6.1 Assessment of Endangered Ecological Communities likely to be affected

An assessment of the potential impacts of the proposal on EEC's that are known or considered likely to occur within the study area is detailed in Table 6-1. A total of three (3) EEC's as listed under the *Threatened Species Conservation Act 1995* (*TSC Act 1995*) have been recorded within the study area.

Analysis of Harper Somers O'Sullivan (2002b), which includes consideration of Ecotone (1999; 2000), University of Newcastle (2001), HLA Envirosciences (2001) and Atlas of NSW NPWS Wildlife Database (January 2006), and recent ongoing investigations within the HEZ lands, has revealed that two (2) additional EEC's have been recorded within the adjacent HEZ study area. Table 6-1 outlines those threatened EEC's that have been gazetted from the vicinity of the study area. Each community has been considered for its potential to occur within the study area and assesses the likely level of impact as a result of the proposal. Those species that exhibit at least a moderate likely level of impact have been addressed further within the assessment processes contained within this report.

Those communities that have been identified as having either a 'moderate' level of impact (or greater) as a result of the proposal or that have been recorded within the study area during field investigations have been subject to Seven-part tests of significance in Appendix A. Additionally, certain species with a less than 'moderate' likely level of impact that are likely to exist within the study area have also been addressed.

This assessment deals with the following heads of consideration in tabulated form (refer to **Table 6-1** overleaf):

'Community' – Lists each Endangered Ecological Community known from the vicinity.

'Habitat Description' – Provides a brief account of the community and the preferred habitat attributes required for their existence / survival.

'Chance of Occurrence' – Assesses the likelihood of each community to occur along or within the immediate vicinity of the study area in terms of the aforementioned habitat description and taking into account local habitat preferences, results of current field investigations and previously gained knowledge via fieldwork undertaken within other ecological assessments in the locality.

'Likely Level of Impacts From Road Alignment' – Assesses the likely level / significance of impacts to each community that would result from the installation of the road alignment, taking into account both short and long term impacts. It considers the scope of the proposal, including the likely 'ecological footprint', duration of excavation works, proposed remediation works etc. The 'subject communities' are identified within this part of the assessment process and have been subject to application of Seven-part tests of significance in Appendix A.

Table 6-1 Assessment of Likely Impacts on Endangered Ecological Communities

Community	Habitat Description	Chance of Occurrence	Likely Level of Impacts from Road Alignment
Kurri Sand Swamp Woodland (KSSW) (LHCCREMS) Map Unit (MU) 35	Occurs on soils developed over poorly-drained Tertiary sand deposits that blanket Permian sediments around Kurri Kurri. Dominant canopy species include *Eucalyptus parramattensis* ssp. *decadens, E. agglomerata, E. fibrosa* and *Angophora bakeri*. It is also typified by a diverse understorey / shrub layer comprised of Proteaceous and Fabaceous species.	**High – Recorded as the dominant vegetation community within the study area**	**HIGH.** The proposed road alignment will traverse the largest known stand of this community and as a result will fragment and isolate parts of a conservation-significant stand of this EEC. ***Likely to be the key ecological footprint of the proposal and addressed accordingly as a community likely to be affected by the proposal.***
Hunter Lowland Redgum Forest (HLRF) (LHCCREMS) Map Unit (MU) 19	Found on gentle slopes arising from depressions and drainage flats on Permian sediments of the Hunter Valley floor in the Sydney Basin and NSW North Coast Bioregions. Dominant canopy species include *Eucalyptus tereticornis, E. amplifolia* and *E. moluccana* with scattered other Eucalypt species also present.	Low / Moderate – although some potential habitat exists, this community does not occur within the study area.	LOW. This community was mapped on the study area within LHCCREMS mapping (NPWS 2000a; House 2003) although this was found to be erroneous. Does not occur anywhere on study area although it does occur within the HEZ study area opposite the north-west corner of the study area.
Lower Hunter Spotted Gum Ironbark Forest (LHSGIF) (LHCCREMS) Map Unit (MU) 17	This community is widespread throughout the central to lower Hunter Valley, with forests between Cessnock and Beresfield forming the core of its distribution. This community is dominated by *Corymbia maculata* (Spotted Gum) and *Eucalyptus fibrosa* (Broad-leaved Ironbark) with occasional occurrences of *E. punctata* (Grey Gum) and *E. crebra* (Grey Ironbark).	**High – Recorded as the co-dominant vegetation community within the study area**	**LOW – MODERATE.** One of the two stands of this community will be dissected by the road alignment. This stand is highly disturbed and the amount of vegetation to be removed / affected is only an incremental amount of the community in terms of its total known distribution, although it must be viewed as contributing to the overall decline of the community and to the factors for which it has been listed an EEC. ***As areas of this EEC will be required to be removed, it has been addressed as a community likely to be affected by the proposal.***
Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bio-regions Correlates with LHCCREMS Map Unit 46 – 'Freshwater Wetland Complex' (FWC)	Associated with periodic or semi-permanent inundation by freshwater, although there may be minor saline influence in some wetlands. They typically occur on silts, muds or humic loams in depressions, flats, drainage lines, backswamps, lagoons and lakes associated with coastal floodplains. Wetlands or parts of wetlands that lack standing water most of the time are usually dominated by dense grassland or sedgeland vegetation, often forming a turf less than 0.5 metres tall and dominated by amphibious plants.	**High - Recorded within the study area.**	**MODERATE** - This community was recorded from a small wetland (1.4ha in size) approximately 700m from Leggetts Drive. The proposed alignment passes in close proximity to this wetland, being within 40m of the eastern edge of the road. Given that strict management regimes are employed, including during the construction phase, it is feasible that potential impacts to this wetland can be minimised, although the potential for negative impacts must be recognised. ***As the proposed alignment will pass in close proximity to this EEC, an Seven-part test of significance has been applied to this community to enable a detailed and thorough assessment of potential impacts to be***

