document.

This included notification to the Local Aboriginal Land Council (LALC), Registrar of Aboriginal Owners, NSW Native Title Service, and SCC, along with placement of media advertisements.

This resulted in direct consultation with the Nowra LALC, Jerrinja LALC, Jerrinja Consultants, South East Coast Gadu Elders Aboriginal Corporation, Merrimans LALC, Ulladulla LALC, South Coast Aboriginal and Elders and Friends Group organisation, Yuin Traditional Owner.

No Aboriginal organisations registered an interest in the assessment, and SEA deemed the Nowra LALC to be a stakeholder for the purposes of the heritage assessment.

Consultation was had with Mr Henry (Sonny) Simms of the Nowra LALC prior to survey work being undertaken.

The Nowra LALC was provided with a copy of the draft Aboriginal Heritage Assessment with a request to review and provide comments.

#### **5.5.2.6     *Cultural Significance of the Subject Site***

Assessment undertaken by SEA entailed research of existing registers to identify sites already known, consultation with relevant Aboriginal stakeholders, and detailed field surveys based on established practices.

The investigations of existing information revealed that the site contains no known items of Aboriginal significance. The site surveys revealed no archaeological sites. Consultations with the Nowra LALC revealed that the site has no cultural values to Aboriginal people.

Furthermore, SEA consider that the potential for Aboriginal heritage evidence to occur, other than stone artefacts, is very low to negligible and artefact deposits or sites having a high local or regional significance are not expected at the site.

#### **5.5.2.7     *Conclusions***

The Aboriginal Heritage Assessment undertaken by SEA found that:

- Relevant registers and environmental planning instruments did not identify the site as containing sites of Aboriginal heritage or cultural significance;
- The field work undertaken by SEA did not detect any evidence of Aboriginal heritage;

- Potential for sub-surface deposits of artefacts having research value is very low;
- Other types of heritage evidence are not anticipated to occur within the study area;
- Consultation with the relevant Aboriginal community did not identify the site as having any significance;
- No further subsurface testing is required;
- The management and mitigation measures proposed are limited to retrieval of artefacts if they are found during construction works and normal DECC procedures associated with the finding of heritage items as the impacts on Aboriginal heritage are expected to be very low.

Therefore it is concluded that the possibility of archaeological items being found on the subject site is negligible. However, in order to ensure the proper protection and management of archaeological items that may be discovered during construction, SEA have made recommendations relating to the management and monitoring of the development works during the construction phase.

#### **5.5.2.8     *Management and Monitoring***

The Aboriginal Heritage Assessment included several recommendations for management and mitigation measures for the protection of the indigenous heritage and archaeological significance of the site. The mitigation measures include the preparation of an Environmental Management Plan for the project to include management procedures and liaison with the LALC and relevant agencies if previously unrecorded heritage evidence and skeletal remains are found during construction.

SEA conclude that implementation of these management and mitigation measures, will ensure that the impact of the proposal on Aboriginal heritage can be satisfactorily managed.

### **5.6    FLORA AND FAUNA (INCLUDE HYDROGEOLOGICAL ASSESSMENT DETAILS)**

#### **5.6.1    Introduction**

SLR Global Environmental Solutions (SLR) was engaged to undertake an Environmental Flora and Fauna Assessment of the site. This section discusses the flora and fauna issues potentially affecting the site and the Part 3A Major Project proposal the subject of this EA. The SLR report discusses site investigations, findings and recommendations with regard to impact of development on native vegetation and wildlife, including

threatened species and endangered ecological communities. The Environmental Flora and Fauna Assessment is included as **Annexure 3** of this EA.

It should be noted that the Environmental Flora and Fauna Assessment undertaken by SLR has resulted in significant modification to the proposed subdivision layout from that originally considered. In the main, this has reduced the development footprint in the northern portion of the site, thus enabling the retention of some 9.5 ha of land being proposed for dedication to SCC for conservation purposes, and this land contains the most ecologically significant portions of the site.

### **5.6.2 Methodology**

The Environmental Flora and Fauna Assessment carried out by SLR is based on the following:

- Review of existing reports and fauna assessments undertaken on behalf of SCC in the consideration of the Nowra Bomaderry Structure Plan.
- Field surveys over a number of days which included:
  - Targeted surveys for the threatened flora species Nowra Heath Myrtle *Triplarina nowraensis*.
  - Botanical surveys.
  - GPS mapping.
  - Nocturnal fauna surveys including spotlighting, call playback and ultrasonic bat detection,
  - Diurnal avifauna surveys,
- Review of published scientific literature.
- Utilisation of experience, skills and knowledge of the assessment team.
- Review of vegetation mapping undertaken by SCC.

