12

Socioeconomic Issues

This chapter outlines the socioeconomic issues surrounding the Tillegra Dam project and provides an assessment of direct and indirect impacts of the Project. This includes consideration of land use changes, potential changes to the local and regional economies, and impacts upon social infrastructure. When the storage is full, it will inundate Quart Pot/Munni Cemetery which is of high social value to the local community. Opportunities to mitigate this impact are detailed in Working Paper H which forms the basis for consideration of this issue in this chapter. The potential recreational opportunities afforded by the dam when operational are also described in some detail, drawing upon the draft Integrated Land Use Plan (Working Paper N).

12.1 Introduction

The DGRs specify that the environmental assessment for the project is to give particular consideration to:

- potential changes to the local and regional economy and measures to mitigate and manage impacts
- existing and future land uses and natural resources (both surrounding and within the inundation area), including agriculture (and details on the class of agricultural land within the inundation area), mineral resources and forestry and measures to mitigate and manage any impacts
- potential impacts upon social infrastructure (housing, medical, etc) both in terms of availability and capacity to accommodate construction personnel
- proposed recreational uses of the dam

- potential public utilisation rates of the dam and its associate flow on effects on the surrounding area including nearby towns, parks and reserves, and its infrastructure (roads, electricity, etc)
- relocation of services, particularly the Bendolba fire station to ensure it meets the needs of the RFS.

With regard to the last bullet point, this issue has previously been addressed in Section 6.7.1 in relation to relocation of services and Section 6.7.2 for the relocation of the RFS station.

A number of specialist investigations have been undertaken to support or contribute to the assessment of likely and potential socioeconomic impacts associated with construction and operation of the Project. These have been documented as Working Papers to the assessment, the key ones comprising:

- *Socioeconomic Assessment* (Working Paper G)
- *Quart Pot/Munni Cemetery Relocation Plan* (Working Paper H)
- *Draft Integrated Land Use Plan* (Working Paper N)

These in large part form the basis for the discussion provided in this chapter.

12.2 Profile of existing socioeconomic environment

12.2.1 Lower Hunter region

The Lower Hunter region covers five LGAs: Lake Macquarie, Newcastle, Port Stephens, Maitland and Cessnock. The major population centre includes NSW's second largest regional city of Newcastle with the largest port in bulk terms and the largest coal exporting port (Dept of Planning 2006). Other regional centres are Charlestown, Glendale, Morisset and Raymond Terrace.

The remainder of the Hunter Valley includes several other large council areas including Scone, Murrurundi, Muswellbrook, Singleton and Dungog. The Dungog LGA adjoins the geographical area of the Lower Hunter and is referred to in Section 12.2.2.

Population

The Lower Hunter region is the sixth largest urban area in Australia and a major centre of economic activity in NSW. It is located 160 kilometres north of Sydney and covers an area of 4,305 km2. The area is the second most heavily populated region in NSW with a regional population estimated at almost 500,000. The overall growth rate is about 0.9 per cent per year.

Cessnock has the largest area in the Lower Hunter region with the lowest density with a population of only approximately 46,000 people. Lake Macquarie has the highest population with 183,139 persons, followed by Newcastle with a population of 141,752 persons. Maitland and Port Stephens have the highest population growth with just over 18 per cent and almost 23 per cent respectively. Over the 10 year period to 2006, the Lower Hunter region experienced a growth in population of just over nine percent. Table 12.1 provides a summary of this population growth.

TABLE 12.1 LOWER HUNTER POPULATION CENTRES

AREA	POPULATION			10 YEARS GROWTH	AREA KM^2
	1996	2001	2006		
Lake Macquarie	172,725	180,315	183,139	6.02 %	752.9
Newcastle	133,589	136,621	141,752	6.11 %	214.5
Port Stephens	51,146	56,771	60,484	18.26 %	979.5
Maitland	50,324	54,390	61,881	22.97 %	391.7
Cessnock	44,735	45,377	46,206	3.29 %	1,966.4
Total	**452,519**	**473,474**	**493,462**	**9.05 %**	**4,305.0**

Source: ABS 1996, 2001 and 2006 Census of Population and Housing

The community profiles for the five LGAs are diverse and the more rural area of Cessnock stands out with a lower income compared to the other LGAs. Key socioeconomic aspects for these communities are summarised in Table 12.2.

TABLE 12.2 COMMUNITY PROFILE: LOWER HUNTER CENTRES

	LAKE MACQUARIE	NEWCASTLE	PORT STEPHENS	MAITLAND	CESSNOCK
Median age of persons	40	37	40	35	37
Median individual income ($/weekly)	394	409	388	428	358
Median family income ($/weekly)	1,102	1,132	1,030	1,159	1,015
Median household income ($/weekly)	922	885	830	1,025	786
Median housing loan repayment ($/monthly)	1,300	1,300	1,300	1,300	1,148
Median rent ($/weekly)	185	195	180	180	160
Average number of persons per bedroom	1.1	1.1	1.1	1.1	1.1
Average household size	2.6	2.3	2.5	2.7	2.6
Median age of persons	40	37	40	35	37

Source ABS 2006 Census Community Profile Series, Table B02 (Data Local Government Area for Lake Macquarie, Newcastle, Port Stephens, Maitland, Cessnock)

Employment and industry

The Lower Hunter region has around 80 per cent rural, semi-rural, agricultural and forested landscapes which include key industries such as mining, wine production and tourism. The region has a skilled workforce and nationally significant economic infrastructure. Recent job growth has been created mainly in the tertiary sectors such as health, education, financial and personal services and tourism.

More than one third of employed persons in the Lower Hunter region work in health care and social assistance; retail trade; and manufacturing sectors. Approximately eight per cent each work in construction, and education and training. Analysis of LGA data indicated a similar distribution for Lake Macquarie, Newcastle and Maitland.

For Port Stephens LGA, approximately 13 per cent of all persons employed work in retail trade. This is followed by manufacturing, public administration and safety; and health care and social assistance with approximately 10 per cent in each sector. For the Cessnock LGA, slightly more persons work in manufacturing (14 per cent) than retail trade (13 per cent). The accommodation and food services; mining and construction sectors employ 9.5 per cent, 7.7 per cent and 7.2 per cent respectively of the local work force.

A detailed summary of the regional employment profile is provided in Table 12.3.

TABLE 12.3 EMPLOYMENT BY INDUSTRY SECTOR IN LOWER HUNTER CENTRES

	LAKE MACQUARIE	NEWCASTLE	PORT STEPHENS	MAITLAND	CESSNOCK	LOWER HUNTER
Agriculture, forestry & fishing	333	302	466	494	419	2,014
Mining	1,466	599	269	1,180	1,382	4,896
Manufacturing	8,512	6,111	2,539	3,424	2,535	23,121
Electricity, gas, water & waste services	1,343	907	210	370	190	3,020
Construction	7,059	4,121	2,182	2,110	1,301	16,773
Wholesale trade	2,776	2,039	729	973	538	7,055
Retail trade	9,813	7,093	3,037	3,515	2,343	25,801
Accommodation & food services	4,599	4,752	2,171	1,751	1,713	14,986
Transport, postal & warehousing	3,305	2,519	1,233	1,322	699	9,078
Information media & telecommunications	906	939	227	328	110	2,510
Financial & insurance services	2,653	2,137	482	689	278	6,239
Rental, hiring & real estate services	1,193	1,074	465	419	245	3,396
Professional, scientific & technical services	3,946	4,336	1,001	1,296	596	11,175
Administrative & support services	2,030	1,715	707	759	504	5,715
Public administration & safety	4,404	4,279	2,518	1,703	781	13,685
Education & training	6,480	5,771	1,437	1,960	872	16,520
Health care & social assistance	10,045	9,386	2,441	2,882	1,890	26,644
Arts & recreation services	778	795	332	272	179	2,356
Other services	3,350	2,271	925	1,220	864	8,630
Inadequately described/ Not stated	1,746	1,280	514	596	536	4,672
Total	**76,737**	**62,426**	**23,885**	**27,263**	**17,975**	**208,286**

Source: ABS 2006 Census Community Profile Series, Table B42C Industry of Employment by Age by Sex, excerpt. (Data Local Government Area for Lake Macquarie, Newcastle, Port Stephens, Maitland, Cessnock).

Approximately 208,000 people are employed in the Lower Hunter region. A detailed breakdown of the employment profile of the regional labour force at the time of the 2006 census is provided in Table 12.4.

TABLE 12.4 LABOUR FORCE STATUS OF LOWER HUNTER CENTRES

CATEGORY	LAKE MACQUARIE	NEWCASTLE	PORT STEPHENS	MAITLAND	CESSNOCK	LOWER HUNTER
Employed:						
Full-time	46,199	37,990	14,137	17,031	10,948	126,305
Part-time	25,330	20,373	8,118	8,494	5,733	68,048
Employed, away from work	3,020	2,609	971	994	672	8,266
Hours worked not stated	2,188	1,455	658	745	623	5,669
Total	76,737	62,427	23,884	27,264	17,976	208,288
Unemployed, looking for work:						
Full-time work	3,613	3,084	1,215	1,193	1,201	10,306
Part-time work	1,878	1,806	613	716	489	5,502
Total	5,491	4,890	1,828	1,909	1,690	15,808
Total labour force	**82,228**	**67,317**	**25,712**	**29,173**	**19,666**	**224,096**
Other						
Not in the labour force	58,513	43,001	19,468	16,248	14,762	151,992
Labour force status not stated	6,522	7,114	2,718	2,253	1,733	20,340
Total	**147,263**	**117,432**	**47,898**	**47,674**	**36,161**	**396,428**

Source: ABS 2006 Census Community Profile Series, Table B41B Labour force status by age by sex, excerpt. (Data Local Government Area for Lake Macquarie, Newcastle, Port Stephens, Maitland, Cessnock).