Community	Habitat Description	Chance of Occurrence	Likely Level of Impacts from Road Alignment
			undertaken.
River-flat Eucalypt Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bio-regions Correlates with LHCCREMS Map Unit 13 – 'Central Hunter Riparian Forest' (CHRF)	Associated with silts, clay-loams and sandy loams, on periodically inundated alluvial flats, drainage lines and river terraces associated with coastal floodplains. Generally occurs below 50 m elevation, but may occur on localised river flats up to 250 m above sea level. Typically forms mosaics with other floodplain forest communities and treeless wetlands, and often they fringe treeless floodplain lagoons or wetlands with semi-permanent standing water. Occurs within the adjacent HEZ, occupying narrow zones along tributaries of the major creeks, excluding the broader alluvial flats.	Low / Moderate – although some potential habitat exists, this community does not occur within the study area.	LOW. This community does not occur upon, or within close proximity to, the study area and as a result no areas of this EEC will be affected.
Quorrobolong Scribbly Gum Woodland (QSGW)	Occurs on residual sand deposits overlying Permian clay sediments from between Quorrobolong and Mulbring, to the south of the study area. Dominant canopy species include *Eucalyptus piperita, E. punctata, E. racemosa* and *Angophora costata.* The total area of this community is believed to be around 70ha.	Low	LOW. This community does not occur upon, or within close proximity to, the study area and as a result no areas of this EEC will be affected.

6.1.1 Affected Endangered Ecological Communities

From the details provided in Table 6-1, the following EEC's have been identified with the potential to be impacted upon by the proposal, and as such will be given further consideration in the following chapter and in Appendix B (Seven Part Tests). Profiles for these addressed EEC's are provided in Appendix H. The affected EEC's addressed are:

- Kurri Sand Swamp Woodland (KSSW);
- Lower Hunter Spotted Gum Ironbark Forest (LHSGIF); and
- Freshwater Wetland Complex (FWC).

KSSW was recorded as a dominant vegetation community within the study area, including areas to be traversed by the proposed road alignment. LHSGIF was recorded from two main sections, and will also be traversed by the alignment. A small area of FWC is situated proximate to the alignment (within 40m of the proposed edge of the road). These communities have therefore been addressed within this section of the report under the various heads of consideration outlined within the Director General's Requirements.

A general description of the ecological community present in the area that is the subject of the action and in any area that is likely to be affected by the action (Section 110 (3) (a)).

Kurri Sand Swamp Woodland

NPWS (2001) describes KSSW as comprising low open-woodland to low woodland and open scrub, with a low open canopy rarely exceeding 15m in height, dominated by *Eucalyptus parramattensis* ssp*. decadens*, *Angophora bakeri* and occasionally *E. signata* and *E. agglomerata*. The lower stratum is typified by *Melaleuca nodosa, Banksia spinulosa, Dillwynia retorta, Jacksonia scoparia, Hakea dactyloides, Acacia ulicifolia* and *Lambertia formosa* and merges into the ground layer. The ground layer contains grasses and low shrubs such as *Entolasia stricta, Pimelea linifolia, Lissanthe strigosa* and *Melaleuca thymifolia*.

This community appears to be highly variable in species composition and dominance ratios. Recent work in the HEZ study area has revealed that up to ten (10) variants of KSSW may occur in that area (Bell 2004b). Upon the Pelaw Main By-pass study area there were also noted to be several local variants of this community, generally in relation to species composition and frequency, particularly in the upper stratum. For example, many areas of KSSW were found to be devoid of *E. signata* trees, whereas other areas were found to be virtually completely dominated by this species. Other parts of the KSSW were found to be comprised entirely in the canopy layer by Stringybark species such as *E. sparsifolia* and *E. agglomerata.* Other areas were found to contain disturbed areas of KSSW, as discussed in Section 6.2.1.

