5.1.6 Existing social environment

The proposed SWRL traverses parts of the Liverpool, Campbelltown and Camden local government areas (LGAs) located in Sydney's South West region. These three LGAs are profiled below, based on Australian Bureau of Statistics 2001 Census Data and the Liverpool, Campbelltown and Camden Council Social Plans.

'Primary communities' are defined as those communities directly affected by a project and located within the potential zone of affectation. For the purposes of the social assessment, primary communities were assumed to be those located within 500 metres of the proposed SWRL corridor. Secondary communities are defined as those communities located between 500 metres and 2.5 kilometres from the proposed SWRL corridor.

A brief profile of each of the LGAs crossed by the SWRL corridor and the primary and secondary communities that surround the corridor is given below. Key social services and infrastructure in the areas are also outlined. A more detailed description is provided in Technical Paper 8 – Social Assessment.

Regional characteristics

The South West region, along with Sydney City, North West and Central Coast, has shown one of the largest increases in population between 1991 and 2004 and a growth rate of 2.5 % (Transport and Population Data Centre, TPDC, 2006). The South West region is expected to continue this high population rate increase over the next 30 years.

The South West region has one of the highest rates of private vehicle ownership in Sydney and the region was recorded to have the highest use of private vehicles in Sydney, with 55% as a vehicle driver and 24% as a vehicle passenger. The greatest purpose for travel in the region is for work related trips (26%), which is comparable with other regions of Sydney. Residents in the South West of Sydney are also recorded as having the longest commute (on average) and travel longer distances (on average) each weekday compared to those residing in Sydney City.

LGA characteristics

Liverpool LGA

The Liverpool LGA is characterised by diverse land uses, including residential suburbs, and rural, industrial and commercial areas. The major facilities of the LGA relate to military purposes (in the Holsworthy-Moorebank area), open space (parks and reserves), leisure activities (sporting facilities and shopping areas), cultural activities (the Powerhouse Regional Arts Centre) and health and education services (including Liverpool Hospital and the South Western Sydney Institute of TAFE).

The provision of new transport infrastructure and new residential areas have been important factors in development within the LGA, which saw the population undergo the largest increase in NSW between 1991 and 2001. The population of the LGA was 153,633 in 2001, with a high proportion of young families and children. The population is also culturally diverse, with a high proportion of residents from a non-English speaking background (the main non-English languages spoken at home are Arabic, Italian and Vietnamese). Employment rates in the LGA increased slightly from 1996 to 2001, attributable to the steady growth of the population and the influx of young families. Liverpool is identified as a 'Regional City' under the Sydney Metropolitan Strategy. The social implications of this are described in Section 5.3.6.

Campbelltown LGA

The Campbelltown LGA contains a number of rural-residential areas, the large undeveloped area of Holsworthy Military Reserve (owned by the Department of Defence) and a large industrial area in Minto. The major facilities of the LGA relate to leisure activities (sporting facilities and shopping centres) and education facilities (including Hurlstone Agricultural High School, the University of Western Sydney and Campbelltown College) and the Macarthur regional shopping centre. The area has been identified as a Regional Centre under the Sydney Metropolitan Strategy. The LGA had a total population of 145,294 persons at the 2001 Census, a large part of which (25.1%), fell into the 5 to 17 and 35 to 49 years of age categories, indicating a high presence of families. This LGA is less culturally diverse than Liverpool (and the Sydney Statistical Division), with almost three quarters of the population speaking English as the main language at home.

Statistics for this LGA indicate a heavy reliance on private vehicles and a drop in the number of train and bus users, suggesting that the availability of, and access to, public transport in the LGA is an issue.

Camden LGA

The Camden LGA is characterised by a mixture of established suburbs and new residential areas. The LGA comprises a significant rural landscape, which forms a large part of its community character. The major features of the area relate predominantly to open space and outdoor activities, including gardens, parks and reserves and educational facilities, including a campus of the University of Sydney and schools. The LGA had a total population of 43,779 persons at the 2001 Census, a large part of which (39.9%), falls within the 25 to 49 year age group. The population of Camden LGA is homogenous in character with lower cultural diversity than the Liverpool and Campbelltown LGAs. A drop in unemployment rates from 1996 to 2001, coupled with the increase in vocational qualifications attained within the population, indicates an increase in socio-economic status in the LGA over this period.

Primary communities along the SWRL corridor

Primary communities along the SWRL corridor are profiled briefly in Table 5-8 below.

Table 5-8 Primary community profiles

Community	LGA	Profile
Parts of Glenfield	Campbelltown	Older, established suburb (20-30 year old houses) characterised by private businesses next to the Station. Predominantly residential, with special uses, such as Hurlstone Agricultural High School, adjacent to the proposed SWRL corridor.
Bardia Village	Campbelltown	An older more established area, the village is part of the Ingleburn Military Precinct, but is no longer used for military purposes. The land is still Commonwealth owned.
Edmondson Park	Liverpool	Characterised by rural-residential development and the former Ingleburn Army Camp in the southern part of the release area. However, residential development is commencing with the Ingleburn Gardens the first residential development underway.
Denham Court	Liverpool and Campbelltown	Characterised by large houses on large parcels of land. The suburb has one of the highest property values within the LGA (Australian Property Monitors 2006).

Community	LGA	Profile
Horningsea Park	Liverpool	A relatively new residential area that mostly comprises young families. The recent opening of the two local schools has strengthened local community ties.
Leppington	Liverpool, Camden and Campbelltown	Predominantly private rural-residential dwellings with some market gardens. Residences mainly comprise large houses on large parcels of land. 2001 Census data indicates that a large proportion is occupied by couples without children. The market gardens have a high population of people from non-English speaking backgrounds (mainly Chinese, Vietnamese and Maltese).
Rossmore	Liverpool and Camden	Characterised by low density housing within a predominantly rural/semi-rural setting. The suburb has experienced steady population growth in recent years. The population has a high number of couples without children.

Secondary communities

Secondary communities along the SWRL corridor are profiled briefly in Table 5-9 below.

Table 5-9 Secondary community profiles

Community	LGA	Profile
Holsworthy	Liverpool	A distinctive area with major military land use based features. The area has experienced significant population growth from 1996 to 2001.
Prestons, West Hoxton and Casula	Liverpool	Significant population growth from 1996 to 2001, comprising mostly young families and first home buyers.
Austral	Liverpool	Significant population growth from 1996 to 2001.
Macquarie Fields and Varroville	Campbelltown	Includes medium to high* density, established residential dwellings and community facilities around the existing rail corridor. Primarily based on five public housing estates with high levels of socio-economic disadvantage. Steady population growth has resulted from the opening of the Macquarie Links golf course and associated estates.
Catherine Field and Oran Park	Camden	Characterised by low* density housing mainly located in rural and semi-rural areas. These areas have experienced steady growth in recent years predominantly through young families (Oran Park) and couples without children (Catherine Field).

Note: Low density - detached dwellings; Medium density - attached dwellings (e.g. townhouses) and low-rise apartment buildings; High density - high-rise apartment buildings

Social services and infrastructure

The key existing community services and infrastructure that lie within the primary and secondary communities along the proposed SWRL corridor are detailed in Appendix A to Technical Paper 8.

The existing services and infrastructure mirror the social profiles of the various communities. The population of the Liverpool LGA is characterised by young families, which is reflected in the large number of education facilities, community services and infrastructure in the LGA. Examples of such facilities include a bowling club, community progress halls and centres in Austral and Horningsea Park respectively. The large number of open space areas in the Liverpool LGA also reflects the predominance of young families in the area.

The population of the Campbelltown LGA has a high number of children in the 5-11 years age group, which is reflected in the significant number of educational facilities, and large amounts of open space in the LGA. The large proportion of the Campbelltown LGA population that comprises families is also reflected in the presence of these and numerous other community facilities. There is an existing heavy reliance of the existing population of this LGA on private cars raises questions regarding the availability of public transport services and options to access these existing facilities.