In summary, the Hunter region supports a diverse economic base including manufacturing, mining, agriculture, commercial and tourism activities. It has an increasing population and economic platform that is significant to NSW. The following socioeconomic features are notable:

- a regional population of 493,462 persons in 2006
- the regional population has increased by nine per cent over the decade at an average annual growth rate of 0.9 per cent
- the total number of persons employed in the Hunter region was 296,200 in December 2007
- regional employment growth over the past decade was 16.9 per cent with an average annual growth rate of 1.6 per cent, almost double the population growth rate
- unemployment in the Hunter region was 5.2 per cent (compared to 4.6 per cent in NSW) in December 2007 compared to historic levels of 7-11 per cent over the past decade
- over the past 25 years the Hunter region has been subject to significant economic structural change with a shift from primary industry and secondary industry to tertiary industry. Service provision or tertiary industry employs almost 84 per cent of workers now compared to almost 70 per cent in 1981
- the manufacturing or secondary industry has declined from 21 per cent in 1981 to 10 per cent in 2006 while the primary industry, predominantly agriculture, has declined from 9.2 per cent to 5.8 per cent over the same period.

12.2.2 Dungog Shire

Population

The Dungog area was called 'Tungog' or 'Tunkok' by the Kooris, meaning 'the place of thinly wooded hills' in the Awabakal dialect. Prior to European settlement, the area had been occupied by Koori people up to about 40,000 years in relatively large numbers in the valleys of the Paterson and Williams Rivers. More detailed accounts of the European and Aboriginal settlement of the area are provided in Chapters 13 and 14 respectively and in the supporting Working Papers.

The 2006 census recorded a population of 8,062 persons for Dungog Shire. Over the decade 1996-2006, the Shire's population increased from 7,720 persons to just in excess of 8,000 persons representing a total growth of six per cent. The average annual population growth over this period was approximately 0.5 per cent.

The major population centres within the Shire are:

- *Dungog*, located approximately 13 kilometres south east of the proposed Tillegra Dam site and the largest population centre in the Shire with an estimated 2,116 persons
- *Gresford/East Gresford*, located approximately 18 kilometres west-southwest of the proposed dam site with an estimated population of 289 persons
- *Paterson*, located approximately 32 kilometres south-southeast of the dam site, on a major road and train line, and the Paterson River, with an estimated population of 340 persons
- *Vacy*, located approximately 27 kilometres southwest of the dam site on the Paterson River
- *Martins Creek*, located approximately 27 kilometres south-southwest of the dam site
- *Clarence Town*, located approximately 30 kilometres south-southeast of the dam site alongside the Williams River.

The predominant age group in the Dungog Shire is the 30-39 years grouping followed by the 40-49 and 50-59 groupings. The 10-19 years grouping is the largest in the town of Dungog.

The predominantly rural district of Dungog, like many similar rural shires in NSW, is experiencing major changes to its demographic profile as a result of the process of ageing. The *Strategic Connections: Economic Flows and Industrial Development in Dungog Shire* study (Dungog Shire Council 2005) indicated that based on existing projections and assuming no major interventions (such as the development of a major new urban area), Dungog Shire would experience a significant increase in the proportion of its elderly population over the next two decades and a significant decline in the younger age brackets.

This shift would be exacerbated by continued outflow of young adults and a slowing of inward migration of families with children. The proportion of households with children would fall dramatically. The economic implications of this trend would be to adversely impact on the Shire's economic dependency ratio (the proportion of a population in receipt of earned income).

Household income in Dungog is diverse with around 60 per cent of households earning between $13,000–$62,000 per annum. Around 23 percent of household income is predominantly in the $26,000–$41,000 range. For Dungog Shire itself, the predominant household income grouping is the $41,000–$62,000 range reflecting the effect of the rural economic activities.

Housing

Household occupancy in Dungog comprises 45 per cent in the owner outright category while purchasers account for 27 per cent and renters 23 per cent. Total owner occupied households was estimated at 73 per cent in 2006. Industry sources state that purchasing households are likely to be paying between $800–$1,000 per month on home mortgage repayments.

The median price of houses in Dungog in the first quarter of 2008 was around $235,000 while in 2007 it was around $220,000. House prices have been trending upward since 2002 at which time the median house price in Dungog was around $120,000. Given that the town of Dungog has most of the houses in the Shire; the trend in median prices for Dungog Shire exhibits the same trend as the town of Dungog.

At the 2006 Census, the average occupancy rate for Dungog LGA was 2.63 persons per household compared to 2.53 for NSW. The private rental market represents 12.6 per cent of all occupied private dwellings in Dungog LGA. This is lower than surrounding LGAs which range from 16 per cent (Gloucester LGA) to 20.5 per cent (Muswellbrook LGA). Percentages for the Greater Metropolitan Region and the Rest of NSW were 18.4 per cent and 22.5 per cent respectively (Dept of Housing, no date).

Economic activity

There are 477 businesses in Dungog Shire, most of them small and medium size businesses with over 40 per cent in the agriculture forestry and fishing sector, 12 per cent in the construction sector and approximately 10 per cent in the property and business services sector. The communication services, wholesale trade, cultural and recreational services, and education sectors are also represented through with less than 10 businesses each. Aside from the agriculture-related economic activities, the industrial and commercial sectors are characterised by small-sized enterprises with a high level of local market dependence.

According to the Australian Bureau of Agricultural and Resource Economics (ABARE 2009) the cash income average for dairy farms in central NSW was $135,000 per farm for 2008/09 and between $23,540 and $40,180 per farm for small to medium sized beef grazing businesses in the Southern regions of Australia.

With regard to tourism, Dungog Shire largely attracts visitors on short breaks and day trips, particularly on weekends. Visitors comprise older travellers and families seeking to experience the rural lifestyle and enjoy the scenery of the Barrington Tops and the Chichester Dam areas. Tourism businesses in the area are generally small operations which seek to provide visitors with a personal and authentic experience. These businesses provide accommodation (eg motels, bed and breakfast establishments, farm stays), wineries, local produce, outdoor recreation activities (eg horse riding, canoeing), farm experiences and local arts and crafts.

Fifty per cent of businesses in Dungog Shire have an annual turnover of less than $100,000; however there are three retail trade businesses with a turnover of between $10 million to less than $20 million. Ninety out of the 477 businesses in Dungog have a turnover of between $200,000 and less than $500,000.

The *Strategic Connections: Economic Flows and Industrial Development in Dungog Shire* report indicates that the economic turnover in Dungog Shire is driven by household spending and government services provision. An estimated 55–60 per cent of spending by households leaks from the Shire. This high level of expenditure leakage has been attributed to the dominant retail sector in the Lower Hunter region in Maitland, Raymond Terrace and Newcastle. Dungog is classed as a lower order urban centre with only a limited range of goods and services to local residents and to residents in adjoining rural areas and nearby smaller towns and villages.

Employment status by industry

The *Strategic Connections: Economic Flows and Industrial Development in Dungog Shire* report identified that the Shire has experienced major economic and labour force changes over the last two decades associated with falls in industrial employment in agricultural processing sectors. Over this same period, there has been a shifting employment pattern with rising participation in the workforce by women and a growing proportion of Shire residents engaged in management and professional occupational categories, particularly in the education and health sectors within government.

The report highlights other relevant and distinctive labour market attributes in Dungog Shire. These include the high proportion of local jobs captured by local residents with an estimated 50 per cent of Shire workers having employment within the Shire and over 75 per cent of Dungog jobs held by local residents. The remaining workers residing in Dungog Shire (estimated at 50 per cent) commute daily to other labour markets in the Maitland and Newcastle areas.

A breakdown of the employment profile for the Dungog labour force is shown in Table 12.5.

TABLE 12.5 LABOUR FORCE STATUS FOR DUNGOG

CATEGORY	TOTAL PERSONS
Employed, worked:	
Full time	2,086
Part time	1,136
Employed, away from work	120
Hours worked not stated	120
Total	3,462
Unemployed, looking for:	
Full time work	122
Part time work	53
Total	175
Total labour force	3,637
Other:	
Not in the labour force	2,348
Labour force status not stated	378
Total	**6,363**

Source: ABS 2006 Census of Population and Housing, Table B41b Labour force status by age by sex.

The 2006 census recorded 3,462 persons employed in Dungog Shire. About two thirds were working full time with the remainder working part time. Unemployment was very low with only 175 persons looking for either full time or part time work. The level of local part time employment was slightly higher than the national average of around 29 per cent. The local participation rate of 64.5 per cent was essentially no different from the rest of Australia.

Approximately 13 per cent of employed people worked in the agriculture, forestry and fishing sector followed by the health care and social assistance, construction, manufacturing, and retail trade sectors with approximately 10 per cent each. More men worked in the agriculture, construction, manufacturing and transport, while women were employed mostly in the health care, retail, education and accommodation sectors.

Land use and natural resources

Land use within Dungog Shire outside of the urban centres is largely agricultural. A notable exception is the northern part of the Shire which contains significant areas of forest including Barrington Tops National Park, a listed World Heritage Area, and Chichester State Forest. The Project would not directly affect these areas nor any other State forests. Significant indirect effects on these areas are also unlikely.

Within the broader Project area (and including the directly affected area), land use is predominantly agricultural, largely comprising the raising of beef cattle and dairying. Other limited scale agricultural activities within the broader Project area include goat, deer and horse grazing (refer Figure 5.4). Land use mapping (DECC 2009) shows that the majority of land use within the Project area is grazing properties but there are also a number of dairies and crop farms. Within the greater Project area, there are State forests, a national park and a number of forested properties, particularly at Mount Butterwicki. There is a forested parcel of land within the directly affected Project area known as the Tillegra Reserve (which is also a travelling stock route).

DPI (Agriculture) has produced maps for Dungog Shire showing the following five agricultural suitability classes (Dungog Shire Council 2003):

- *Class 1 Prime arable land*: Land capable of regular cultivation for cropping (cereals, oilseeds, fodder etc) or intensive horticulture (vegetables, orchards). Has a very good capability for agriculture, where there are only minor or no constraints to sustained high levels of production. Will include irrigated areas with high production.
- *Class 2 High quality arable land*: Land suitable for cultivation for cropping but not suited to continuous cropping or intensive horticulture. Has a capability for agriculture but where constraints limit the cropping phase to a rotation with improved pastures and thus reduce the overall level of production.
- *Class 3 Some cultivation/pastureland*: Land suitable for grazing. Well suited to pasture improvement and can be cultivated for an occasional cash crop or forage crop in conjunction with pasture management. Overall level of production is moderate as a result of high environmental costs, which limit the frequency of ground disturbance. Has a moderate capability for agriculture. Pasturelands are capable of sustained highs of production although conservation measures may be required.
- *Class 4 Unsuitable for cultivation/poor grazing land*: Land suitable for grazing and not suitable for cultivation. Agriculture is based on native pasture or improved pastures relying on minimum tillage techniques. Overall level of production is low. Environmental constraints make arable agriculture uneconomic.
- *Class 5 Unsuitable for agriculture*: Land suitable only for rough grazing or land not suitable for agriculture. Agricultural production is very low or zero. Severe or absolute constraints to production imposed by environmental factors.