KSSW dominates the study area, comprising approximately 399ha of the total 491.3ha. Biosis (2001) identified this stand of KSSW as being the largest remnant of this community, at 391.4ha. Mapping done by Biosis (2001) was based upon that done by the original LHCCREMS mapping NPWS (2000a), which has since been updated (House 2003). Ground-truthing vegetation sampling revealed that areas mapped as KSSW were in fact LHSGIF or the other community identified during this investigation, being GGSGF. However, some areas mapped as LHSGIF and/or Hunter Lowland Redgum Forest (HLRF) were found

to be comprised of KSSW. As a result, a reasonable balance in these errors occurred and the final figure for the area of KSSW on the study area was found to be fairly comparable to that offered by Biosis, at 399ha (i.e. < 5% variance).

Lower Hunter Spotted Gum / Ironbark Forest

LHSGIF is an open forest assemblage dominated by *Corymbia maculata* (Spotted Gum), *Eucalyptus fibrosa* (Broad-leaved Ironbark) and *E. punctata* (Grey Gum). *E. crebra* (Narrow-leaved Ironbark) also occurs, as well as a suite of other Eucalypts. The peak of distribution occurs within the forested areas between Beresfield and Cessnock. On the basis of revised vegetation mapping conducted in 2002, a total of 32,366ha of LHSGIF has been mapped within the LHCCREMS study area boundary, representing a significant proportion of forested areas found within the Lower Hunter Valley, and in particular within the bounds of the Cessnock City Council Local Government Area (NPWS 2000a; House 2003).

This community occurs in two disjunct sections along the higher slopes and ridges within the north-west and west-south-west sections of the study area. It occurs as an open forest with a canopy height of 15-20 metres and 30-50% cover. The dominant canopy species include *Corymbia maculata* (Spotted Gum), *Eucalyptus fibrosa* (Broad-leaved Ironbark) and *E. punctata* (Grey Gum). The understorey is dominated by species such as *Hakea sericea* (Bushy Needlebush), *Bursaria spinosa* (Native Blackthorn) and *Exocarpus strictus* (Dwarf Currant). The groundcover comprised mostly of native grasses and herbs such as *Entolasia stricta* (Wiry Panic), *Themeda australis* (Kangaroo Grass), *Aristida vagans* (Three-awn Speargrass) and *Pratia purpurascens* (White Root).

Freshwater Wetland Complex

This community includes vegetated wetland areas subject to periodic or semi-permanent inundation by freshwater, with some minor saline influence possible. They typically occur on silts, muds or humic loams in depressions, flats, drainage lines, backswamps, lagoons and lakes associated with coastal floodplains. This community generally occurs below 20m elevation throughout its distribution. The structure of the community may vary from sedgelands and reedlands to herbfields, and woody species of plants are generally scarce. Typically these wetlands form mosaics with other floodplain communities, and often they include or are associated with ephemeral or semi-permanent standing water. The composition of Freshwater Wetlands on Coastal Floodplains is primarily determined by the frequency, duration and depth of waterlogging and may be influenced by the level of nutrients and salinity in the water and substrate.

A small tributary of Wallis Creek was found to traverse the study area. Along this creekline, a small wetland (possibly formed / constructed from previous mining activity and road construction) was characterised by a distinctive vegetation association. The wetland contained emergent reeds including *Eleocharis sphacelata* and *Philydrum lanuginosum* (Woolly Frogmouth). Some small, regenerating *Callistemon rigidus* and *Melaleuca* spp. (Paperbarks) were found lining the edge of this wetland. Some dead Paperbarks were also found in the centre of the wetland.

As aforementioned, a second, small wetland (less than a 0.5ha in size) was also located to the south-west of the above wetland, although it has not been recognised as a separate vegetation assemblage for mapping or assessment purposes.

6.2 Assessment of habitat

A full description of the type, location, size and condition of the habitat of the ecological community and details of the distribution and condition of similar habitats in the region (Section 110 (3) (c)).

Kurri Sand Swamp Woodland

KSSW has a restricted distribution, wholly within the lower Hunter Valley where it occurs on soils developed over poorly drained Tertiary sand deposits that blanket Permian sediments around Kurri Kurri and Cessnock. The assemblage extends from Cessnock in poorly drained deposits as pockets within broader Permian sediments, east to the Kurri – Tomalpin area. The distinctive soils underlying this community make it readily distinguishable, however mapping of this community has been difficult, as not all sand deposits have been marked on available soil maps for the region. Consequently both former and current estimations of distribution are likely to be underestimated.

Approximately 399ha of KSSW occurs within the study area, thus qualifying this stand as the largest known anywhere, representing 16.7% of the total known area of this community. Regionally, LHCCREMS mapping (NPWS 2000a; House 2003) indicates that approximately 2385ha of KSSW persists, with the total distribution being limited to within a 10km radius of Kurri Kurri. Biosis (2001) reported that since 1850, KSSW has suffered a 47% reduction in its distribution which has resulted in the creation of approximately 90 remnant fragments which are now subject to a number of different threats such as edge effects, weed invasion and inappropriate fire regimes due to the remnants being located close to extensive areas of urban and industrial development.