The rural landscape of the Camden LGA is supported by the presence of major features such as Belgenny Farm, the Mount Annan Botanic Garden, the Camden Bicentennial Equestrian Park and the Nepean River. The small number of schools and infrastructure within the LGA reflects the social profile of the LGA.

Potential impacts of the SWRL on the above existing social conditions are described in Chapter 17 (Social Assessment).

5.1.7 Existing economic profile

Economic and business indicators in South West Sydney

The region of South West Sydney that comprises the LGAs of Liverpool, Campbelltown, Camden and Wollondilly, is a fast growing area that has made substantial economic progress in recent decades. There are three key economic indicators that highlight the economic progress this region has made prior to the proposed development of the South West Growth Centre:

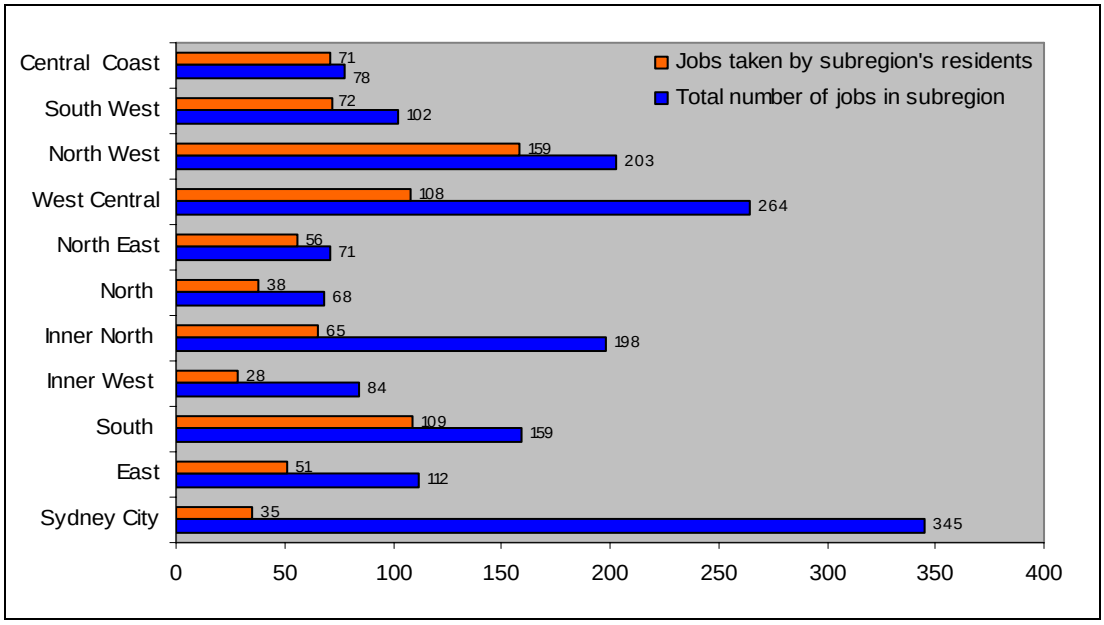
- The *gross regional product (GRP)* of greater western Sydney, which is part of South West Sydney, was estimated to be $71.5 billion in 2004–05 (GWS 2006). This is a significant amount, considering that greater western Sydney's GRP accounts for 40 % of Sydney's and 26 % of NSW's total GRP.
- *Incomes* in greater western Sydney are among the highest in NSW and across other Australian States. With the exception of Sydney, greater western Sydney has the second highest weekly individual and household incomes ahead of the Hunter and Illawarra in NSW, Melbourne, South East Queensland and North Adelaide (ABS 2001 Census cited in Greater Western Sydney Economic Development Board 2006).
- *Employment* in the South West region makes up a small proportion of jobs compared to other regions in Sydney, despite its significant contribution to the GRP of greater western Sydney (see Table 5-10). The South West region also has one of the highest percentage rates of jobs taken by its own residents. That is, 71 % of all jobs in the South West are undertaken by the local population, implying that a large proportion of local and regional economic activity is contained in the South West region (see also Figure 5-6). However, less than half of the workforce in the South West resides and works within the sub-region. The region has a low level of employment self-containment, with more people than jobs.

Table 5-10 Distribution of jobs and workforce by region

	Number of Jobs (000's)	Number of Jobs %	Total Workforce (000's)	Total Workforce %	% jobs in the sub-region taken by its residents	% of workforce that live and work within the sub-region
Sydney City	345	20.5%	59	3.3%	10.1%	58.9%
East	112	6.6%	130	7.2%	45.5%	39.1%
South	159	9.5%	284	15.8%	68.6%	38.5%
Inner West	84	5.0%	108	6.0%	33.8%	26.2%
Inner North	198	11.7%	145	8.0%	32.8%	44.8%
North	68	4.0%	118	6.6%	56.0%	32.2%
North East	71	4.2%	112	6.2%	78.9%	49.9%
West Central	264	15.7%	246	13.6%	40.9%	44.0%
North West	203	12.1%	326	18.1%	78.2%	48.8%
South West	102	6.1%	164	9.1%	70.8%	44.1%
Central Coast	78	4.6%	110	6.1%	90.8%	64.3%
Sydney SD	1684	100%	1802	100%	96.7%	90.3%

Note: SD refers to Statistical Division

Source: ABS 2001, Transport and Population Data Centre Trans Figures (TPDC, June 2006)



Source: Transport and Population Data Centre Trans Figures (TPDC, June 2006)

Figure 5-6 Distribution of jobs by Sydney region

The following indicators highlight the growth, concentration, competitiveness and industrial park size of businesses in South West Sydney:

- *business growth*: The number of business entities operating in South West Sydney has grown significantly in the past 3 years. The June 2004 ABS Business Register identified 37,772 businesses entities operating in South West Sydney (excluding Wollondilly). This compares to 27,173 registered businesses entities in 2001, representing an average growth of 39% over three years. Of these businesses, Liverpool had the largest number of businesses operating in South West Sydney (20,690), followed by Camden (8,869) and Campbelltown (8,213). The largest growth was experienced in Camden (45%), followed by Liverpool (40%), and Campbelltown (32%).

- *business concentration:* On average, the largest concentration of businesses can be found in construction (25.6%), property and business (20.7%), retail trade (9.7%), wholesale trade (9%), and finance and insurance (7.3%) (ABS Business Register 2004).
- *business competitiveness:* According to the Property Council of Australia's Cyberstats, South West Sydney provides the most competitive industrial rental rate of all the regions in Sydney. Primary and secondary rents in South West Sydney are $100 and $75 square metres per year respectively. This is $10 and $5 square metres per year lower than the second lowest industrial rental region, which is Outer Western Sydney (Property Council of Australia Cyberstats cited in Greater Western Sydney Economic Development Board 2006, p. 20).
- *business/industrial parks:* South West Sydney has 15 business parks, comprising approximately 1,687 hectares of land. This area is substantial, considering that it accounts for more than 21% of all business park areas in greater western Sydney (Greater Western Sydney Economic Development Board 2006, p. 18-19).
- *corporates:* Examples of major corporates in South West Sydney (including Campbelltown, Camden, Liverpool and Wollondilly, unless otherwise stated) include BHP Billiton, Coca Cola Amatil, Kimberley Clark Australia, and Cadbury Schweppes (Greater Western Sydney Economic Development Board 2006, p. 20-21).

Businesses in the vicinity of the SWRL

Businesses, including rural businesses, in the vicinity of the proposed SWRL are described in detail in Chapter 18 (Economic and business impacts). Businesses include retail and other small businesses in the Glenfield town centre, Glenquarie shopping centre, Leppington shopping centre, several other retail/service centres, service stations, the Austral shopping strip, Rossmore shops and rural businesses (primarily market gardens).

Impacts on the above existing businesses and economic conditions are described in Chapter 18 (Economic and Business Impacts).

5.2 Existing biophysical environment

5.2.1 Biodiversity

Technical Paper 3 – Biodiversity Assessment, in Volume 2 of this report, provides a detailed description of existing biodiversity along the SWRL corridor alignment. Key findings are summarised in this Section.

