4.3 Results

4.3.1 Flora Survey

Throughout the study area, LHCCREMS mapping of community boundaries (NPWS 2000a; House 2003) was considered to be slightly inaccurate, therefore further ground truthing utilising Leica / Trimble GPS systems (accurate to within 1 metre) as well as aerial photograph interpretation was undertaken to accurately determine the distribution of vegetation communities within the defined study area, and particularly along the proposed road alignment. The distribution of vegetation communities within the study area is shown in Figure 4-3.

4.3.1.1 Flora Assemblages

Four main vegetation communities were delineated as occurring within the study area, namely Kurri Sand Swamp Woodland (KSSW), Lower Hunter Spotted Gum / Ironbark Forest (LHSGIF), Grey Gum / Scribbly Gum Open Forest (GGSGF) and Freshwater Wetland Complex (FWC). Some low-lying areas within the study area were also characterised by creekline associations, although the vegetation within these areas was not considered significantly different to those vegetation communities previously outlined such that they would warrant classification as distinct assemblages. Examples include the creekline proximate to Leggetts Drive in the north-western corner of the study area and a major drainage line in the south-eastern corner of the study area. These areas have been included within the KSSW assemblage, although some species present (or at least frequencies thereof) may not be truly indicative of the KSSW community. It should be noted that this community is highly variable in composition throughout its distribution, with up to ten (10) variants described (NPWS 2000; Bell 2004b). Indeed, up to five (5) distinct variants of KSSW were noted within the study area, although these have not been distinguished within mapping herein.

Cleared land has been mapped within various sections of the study area, most notable within a large paddock area just to the south of John Renshaw Drive in the north-western portion of the study area. Clearing in association with railway infrastructure has also modified / denuded areas of vegetation, particularly along the disused railway embankment. These areas have not been distinguished within vegetation mapping, which indicates the broad-scale distribution of communities in those areas, including vegetation that may be regenerating in those modified areas.

Refinement of the vegetation mapping previously delineated occurred in areas where the alignment traverses or comes into close proximity to significant vegetation communities. Two vegetation communities are traversed by the road alignment, being Kurri Sand Swamp Woodland and Lower Hunter Spotted Gum / Ironbark Forest. A section of cleared land is also within the footprint of the proposed road. This cleared land has not been identified / described as a distinct vegetation community.

***Kurri Sand Swamp Woodland (KSSW)*- MU 35 NPWS (2000a) (Endangered Ecological Community *TSC Act 1995*)**

KSSW was found to be the dominant community within the study area. The study area contains the largest mapped occurrence of this Endangered Ecological Community (EEC) (Biosis 2001).

The community was found to be dominated by trees with a canopy height of 10-12 metres and 15-30% canopy cover. The dominant canopy species included *Eucalyptus parramattensis* ssp. *decadens, E. agglomerata* (Blue-leaved Stringybark) and *Angophora bakeri*, with several other Eucalypt species, such as *E. fibrosa* (Broad-leaved Ironbark). The latter two of these occurred less frequently / sporadically. In some areas, the canopy was dominated by *E. signata* (Scribbly Gum) whereas *E. sparsifolia* (Narrow-leaved Stringybark) was recorded in some parts of this community.

The KSSW community is typified by a diverse understorey, and a number of species were recorded including *Banksia spinulosa* var. *collina* (Hill Banksia), *Lambertia formosa* (Mountain Devils) *Leptospermum* spp., *Hakea* spp., *Dillwynia retorta* (Heathy Parrot Pea), *Xanthorrhoea glauca* ssp. *glauca* (Grass Tree), *Isopogon anemonifolius* (Drumsticks), *Ptilothrix deusta* and *Themeda australis* (Kangaroo Grass).

As aforementioned, this community is variable throughout its distribution, and the study area patch is no exception to this, with a number of notable local variations recorded. This inconsistency appears to be dependent on a number of variables including soil type and profile, disturbance history and fire regime. Within the study area a large amount of variability also was noted. For example, in a small area of KSSW north of the wetland, *Allocasuarina littoralis* (Black She-oak) occurs as the dominant canopy / sub-canopy species and some areas were typified by pure stands of Stringybark species with very little to no shrub layer.