Lower Hunter Spotted Gum / Ironbark Forest

NPWS (2000) describes LHSGIF as being "widespread throughout the central to lower Hunter Valley". Within the Lower Hunter, the peak of distribution occurs within the forested areas between Beresfield and Cessnock. On the basis of revised vegetation mapping conducted in 2002, a total 32,366 hectares of LHSGIF has been mapped within the REMS study area boundary, representing a significant proportion of forested areas found within the Lower Hunter Valley, and in particular within the bounds of Cessnock City Council Local Government Area. LHSGIF is the 3rd largest vegetation community mapped under existing LHCCREMS mapping, behind 'Hunter Range Grey Gum Forest' (MU21 – 39,718ha) and 'Coastal Plains Smooth-barked Apple Woodland' (MU30 – 35,336ha).

Importantly, three other vegetation classifications occur within the LHCCREMS study area that contain similar floristic and structural characteristics as LHSGIF. These are 'Coastal Foothills Spotted Gum / Ironbark Forest' (MU15), 'Seaham Spotted Gum – Ironbark Forest' (MU16) and 'Central Hunter Ironbark – Spotted Gum – Grey Box Forest' (MU18). Distinctions between these communities have been made based upon statistical analysis of species composition, structural form, geological substrate and distribution. In general, however, precise distinctions between LHSGIF and other Spotted Gum / Ironbark communities are not well understood, or at least, not well defined. However, a useful distinction places emphasis on the frequency of Ironbark species, in particular *E. crebra* and *E. fibrosa* and the frequencies at which these species occur. A range of other 'key-stone' Eucalypts are also thought to occur at different densities within LHSGIF to other Spotted Gum / Ironbark communities.

A range of disturbances have been noted throughout the range of this community, particularly where it occurs along the lower-elevated forested areas of the Lower Hunter Valley. As a result of past clearing, a characteristic feature of current LHSGIF is the incidence of stands of young regrowth canopy species, in turn affecting the lower strata coverage and species composition. Furthermore, the influence of altered fire regimes (predominantly in the form of an increase in the frequency of fires) have affected the current attributes, and indeed quality, of vegetation throughout the distribution of the LHSGIF community.

Freshwater Wetland Complex

Within the Lower Hunter, this community is associated with permanently or inundated swamps or wetlands along the floodplain of the Hunter Valley. A distinct vegetation complex dominated by various sedge, rush and obligate waterplants exists within this assemblage. Significant examples include Hexham Swamp, Ellalong Lagoon and wetlands situated along the Wallis Creek floodplain.

6.2.1 Description of disturbance history

Kurri Sand Swamp Woodland

Biosis (2001) delineated a condition rating for this stand of KSSW as '4' out of a possible '5' (with '5' being the best quality). This rating is conceded as being accurate, as much of the KSSW on the study area is in a fairly good state. Only the section near the village of Pelaw Main appears to have suffered from high levels of disturbance such that weed or invasive species persist as co-dominant species. This area of KSSW suffers from edge effects associated with a history of human settlement within Pelaw Main. This was evidenced by the following:

- The species composition therein was found to be quite different from KSSW elsewhere on the study area, with many species recorded being more typically found within disturbed LHSGIF areas (including weed species);
- There was evidence of an unusually high fire frequency in this area (such as via the dominance of Blady Grass within the groundcover layer);
- The linear sections of creeklines in that area were found to be dominated almost entirely by *Melaleuca* spp;
- The area was found to contain several discarded vehicles and illegally dumped rubbish with many of the vehicles have been burnt out; and
- Several cleared patches and a small wetland were found to exist within this part of the KSSW.

Throughout the remainder of the study area, disturbance was generally limited to either evidence of past clearing (which does not appear to have caused significant detrimental effects to the vegetation) or minor weed incursions along vehicle tracks.

Lower Hunter Spotted Gum / Ironbark Forest

As previously noted, a range of disturbances has been noted throughout the range of this community, and the two stands within the study area are certainly no exception to this.

Approximately 67.2ha occurs within the study area, distributed between two disjunct sections. These two stands, and in particular the southern stand, are considered to be quite degraded examples of LHSGIF. In particular, it appears that rubbish dumping and frequent fire events have contributed to the advanced levels of degradation. Both of these factors were particularly evident in the southern stand, which appears to have burnt several times over the past few fire seasons and where continuous illegal dumping appears to occur. Track construction and past clearing have also been factors in their disturbance. It is likely that proximity to settled areas accounts for the high level of these disturbances.

In general, it is asserted that this community exists within the study area in a relatively high state of degradation.

Freshwater Wetland Complex

Determining levels of disturbance for this community is difficult, given that it is unclear whether or not the wetland is indeed, naturally occurring. It is possible that it formed as a result of the installation of the railway embankment that it is situated adjacent to. Notwithstanding, there does appear to be a high incidence of degradation from vehicle trampling, evident from a plethora of vehicle tracks across the muddy substrate around the edge of the wetland (as well as within the wetland when it was dry). Some weed incursion was also noted from the periphery of the wetland, particularly along the edge of the railway embankment.