The proposed alignment of the SWRL corridor traverses numerous lots with a variety of land uses. The remnant vegetation and fauna habitats along the corridor alignment have, therefore, been exposed to a range of past impacts and levels of disturbance.

Existing biodiversity along the SWRL corridor alignment was determined based on database searches, review of background reports and field surveys across the study area in July 2006. The *Final Native Vegetation Mapping of the Cumberland Plain, Western Sydney* (National Parks and Wildlife Service 2002b) was 'ground-truthed' during the field survey and vegetation communities were classified in accordance with identified conservation significance classes. Species of plant were assessed and recorded using a random meander technique. The fauna survey was based primarily on the habitats present, with

species recorded opportunistically. The surveys were undertaken in winter, which has low animal activity and is not the peak flowering season of threatened species considered most likely to occur in the area. For this reason, further targeted surveys are proposed as part of additional assessments to be undertaken.

Vegetation communities

Vegetation communities along the SWRL corridor alignment are mapped in Figure 5-7.

Three native vegetation communities have been mapped along the proposed SWRL alignment (NSW National Parks and Wildlife Service 2002a): the Shale Hills Woodland and Shale Plains Woodland sub-units of the Cumberland Plains Woodland; and the Alluvial Woodland sub-unit of the Sydney Coastal River Flat Forest.

The remaining areas of the SWRL corridor alignment are areas mapped (by National Parks and Wildlife Service, 2002a) as 'No native vegetation overstorey'. These areas comprise grassland dominated by native and or exotic species, cleared paddocks, market gardens, roads, industrial and residential areas.

Shale Plains Woodland, also a sub-unit of Cumberland Plain Woodland, is the most abundant vegetation community within the study area. This sub-unit occurs along the entire length of the proposed SWRL corridor, with the exception of the gentle ridge between West Hoxton and Denham Court (where Shale Hills Woodland occurs) and at drainage lines (where Sydney Coastal River Flat Forest occurs). The remnants of Shale Plains Woodland in the study area are dominated by *Eucalyptus moluccana* and *E. tereticornis*, and regularly co-dominated by *E. crebra, E. eugenoides* or *Corymbia maculata* and vary in condition from poor to good.

The Shale Hills Woodland remnants are all in poor conditions as a result of grazing and other land uses. They comprise isolated patches of *Eucalyptus tereticornis* and/or *Eucalyptus molucanna*, with a depauperate or weed dominated understorey.

Sydney Coastal River Flat Forest (Alluvial Woodland) occurs exclusively in association with drainage lines and is known to be most commonly associated with recent alluvial deposition (National Parks and Wildlife Service, 2002a).

The condition of the surveyed vegetation community remnants varies throughout the study area as a result of the diversity in land uses and management practices. Appendix B of Technical Paper 3 (in Volume 2 of this report) summarises the vegetation condition of each of the surveyed reference remnants in the study area. The majority of the surveyed remnants are in poor condition as a result of land clearing, grazing or other agricultural practices. In such areas, the remnants generally comprise one or two canopy species with no native understorey or groundcover. The remnants that are in good condition are those where grazing and other practices were either never carried out, or have been excluded for a long period of time.

Species of plant

A total of 84 plant species was recorded amongst the native vegetation remnants within the study area, of which 54 (64%) were native (see Appendix C of Technical Paper 3). Seven of the species present are listed as noxious weed species under the *Noxious Weeds Act 1993* (see Table 3-1 in Technical Paper 3).

Fauna habitats

Figure 5-8 shows the fauna habitat classes identified along the SWRL corridor.

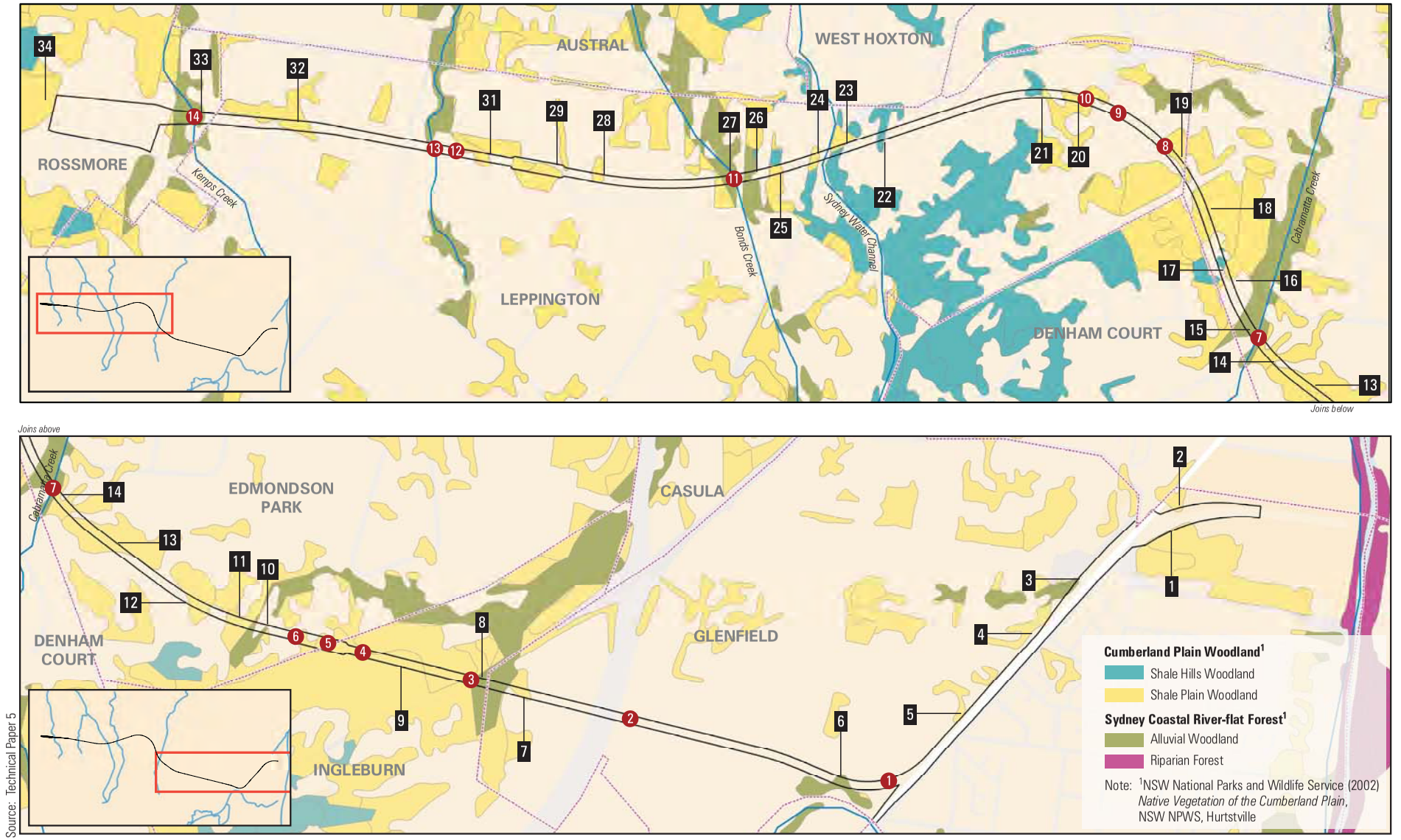
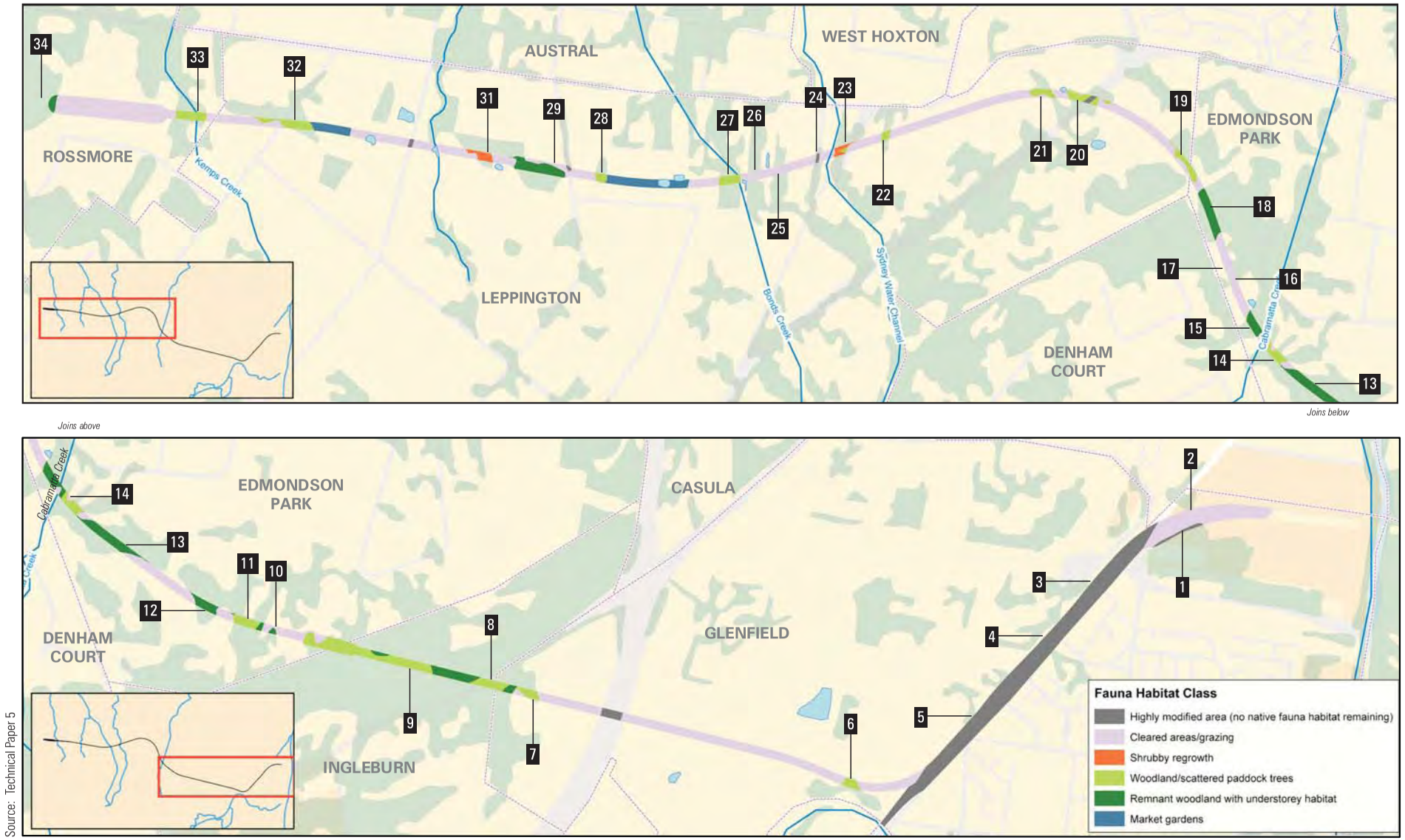