There is no Class 1 land within the Shire and the relatively small area of Class 2 land is generally flood affected. The percentage breakdown of each of the classes within the Shire is as follows:

- Class 2: 17 per cent
- Class 3: 24 per cent
- Class 4: 51 per cent
- Class 5: 8 per cent.

With the exception of Class 2, all these classes are represented within the Project area (refer Figure 12.1).

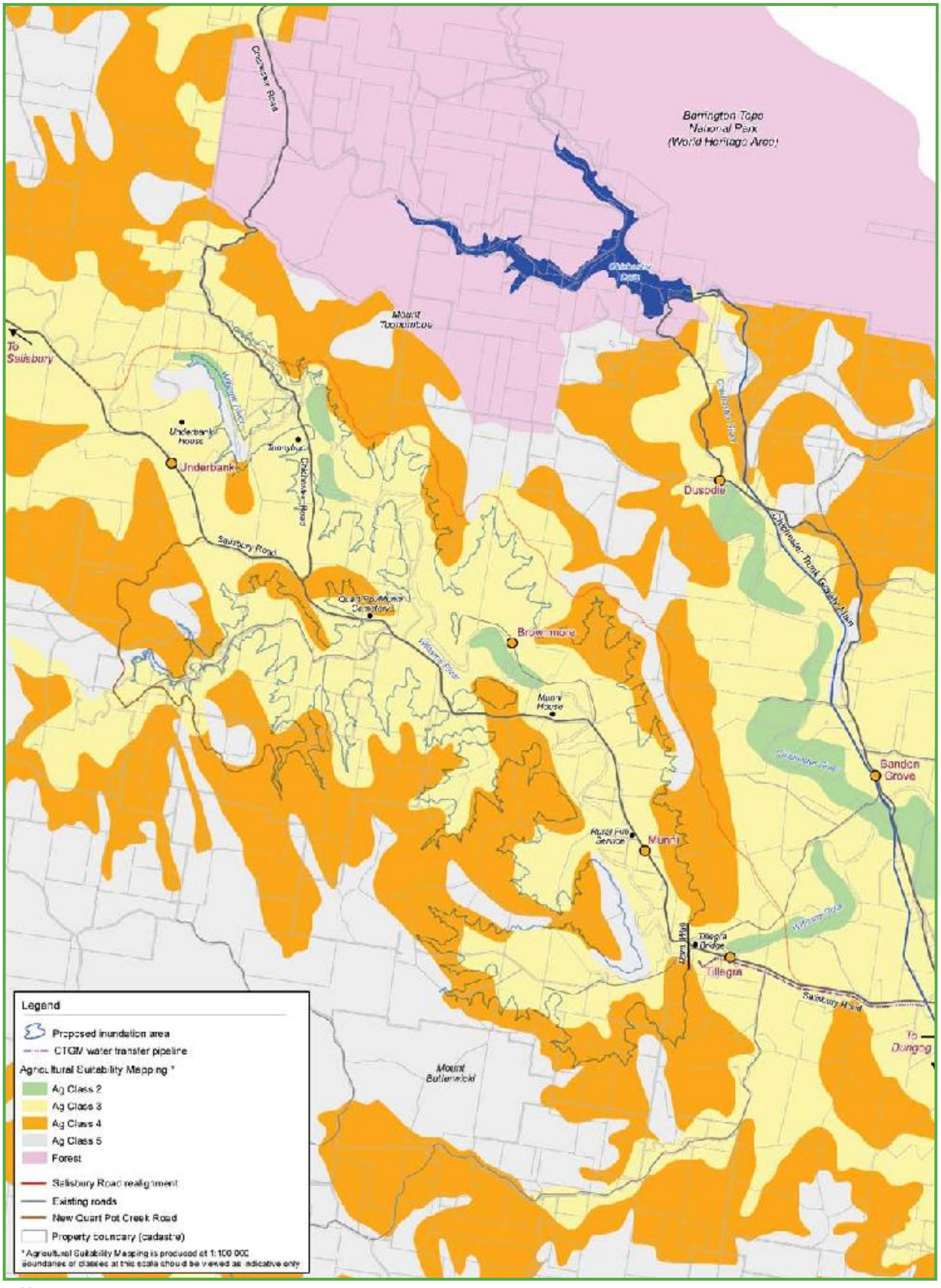

FIGURE 12.1 CLASSES OF AGRICULTURAL LAND

Dairying used to be a prominent agricultural activity in the Williams River Valley. The decline has in large part been driven by deregulation and the associated restructuring of the dairy industry. The impact of this on the Dungog area was the subject of a paper published in *Rural Society* (Davidson 2001). This noted that from 1990 to 1999, 28.6 per cent of Dungog's dairies closed out their operations. It was also noted that when dairy farms close out, increasingly the property was broken up and used for other, non-agricultural, purposes.

A review of the DPI(Mineral Resources) *Minview* database indicated that there were no known occurrence of specific mineral resources within the Project area although there is potential for gold–pyrite vein type mineralisation such as occurs in the adjoining Chichester Dam catchment. The database search also indicated that there were no current titles or applications for titles for mineral, coal or petroleum resources within 10 kilometres of the proposed dam site and storage area.

The database search indicated the presence of a number of extractive resource sites, in particular limestone quarries, in the general vicinity of the dam site, though none were located within the actual Project area. The extractive approval and licensing status for these quarries/pits is unknown, however the vast majority are not operational. The only site noted as operational on the *Minview* database was the Williams River sand deposit near Bendolba. The closest major regional hard rock quarry with concrete aggregate material is the Railcorp Quarry at Martins Creek about 30 kilometres to the south.

12.3 Effects on the regional economy

The Lower Hunter region is the sixth largest urban area in Australia and a major centre of economic activity in NSW. It is the second most heavily populated region in NSW with a population estimated at around 500,000 which is forecast to increase to 660,000 by 2026. The region supports a diverse economic base including manufacturing, mining, agriculture, commercial and tourism activities. The range of economic activities would continue to expand with the forecast population growth and other significant prospective commercial and industrial activities that would be attracted to the region.

The direct and indirect economic impacts of construction and operation of Tillegra Dam at the regional and State (and national) levels has been assessed through the use of computable general equilibrium (CGE) modelling. This was undertaken by Monash University's Centre of Policy Studies (CoPS) using TERM, a 'bottom-up' CGE model of the Australian economy which treats each region as a separate sub-economy. The high degree of regional detail makes TERM a useful tool for examining the regional impacts of effects that may be region–specific. TERM has a particularly detailed treatment of transport costs and is naturally suited to simulating the effects of improving infrastructure and consequent service provision from that infrastructure. The CoPS report is provided as an appendix to Working Paper G.

12.3.1 Methodology

The CGE analysis involves:

- development of a baseline forecast which models a 'without dam' scenario using a set of recognised macroeconomic forecasts and certain assumptions about water scarcity at the regional, State and national levels
- development of a policy scenario ('with dam'), which introduces a 'shock' to the model through the *Water and Drains* industry sector based on the proposed capital expenditure and continuing operation of the proposed Tillegra Dam

- comparison of relative changes in gross domestic product, investment, and household consumption to assess the impact of the dam on the regional, state and national economies.

For the purpose of the analysis, the Hunter region was disaggregated to exclude statistical divisions outside the watershed for the Tillegra Dam. It was also aggregated to produce the aggregated outputs for the Hunter region (as defined), the rest of NSW, and the rest of Australia.

Key baseline forecast assumptions

The following assumptions were used in projecting the dynamic regional model (TERM) baseline from 2006 to 2031:

- ongoing productivity improvements in most sectors, with growth more rapid in primary and secondary industries than in most services
- State macro forecasts provided by Access Economics
- water users were assumed to increase water efficiency by one per cent per annum.

The baseline is important because it assumes that there is a fixed water resource that would not grow as rapidly as the economy. In other words, water scarcity would worsen with economic growth. The Tillegra Dam project would provide benefits relative to the baseline by alleviating the increasing scarcity of water in the Lower Hunter region as the economy grows.

Policy scenario

The policy scenario used the following assumptions:

- $300 million is spent constructing Tillegra Dam between 2008 and 2014
- direct costs of the Project as ascribed to the CGE model were based initially on a report prepared by HWC (2007d)
- the dam would become fully operational in 2015, raising minimum annual yields in the Lower Hunter region from around 67 gigalitres to 125 gigalitres
- the model shock is introduced in the *Water and Drains* sector which comprises both water provision and water services components.

The model assumes the dam is funded through borrowing of offshore funds. This implies that national debt may rise in the future at the same as additional production capacity rises due to the Project. Therefore, some of the additional income generated by the Project must be paid in interest to the offshore funding source.

12.3.2 Results

A key finding from the results is that the dam brings an additional benefit each year to the Hunter region because baseline water scarcity is worsening year by year. Each year brings a marginal benefit from the dam as baseline water scarcity from a fixed resource worsens with economic growth.

This is the reason the labour market in the Hunter continues to strengthen relative to baseline. This is a crucial point and one which the slow adjustment relative to forecast illustrates. Where the benefit is a one-off gain, the equilibrium would be reached more quickly.

A more detailed discussion of key regional and national results follows.

Key regional results

Key results for the Hunter region are shown in Figures 12.2 and 12.3 as percentage deviations from the baseline forecast for the region. The regional level impacts are considered significant.

Employment and real regional GDP (Gross Domestic Product) are more affected by the alleviation of ongoing water scarcity which is why after 2014 GDP initially rises sharply and then slowly increases while labour maintains an increased level over the baseline forecast. The impact of construction is significant at the regional level. Capital stock (the total capital existing in an economy at a particular time) increases faster and earlier, reflecting the construction costs of the dam, and runs at a faster rate than GDP relative to the baseline forecast.

The technological improvement arising from the dam becoming operational in 2015 strengthens the labour market further.