6.2.2 Extent of habitat removal

Kurri Sand Swamp Woodland

The proposal will entail the removal of vegetation within two EEC's. Figure 6-1 shows the distribution of Endangered Ecological Communities (including the FWC) along or proximate to the road alignment and areas to be removed / affected.

It is considered that the most significant ecological impact of the proposed road is likely to be that upon the KSSW community, chiefly due to the fact that it traverses the largest 'unbroken' stand of this EEC anywhere. The proposed alignment crosses KSSW in two sections, the main crossing being just to the south-east of Pelaw Main, the other being a small traversal proximate to John Renshaw Drive.

The longest traversal of KSSW is situated between the two stands of LHSGIF, being approximately 1.1km in length. The second traversal, near John Renshaw Drive, is approximately 200m in length. As aforementioned, there is likely to be a direct loss of 6.7ha of KSSW, representing 1.7% of KSSW extant on the study area. A further 6.6ha is considered likely to be affected by the proposed road via edge effects and other indirect impacts. As a result, 13.3ha of KSSW may be affected by the proposal, comprising 3.3% of the total KSSW on the study area. In the context of the total known distribution of KSSW (2385ha, using estimates provided by LHCCREMS mapping), the area to be removed is 0.28% of the total known area whilst the area to be affected represents 0.56% of the total known area.

In terms of the amount of KSSW that will be removed / affected with regards to both the study area patch size and total known area, such levels of actual removal / impact may not be regarded as being significant. However, as the stand of KSSW on the study area is the largest remaining patch of the community anywhere, it must be recognised as being of high conservation value. Therefore, even though the levels of removal / impact may not be

regarded as being proportionally significant, any such impacts upon an area of high conservation value for an EEC should be regarded as significant.

The proposal will also result in the isolation of KSSW that would remain post road construction. Primarily, this would occur between the proposed road alignment and the township of Pelaw Main to the west. Approximately 39ha of KSSW would be isolated from the remainder of KSSW in the study area by the proposed road. This represents 9.8% of the total amount of KSSW found within the study area. Much of this area of KSSW suffers from edge effects associated with a history of human settlement within Pelaw Main, as outlined in Section 6.2.1 above. The proposal is likely to exacerbate this degradation. Given the present state of the KSSW in that area, further degradation of this patch is unlikely to be at the significant detriment to the study area patch of KSSW, although any further degradation of any part of the study area stand of KSSW must be regarded as detracting from the long term and ongoing viability of the community.

However, given that conservation agreements are proposed to protect the majority of land to the east of the alignment, a highly favourable conservation outcome may be achieved for this community, given that it would constitute the largest unbroken stand of KSSW in a conservation reserve. Such an outcome could be viewed as potentially offsetting the impacts of the proposed road upon the community, given that appropriate management of that area occurs.

Lower Hunter Spotted Gum / Ironbark Forest

The alignment dissects the southernmost stand of LHSGIF along a 470m length. A very small section in the north (proximate to the cleared area near John Renshaw Drive) will be traversed, being less than 40m in length. There is likely to be a direct loss of 2.4ha of LHSGIF, representing 3.6% of this community extant on the study area. A further 3.0ha is considered likely to be affected by the proposed road via edge effects and other indirect impacts. As a result, 5.4ha of LHSGIF will be affected by the proposal, comprising 8.0% of the total on the study area. In the context of the total known distribution of LHSGIF (32266ha, using estimates provided by LHCCREMS mapping), the area to be removed is 0.0074% of the total known area whilst the area to be affected represents 0.017% of the total known area. In the context of the wider distribution of this community, it is not considered that a significant area of this community will be removed or affected by the proposal.

Freshwater Wetland Complex

No areas of this community will be removed under the proposal. However, as the road passes proximate to the wetland, some edge effects may occur. As such, appropriate management techniques should be employed to minimise the likelihood and severity of such potential impacts. This is particularly important during the construction phase, where soil stability adjacent or upstream of the wetland is likely to be the least secure.

WARNING
Note that this Vegetation Community Map depicts clearly defined boundaries between vegetation communities that are the product of individual interpretation and are not distinguished by clearly defined boundaries on the ground.
Therefore, this map should only be treated as an indication of approximate peripheries between delineated vegetation communities.
Caution should therefore be exercised when using this data for purposes requiring high levels of accuracy. Furthermore, no account for intergrading areas between delineated vegetation communities has been made.