Figure 5-7 Vegetation communities and creek crossings along the SWRL corridor



Source: Technical Paper 5

Figure 5-8 Fauna habitats along the SWRL corridor

The suitability, size and configuration of fauna habitats correlated broadly with the structure, floristics, connectivity and quality of the local and regional vegetation types described above. Some riparian habitats are present within farm dams and tributaries of Cabramatta and Kemps Creek, as well as other unnamed drainage lines that form part of the Georges River catchment.

Six terrestrial fauna habitat classes occur within the study area:

- highly modified areas, where all remnant fauna habitat has been removed and marginal foraging areas are in poor condition
- cleared areas (the most abundant fauna habitat class), which comprise mainly introduced or native grasses and marginal foraging areas in poor condition
- areas of shrubby regrowth, comprising mainly weed species, with some areas dominated by native species, but with faunal habitats in generally poor condition
- areas of modified woodland, which generally lack understorey habitats and habitats are generally in poor condition
- remnant woodland habitats, which consist of a mosaic of trees in two age classes in generally good condition, and providing a variety of microhabitat features and refuge for native species amongst the surrounding modified landscape.

Riparian and aquatic habitats along the proposed SWRL route include ephemeral streams within roadside drainage gullies, culverts, man-made waterways, farm dams on rural residential properties and main creek lines. These habitats are highly disturbed and subject to pollution from surrounding urban environments and land use practices, resulting in poor water quality.

Riparian habitats include both introduced weeds and native species, including *Phragmites* and *Typha* species. There are numerous barriers to fish migration within the site and surrounding study area, which are likely to have reduced species richness and abundance. Species diversity would also be negatively influenced by the introduced predatory Mosquito Fish (*Gambusia holbrooki*), which have been recorded previously in most of the creek systems (Department of Environment and Conservation 2006a; Harris, J.H. and Gehrke 1997). In general, the catchments and creeks within the study area are highly degraded.

Further details on aquatic and riparian habitats are provided in Section 3.4.3 of Technical Paper 3.

Species of animal

A total of 38 native fauna species were recorded in the study area during field surveys, comprising two invertebrates, two reptiles, one amphibian, 32 birds and one mammal species. In addition, four introduced mammal species were recorded. A full list of fauna species recorded is included in Appendix D of Technical Paper 3. No threatened species was recorded during the current survey.

Corridors and connectivity

A regional habitat corridor was identified by Eco Logical Pty Ltd (2003a) between Camden Valley Way (Cabramatta Creek) and Campbelltown Road, which includes some patches of remnant vegetation. Riparian habitats along the proposed SWRL corridor, including alluvial woodland, provide marginal habitat connectivity with the surrounding fragmented and disturbed habitats in the local area. In general, vegetation within a 10 kilometre radius of the study area, and much of the Cumberland Plain, is highly fragmented. Although this

vegetation may function as part of a wider local and regional corridor system, the vegetation does not form part of a clearly defined wildlife corridor between larger areas of wildlife habitat.

Conservation reserves

The proposed SWRL corridor does not traverse any of the three Environment Conservation Zones identified in State Environmental Planning Policy (Sydney Region Growth Centres) 2006. It does, however, traverse areas identified as 'Flood prone and major creeks land' (site survey remnants 26 and 27). These areas are subject to the development controls of Part 6 of the SEPP concerning vegetation, which also applies to land zoned as Environment Conservation under the SEPP.

The proposed SWRL corridor also traverses an area identified as Habitat Corridor and Park Areas in Precinct 9 - Hoxton Park Ridge identified in the Sydney Regional Environmental Plan (SREP) No 31 - Regional Parklands (site survey remnants 19 to 23 between the intersection of Bringelly and Cowpasture Roads at Leppington). Areas adjacent to the proposed SWRL have been zoned for conservation within the Edmondson Park area (as shown on Figure 3-3).

Species, populations and communities of conservation concern

Threatened ecological communities

Threatened ecological communities are listed under Schedule 1 of the *Threatened Species Conservation Act 1995* and the *Environment Protection and Biodiversity Conservation Act 1999*. All of the remnant vegetation communities identified within the study area are threatened ecological communities.

Shale Hills Woodland and Shale Plains Woodland are both sub-units of Cumberland Plain Woodland, which is listed as endangered under the *Threatened Species Conservation Act 1995* and *Environment Protection and Biodiversity Conservation Act 1999*. The occurrence of Cumberland Plain Woodland at the site gives the site national and state conservation significance.

Approximately 0.73 hectares of Shale Hills Woodland occurs within the study area (over four survey reference remnants). Shale Plains Woodland is the most abundant threatened ecological community within the study area, occupying a total of 11.78 hectares over 23 reference remnants.

Sydney Coastal River Flat Forest – Alluvial Woodland forms part of River Flat Eucalypt Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions, which is listed as endangered under the *Threatened Species Conservation Act 1995*. Approximately 3.87 hectares of this community occurs within the study area, over seven drainage lines that would be traversed by the project (seven reference remnants).