The impacts of aggregate consumption and investment at the regional level are larger relative to the baseline forecasts of the Australian economy than the impacts on capital stock, real regional GDP and employment. As Figure12.3 illustrates, the increase in aggregate investment peaks at 1.07 per cent of baseline forecast in 2012 reflecting the significant regional impact of construction costs.

The subsequent dip in aggregate investment reflects the declining pattern of dam construction costs before aggregate investment is stimulated by water availability once the dam becomes fully operational. The ongoing availability of additional water underpins a higher level of economic activity allowing a higher level of household consumption relative to the baseline forecast for the region.

Key national results

Key national results are shown in Figures 12.4 and 12.5 as percentage deviations from the baseline forecast. Given the capital expenditure and the scale of alleviation of water scarcity relative to the national economy, it is not surprising that the national level impacts are not very significant.

As Figure 12.4 shows, even the largest impact, an increase in real GDP relative to the baseline forecast, peaks at 0.038 per cent of baseline forecast GDP in 2025. Employment and capital achieve small positive results over the forecast period.

Employment and real GDP are more affected by the alleviation of ongoing water scarcity, which is why after 2014 GDP initially rises sharply and then slowly increases while labour maintains an increased level over the baseline forecast. The impact of construction is nominal on real GDP and employment at the national level. In contrast, capital expenditure increases faster and earlier, reflecting the construction costs of the dam.

National level impacts of aggregate consumption and investment are slightly larger but still small relative to the baseline forecasts of the Australian economy. As Figure 12.5 shows, the increase in aggregate consumption peaks at 0.06 per cent of baseline forecast aggregate consumption in 2025.

12.3.3 Analysis of welfare impacts

A more detailed analysis of household consumption highlights some key welfare impacts from the Tillegra Dam project. The welfare gain is calculated as the year–by–year increase in national household spending due to the Project, relative to business as usual household spending. The calculation of year–by–year household spending is based on disposable income after accounting for interest payments on net foreign debt.