JOHN RENSHAW DRIVE

N

PELAW MAIN

Kurri Sand Swamp Woodland
to be Isolated - 39 Ha

LEGGETTS DRIVE

HEZ Hunter Economic Zone

KEY

Pelaw Main By-pass

Pelaw Main By-pass Impact Zone (25m buffer)

Pelaw Main By-pass Study Area

Vegetation Communities

Cleared Areas

Kurri Sand Swamp Woodland
Removed: 6.67 Ha -- Affected: 6.64 Ha

Lower Hunter Spotted Gum / Ironbark Forest
Removed: 2.39 Ha -- Affected: 2.94 Ha

0 100 200 300 400 500 m

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NOTES:

HEZ Hunter Economic Zone

SCALE: 1: 7500 at A3 Size
DATE: 11/11/2005
DRAWN: S.WATSON
PROJECTION: MGA Zone 56 (GDA 94)

SPECIES IMPACT STATEMENT
PELAW MAIN BY-PASS

FIGURE 6-1

OCCURRENCE OF ENDANGERED ECOLOGICAL COMMUNITIES ALONG THE ROAD ALIGNMENT

LAYOUT REF: H:\HEZ\MAPINFO\20675 LINK - ROAD\2005 SIS NEW ALIGNMENT DOCUMENT FIGURES\20675-FIG 6-1 EEC'S ALONG ALIGNMENT-A-A3.WOR

JOB REF: **20675**

6.3 Discussions of conservation status

For each ecological community present, details of its local, regional and State-wide conservation status…[and]…its habitat requirements…(Section 110 (3) (b)).

Kurri Sand Swamp Woodland

Analysis of NPWS (2000) and Biosis (2001) data indicates that the study area comprises the largest remnant occurrence of KSSW, having been mapped at 391.4 hectares (Biosis Fragment No. 92). Ground sampling revealed that the area of KSSW on site is in fact larger than this, at 399ha (including small areas of wetland and creekline vegetation in the north-western corner of the study area and recent clearing for the construction of a dwelling near the eastern boundary). This represents 16.7% of the total known area of KSSW. As such, this remnant is of a very high conservation value.

KSSW also provides potential habitat for a number of threatened flora species such as *Eucalyptus parramattensis* ssp. *decadens, Grevillea parviflora* ssp. *parviflora* and *Acacia bynoeana*. It is also possible that *Rutidosis heterogama* would be found within this community within the study area. ROTAP-listed species such as *Macrozamia flexuosa* and *Grevillea montana* (coded 2K and 2KC respectively) were also recorded in the KSSW. Therefore, the conservation status of the endangered community would also have some bearing on the conservation status of these species.

The total known extent of KSSW is only 2385 hectares (NPWS 2000a; House 2003). Of this, 435ha is conserved in the Werakata National Park section that is contained within the bounds of the HEZ study area (Bell 2004b). A further 97.5ha is conserved within the remaining two portions of this reserve (NPWS 2000; House 2003). Therefore, a total of 532.5ha exists in Werakata National Park. This represents 22.45% of the total known distribution of this community. A further 231.4ha occurs within 7(b) Habitat Protection Zone within the HEZ study area. This brings the amount of KSSW contained in reserve areas to 763.9ha (approximately 32% of the total known area), with the remainder primarily being located on private or crown lands (such as that found on the subject study area).

Importantly, with the potential future addition of proposed conservation lands to the east of the road alignment, which is likely to be in the order of 230-300ha (depending on results of negotiations), of which the vast majority is KSSW, over 1000ha of this community may exist within conservation reserves. This would bring the total amount reserved to over 42% of the total known area (with a best-case scenario of around 46%). Should this occur, it is considered that this community would be adequately represented within conservation reserves.

Furthermore, the production of a Recovery Plan has recently been initiated for KSSW and the conservation status of the community is likely to be a key focus of that process.

Lower Hunter Spotted Gum / Ironbark Forest

Within the Lower Hunter, the peak of distribution occurs within the forested areas between Beresfield and Cessnock. On the basis of revised vegetation mapping conducted in 2002, a total of 32,366ha of LHSGIF has been mapped within the LHCCREMS study area boundary, representing a significant proportion of forested areas found within the Lower Hunter Valley, and in particular within the bounds of the Cessnock City Council Local Government Area (NPWS 2000a; House 2003).

In terms of direct reservations of this community, 2,541ha is known to be reserved within Werakata National Park, representing the most widespread community within that reserve. Although not classified as a direct reservation, 2,762ha occurs within State Forests, of which 99% occurs in the Cessnock LGA. Some areas have been mapped within Wallaroo State Forest (NPWS 2000; House 2003), although this could be erroneous (being more likely to be Seaham Spotted Gum Ironbark Forest). Within the HEZ, 461.4ha of LHSGIF is proposed to be reserved within the 7(b) conservation zone.

The relatively small area of reservation of the community in the locality along with ongoing threats from urban and industrial development, logging, inappropriate fire regimes, etc., suggests that this community may be under substantial threat. Acquisition of further lands for reservation and/or other conservation mechanisms should be considered by the relevant authorities to ensure the long-term viability of the community. An option for achieving this may be via including the majority of LHSGIF currently within the State Forest system (particularly Aberdare State Forest) within National Park Estate. The best outcome for the community would be achieved by the appending the remaining parcels of Aberdare State Forest into the existing DEC reserve system. Should this be feasible, then an additional 2,094 ha or 6.5% of the total mapped area of LHSGIF would be added to the National Park Estate, resulting in over 14% reservation of the total extent of the community.