Endangered populations

The *Marsdenia viridiflora* R. Br subspecies *viridiflora* population in the Bankstown, Blacktown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and Penrith LGAs is the only threatened population listed under the *Threatened Species Conservation Act 1995* within the Liverpool LGA. No previous records of this species along the proposed SWRL route were identified and it was not observed in any of the remnants within the study area during field surveys.

Threatened species of plant

Twenty-seven threatened species of plant (listed under the *Threatened Species Conservation Act 1995*) were identified from database searches as potentially occurring within the study area. Fourteen of these species are also listed under the *Environment Protection and Biodiversity Conservation Act 1999.* However, suitable habitat was recorded only for *Acacia pubescens*, *Pultenaea pedunculata* and *Pimelea spicata*. *Acacia pubescens* and *Pimelea spicata* are both listed under the *Threatened Species Conservation Act 1995* and the *Environment Protection and Biodiversity Conservation Act 1999*, while *Pultanaea pedunculata* is listed under the *Threatened Species Conservation Act 1995* only. Despite the availability of habitat, *Acacia pubescens* and *Pultanaea pedunculata* are considered unlikely to occur within the study area.

Pimelea spicata is known to occur within both Shale Plains and Shale Hills Woodland in western Sydney, both of which occur within the study area. One record of this species occurs within the study area at the eastern end of the site within or adjacent to the existing railway corridor at Glenfield. *Pimelea spicata* was not observed along the proposed SWRL route during field surveys for this assessment; however, the species is recognised as being inconspicuous, particularly outside the peak flowering period when the surveys were undertaken. Based on the availability of suitable habitat, the species is considered to be most likely to occur in a few areas along the proposed SWRL route (namely route survey remnants 7, 8, 10 –13 and 34) — see Figure 5-7.

Threatened species of animal

Forty-four threatened fauna species have been previously recorded, or have the potential to occur, in the study area, comprising six amphibian, two reptile, 19 bird, 14 mammal, two fish and one invertebrate species. Of these, 37 are listed under the *Threatened Species Conservation Act 1995*, two are listed under the *Fisheries Management Act 1994*, and 12 are also listed under the *Environment Protection and Biodiversity Conservation Act 1999*.

A population of the vulnerable (under the *Threatened Species Conservation Act 1995*) Cumberland Plain Large Land Snail (*Meridolum corneovirens*) was recorded in the study area in survey reference remnant 9. Suitable habitat also exists within the study area for other threatened fauna previously recorded in this area, including Common (Eastern) Bentwing Bat (*Miniopterus schreibersii*); Large-footed Myotis (*Myotis adversus*); Eastern Freetail Bat (*Mormopterus norfolcensis*), Greater Broad-nosed Bat (*Scoteanax rueppellii*), Grey-headed Flying Fox (*Pteropus poliocephalus*); and Green and Golden Bell Frog (*Litoria aurea*).

Despite the existence of records in the locality or the occurrence of predicted habitat, 38 of the 44 previously recorded threatened species are considered unlikely to occur within the study area.

Migratory species

Migratory species listed under international agreements to which Australia is a signatory are considered to be matters of national environmental significance, and are protected under the *Environment Protection and Biodiversity Conservation Act 1999*. A total of 12 migratory bird species listed under these agreements have been recorded in the study area or have the potential to occur. However, the study area is not considered to comprise important habitat for any migratory species as it does not contain habitat that is:

- used by a migratory species occasionally or periodically in a region that supports an ecologically significant proportion of the population of the species
- used by a migratory species which is at the limit of the species' range
- located in an area where the species is declining.

Impacts on the above existing biodiversity are described in Chapter 14 (Biodiversity Impacts).

5.2.2 Hydrology and surface water

Fourteen waterway crossings have been identified along the proposed SWRL corridor (see Figure 5-7). The watercourses that would be crossed by the SWRL include the Cabramatta, Bonds, Scalabrini and Kemps Creeks, and tributaries of Bunbury Curran, Maxwells, Cabramatta and Scalabrini Creeks. Other relatively minor crossings exist in the vicinity, but are not considered in detail in this Environmental Assessment.

The main SWRL waterway crossings as shown on Figure 5-7 comprise:

- Crossing 1: a tributary of Bunbury Curran Creek/Bunbury Curran floodplain
- Crossing 2: a tributary of Bunbury Curran Creek
- Crossings 3 to 6: tributaries of Maxwells Creek
- Crossing 7: Cabramatta Creek
- Crossings 8 to 10: tributaries of Cabramatta Creek
- Crossing 11: Bonds Creek
- Crossing 12: a tributary of Scalabrini Creek
- Crossing 13: Scalabrini Creek
- Crossing 14: Kemps Creek.

The watercourses all drain in a generally northern direction and make up parts of the Georges River and Hawkesbury-Nepean River Catchments.

The drainage catchment areas upstream of the proposed SWRL corridor vary in regard to their size and level of urbanisation. The catchments considered range in size from less than three hectares to up to approximately 750 hectares. A number of the catchments remain in a relatively natural state, with areas of heavy vegetation remaining. Other catchments are fairly open and characterised by predominantly rural-residential and/or low density residential development.

A number of areas along the SWRL corridor are known to be flood-prone (PB 2006b). South of Glenfield Station, the SWRL would pass through the potential Glenfield flood detention basin area, which is under consideration by Campbelltown City Council to mitigate downstream flooding problems. The proposed Edmondson Park Station site is influenced by three local catchments. Existing flood and drainage-related studies and data are held by the three LGAs through which the corridor would pass. However, these existing studies are generally broad and outdated, and do not necessarily include the current study area. Other than the known (and somewhat limited) flood histories upstream of Crossings 7 and 11 (the upper reaches of Cabramatta and Bonds Creeks respectively), flood data is generally

scarce. Historical flood level information is typically only available for the main watercourse reaches downstream of the current study area.

A more detailed assessment of the hydraulic, drainage and flooding issues along the SWRL corridor is provided in Chapter 13 and Technical Paper 2 (Volume 2) of this Environmental Assessment.

Impacts on the above existing hydrology and surface water conditions are described in Chapter 13 (Hydraulic and Surface Water Impacts).

5.2.3 Geology, soils and water quality

The geology and soils of the study area were described (based on previous studies and a desk-top assessment) in the *South West Rail Link Environmental Issues Study Summary Report* (Connell Wagner 2003a). The geology of the study area (as indicated on the 1:100,000 Geological Series Sheet for Penrith) is predominantly characterised by Bringelly Shale underlain by Minchinbury and Ashfield Shales (which outcrop in several locations). The Shale is overlain by Quaternary Alluvium in some locations, including adjacent to Bonds and Cabramatta Creeks. The soil landscapes associated with these bedrock materials in the study area include the South Creek, Blacktown and Luddenham soil landscapes. These soil landscapes tend towards moderate to high erosion risk and low to moderate fertility.

The topography of the area consists of gently to steeply undulating hills and existing surface water quality is thought to be typical of urban and rural areas, and subject to existing human influences. Saline soil/groundwater conditions would be expected at crossings of major creeks and in cuttings. The *South West Rail Link Environmental Issues Study Summary Report* (Connell Wagner 2003a) identified the areas of potential salinity hazard and determined that soils affected by salinity would be unlikely to be encountered within the proposed SWRL Corridor. However, the *Edmondson Park Background Report* (Civitas 2003) identified that saline soils are likely to be encountered in the Edmondson Park Release Area.

Geology, soil and water quality impacts are described in Chapter 19 (Other environmental issues).