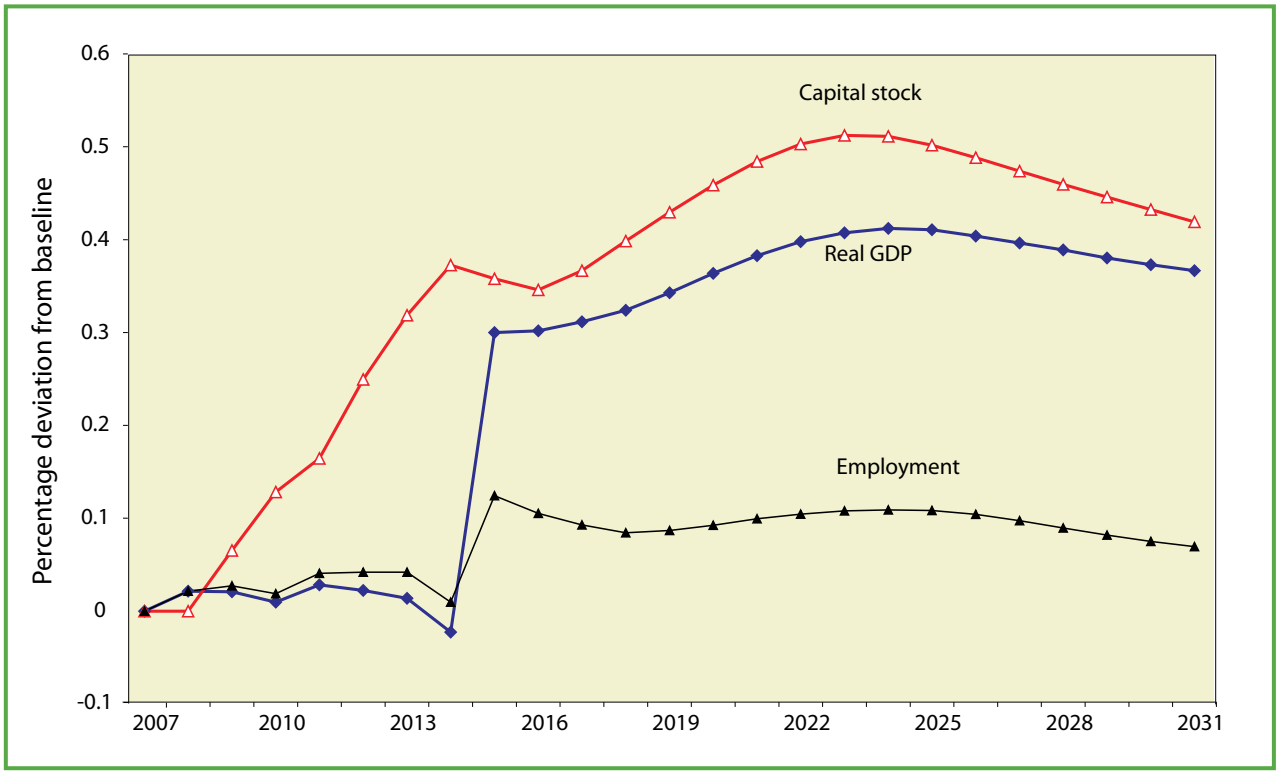

FIGURE 12.2 KEY RESULTS HUNTER REGION – GDP CAPITAL AND EMPLOYMENT

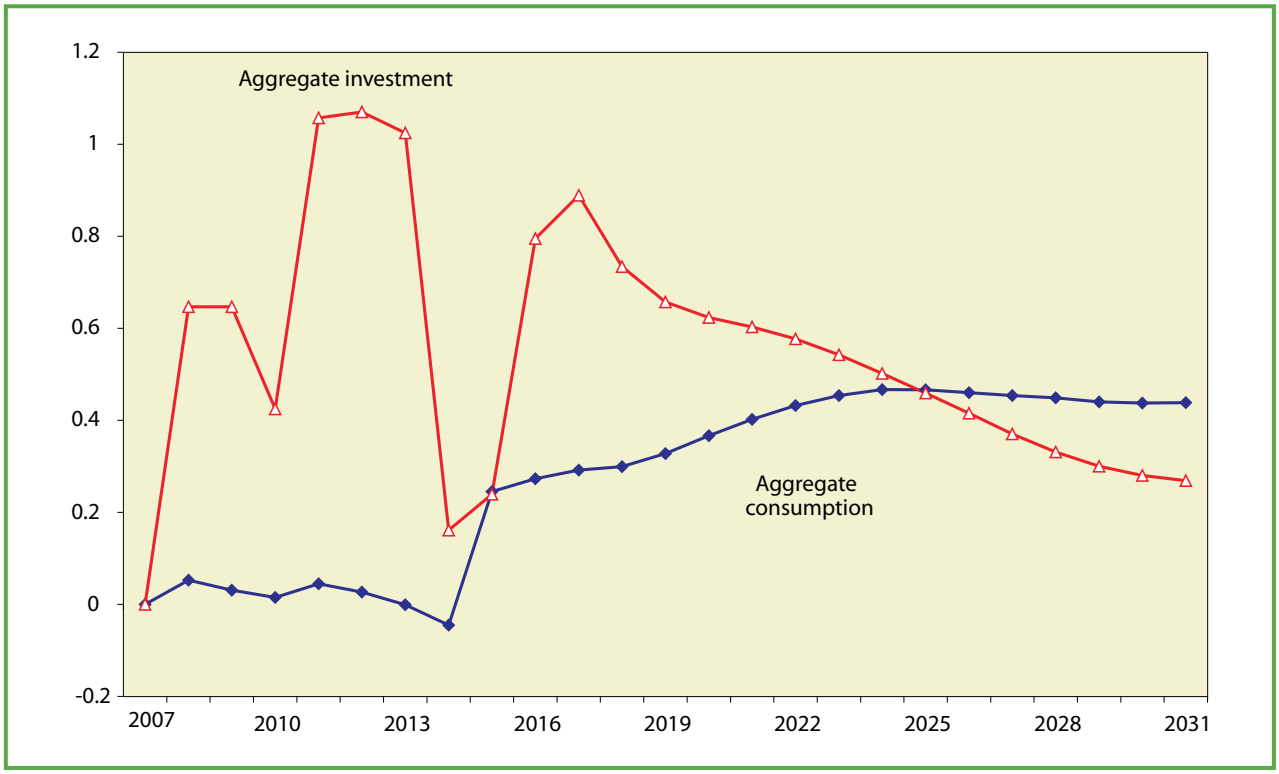

FIGURE 12.3 KEY RESULTS HUNTER REGION – AGGREGATE CONSUMPTION AND AGGREGATE INVESTMENT

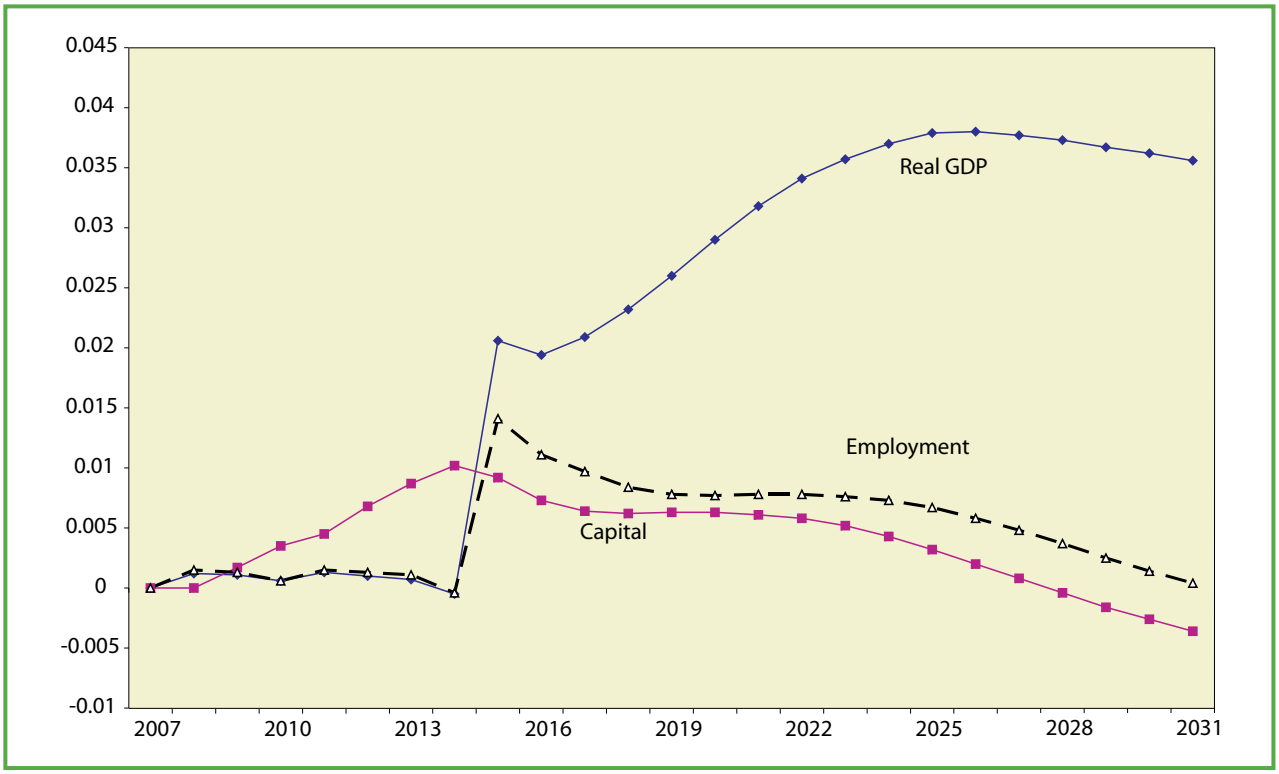

FIGURE 12.4 KEY NATIONAL RESULTS – GDP CAPITAL EMPLOYMENT

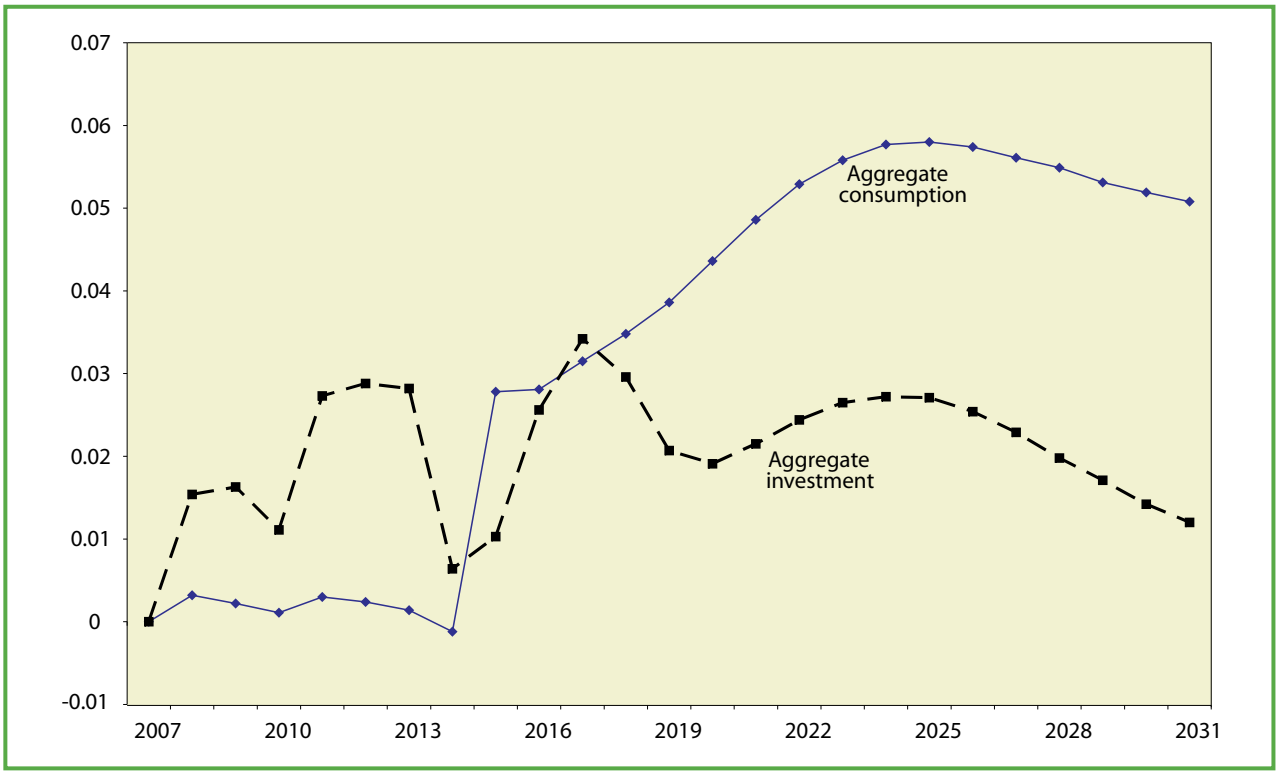

FIGURE 12.5 KEY NATIONAL RESULTS – AGGREGATE CONSUMPTION AND AGGREGATE INVESTMENT

The net present value (the discounted sum of future year by year household spending gains) of the welfare gain arising from the Project is $2.3 billion at a national level. This assumes that water scarcity rises in the future (that is, additional supplies in the future are smaller than additional demands).

The following three figures summarise the expected paths of household income and provide an insight into the benefits that might be achieved at the Hunter region, rest of NSW, and rest of Australia levels.

Hunter region, NSW

Figure 12.6 shows there is a clear difference in impact between the construction phase of the Project and the operation phase. There is a short period where household income is negative around 2013–14. During this time construction has largely been completed however the dam has not achieved full operations. That is, the service potential from additional water is not there because the dam is filling up.

During operation of the dam, average annual household income in the Hunter region is $35.6 million better in present value terms than the do nothing case.

Rest of NSW

Figure 12.7 shows that the rest of NSW benefits to a small degree from the construction phase of the Project. Household income in the rest of NSW increases slightly during the construction period, reflecting the spillover of some construction benefits into the rest of the State.

During operation of the dam, average annual household income in the rest of NSW is $59.5 million better in present value terms than the 'do nothing' case.

Rest of Australia

The rest of Australia does not benefit as much during the construction phase as the Hunter region or rest of NSW (refer Figure 12.8)

During operation of the dam, average annual household income in the rest of Australia is $34 million better in present value terms than the do nothing case.

12.4 Effects on the local economy

The Tillegra Dam Project would have direct and indirect effects on the local economy during both construction and operation of the dam. These would be on a number of scales ranging from individual farming enterprises through to Shire-level effects.

12.4.1 Directly affected farming enterprises

The Project has identified 38 properties that will require acquisition in full or in part. To date, HWC has negotiated the purchase of 32 properties. HWC has purchased these properties in accordance with the market value of the land as well as compensating landowners consistent with and beyond the provisions of the *Land Acquisition (Just Terms Compensation) Act 1991*.

In addition to market value HWC has met the following costs:

- legal fees for the landowner on the sale to HWC
- legal fees for the landowner on their subsequent purchase of a new property
- valuation fees for the landowner on the sale to HWC