It should be noted that a conservation outcome for this community may be achieved within the land to the east of the alignment, although in the context of the distribution of the community, the level of reservation is not considered to be significant.

Also, current zonings within the Cessnock LGA could be revisited with a view to protecting LHSGIF under local environmental planning instruments. Such areas could be rezoned to 7(b) 'Environmental Protection (Conservation) Zone'. This would enable early identification of environmentally constrained areas to relevant parties via local government planning instruments. Such zonings may well be realistically achievable within the framework or proposed upcoming changes to threatened species legislation and assessment processes, specifically with regard to Biodiversity Certification.

Freshwater Wetland Complex

Within the Lower Hunter, 'Freshwater Wetlands on Coastal Floodplains' is protected within conservation reserves such as Hexham Swamp and Pambalong Nature Reserves. Approximately 3,098 hectares of the vegetation community 'Wetland Complex' has been has been mapped within the LHCCREMS study area boundary. The largest portion of this community occurs within Hexham Swamp Nature Reserve, containing approximately 2,250 hectares of this community. Therefore, it could be stated that this community is well-represented within the lower catchment of the Hunter River.

Elsewhere within the region, small areas of this community are protected within conservation reserves such as Pitt Town Nature Reserve and Scheyville, Wyrrabalong, Botany Bay, Royal and Seven Mile Beach National Parks. However, these are unevenly distributed throughout the range and unlikely to represent the full diversity of the community. In addition, wetlands within protected areas are exposed to hydrological changes that were, and continue to be initiated outside their boundaries. Some Freshwater Wetlands on Coastal Floodplains are protected by State Environmental Planning Policy (SEPP) 14, although this has not always precluded impacts on wetlands from the development of major infrastructure (NSW Scientific Committee 2004).

It should be noted that a conservation outcome for this community may be achieved via the proposed reservation of the FWC within the land to the east of the alignment.

6.3.1 Significance within a local context

The KSSW community does not occur outside of the locality and hence KSSW has a very high level of significance within the local context. This is especially true given that it is the largest 'unbroken' stand of this community remaining.

LHSGIF occurs commonly within its range (from approximately Beresfield to west of Cessnock), although the stand through which the proposed road passes has been highly degraded and may not be of a high significance on local scale. This is supported by the incidence of this community within the locality in much less degraded states than that found within the study area.

The FWC is small in size, quite ephemeral, not frequented by water birds or a high number of amphibians and may not even represent a 'natural' wetland. As a result, this wetland is not considered to be of a high significance locally.

The conservation status of these communities within a local context is identical to that previously discussed in Section 6.3.

6.3.2 Discussion of corridor values

Kurri Sand Swamp Woodland

KSSW is naturally fragmented in its distribution. Of significance, the study area contains the largest known single (non-fragmented) occurrence of KSSW. Within the locality, KSSW is fragmented by a number of roads, trails, easements, and other forms of development, which impact on the vast majority of remnant patches of the community. Some of these areas could be feasibly restored to support KSSW if the required substrate and microclimatic conditions are present.

The proposal will result in the isolation of a small area of KSSW between the proposed road alignment and the township of Pelaw Main to the west. Approximately 39ha of KSSW would be isolated from the remainder of KSSW in the study area by the proposed road. A further small area (approximately 1ha) will be isolated between the road and LHSGIF along John Renshaw Drive. This represents 9.8% of the total amount of KSSW found within the study area.

The proposal is likely to exacerbate this degradation, although given the present state of much of the KSSW in that area, the impact of this further degradation is difficult to quantify, although given the noted significance of the study area patch, any further degradation could be considered detrimental to the status of the community on a broader scale. Furthermore, whilst the future status of KSSW to the east of the proposed alignment may be secure at this stage (given negotiations for conservation outcomes between landholders, DEC and the RTA), the future of the isolated KSSW to the west is uncertain.

In the context of the distribution of the community in the locality, large areas of KSSW occur immediately to the north of the study area. These patches then stretch further to the north of the township of Kurri Kurri. The connection of these patches to the study area is initially severed by John Renshaw Drive. Beyond this further fragmentation occurs mainly as a result of power easements and main roads. The alignment of the proposed extension to the F3

freeway is also likely to further fragment existing areas of this community. The construction of the proposed Pelaw Main By-pass will not exacerbate or contribute to the further fragmentation of this community on such areas external to the study area.

Lower Hunter Spotted Gum / Ironbark Forest

Throughout its distribution, LHSGIF occurs within large, relatively unfragmented parcels as well as within smaller, disjunct patches. Often roads and major powerline easements cause the greatest fragments of this community. Large, unbroken stands persist within areas such as State Forests, Werakata National Park, parts of the HEZ study area as well as large mining leases. The stands within the study area are relatively isolated from other patches, chiefly by Leggetts and John Renshaw Drives. The northern stand is particularly isolated and only a small area occurs across John Renshaw Drive. This stand should not be affected by the proposal.