5.2.4 Contaminated and hazardous materials

Current and former agricultural and defence land uses along the SWRL corridor may have resulted in contamination of soils, potentially including illegal disposal of wastes and pesticides. Residual surface soil contamination may have resulted from the use of pesticides, fertilisers and other agricultural chemicals (PB 2006b; Civitas Partnership 2004). The primary source of concern is land within the Edmondson Park release area, which was formerly occupied by the Ingleburn Military Camp (a major infantry training camp, army hospital and field workshop). A study by PB (2004) indicated that the potential contaminants of concern and their likely occurrence at the site include:

- potential unexploded ordinance (UXO)
- expended and live small arms ammunition and grenade explosion residues (including by-products such as nitrates and phosphates)
- lead particulate and other heavy metals (arsenic, cadmium, chromium, copper, nickel, zinc and mercury)

- petroleum hydrocarbons (including total petroleum hydrocarbons, benzene, toluene, ethyl benzene, xylenes and polycyclic aromatic hydrocarbons)
- phenols (in the vicinity of coal stockpiles and residual coal)
- pesticides and herbicides
- asbestos
- unknowns, such as various household type chemicals.

At Glenfield North Junction, the SWRL crosses land that comprises the Glenfield Waste Facility (see Figure 5-1). The facility is currently licensed to L.A. Kennett Enterprises Pty Ltd for 'solid waste landfilling' and 'crushing, grinding or separating works'. It is understood that Kennett has filled close to the top of the embankment on which the East Hills Line sits as it approaches the Junction. Further assessment and consultation with the facility operator is required to confirm the type of wastes existing in the landfill (see Chapter 19), and whether the waste comprises inert matter or contaminated/hazardous materials.

Impacts relating to contaminated and hazardous materials are described in Chapter 19 (Other environmental issues).

5.2.5 Air quality

There are limited industrial sources of air emissions in the vicinity of the SWRL. Local air quality is primarily influenced by proximity to major traffic routes and regional pollution in the Sydney Basin (PB 2006b).

An air quality assessment was undertaken as part of the *South West Rail Link Environmental Issues Study* (Connell Wagner 2003g). This assessment detailed the results of ambient air quality monitoring data from Rose Street, Liverpool, which indicated:

- exceedances of both National Environment Protection Measures and the NSW Government Long-term Reporting Goal for ozone on a regular basis during summer months, with no exceedances during autumn and winter
- no exceedances for oxides of nitrogen
- two exceedances for PM_{10} (particulate matter less than 10 microns in aerodynamic diameter) as a result of bushfires impacting the Sydney airshed
- no exceedances for $PM_{2.5}$ (particulate matter less than 2.5 microns in aerodynamic diameter) based on criterion for PM_{10} (in the absence of current Australian criteria for $PM_{2.5}$)
- no exceedances of the relevant guidelines for carbon monoxide.

The concentrations of atmospheric pollutants along the SWRL corridor would be likely to be less than those recorded at the Liverpool monitoring site, due to the distance between the two areas and the more urban setting of the Liverpool monitoring location (Connell Wagner 2003g).

Air quality impacts are described in Chapter 19 (Other environmental issues).

5.3 Planned future development

5.3.1 Introduction

An overview of the planned future development in the wider Sydney region and the South West Growth Centre is described in Chapter 2 (Project Need). Further details on the strategic planning context of the Growth Centre are described in Chapter 3 (Section 3.2).

As shown in Figure 3-6, the SWRL would cross through the Western Sydney Parklands and Edmondson Park, Leppington North, Leppington and Rossmore precincts identified for future development in the South West Growth Centre. The corridor would also pass through Glenfield, which is already largely developed and established.

This Section provides a description of the likely change in land use and property, traffic and transport, social and visual factors within these precincts, to set the context for the impact assessments included in Part D of this report.

The assessment of future land use and property was based on a review of planning documentation for the South West Growth Centre, including the Metropolitan Strategy and associated background documents, the State Environmental Planning Policy (Sydney Region Growth Centres) 2006, planning documentation supporting the rezoning of the Edmondson Park release area, and other land use planning tools provided by local councils. Current development approvals were also reviewed to identify any approved developments that may occur in the future.

Detailed precinct planning and rezoning of the South West Growth Centre area is required for the future land uses described in State Environmental Planning Policy (Sydney Region Growth Centres) 2006 to be realised. Furthermore, once rezoning has occurred, the timing and intensity of potential future land use change would be influenced by social and economic factors.

The potential future land use changes described in this Section based on current state and local government land use planning instruments and plans. This information has been used to inform the environmental assessment of other key issues.

Potential future land use patterns in the vicinity of the SWRL are shown in Figure 5-9.

5.3.2 Glenfield

Potential future land use change between Glenfield North Junction and the Hume Highway in the vicinity of the proposed SWRL corridor alignment has been identified as follows:

- commuter parking — The SWRL would result in the conversion of some land on the western side of Railway Parade north and south of Glenfield Station from commuter parking to railway uses. The loss of approximately 120 parking spaces in this location is proposed to be replaced, potentially by new parking on the western side of the Main South Line, where RailCorp has purchased a lot located on the eastern edge of the Department of Education and Training Liverpool District Office site (Caldis Cook 2006).
- the proposed Southern Sydney Freight Line (SSFL) — The Australian Rail Track Corporation's proposed SSSFL includes a flyover a considerable distance north of the Glenfield Road bridge that would require some land acquisitions outside the rail corridor.

- public open space at the Glenfield Waste Facility — When operation of the facility ceases, the site is proposed to become public open space, as an extension of Leacock Regional Park.
- Glenfield Road residential estate — As described in Section 5.1.1, this area is currently undergoing residential subdivision and development. Development of this residential estate is expected to be completed in 2013 and is estimated to yield 1,000 dwellings (Campbelltown City Council 2006).
- new road to the hotel at Macquarie Links Estate — A new road access may be developed to the hotel currently under construction in the north-western corner of Macquarie Links Estate. The new road would be constructed between Campbelltown Road adjacent to the Hume Highway and abutting the James Meehan Estate.
- James Meehan Estate — a portion of estate outside the SWRL corridor was identified by Campbelltown City Council as a potential regional detention basin. The future use of the remainder of the land has not yet been determined.

5.3.3 Edmondson Park release area

The Sydney Metropolitan Strategy proposes development of the Edmondson Park release area to include 7,500 to 8,500 dwellings and a town centre with 18,000 to 20,000 square metres of retail space including two supermarkets (NSW Government 2005). Crossing through the town centre will be an integrated, regional open space corridor.

Background planning documentation supporting the local environment plan amendments for rezoning of the Edmondson Park release area (Civitas Partnership 2004, 2005) is broadly consistent with the Metropolitan Strategy. The documentation proposes the following land uses at Edmondson Park (development proposed at Ingleburn Gardens Estate is identified separately below):

- a town centre, comprising 25,000 square metres of retail floor space, including two supermarkets (3,000–4,000 square metres each), one discount department store (5,000–6000 square metres) and 10,000 to 15,000 square metres of specialty shops (The town centre would further include community facilities (e.g. a library), a high school, transport interchange and Edmondson Park Station.)
- 7,333 dwellings, comprising 1,442 apartments, 631 attached and semi-detached dwellings, 5,191 detached dwellings and 70 rural-residential dwellings, with an a estimated resident population of approximately 21,000 (Proposed dwelling densities range from 12 to 55 dwellings per hectare with a maximum building height of six storeys in the town centre (except for a gateway apartment building of 6 to 10 storeys) and up to 4 storeys in other parts of the release area.)
- highway retail uses along part of the southern side of Camden Valley Way
- six local villages, including two villages on Camden Valley Way, that will include local retail uses (e.g. convenience stores and cafes), high density residential development, schools, community facilities and neighbourhood parks
- four schools, comprising a high school in the town centre and primary schools at three of the local villages
- a hierarchy of public open space, including conservation areas (154 hectares), riparian parks, district parks and neighbourhood active and passive recreation areas.