A small wetland (less than a 0.5ha in size) was also located within the central part of KSSW. This smaller wetland was fringed by KSSW vegetation, predominantly *Melaleuca* spp. (Paperbarks). Due to the small size of this wetland and the lack of a distinct array of flora species, this area has not been recognised as a separate vegetation assemblage for mapping purposes.

***Lower Hunter Spotted Gum / Ironbark Forest (LHSGIF)* – MU17 NPWS (2000a) (Endangered Ecological Community *TSC Act 1995*)**

This community occurred along the higher slopes and ridges within the north-west and west-south-west sections of the study area. The community occurred as open forest with a canopy height of 15-20 metres and 30-50% cover. The dominant canopy species included *Corymbia maculata* (Spotted Gum), *Eucalyptus fibrosa* (Broad-leaved Ironbark) and *E. punctata* (Grey Gum).

The understorey was 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).

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

PELAW MAIN

PROPOSED ROAD ALIGNMENT

Wallis Creek

HEZ Spine Road (formed)

LEGGETTS DRIVE

N

KEY

Pelaw Main By-pass

Pelaw Main By-pass Study Area

Vegetation Communities

Cleared Areas

Freshwater Wetland Complex

Grey Gum / Scribbly Gum Forest

Kurri Sand Swamp Woodland

Lower Hunter Spotted Gum / Ironbark Forest

0 200 400 600 800 1000 m

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NOTES:

Hunter Economic Zone

SCALE: 1: 12000 at A3 Size

DATE: 11/11/2005

DRAWN: S. WATSON

PROJECTION: MGA Zone 56 (GDA 94)

SPECIES IMPACT STATEMENT
PELAW MAIN BY-PASS

FIGURE 4-3

VEGETATION COMMUNITIES WITHIN THE STUDY AREA (SHOWING ROAD ALIGNMENT)

LAYOUT REF: H:\HEZ\MAPINFO\20675 LINK - ROAD\2005 SIS NEW ALIGNMENT DOCUMENT FIGURES\20675-FIG 4-3 VEGETATION COMMUNITIES-A-A3.WOR

JOB REF: 20675

***Grey Gum / Scribbly Gum Open Forest (GGSGF)* – No LHCCREMS Equivalent Community**

This community occurred as an isolated patch (approximately 12ha in size) and was restricted to the south-eastern corner of the study area, surrounded by KSSW. The dominant tree species were *E. punctata* (Grey Gum) and *E. signata* (Scribbly Gum), with occasional scattered *E. fibrosa* (Broad-leaved Ironbark). These trees were found to grow significantly taller than the surrounding KSSW, growing to 20m.

There was some crossover in lower strata species composition between this community and the KSSW, evidenced by species such as *Hakea sericea* (Bushy Needlebush) and *Banksia spinulosa* var. *collina* (Hill Banksia). However, many species recorded within this community were not located within the KSSW such as *Acacia suaveolens* (Sweet-scented Wattle) and *A. falcata.* The groundcover layer included native species such as *Themeda australis* (Kangaroo Grass) and *Pratia purpurascens* (White Root) and introduced species such as *Axonopus affinus* (Narrowleaf Carpet Grass) and *Hypochoeris radicata* (Catsear).

No equivalent community as defined under LHCCREMS mapping (NPWS 2000a; House 2003) can easily be established for this community.

***Freshwater Wetland Complex* – MU46 NPWS (2000a) (Endangered Ecological Community *TSC Act 1995*)**

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.

Some smaller wetland areas (less than a 0.5ha in size) were also located in two other locations, although they have not been recognised as a separate vegetation assemblages for mapping or assessment purposes due to a lack of distinctive vegetation therein.

4.3.1.2 Conservation Status of Vegetation Communities

Kurri Sand Swamp Woodland **LHCCREMS Map Unit - MU 35**

KSSW is listed as an Endangered Ecological Community under Part 3 Schedule 1 of the *TSC Act 1995.* The total known extent of this community 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), the remainder primarily being located on private or crown lands (such as that found on the subject study area).

With the 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.

Threatened species such as *E. p*. *decadens, A. bynoeana* and *G. p. parviflora* have been recorded within KSSW. Several other regionally significant and/or ROTAP listed plant species also occur within this community.