The southern stand is separated from larger stands within the HEZ by Leggetts Drive. As the proposal is a continuation of the existing Spine Road to the HEZ, the proposed Pelaw Main By-pass will exacerbate fragmentation of LHSGIF within the locality. The road will effectively dissect this stand, resulting in two isolated stands of approximately 15ha in size. Given the highly degraded state of this stand at present, this isolation is considered to be significant to the overall status of the community.

Freshwater Wetland Complex

Freshwater wetlands are naturally isolated by virtue of their distribution. The proposal will not result in any fragmentation of this community, although it could affect flow paths of feeder creeks within its catchment. Appropriate flow regime management recommendations have been made within this report.

6.3.3 Key Threatening Processes

Table 6-2 provides a summary of potentially relevant Key Threatening Processes upon the three EEC's recorded within the study area.

Table 6-2 Summary of Effects of Key Threatening Processes Upon Endangered Ecological Communities

Key Threatening Processes	Comment
Clearing of Native Vegetation	In terms of the amount of each EEC to be removed, it is not considered that a significant amount of vegetation will be removed. However, given that the vegetation removal will occur within the largest known stand of KSSW, any level of clearing could be regarded as significant and as potentially triggering this KTP.
High frequency fire resulting in the disruption of life cycle processes in plants and animals and loss of vegetation structure and competition	It is not expected that this KTP will be caused or exacerbated by the proposal, particularly given the current fire regimes experienced and possible exposure of potential arsonists to the public and authorities.

Key Threatening Processes	Comment
Alteration to natural flow regimes of rivers and streams and their floodplains and wetlands	Creekline crossings should be designed to minimise any potential impacts to the natural flow regimes that may influence the water quality within the creeklines as well as areas downstream such as the Freshwater Wetland Complex EEC, and ultimately Wallis Creek. Given that appropriate measures are taken, it is not expected that this KTP will be caused or exacerbated by the proposal such that any of the EEC's will be affected to any great detriment.
Anthropogenic Climate Change	Technically, the proposal constitutes incremental contribution to this KTP, however it is considered negligible in large scale terms and should not significantly affect the various EEC's.
Bushrock Removal	No areas of bushrock occur within the study area and it is considered unlikely that the proposal will cause this KTP to affect any of the EEC's addressed.
Invasion of native plant communities by *Chrysanthemoides monilifera*	*Chrysanthemoides monilifera* (Bitou Bush) is essentially a coastal species that predominantly occurs on sand dunes. With no records of this species having been noted within the study area during fieldwork, it is unlikely that the proposal will cause this KTP to affect any of the EEC's addressed.
Predation by *Gambusia holbrooki* (Plague Minnow or Mosquito Fish)	No *Gambusia* is considered to be present on the study area and there are no areas where this species is likely to be found.
Competition and Grazing by the feral European Rabbit	Rabbits occur within the study area, however the proposed road is unlikely to directly or indirectly affect the numbers and distribution of this species. Therefore it is unlikely that the proposal will cause this KTP to affect KSSW.
Predation by the European Red Fox	Evidence of Foxes has been recorded within the study area. The construction of the road may serve to open up the study area more for predators such as Foxes. However, this is highly unlikely to impact upon the addressed EEC's.
Invasion of Native Plant Communities by Exotic Perennial Grasses	Some exotic grass species have been recorded within the study area, such as Kikuyu and Narrow-leaf Carpet Grass. However, more serious incursions were noted from invasive natives such as Blady Grass. It is not believed that the proposal will exacerbate any current incursions of introduced perennials, given that appropriate seeding of stabilisation areas (such as batters) takes place.
Removal of Dead Wood and Dead Trees	Very little dead wood or trees were noted along or adjacent to the proposed alignment, perhaps attributable to the high frequency burning that the study area appears to experience. Therefore, this KTP is not considered applicable to the proposal.
Invasion of native plants by *Phytophthora cinnamomi*	This widespread pathogen has not currently been confirmed to occur within the open forests or woodland around the Cessnock area. Assessing potential impacts from the proposed road are extremely difficult to quantify given the poor understanding of the pathogen and its management. Should the pathogen be identified in the region, then it is recommended that a national Threat Abatement Plan co-ordinate its management. Until such time, however, it cannot be seen as being applicable to this proposal.

6.4 Description of feasible alternatives

A description of any feasible alternatives to the action that are likely to be of lesser effect and the reasons justifying the carrying out of the action in the manner proposed, having regard to the biophysical, economic and social considerations and the principles of ecologically sustainable development (Section 110 (3) (e))

A 'Description of Feasible Alternatives' is covered in Section 5.6 and this assessment applies to Endangered Ecological Communities.