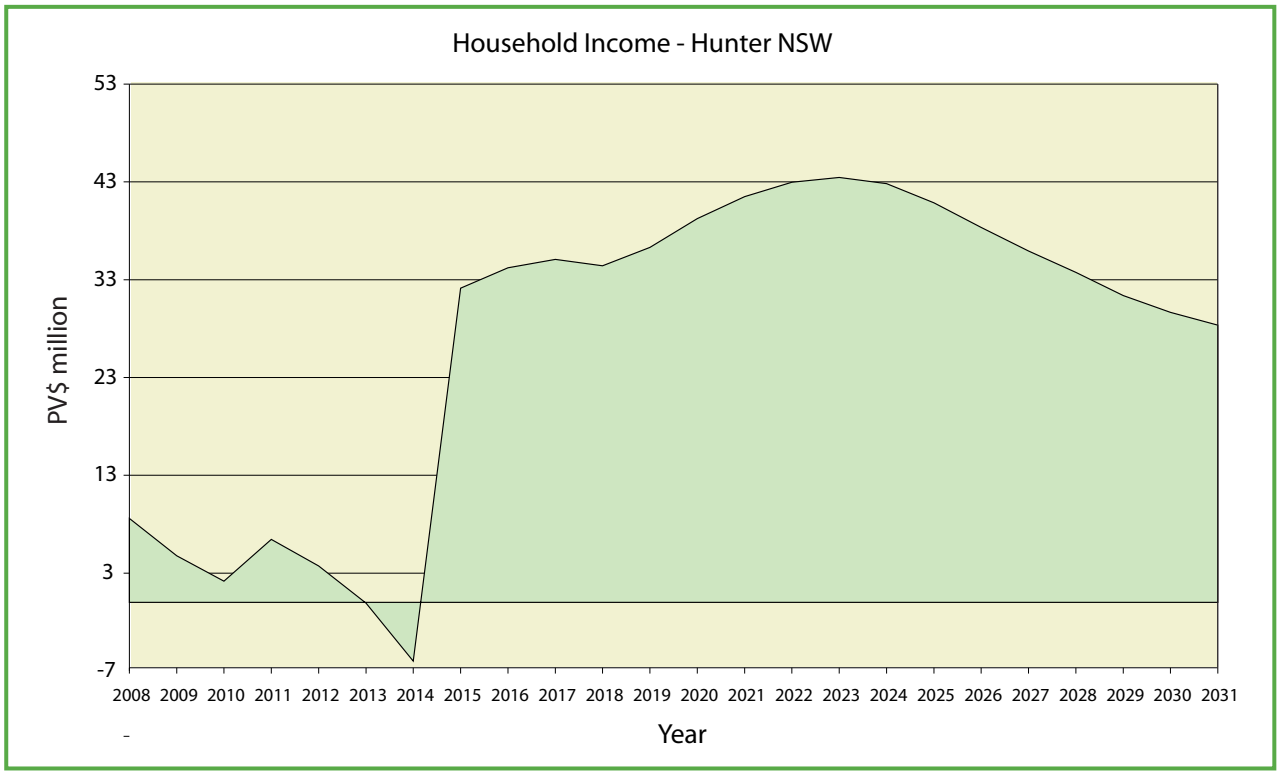

FIGURE 12.6 HOUSEHOLD INCOME – HUNTER

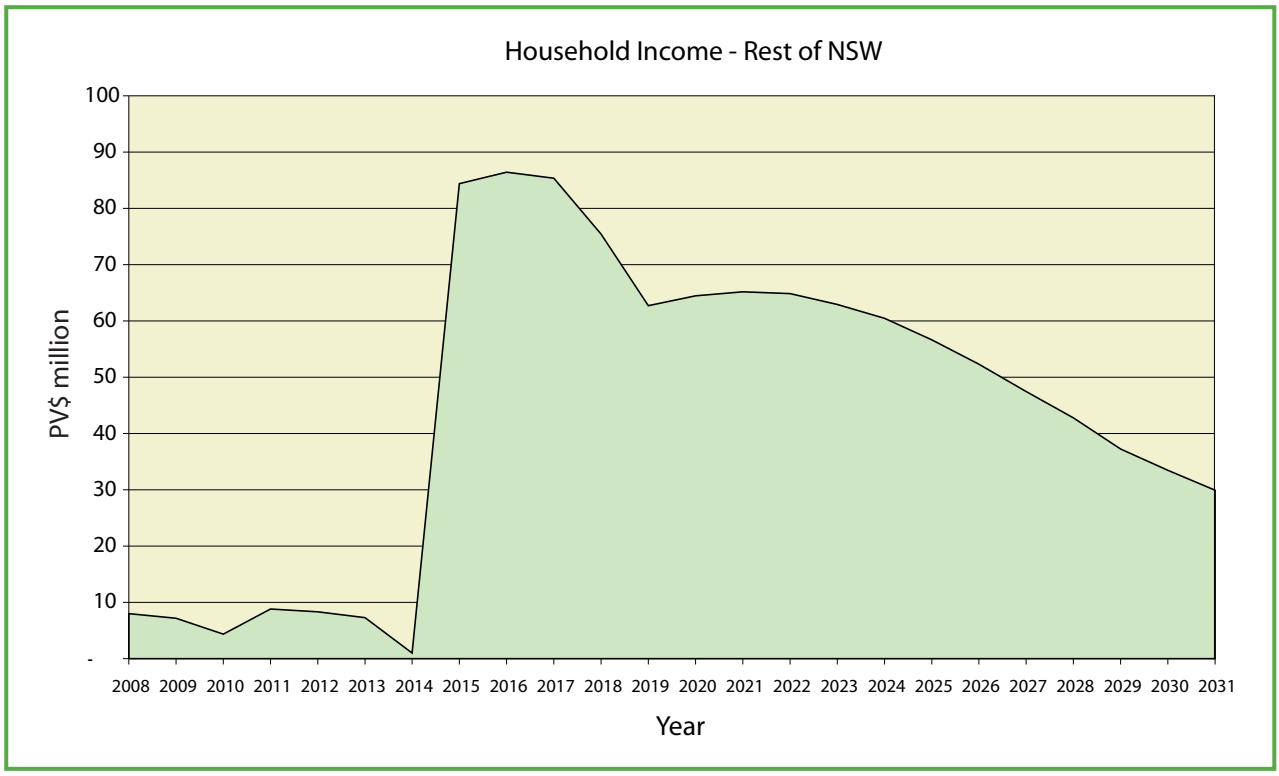

FIGURE 12.7 HOUSEHOLD INCOME – REST OF NSW

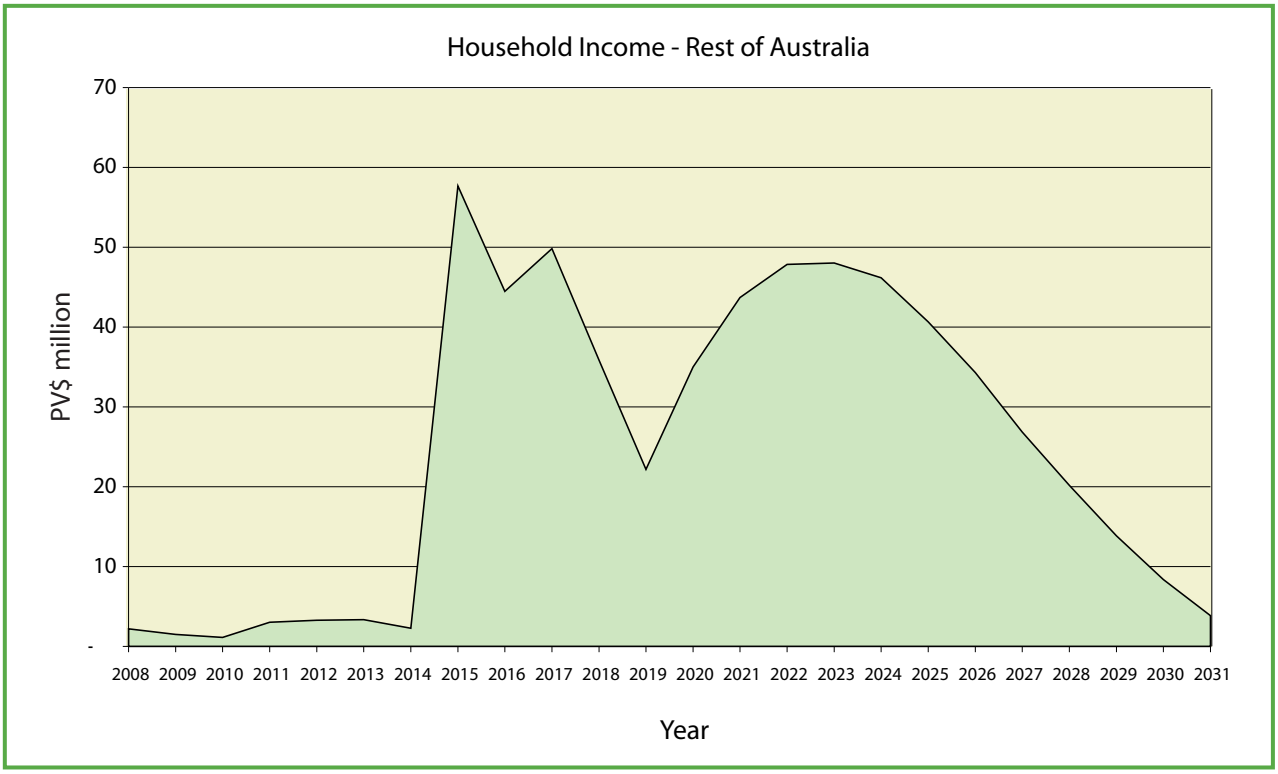

FIGURE 12.8 HOUSEHOLD INCOME – REST OF AUSTRALIA

- valuation fees on subsequent property purchase
- accountancy fees for the sale to HWC (mainly in relation to provision of advice for issues such as Capital Gains Tax)
- building and pest reports on subsequent property purchases
- cost to transport stock to the new property
- solatium
- cost of relocating household effects to the new property
- stamp duty on the subsequent property purchase
- bridging costs for any delays in sale timeline
- legal fees in entering into a lease back arrangement with HWC
- allowance for time spent inspecting other properties
- bank fees incurred (eg discharge of existing mortgage, etc).

Following these principles, landowners have been adequately compensated in order for them to consider purchasing land within Dungog Shire, the local region, or elsewhere within NSW.

The majority of landholders have leased back their former properties from HWC at a greatly discounted rate. This has ensured that former owners have had the opportunity to remain farming within the Shire until land is required as part of the Project or alternatively they find a suitable property to purchase.

Of the 38 properties, 17 are occupied by the landowners. Three are expected to remain in the Project area on diminished landholdings, seven have acquired properties elsewhere within Dungog Shire

and seven have acquired properties outside of Dungog Shire. The majority of landowners who have acquired replacement properties are semi-retired/retired. The annual income of the remaining five to six landowners is estimated to be between $30,000 and $70,000 based on information gathered during property purchases completed to date.

The 21 properties not occupied are owned as either hobby farms or as investment grazing properties. Eleven of these landowners are resident elsewhere in Dungog Shire; two will retain a diminished landholding within the Project area. The remaining eight properties are owned by six landowners all of whom already reside elsewhere in the Hunter region or in Sydney.

In total, income generated from the 38 properties would range between $1.1 million and $2.6 million on an annual basis, based on information available to HWC.

12.4.2 Shire-level effects

The acquisition of the properties required for the Tillegra Dam Project would reduce Council's annual rates income by approximately $80,000 once construction of the dam is completed and filling of the storage occurs. This would be partially offset through the removal of the need to provide services to these properties, however, there would be an annual shortfall which effectively would be removed from the local economy through Council expenditure (salaries, services, etc).

As noted in Section 12.4.1, HWC has been progressively purchasing land to facilitate the construction and operation of the dam. As at August 2009, there remained six landowners with which to negotiate land purchases. Purchase has taken place on a property by property basis. As such, boundaries have not necessarily accorded neatly with the general Project boundary, particularly for those properties located both within and outside of the inundation area. Where landowners have requested HWC purchase total holdings as opposed to directly affected land this has occurred.

This has resulted in the acquisition of land which is not directly required for the Project and which HWC plans to divest through the commercial property market and would therefore be available for Council to levy rates on. The timing of this is uncertain but divestment is unlikely to commence until the dam and associated infrastructure had been constructed.

The removal of up to 38 households from the district (though not all have necessarily left the Shire) would have some effect on local business activity. As indicated in Section 12.2.2, however, it is estimated that 55-60 per cent of household spending leaks from the Shire. It should also be noted that some of the farm income that is generated from the Project area is taken directly out of the Shire as owners do not reside on farm and income above that reinvested in the business is spent directly at thier primary place of residence outside the region.

During construction, it is likely that local business would experience patronage by construction workforce personnel due to Dungog's proximity to the construction site. This would provide a stimulus to the local economy during the construction period.

Following construction, it is anticipated that visitor numbers to Tillegra Dam would progressively increase, particularly as the storage nears its maximum and the range and extent of water-based recreational activities increases. Visitor numbers may also be driven by other tourism developments which may be established by private operators. Again, due to Dungog's proximity to Tillegra Dam, the local economy would be expected to benefit from increased visitation levels. Recreation opportunities are discussed in further detail in Section 12.10.

There could be a short term decline in spending in the local economy between the end of construction (and when members the construction workforce from outside the district leave) and

when the storage reaches a level that would attract significant numbers of visitors that would engage in water-based recreational activities.

