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## **Review of Flora Impacts of Southern Highlands Regional Shooting Complex**

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## **1.0 Introduction**

A proposed Section 96 Application to extend the existing Hilltop Rifle Range to form the Southern Highlands Regional Shooting Complex was lodged in November 2007. There is an existing consent, issued by Wingecarribee Council dated 26 September 1986.

In the existing consent, Condition 1 states that no trees are to be lopped, removed, damaged or destroyed without the prior written consent of Council. It is not known whether this condition was complied with, whether the consent relied on existing clearing or if consent for clearing was granted. There may have been a breach of the consent conditions of the original 1986 consent. Additional documents and historical aerial photographs would be required to determine what the existing cleared areas were at the time of consent, what areas were cleared after consent and whether Council had given written consent to any additional clearing.

## **2.0 Current proposal**

### **2.1 Director General's Requirements - Biodiversity**

The key biodiversity issues to be addressed in the revised Director General's Environmental Assessment Requirements for the project dated 23 August 2007 are:

- Demonstrate that the proposed clearing of vegetation will not have a significant effect on any threatened species, populations or ecological communities, or their habitats, communities or populations having regard to DECC's draft Guideline for Threatened Species Assessment.
- The environmental assessment should clearly state whether it meets each of the key thresholds identified in Step 5 of the draft Guideline.
- Describe the actions that will be taken to avoid / mitigate impacts or compensate for unavoidable impacts of the project on threatened species and their habitats. This should include an assessment of the effectiveness and reliability of the measures and any residual impacts after these measures are implemented.
- Confirm whether the proposal is a controlled action under the Environmental Protection and Biodiversity Conservation Act 1999 through consultation with the Commonwealth Department of Environment and Water Resources.

### **2.2 Area potentially impacted**

GHD (2007 in Executive Summary) state that:

*The total area to be impacted (approximately 16 ha) ..*

Based on the footprint of the proposed facilities, the proposal will require the additional clearing of approximately 16 ha of native vegetation. The proposed facilities are on ridgelines separated by intact bushland adjoining creeklines.

It is likely that the areas impacted would be greater than the area cleared due to effects including nutrient and weed runoff, additional light from the cleared edge, and the erosion risk of the soil type.

### **3.0 Adequacy and appropriateness of methodology of the Ecological Assessment (GHD 2007)**

#### **3.1 Geology and soil landscape**

The geology, soil landscape and topographic location do not appear to have been adequately considered in the environmental assessment by GHD (2007) in determining sampling locations, presence of endangered ecological communities and the potential effects of the proposed clearing on adjoining vegetation. The Final Determination for endangered ecological communities (EEC) relies on soil and geological details.

In terms of the geology and soil landscape, the ecological assessment (GHD 2007) states that:

*The area is predominantly Hawkesbury Sandstone, which generates coarse-grained, infertile sandy soils that are often shallow and rocky (DECC 2004b).*

DECC (2004b) is a survey of the vertebrate fauna of the Nattai and Bargo Reserves.

The geology and soil description given in the ecological assessment is not consistent with that given in the Water and Contamination Assessment (GHD 2007) which identifies:

*The three main groups of soils within the region (NPWS 2001);*

- *Sandstone tableland soils;*
- *Valley soils (sandstone derived); and*
- *Soils associated with nutrient rich shales and igneous rocks.*

*.. These soil landscapes types are unstable when disturbed. .. If rain then follows shortly after fire, there is a resulting increase in surface run-off, causing increased erosion, and reduction in plant propagules and animal habitats.*

**In conclusion**, source documents for geology and soil landscape mapping and/or the assessment in the Water and Contamination report, rather than comments in a survey of the vertebrate fauna (DECC 2004b), should be relied on.

#### **3.2 Flora**

##### **3.2.1 Previous surveys**

GHD (2007, page 3) point out that:

*The study area falls within 1000 ha of land that has been excised from the Bargo State Conservation Area .. . It currently exists as intact vegetated woodland with connectivity with the surrounding Bargo State Conservation Area.*

The literature and data searches included:

- NSW DECC Atlas of NSW Wildlife Database for state listed threatened species recorded in the locality;
- DEWR for Commonwealth listed threatened species recorded in the locality;
- Royal Botanic Garden threatened flora database records;
- Wingecarribee Biodiversity Strategy (Eco Logical Australia Pty Ltd 2003);
- The native vegetation of the Nattai and Bargo Reserve (DECC 2004) – not cited in the GHD (2007) references

Despite listing the native vegetation of the Nattai and Bargo Reserve (DECC 2004) in their literature search, GHD (2007) failed to note that DECC (2004) had mapped a Vulnerable plant species in the north-east of the study area.