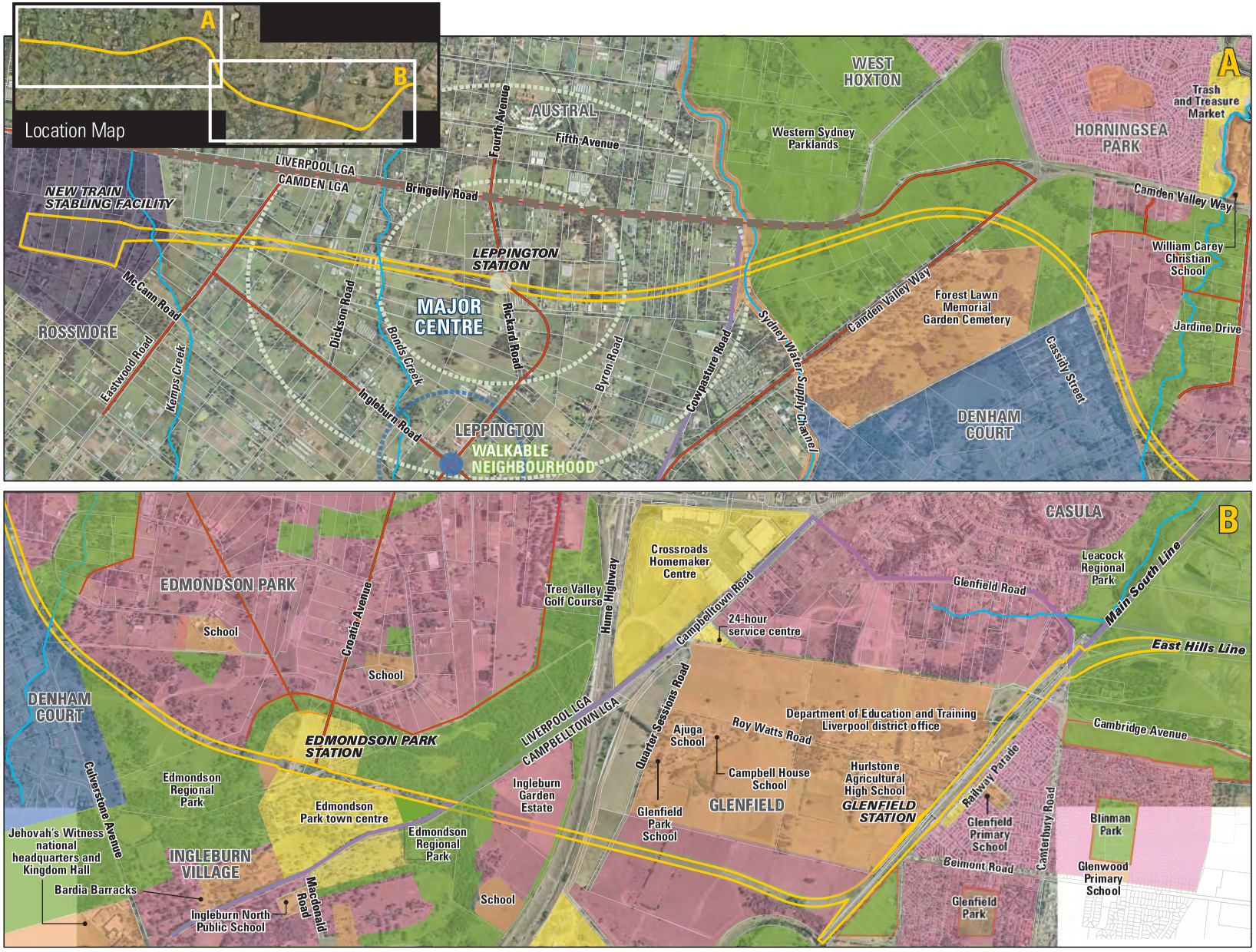


Figure 5-9 Potential future land use

Proposed land uses though the section of Edmondson Park that is identified as a 'deferred matter' in Figure 3-3 are subject to resolution of the SWRL corridor. Once the corridor is defined, uses/zoning of the deferred matter area would be resolved.

In 2005, Monarch Investments received approval for a master plan for Ingleburn Gardens Estate from Campbelltown City Council. The master plan and zoning of the site accommodate the SWRL corridor and includes a private school, construction of which has already commenced (Monarch Investments 2005, 2006c). Approved subdivision works have also been undertaken at the site (Don Fox Planning 2006a). In July 2006, Monarch Investments lodged a staged development application with Campbelltown City Council for development of the Ingleburn Gardens Estate in 16 stages, to include 284 dwellings under community title and two non-residential lots that would facilitate a community centre and future childcare centre. The development would also include a local shop and a community meeting room (Don Fox Planning 2006a, 2006b).

As described in Technical Paper 1 (Traffic, Transport, Parking and Access) in Volume 2, Edmondson Park is planned to comprise a network and hierarchy of streets, public transport routes, and cycle/pedestrian networks.

Bernera Road is proposed to be extended south via Croatia Avenue, to and through Edmondson Park and joining into Macdonald Road south of Campbelltown Road. This would provide the main public transport access to Edmondson Park Station, and is proposed as a bus priority corridor, that would link to the Liverpool to Parramatta Bus Transitway. Bardia Avenue, a diagonal north-west spine road, would link the western end of the site to the town centre and would also join into Macdonald Road south of Campbelltown Road. The road would become the main street in the town centre. A network of secondary east–west and north–south roads is planned to ensure good accessibility. Within the town centre, parallel roads would be provided approximately every 200 metres.

The proposed location of Edmondson Station, and the separately proposed extension of the Liverpool-Parramatta Transitway, would provide Edmondson Park with a good opportunity to increase bus accessibility to the site. The planned network of pedestrian and cycle links would connect localities within the release area, whilst also providing connections to external locations such as the Western Sydney Parklands recreation area to the north-west.

5.3.4 Western Sydney Parklands

The proposed SWRL corridor would pass through the southern section of land proposed for use as the Western Sydney Parklands (see Figure 5-9). A section of the SWRL, approximately 1,350 metres long, would pass across the Parklands between Camden Valley Way and Bringelly Road, and another section, approximately 600 metres long, would pass through the Parklands to the west of Camden Valley Way. The affected land forms Sub-precincts 9.7 and 9.6 within the Hoxton Park Ridge precinct (Precinct 9) of the Parklands — see Chapter 3 (DIPNR 2004). The severing of the Sub-precincts by the SWRL necessitates a re-evaluation of appropriate land uses in the area and the provision of crossings of the rail corridor (see Chapter 10). The connectivity provided by the SWRL would also create opportunities for planning of the southern precincts.

5.3.5 Leppington and Rossmore

The South West Growth Centre Structure Plan divides the Leppington local area into three development precincts: Leppington North, Leppington and East Leppington. The Plan also divides Rossmore into two development precincts: Rossmore and Rossmore North. The proposed Leppington Station is located in the Leppington North precinct. The SWRL corridor also crosses into the northern edge of the Leppington precinct west of the Station and the stabling facility is located within the Rossmore precinct (see Figure 3-6).

Neither the Leppington precincts, nor the Rossmore precinct, were among the first precincts identified for development by the NSW Government (Growth Centres Commission 2006). Planning for the Leppington and Rossmore precincts has not progressed beyond the level of detail contained in the South West Structure Plan.

The Metropolitan Strategy defines a hierarchy of centres for the South West Growth Centre. The hierarchy includes major centres, town and village centres and walkable neighbourhoods. As shown in the South West Growth Centre Structure Plan, development of a major centre is proposed at the Leppington North precinct. Previous planning for this major centre estimated that it could accommodate 60,000 to 80,000 square metres of retail space. Previous planning for the Leppington North precinct estimated that it could accommodate 12,000 dwellings and a resident population of 33,000. In total, 26,000 dwellings and a resident population of 72,000 could be accommodated in the Leppington local area.

The South West Growth Centre Structure Plan shows a mixed use employment corridor along Bringelly Road from the Western Sydney Parklands to west of Eastwood Road.

The Leppington major centre would be generally bounded by Bringelly Road to the north, Dickson Road to the west and Rickard Road to the east. The proposed size and timing of the road and strategic bus network for Leppington is discussed in more detail in Chapter 2 and Technical Paper 1 (Section 3).