During construction, while it is expected that the contractor's management team would be brought in from outside the Shire, it is similarly expected that there would be significant opportunities for construction positions to be filled by Shire residents. There would also be opportunities for skill development in workers as well as the development of new (not currently provided in the area) services and products to assist the construction of the dam, that would provided local income for the duration of the construction period. Some of these industries could potentially remain in the area after the construction period and provide additional local income post-construction.

12.5 Effects on land use and zoning

Land use surrounding the storage area includes agricultural uses as well as rural homesteads. The most obvious land use change associated with the Project would be the conversion of the 2,100 hectare inundation area from agriculture to water supply.

An analysis of the land that would be retained by HWC for operational use of the dam (including the inundation area and surrounding buffer zone, operational and recreational areas, and the habitat corridor) together with land required for the relocation of Salisbury Road identified that the following areas of agricultural land would be affected (refer Figure 12.1):

- Class 2 agricultural land – 82.5 hectares
- Class 3 agricultural land – 2,156.9 hectares
- Class 4 agricultural land – 1,171.2 hectares
- Class 5 agricultural land – 532.5 hectares.

According to DECCW Land Use Mapping, five dairy properties and one crop farm would be affected by the inundation with the rest of the land being identified as grazing properties. Potential social effects of land acquisition are discussed in Section 12.4.

Management of water quality in the storage would include the establishment of a nominal 50 metre wide buffer zone around the entire perimeter of the storage above the FSL. For the most part, land in this zone would be allowed to naturally revegetate (with supplementary planting undertaken if and as required) thereby acting as a filter for surface runoff. In some locations it may be necessary to provide fencing to restrict access by livestock. A number of other areas may be utilised for recreational purposes (refer Sections 6.7.6 and 12.9 of Working Paper N for further details on recreational opportunities).

In recognition of the need to effectively manage water quality in the storage but to also not preclude opportunities for recreational activities (including commercial enterprises), a draft management plan has been prepared to facilitate achievement of these two broad objectives. The draft ILUP is intended as an ongoing management tool for HWC and Council (and the wider community). The draft ILUP outlines the future operational and recreational activities that could occur on and around the storage as well as identifying implementation processes.

Larger blocks of land which do not share a boundary with the storage may be suitable for addition to existing/neighbouring holdings or sold as separate parcels. As the storage begins to fill, confirmation of land boundaries (for properties that would need to be subdivided due to inundation of part of that property),would enable land to be progressively released for sale.

For properties that border the storage/buffer area and that would be divested, HWC would consider whether to place covenants on the land (eg regarding set backs from the buffer area and sewage disposal arrangements). The purpose of any such covenants would be to protect the water quality of the storage in line with the objective of maintaining a high quality water supply.

Disposal of land may act as a catalyst for land use change with any development being controlled through the provisions of the Dungog LEP. Council's *Draft Dungog Land Use Strategy* indicates that the area surrounding the storage is not an appropriate location for a substantial increase in population due to its isolation from services. Rather, it supports the continuation of agricultural land uses around the storage area. The draft strategy identifies land along Salisbury Road below the dam wall could be zoned RU4 Rural Small Holdings, with a minimum lot size of 15 to 20 hectares. This would provide for subdivision of larger blocks of land and an opportunity for Council to increase its rates income.

The likelihood of downstream impacts on land use is considered to be low. As described in detail in Chapter 10 and Working Paper D, the proposed run-of-river transfers would be undertaken in such a fashion to minimise impacts on hydrology and water quality, the form of the river channel, and aquatic ecology. Development of the strategy has been cognisant of downstream water uses and the need to maintain their existing entitlements.

Potential zoning

As described in Section 8.1.4, the majority of the area affected by the Project (which includes the dam and associated structures, inundation area, transfer pipeline, new Salisbury Road alignment, etc) would be on land that is zoned Rural 1(a). The sole exception to this is a small parcel of land comprising Tillegra Reserve which is zoned Environment (7). This would be substantially affected by the southern part of the dam wall and the spillway, and by construction activities in general.

The NSW Government has developed a standard template LEP that all councils need to conform to for their respective LGAs and have operational by 2011. Dungog Shire Council is currently preparing its standard LEP, under the Model Provisions, the aim being for it to be operational prior to 2011.

Preparation of the draft ILUP has overlapped with Council's preparation of the standard LEP and attention was paid to making it as consistent as possible in providing clear objectives for the future development of the area. To this end, the draft ILUP only identifies potential zonings that could be applied by Council on land surrounding the storage. It would be at Council's discretion as to the exact zonings allocated and the specific locations of such zonings.

Potential zonings for the storage and surrounding area include:

- SP1 Special Activities
- SP2 Infrastructure
- SP3 Tourist
- E3 Environmental Management
- RU1 Rural Production
- RU4 Rural Small Holdings.

The Standard LEP is simply a template and provides flexibility to each individual council. As such, the following potential zonings assume that Council would make certain activities within the zoning permissible.

These zonings have been identified based only on the use and activities that could be undertaken on and around the storage. They do not take not take into account the whole of Dungog Shire which

Council, in preparing its standard LEP, is required to do. Activities identified in the draft ILUP as required to be permissible may not necessarily be consistent with Council's direction for the wider Shire.

Subsequent to preparation of the draft ILUP, Council prepared a Land Use Strategy which was placed on public exhibition in July 2009. The strategy makes a range of recommendations as to the potential zonings for areas around the storage area. These comprise:

- SP2 Infrastructure (Tillegra Dam infrastructure and ancillary facilities)
- SP3 Tourist (areas identified in the draft ILUP for recreational facilities, with the exception of additional land within the Underbank precinct and the option for future tourist zoning south of the Underbank precinct)
- E2 Environmental Conservation (areas identified as land available for the habitat corridor stretching from Mount Butterwicki through to land on the northern side of the storage)
- RU4 Rural small holdings (for properties below the dam wall extending eastward to Chichester Dam Road
- W2 Recreational Waterway (for the storage area and 50 metre buffer zone).

As may be seen there is general consistency between these potential zonings and the draft ILUP.

12.6 Effects on natural resources

A review of the Department of Mineral Resources *Minview* database indicated the presence of a number of extractive resource sites in the wider locality. While the extractive approval and licensing status for these is not known, the vast majority are not operational. The only operational site was the Williams River sand deposit near Bendolba. The *Minview* database does not identify the location of this deposit. The closest major regional hard rock quarry with QA concrete aggregate material is the Railcorp Quarry at Martins Creek about 30 kilometres to the south.

Once constructed, the dam would represent a permanent barrier to the downstream movement of sediment and consequently there would not be any significant replenishment of material removed from the river channel or its immediate margins other than what might be eroded from upstream sections of the river channels below the two dams. Over the longer term the economic viability of the sand deposit resource may therefore reduce but this would also be influenced by a range of factors unrelated to the Project such as market demand, etc.

As noted in Section 7.6, enquiries with DPI (Mineral Resources) indicated that there are no mineral deposits of a significant nature at Tillegra. It was also noted that a petroleum exploration authority had been granted for land across the majority of Dungog, Gloucester and Taree LGAs. The authority encompasses the Tillegra Dam site however it is not considered likely that petroleum reserves of any substantial nature would be found specifically under or near the dam site.

The Project would not impact on any forest resources in the region nor restrict access to these.

12.7 Demand on local health care facilities

The principal medical facility in Dungog is the Dungog Community Hospital. At the time of preparation of the EA Report there were also four Dungog-based medical practitioners listed in the Yellow Pages.

According to the Hunter New England Area Health Service website, Dungog Community Hospital is a 15–bed rural hospital that provides inpatient medical, post–surgical and post-natal services for

appropriate patients, transferring from other hospitals. A 24–hour emergency service manages the needs of the local community and ambulance transfer to The Maitland Hospital or other larger facilities is enabled by road or air.

There is provision for diagnostic and allied health services to be arranged on-site. Outpatient and community-based services include social work, women's health, sexual assault, child and family health, dietetics, pain management and rehabilitation, podiatry, physiotherapy, speech pathology, an optometrist, an audiometry clinic for hearing testing, needle exchange and palliative care.

There are a number of other health care facilities in the wider lower Hunter region. These include major hospitals in Newcastle such as the John Hunter Hospital and smaller community facilities such as The Maitland Hospital and Singleton Hospital.

It is expected that the Project would have minimal demand on local health care facilities in terms of increased demands on services. As indicated in Chapter 7, it is expected that the construction contractor(s) would bring a core team of specialist workers to the site with the majority of construction workforce requirements being drawn from across the lower Hunter and would commute to the worksite. There may be a need for occasional emergency services but apart from this it is expected that the medical and health needs of the construction workforce would be serviced outside of Dungog.

12.8 Demand on local accommodation

While approximately 280 construction workers could be working on the Project at the peak periods, based on preliminary discussions with a number of construction contractors, it is anticipated that the majority of the construction workforce would be recruited locally from the Dungog LGA or other areas in the lower Hunter region, with only approximately 10 per cent being brought in to the area by the construction contractor.

On this basis, approximately 28 people would be looking for accommodation within Dungog or the surrounding area. For those purchasing a residential property or looking for rental accommodation, it is unlikely that there would be sufficient availability of either houses or rental accommodation in the local area and therefore some would need to find suitable accommodation in the wider area, such as in Singleton, Maitland, Newcastle or Raymond Terrace.

As noted, it is highlighted that personnel comprising the core team of the workforce may choose to reside in Dungog for all or part of the duration of construction activities but could equally choose to commute from other settlements in the Dungog Shire or the region (such as Singleton or Maitland or even as far as Newcastle, Raymond Terrace or Port Stephens). It is expected that the decision would in part be based on a number of factors including cost and the quality of accommodation choices.

Section 12.2 noted the availability of private rental accommodation in Dungog LGA and the wider area. Additionally, within Dungog there are two hotels (48 rooms in total), one motel (12 rooms) and three bed and breakfast establishments (10 rooms in total). There are also a few other bed and breakfast establishments that have 2-4 rooms around the Barrington Tops area and some others to the south. It is not anticipated that there would be a significant demand on accommodation within Dungog due to the proximity of other larger urban areas.

For some major infrastructure projects construction contractors set up construction camps, typically where a project site is located in a remote area and there are effectively no viable local accommodation alternatives. The Tillegra Dam Project is not considered to be in a remote location,

being approximately 70 kilometres from Newcastle and with other towns and settlements closer to Dungog. Should the construction contractor decide to establish a camp, there would be options for siting any such camp on HWC-owned land in proximity to the dam construction site. Such action if proposed by the construction contractor would be subject to its own environmental assessment and approval process.