A Recovery Plan for this community is currently in production, which includes a detailed review of its status / ecology / distribution within the area. A draft document is expected to be produced by the KSSW Recovery Team and ready for public comment in early 2006 (T. Hogbin pers. comm.).

Further detailed information regarding KSSW is provided in Section 4.4.3 and Chapter 6.

Lower Hunter Spotted Gum / Ironbark Forest LHCCREMS Map Unit - MU 17

LHSGIF is listed as an Endangered Ecological Community under Part 3 Schedule 1 of the *TSC Act 1995.* 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 Hunter Economic Zone (HEZ), 461.4ha of LHSGIF is reserved within the 7(b) conservation zone. Options for achieving a greater conservation outcome for LHSGIF are discussed later in Section 6.3.

A total of 67.2ha occurs within the study area, or 0.2% of the total estimated community area. The proposed Pelaw Main By-pass would result in the direct impact upon approximately 5.4ha or 0.017% of the total estimated community area. This is not considered to be a substantial component of the remnant area comprising this community and should not have any significantly deleterious effects upon neither the local stand of the community nor the remainder of the community throughout its distribution.

Threatened species such as *G. p. parviflora, Rutidosis heterogama* and *Callistemon linearifolius* have been recorded within LHSGIF. Several other regionally significant and/or ROTAP listed plant species also occur within this community.

Grey Gum / Scribbly Gum Open Forest No LHCCREMS Map Unit Equivalent

Determining the conservation status of this community is problematic, given that no corresponding community under the LHCCREMS mapping criteria (NPWS 2000a; House 2003) can be noted. However, it could be stated that, given the lack of documentation regarding this community, that it is probably not well represented within the conservation reserve system. It should be noted that this community will not be directly affected by the proposed road and is a considerable distance from the proposed corridor.

Freshwater Wetland Complex **LHCCREMS Map Unit - MU 46**

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 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, Wyrrabolong, 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. State Environmental Planning Policy (SEPP) 14 protects some Freshwater Wetlands on Coastal Floodplains, although this has not always precluded impacts on wetlands from the development of major infrastructure (NSW Scientific Committee 2004).

4.3.1.3 Threatened / Significant Flora Species

Four (4) threatened flora species have been identified within the study area, namely *Acacia bynoeana, Eucalyptus parramattensis* ssp. *decadens, E. glaucina* and *Grevillea parviflora* ssp. *parviflora.* A brief discussion of these species is provided below, whilst more specific details concerning the occurrence of *G. p. parviflora* and *E. p. decadens* and are provided in Sections 4.4.2 and 4.4.3 respectively. Two (2) other threatened flora species could potentially occur within the study area, being *Rutidosis heterogama* and *Callistemon linearifolius.*

Acacia bynoeana* - 'Endangered' *TSC Act 1995* and 'Vulnerable' *EPBC Act 1999

A. bynoeana was recorded from a small number of plants along the proposed alignment and the associated buffer zone. It was also recorded near the southern boundary of the study area within KSSW. It has also been recorded on the HEZ lands immediately adjacent to the south-west corner of the study area within similar habitat.

In the vicinity of the proposed alignment, eleven (11) plants have been recorded from an area of less than 600m^2. A further three (3) specimens have been recorded approximately 110m north-west of these plants, being about 35m from the alignment. No further specimens could be located in this area despite thorough searches, although it is possible that a small number may have gone undetected. In the southern end of the study area, two stands of the species have been recorded, containing approximately thirty (30) and twenty (20) specimens respectively. It is probable that more individuals occur in these parts of the study area, although approximating numbers is a difficult and time-consuming exercise. It can be reasonably assumed that should other plants occur, they would do so in relatively low numbers.

Due to the cryptic nature of this species, it is possible that it occurs within other areas of KSSW throughout the study area, despite searches undertaken in several parts thereof. Within the locality, this species appears to occur in small, patchily distributed areas where appropriate conditions exist (authors, pers. obs.). As such, it could easily remain undetected in small, isolated pockets of the study area that have not been subject to rigorous searches.

The location of *A. bynoeana* along or near the proposed alignment is shown in Figure 4-4, whilst the remainder of *A. bynoeana* within the study area is shown in Figure 4-5.