### **3.2.2 GHD (2007) survey**

GHD (2007, page 6) state that the Eco Logical Australia Pty Ltd (2003) mapping was used as a guide only and detailed mapping of the study sites (within the vegetation clearance zone) was undertaken. No vegetation map of the Site was presented in the ecological assessment. There was no reference made by GHD (2007, page 6) to the DECC (2004) regional mapping.

The GHD (2007) vegetation survey was limited to four 20 m x 20 m vegetation quadrats and eight 'random meanders', in the vicinity of the proposed facilities on 3 and 4 October 2006 and 5 October 2007 (GHD 2007).

There was no sampling of vegetation adjacent to or downslope of the facilities, especially along creeklines.

There is no vegetation structure data, other than an observation of vegetation being a woodland and a list of average tree heights and numbers of hollow bearing trees only in four 10 m wide transects of varying length (GHD 2007 page 21). It is stated that:

*Eucalyptus punctata* .. *did not represent at least 15% of the total number of trees in the upper or lower strata of the tree component.*

There is insufficient height or tree density data presented to justify the woodland structure or tree composition.

It is stated that cover abundance scores for the plant species in the quadrats was recorded, however this data is not provided in GHD (2007).

**In conclusion**, sampling the vegetation using 20 m x 20 m quadrats was appropriate as it allows a comparison to be made with other data sets sampled from 0.04 ha sampling areas.

However, the sampling was inadequate. The surveyed area was limited to the approximately 16 ha proposed for clearing, and failed to sample the adjoining areas and creeklines downslope that are potentially affected by the proposal.

No structural data or cover abundance were presented to validate the assumptions for the Koala Habitat Assessment, or assist in determining extent of change of vegetation cover associated with the proposed clearing and potential erosion risks. In the Water and Contamination Assessment (GHD 2007) disturbed soils were described as having an increased surface run-off and erosion risk.

## **4.0 Adequacy and appropriateness of collected data**

### **4.1 Species data recorded**

GHD (2007) recorded a total of 64 plant species, with 29 species recorded in the four 0.04 ha quadrats. More than half (54%) of the plant species (35 species) were recorded as incidental recordings.

The number of species recorded in the quadrats ranged from 12 to 21, far lower than the average 36 to 56 taxa recorded per 0.04 ha plot for similar sandstone vegetation communities (based on DECC (2004) regional mapping survey data).

## 4.2 Likely presence of endangered ecological communities

There was no comprehensive assessment of the likelihood of endangered ecological communities (EEC) included. In section 3.1 of GHD (2007), it is concluded that the potential EECs are unlikely to occur within the study area based on the vegetation modelling of Eco Logical Australia (2003) (Wingecarribee Biodiversity Strategy Phase 1).

Preston and Adam (2004) states that:

*The Threatened Species Conservation Act 1995 requires that endangered ecological communities be defined as assemblages of species. In practice, information on a range of other attributes can be used in the delineation and recognition of communities.*

These attributes include:

- structural features of vegetation such as vertical structure or stratification, foliage projective cover of the tallest stratum, height of dominant life form of the tallest stratum, and strata including canopy, understorey, shrubs and groundcover;
- abiotic factors such as climatic and physiographic factors;
- edaphic factors such as geology and soils; and
- ecological or biotic factors, including dynamic attributes of key species and ecological interrelationships within communities.

To adequately address whether an endangered ecological community occurs in an area, comparison of the vegetation data with the Final Determination for that community is required. GHD (2007) does not present a comparison of their vegetation data with the Final Determinations for any endangered ecological communities, or the diagnostic species lists for vegetation communities described in DECC (2004). GHD (2007) also does not provide adequate data to make these comparisons due to:

- the low number of species recorded in the 0.04 ha sampling areas (ranging from 12 to 21 species per 0.04 ha rather than the expected 36 to 56 taxa per 0.04 ha recorded by DECC (2004) in their regional mapping survey data). Comparison of this vegetation data with the listed characteristic plant species in the Final Determinations for endangered ecological communities or the diagnostic species lists for vegetation communities described in DEC (2004) is problematic;
- Lack of adequate soil and geology observations or data to allow comparison with the Final Determinations;
- Lack of structural data to allow comparison with the Final Determinations and so forth.

**In conclusion**, GHD (2007) fail to compare the vegetation data recorded in the survey with the Final Determinations for any endangered ecological communities, and furthermore do not present adequate data to make these comparisons.

## 4.3 Likely presence of threatened plant species

DECC (2004) mapped a Vulnerable species listed on the Threatened Species Conservation Act 1995 (TSC Act) as occurring in the north-east of the Site, in the vicinity of the proposed facilities. No investigation of this record was undertaken by GHD (2007), despite citing DECC (2004) as source document.