5.3.6 Implications for the visual environment

The above changes would have a number of implications for the visual environment, which need to be considered in the assessment of visual impacts included in Chapter 16.

A summary table of the main future visual characteristics of each visual unit identified in Figure 5-5 is presented in Table 5-11, with more detailed information on each unit provided below.

Table 5-11 Expected future visual characteristics by visual unit

Visual unit	Main visual characteristics
Unit 1 — Glenfield Junction (including station)	Land uses in this unit are planned to remain largely unchanged. Future visibility of proposed SWRL – moderate to high (due to elevated flyovers).
Unit 2 — Glenfield to Hume Highway	Residential development is proposed over the majority of the existing vacant area (the James Meehan Estate) between Hurlstone Agricultural High School and the Macquarie Links residential area and Macquarie Links Golf Course to the south. A new hotel, the Macquarie Links Crowne Plaza, is proposed close to the Hume Highway, south of the proposed SWRL corridor. Future visibility of proposed SWRL – varies from moderate to high (depending on viewer location).

Visual unit	Main visual characteristics
Unit 3 — Hume Highway to Cabramatta Creek	The new town centre of Edmondson Park is planned over the majority of this unit, centred on the proposed Edmondson Park Station. Crossing through the town centre will be an integrated, regional open space corridor. The remaining area will include a mix of residential types and schools as well as a small industrial estate to the south.
	Future visibility of proposed SWRL – varies from moderate to high (depending on viewer location). Railway in cutting at station.
Unit 4 — Cabramatta Creek to Cowpasture Road	The majority of this unit is planned to remain as rural-residential and parkland in the future. Forest Lawn Memorial gardens Cemetery would also remain. The main planned land use changes are a small residential area north-east of the cemetery site, which is part of the planned Edmondson Park development, and further development of the Western Sydney Parklands into a regional recreational attraction.
	Future visibility of proposed SWRL – varies from moderate to high (depending on viewer location). High visibility in the vicinity of Camden Valley Way.
Unit 5 — Leppington, west of Cowpasture Road.	Significant land use change is proposed for this unit; although the area is yet to be properly planned. The proposed changes include the new regional town centre of Leppington, centred on the new Leppington Station. Substantial new residential and civic use areas would support the centre. The Western Sydney Parklands will continue to develop to the north-west of Bringelly Road. Light industrial land uses are likely to concentrate around the train stabling facility if the SWRL proceeds.
	Future visibility of proposed railway – high.

5.3.7 Implications for the social environment

There will be considerable change in the future social profile of the south-western area of Sydney over the next 25 to 30 years. This will include changes in land use, population and the character of existing areas, particularly those areas earmarked for urban release. Population increases will inevitably lead to changes to communities.

Primary communities

Glenfield is one of three suburbs in the Campbelltown LGA that is expected to experience a significant increase in population as a result of residential expansion (ID consulting 2006a).

Edmondson Park is planned to accommodate 8,000 new dwellings, which would see a population increase of approximately 21, 000. Edmondson Park is planned to provide a range of housing choice, including higher density development than previous release areas, which would provide a range of lot sizes and dwellings. The zoning of the Edmondson Park release area makes provision for several new schools and childcare centres (Liverpool Shire Council, 2006).

The South West Structure Plan identifies three precincts in Leppington: Leppington North, East Leppington and Leppington South. It also identifies Rossmore as a precinct area. These precinct areas are not included in the first land release, and the timing of this release is yet to be determined by the Growth Centres Commission and the NSW Government.

The draft Structure Plan for the three Leppington precincts shows that the Leppington North and South precincts would become a major town centre to service the surrounding precincts. The future population of Leppington is estimated to be approximately 33,000, with approximately 12,000 dwellings made up of a diverse mix of housing types.

The Structure Plan identifies Leppington as a 'major centre' in the South West Growth Centre, focused around the proposed SWRL. The *Planning Report for the South West Growth Centre* (Department of Planning 2005) indicated that it could comprise mixed uses, with approximately 10 to 12 neighbourhood centres, two supermarkets and one to two department stores.

The current Structure Plan identifies Rossmore as a 'village centre'. The Department of Planning (2005c) *Structure Plan Explanatory Notes for the South West Growth Centre* indicate that Rossmore would be developed with 9,000 dwellings. The precinct would include the SWRL stabling facility and consideration would need to be given to opportunities for surrounding light industrial land uses.

Secondary communities

Liverpool city has been identified (in the Metropolitan Strategy) as a 'regional city'. As such, in the future, the city will be developed with the aim of providing a focus for innovative business environments, jobs and more lifestyle and work opportunities closer to growing parts of Sydney and will attract new shopping, health, education, business and cultural facilities. The development of Liverpool into a regional city is likely to produce a change in the social profile of the LGA through the provision of greater education and employment opportunities and improved transport links within and beyond the LGA. A population increase of 149,000 people is predicted in Liverpool by the year 2031, mainly due to new housing and urban development (Id Consulting 2006b).

Camden is also predicted to be a high population growth area, with an increase of 89,000 people predicted by 2031 (Id Consulting 2006c). Campbelltown is expected to experience the lowest growth out of the three LGAs, but is still expected to grow to a population of 181,440 by 2031 from 150,150 in 2001 (Department of Planning 2004b).

Future services and infrastructure

Future services and infrastructure in the South West Growth Centre are described in Table 5-12 based on the Department of Planning's *Preliminary Infrastructure Report* and the *Planning report for the South-West Growth Centre*. A diverse range of infrastructure is planned to facilitate and cater for the needs of planned development of the South West Growth Centre. The provision of road and public transport upgrades is addressed in Chapter 2, so is not included in this table.

Table 5-12 South West Growth Centre planned future services and infrastructure

Type	Description
Health	▪ Health facilities will be expanded, including improvements to existing hospitals, new community and primary health centres.
	▪ The NSW Government has allocated significant funding to be spent on improvements and upgrading of the existing hospital at Liverpool.
Education	▪ In the first 5 years of development, it is proposed that there will be three new primary schools and one new high school. Over the 25 to 30 year period, it is anticipated that there will be 45 primary schools and 15 high schools and TAFE facilities in the area.
Water infrastructure	▪ There are currently no existing sewage treatment plants of significance in the growth centre. Adequate infrastructure, including reservoirs, trunk mains and sewerage treatment plants are planned.
	▪ The NSW Government has plans to allow alternative suppliers to provide water facilities to the new precincts to facilitate sustainable water supplies.

Type	Description
Community services and infrastructure	▪ Each precinct contains provision for community services and infrastructure. ▪ Edmondson Park, which has a total area of 827 hectares, will provide 23.29 hectares of special use activities (e.g. schools, community purposes and the future rail corridor).
Open space	▪ Edmondson Park will provide 217.8 hectares of areas of conservation and open space. ▪ The Western Sydney Parklands, which is an important open space that will address social issues relating to economic, connectivity, cohesiveness and community well being and cultural issues.

Source: Based on Technical Paper 8

The South West Structure Plan identifies the proposed centres and employment lands for each of the precincts (see Figure 2-2). The planned future infrastructure, services and employment lands cater for a population with mixed cohorts, but primarily for a younger family population. This is evident through the number of schools and employment opportunities. The planned public transport infrastructure will allow access to jobs and employment lands in/out of the region and within the planned precinct areas.

5.3.8 Implications for the biophysical environment

The identified proposed changes in the South West Growth Centre will also mean significant changes in the biophysical environment, including:

- the potential removal of vegetation subject to precinct planning within all areas not already zoned for conservation in the South West Growth Centre Structure Plan
- significant changes in background noise levels, which would generally increase with the proposed urban consolidation, as discussed in Technical Paper 5 (Noise and Vibration)
- changes in hydrology and hydraulics; although future development of the area will most likely include provisions to ensure there is no increase in peak catchment flows. This assumption is supported by studies such as the *Edmondson Park Master Planning Water Cycle Management: Stormwater Final Report* (GHD 2003), which details proposed basins for attenuating any increase in flood flows resulting from future urbanisation.