Eucalyptus parramattensis* ssp. *decadens* – 'Vulnerable' *TSC Act 1995* and *EPBC Act 1999

E. p. *decadens* was found to occur as a dominant or co-dominant canopy species within the KSSW community. Several sporadic occurrences were also noted within transitional zones between the KSSW and LHSGIF communities. This species was recorded along the proposed road alignment and further detailed information is provided in Section 4.4.3 of this report.

Grevillea parviflora* ssp. *parviflora* – 'Vulnerable' *TSC Act 1995* and *EPBC Act 1999

G. p. *parviflora* was found to occur as a common to abundant understorey species over the majority of the study area, with the only clearly absent patches being within cleared areas and some areas of LHSGIF.

This species appears to achieve the highest densities within KSSW and ecotonal areas. Within the LHSGIF community this species has a more sporadic occurrence, being absent from an understorey containing dense thickets of *Melaleuca nodosa* and regenerating / juvenile Broad-leaved Ironbarks. However, in those areas within the LHSGIF where this species occurred, it usually was found to be quite dense, perhaps owing to the shallow soils and rhizomatous nature of the species. This species was recorded along the proposed road alignment and further detailed information is provided in Section 4.4.1 of this report.

Eucalyptus glaucina* – 'Vulnerable' *TSC Act 1995* and *EPBC Act 1999

Trees identified as being either specimens of *E. glaucina* or as trees containing *E. glaucina* genes were recorded close to the south-eastern corner of the study area. Here, seventeen (17) mature or semi-mature specimens were located in a 0.65ha area surrounding the disused railway verge. A similar number of juvenile trees were also recorded therein. Each of these trees (with the exception two individuals) were located in the immediate vicinity of the railway verge, and all trees were found within previously cleared / highly modified land. It is unclear whether these trees would have occurred in this area naturally, although three (3) of the trees were found to be quite mature.

Some quite large stumps were also located in this general location and it appears that the area is maintained for maintenance of underground telecommunication cables. Although the area from which these trees were recorded is quite disturbed, KSSW, and species typical to this community, exists in the immediate surrounds. Interestingly, LHCCREMS mapping shows Hunter Lowland Redgum Forest (HLRF) as occurring in this part of the study area. It is perhaps possible that this community may have existed historically in this area, although the KSSW community (or at least pioneer species within that community) have established in the area.

Notwithstanding, detailed searches along the proposed alignment failed to reveal any sign of this species.

The location of *E. glaucina* within the study area is shown in Figure 4-5.

WARNING

Note that this 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.

Point locations for *A. bynoeana* plants have been recorded using GPS-accurate data only and have not been subject to detailed survey.

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

PELAW MAIN

N

Wallis Creek

HEZ Hunter Economic Zone

Removed or Affected
Acacia bynoeana

- Removed Plants (5)
- Directly Affected Plants (6)
- Potentially Affected Plants (3)

EXPANDED VIEW - SCALE 1:2000

LEGGETTS DRIVE

Acacia byneoana

- Acacia byneoana Record
- Pelaw Main By-pass
- Pelaw Main By-pass Impact Zone (25m buffer)
- Pelaw Main By-pass Study Area

Vegetation Communities

- Grey Gum / Scribbly Gum Forest
- Lower Hunter Spotted Gum / Ironbark Forest
- Freshwater Wetland Complex
- Kurri Sand Swamp Woodland
- Cleared Areas

0 200 400 600 800 1000 m

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NOTES:

HEZ Hunter Economic Zone

SCALE: 1: 12000 at A3 Size

DATE: 11/11/2005

DRAWN: S. WATSON

PROJECTION: MGA Zone 56 (GDA 94)

SPECIES IMPACT STATEMENT
PELAW MAIN BY-PASS

FIGURE 4-4

DISTRIBUTION OF ACACIA BYNOEANA ALONG OR ADJACENT TO THE ROAD ALIGNMENT

LAYOUT REF: H:\HEZ\MAPINFO\20675 LINK - ROAD\2005 SIS NEW ALIGNMENT DOCUMENT FIGURES\20675-FIG 4-4 ACACIA BYNOEANA-A-A3.WOR

JOB REF: **20675**