The Environmental Assessment undertaken by SLR was done so in accordance with the draft *Threatened Biodiversity and Assessment- Guidelines for Development and Activities* and the draft *Guidelines for Assessment of Impacts on Threatened Species under Part 3A* (DEC 2005).

### **5.6.3 Existing Flora and Vegetation**

#### **5.6.3.1 Vegetation Mapping**

According to SLR, investigations relating to the subject site have identified a total of six native vegetation community types, the location and extent of which is depicted in Figure 4 of the SLR Report. The vegetation communities identified include the following:

- Grey Gum – Blue Leaved Stringybark Forest/Woodland;
- Spotted Gum – Blackbutt Forest;
- Scribbly Gum – Bloodwood Forest;
- Paperbark Closed Forest;
- Regrowth Woodland and Scattered Trees;
- Kunzea Shrubland/Heathland; and
- Pasture.

The vegetation communities identified by SLR are not identified as endangered ecological communities (EECs).

#### **5.6.3.2     *Native, Introduced and Threatened Plant Species Recordings***

Prior ecological assessment undertaken in the consideration of the NBSP resulted in the identification of a total of 269 individual plant species occurring in the Mundamia Investigation Area. Further detailed site investigations undertaken by SLR identified a further 22 native plant species occurring on the site. Of these, one plant species, Nowra Heath Myrtle *Triplarina Nowraensis*, is listed as “*endangered*” under Part 1 of the Threatened Species Conservation Act.

In addition, three Rare or Threatened Australian Plants (ROTAP) have been recorded on the site including *Acacia subtilnervis*, *Leptospermum epacridoideum* and *Leptospermum sejunctum*. Furthermore, *Acacia hispidula* was recorded on the site, and this is a plant species which is regionally significant to the Shoalhaven.

#### **5.6.3.3     *Vegetation Significance***

The proposal results in the development of land which is mostly cleared and vegetated with pasture grasses or alternatively vegetated with poor quality native vegetation, and the retention of large areas on the eastern and northern boundaries of the site which are to be retained for conservation purposes. This is consistent with the prior studies and assessment undertaken by SCC in the consideration in the NBSP.

The proposal will involve the removal of 31.03 ha of land, which represents some 71.68% of the property. Of this, 21.41 ha is land which has already been disturbed, modified or cleared, with much of it being used for agricultural activities, whilst an additional 0.67 ha comprises regrowth vegetation or scattered trees.

The proposal also involves the retention of 9.49 ha of land which is to be dedicated for biodiversity conservation purposes and this represents high quality vegetation and habitat which will be maintained within the conservation area (proposed to be zoned E2 Environmental Conservation) along the eastern and northern boundaries of the site.

The proposal will result in the retention of the majority of the three ROTAP listed plant species, whilst the regionally significant *Acacia hispidula* will be retained within the proposed conservation area.

In relation to the threatened plant species listed under the TSC Act, Nowra Heath Myrtle, *Triplarina nowraensis* the majority of these specimens will be retained within the conservation area.

The site does not contain any endangered ecological communities, or endangered populations of vegetation.

SLR do not consider that the proposal will have any significant effects on identified flora values, essentially on the basis of the conservation of high quality habitat on the periphery of the subdivision.

#### **5.6.4 Existing Fauna and Fauna Habitats**

##### **5.6.4.1 Fauna**

According to SLR, the open farmland portion of the site is structurally simple and provides little habitat opportunities for fauna. The forested portions on the northern and eastern portions of the site are more complex, and provide high diversity in habitat for forest dependent species. Further, the site contains a substantive rock outcrop which comprises small caves and rock overhangs. It is the forested lands and rock outcrop which are largely contained within the conservation area proposed as part of the proposal.

Fauna surveys undertaken by SLR recorded a total of 120 native species of mammals, birds, reptiles and amphibians, and 7 introduced or domestic mammal species on the site and surrounding lands.

Of the native species identified by SLR, a total of eight are listed threatened fauna species. Favourable habitat for these species is largely confined to the eastern and northern portions of the site, the majority of which will be retained within the conservation area zoning.