Five threatened plant species listed on both the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) and the TSC Act are considered likely to occur in the Study Area. None were found during 5.5 hours of targeted surveys. Given a known Vulnerable species record in the study area, the search effort appears to be inadequate.

## **5.0 Assessment of impact**

In the assessment of impact of the proposal, GHD (2007) assumes that three of the threatened plant species do occur in the study area. The assessment concludes that there is (GHD 2007 p37):

*potential for direct impacts on suitable habitat for some threatened flora species ... as well as indirect impacts.*

The conclusion reached is that the proposal will not impact on the long-term survival of threatened flora species as there is similar suitable habitat for the species in the large areas of surrounding vegetation. There are no data presented to support this conclusion.

The Assessment of Impact of the proposal on threatened flora does not follow the standard 7 part test format as presented in the DECC Threatened Species Assessment Guidelines. It is difficult to determine if this non-standard assessment of significance has addressed the seven factors of assessment as required under the Act.

The Commonwealth Threatened Species Assessment (section 4.4) is inadequate. The Assessment of Impact in section 4.2.1 assumes that the threatened plant species are likely to occur on the Site; therefore a referral to the Commonwealth Department is required.

## **5.1 Cumulative impacts**

No assessment of impacts of the development on the adjacent and downslope vegetation was undertaken.

## **5.2 Adequacy of mitigating measures**

Flora related mitigation measures considered are given in Section 5.1, namely:

- to reduce the amount of vegetation clearance required; and
- partial clearance within the shotgun range.

These recommendations appear to have been made without reference to the requirements of the shooting range.

In Section 5.2, mitigation measures given are:

- prepare a weed management plan for an area with no exotic species recorded (this assumes that flora data was adequately sampled) to control noxious weeds and reduce edge effects;
- sediment fencing, detention basins;
- stockpile soil that may contain seed of exotic species away from adjacent vegetation and drainage lines. Details are not presented.

The proposed Shooting Facility is on land of conservation value, formerly in a Conservation Area. The vegetation is intact native bushland with connectivity to the surrounding Bargo State Conservation Area. No exotic species were recorded. If a

weed management plan is being proposed then it is presumably expected that exotic species are associated with the proposal.

The recommendation for sediment fencing and detention basins assume sediment and possibly erosion associated with the proposal that needs to be controlled.

In Section 5.3, GHD (2007) point out that of the 1034 ha excised from the National Park, only 16 ha is proposed to be cleared. This does not consider the downslope effects of the proposal, such as shotgun lead, Asset Protection Zones and exotic grasses used on the firing range.

In terms of the off site offsets, there are no data on the quality of the offset areas to determine the adequacy of the offset. It is likely these Crown Land offset areas are themselves environmentally constrained and the proposal will merely formalise the land status.

## **6.0 Conclusions**

The GHD flora assessment of the proposed development area is inadequate in:

- area investigated (restricted to proposed clearing);
- use of data presented in DECC (2004);
- sampling effort (5.5 hours for searches of threatened plant species);
- data recorded in quadrats (lower number of species recorded per 0.04 ha than expected from data presented in DECC 2004);
- insufficient quadrat sampling with only 47% of species recorded in the four quadrats;
- no comparison with Final Determinations or community descriptions in DECC (2004)
- no assessment of significance addressing the factors of assessment in the 7 part test;
- no adequate mitigation measures;
- no details of the vegetation in the areas proposed as offsets. The offset sites may be already highly flora constrained with little or no future development potential.

In terms of the revised Director General's Environmental Assessment Requirements for the project, GHD (2007) have not:

- adequately demonstrated that the proposed clearing of vegetation will not have a significant effect on any threatened species, populations or ecological communities, or their habitats, communities or populations;
- clearly stated whether it meets each of the key thresholds identified in Step 5 of the draft Guideline:
- adequately described the actions that will be taken to avoid / mitigate impacts or compensate for unavoidable impacts of the project on threatened species and their habitats, including an assessment of the effectiveness and reliability of the measures and any residual impacts after these measures are implemented; or
- consult with the Commonwealth Department of Environment and Water Resources to confirm whether the proposal is a controlled action under the Environmental Protection and Biodiversity Conservation Act 1999.

## References

DECC (2004)

*The Native Vegetation of the Nattai and Bargo Reserves*. Conservation Programs and Planning Branch, Metropolitan Environmental Protection and Regulation Division. Dated August 2004

GHD (2007)

*Southern Highlands Regional Shooting Complex: Ecological Assessment*. Dated October 2007.

Preston B.J. and Adam P. (2004)

Describing and listing threatened ecological communities under the Threatened Species Conservation Act 1995 (NSW): Part 2 – the role of supplementary descriptors and the listing process. *Environmental and Planning Law Journal* **21**: 372-390.