Species that were identified by SLR include the Square-tailed kite, Gang-Gang Cockatoo, Glossy Black Cockatoo, Powerful Owl, Yellow-bellied Glider, Grey-headed Flying Fox, East-coast Free-tail bat and Common Bent-wing Bat. These species are all identified as vulnerable pursuant to Schedule 2 of the TSC Act.

The subject site contains a significant number of hollow bearing trees, an abundant number of which are sited within that part of the site identified as a conservation area.



SLR did identify and locate 60 hollow bearing trees on the site, containing a total of 165 hollows of varying size, which are sited in the development area and the adjacent asset protection area. SLR consider that of the 60 hollow bearing trees, 39 will require removal in order to enable the development to proceed, however do not consider that this will have a significant impact. This is due to the implementation of a “Hollow-Bearing Tree Protocol” which will result in no net reduction in hollow-bearing tree resources, the siting of a substantial number of trees within the conservation area which is to be dedicated, coupled with substantial other hollow-bearing tree resources in the immediate area and locality.

### ***Avifauna***

SLR detected a total of seventy four (74) bird species within and surrounding the subject site, and of these, four are threatened, being listed as vulnerable under the TSC Act. These included the Square-tailed kite, Gang-Gang Cockatoo, Glossy Black Cockatoo, and the Powerful Owl.

According to SLR, the species are all highly mobile, are wide ranging, and unlikely to be solely dependent on the subject site for their habitat and survival. Furthermore, the proposal retains the high quality habitat for the species and the most significant vegetation in the conservation area.

### ***Amphibians and Reptiles***

Habitat for amphibians is restricted to a number of small farm dams scattered throughout the site, a small drainage depression in the central section of the property, and a sandstone creekline which is not subject of any direct disturbance. Two threatened amphibian species are known to occur in the local area, including the Giant Burrowing Frog, and the Green and Golden Bell Frog.

Previous studies undertaken in support of the NBSP failed to record the Giant Burrowing Frog, whose habitat would be retained within the conservation area regardless, and as such is not affected by the proposal.

The SLR survey included searches for the Green and Golden Bell Frog, however this intensive survey effort failed to detect the species.

The subject site has the potential to provide habitat for reptiles due to the diverse structure of habitat across the site, particularly involving the rock outcrops. Two reptile species, the Broad-headed Snake and Rosenberg’s Monitor, are known to occur in the locality, however virtually all potential habitat for these species is to be retained within the conservation area.

## ***Mammals***

Twenty three native mammal species were recorded on the site, along with eight introduced or domestic species. Of these, four are listed as vulnerable and these include the Yellow-bellied Glider, Grey-headed Flying Fox, East-coast Free-tail bat and Common Bent-wing Bat.

These species are all forest dependent, utilising habitat in the eastern and northern portions of the site, the vast majority of which will be retained in the conservation area. Of the four species detected, the only species that is likely to be resident on the site is the Yellow-bellied Glider as the other three are highly mobile, and are likely to have habitat requirements that are more wide ranging than that offered by the subject property.

According to SLR, the Yellow-bellied Glider and the Eastern Free-tail Bat utilise tree-hollows for denning and roosting purposes. Hollow-bearing trees were identified and mapped by SLR, and the vast majority are to be retained within the conservation area, whilst consideration of lands to the east of the subject site reveals that these contain extensive tree-hollow resources which are available for use by these species.

### **5.6.5 Ecological Considerations**

#### ***5.6.5.1 Environmental Constraints***

According to SLR, the proposed development of the subject land is affected by the following ecological constraints:-

- individuals and patches of the threatened Nowra Heath-myrtle *Triplarina nowraensis*;
- the potential presence of the Spring Tiny Greenhood orchid, although this species has not been recorded on the site;
- hollow-bearing trees, which provide potential habitat for a number of threatened species;
- the loss (albeit relatively small) of foraging habitat and/or some potential roosting habitat (open forest/woodland and tall shrubland) for a number of threatened fauna species; and
- the potential direct and indirect impacts upon habitat for or individuals of a number of threatened biota.

SLR do not consider that impacts on groundwater dependent ecosystems presents a constraint to development as the Swamp Paperbark Forest and moss gardens which are existent are not solely dependent on water sourced from the subject site. Similarly, SLR