12.9 Quart Pot/Munni Cemetery

Quart Pot/Munni Cemetery is located immediately off Salisbury Road, between Munni and Underbank, occupying an area of approximately 0.85 hectares of sloping land. There are approximately 88 known burials in 60 graves in the cemetery. The oldest burial dates from 1923 while the most recent took place in January 2008. There are about 10 reservations for future burials. The cemetery is of significant social value to the local community with several generations of local families buried there.

While specific details relating to operation of the storage have yet to be finalised (and would in any case be subject to approval of the Project), it is anticipated that for the majority of the time, the dam would be kept between 90 per cent full and FSL. This means that the area currently occupied by the cemetery would be under water most of the time (ie for many years and possibly even decades at a time).

Issues and aspects relating to heritage matters are considered separately in Chapter 13 *Contemporary Heritage* (with further detail provided in Working Paper L). The following discussion focuses on social issues relating to the eventual inundation of the cemetery and options considered to manage the associate impacts. Reference should also be made to Working Paper H *Quart Pot/Munni Cemetery Relocation Plan*.

In June 2007, HWC released a brochure providing background on the Tillegra Dam project and outlining a range of issues relating to the cemetery. It also identified potential options for affected families to consider which essentially comprised:

- leaving the gravesite as is
- relocating either the entire gravesite or the headstone only to an alternative existing cemetery
- creating a new working cemetery and relocating either the entire gravesite or the headstone only.

It was also stated that if it was the general wish of affected families that a new working cemetery be established in the area, HWC would fund the establishment of that cemetery. In addition to the above options, HWC would create a memorial overlooking the existing cemetery site.

As indicated in Chapter 4, community consultation in relation to the cemetery was undertaken through a subcommittee of the TDCRG. The subcommittee (and the TDCRG) was consulted regularly during preparation and subsequent revisions of the relocation plan. Additional open days for the public and direct consultation with affected families has occurred and would continue to occur into the future.

12.10 Recreation opportunities

In addition to the storage acting as a high quality drinking water source to provide drought security and meet future population growth for the Lower Hunter region, HWC recognises that there is potential for it to also provide recreational and social benefits for the local and wider community. These would serve to offset some of the impacts associated with the Project such as the reduction in land available for agricultural purposes. The following discussion is expanded on in Working Paper N *Draft Integrated Land Use Plan*.

The storage would be operated such that outside of drought periods, the water level would be maintained between 90 per cent of FSL and FSL (the difference in elevation between these two levels being approximately 1.8 metres). The relatively stable storage level could support a variety of water-based recreational activities as well associated land-based activities. It is expected that a number of these activities would be undertaken on a commercial basis by private operators (in accordance with HWC's land management requirements). Accordingly, responsibility for servicing, implementing and managing these activities would not rest solely with HWC.

12.10.1 Comparable recreational areas in the general area

There are a number of storages, State Forests and National Parks in the Upper Hunter region. Chichester Dam, Lostock Dam and Glennies Creek Dam (known as Lake St Clair) are used for a variety of recreational purposes in addition to being used as water storages. North of Tillegra is the Barrington Tops National Park (part of the listed World Heritage area), as well as State Forests in the Upper and Lower Barrington area. Moving east towards the coast is Myall Lakes National Park and further south near Clarence Town are the Wallaroo and Karuah Nature Reserves. These comparable recreational areas are shown on Figure 12.9 and the facilities and activities provided at each listed in Table 12.6.

TABLE 12.6 SNAPSHOT OF COMPARABLE RECREATIONAL FACILITIES AND ACTIVITIES IN THE UPPER HUNTER REGION

	CHICHESTER DAM	BARRINGTON TOPS	LOSTOCK DAM	LAKE ST CLAIR	KARUAH AND WALLAROO	MYALL LAKES
Vehicle entry fee				Y		Y
Camping grounds	Y	Y	Y	Y	Y	Y
Caravan sites		Y	Y			Y
Cabins/cottages	Y	Y			Y	Y
Toilets	Y	Y	Y	Y	Y	Y
Picnic facilities	Y	Y	Y	Y	Y	Y
Barbeques	Y	Y	Y	Y	Y	Y
Kiosk				Y		Y
Swimming		Y	Y	Y		Y
Showers			Y	Y		
Walking tracks	Y	Y	Y	Y	Y	Y
Cycling		Y		Y		Y
Boating			Y	Y	Y	Y
Canoeing/ kayaking		Y	Y	Y	Y	Y
Boat ramps			Y	Y	Y	Y
Fishing		Y	Y	Y	Y	Y

12.10.2 Potential recreational opportunities

Walking tracks and lookouts are found throughout the region and there is the opportunity to augment these by creating similar walking tracks around the storage. There is also potential to extend walking tracks to Chichester, further linking the mountains to the storage.

Other potential recreational opportunities may include:

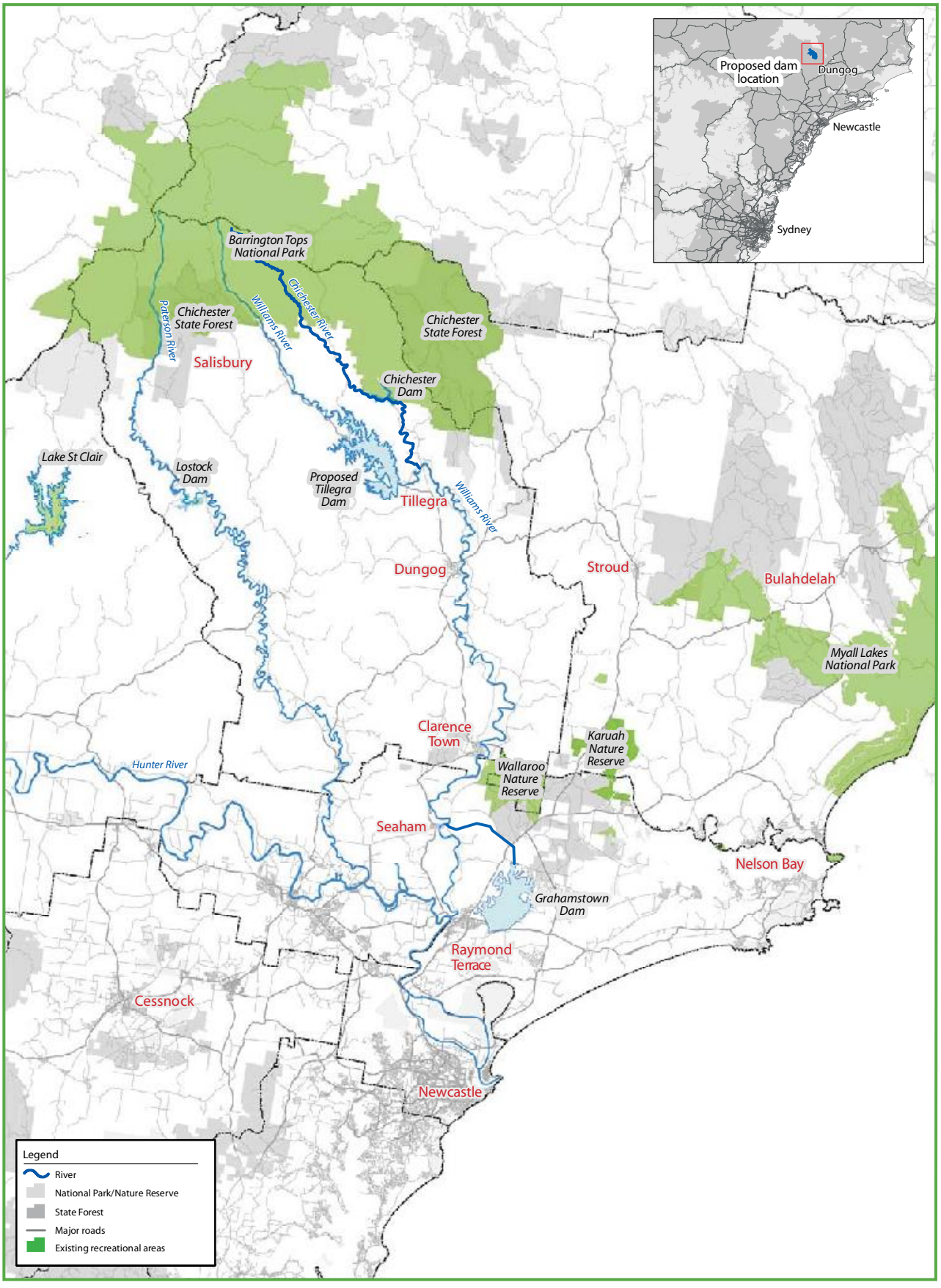

FIGURE 12.9 COMPARABLE RECREATIONAL AREAS

- visitor information–to provide visitors with information about the dam through the use of interpretive signage, and education facility and an interpretive centre
- access and leisure areas–creating suitable access to the storage and leisure areas
- camping grounds–establishment of camping grounds and other forms of short stay accommodation
- lookouts–providing visitors with opportunities to view the dam wall, storage an rural surrounds from a variety of vantage points during construction and operation of the Project
- amenities–the provision of amenities such as access to potable water, toilets, picnic and barbeque facilities
- sale of provisions–such as fishing licenses and outdoor equipment
- swimming–the provision of safe and appropriate designated swimming areas
- boating and associated facilities–passive (ie canoeing and kayaking) and power boating activities in designated areas of the storage and the construction of a boat ramp
- fishing–recreational fishing
- children's playgrounds
- commercial accommodation.

The storage could also serve as a location for water-based competitions such as rowing that have not previously existed in the area.

The overall concept for potential recreational uses as developed for the draft ILUP is illustrated in Figure 12.10. HWC is supportive of use of the storage for recreational uses subject to the overarching water quality management objectives. Feedback from the community to date has also shown that this would be extremely desirable.

While HWC has consequently undertaken planning activities, such as the draft ILUP, to facilitate access, it should be noted that HWC's role is simply to provide water and wastewater services to the Hunter region, not to manage recreational activities in isolation from other authorities. Recreational boating, fishing and general use of public space is generally managed by NSW Maritime, DPI, local government by laws and input from other relevant government agencies working under a variety of legislative responsibilities. Consequently submissions are invited from the public on the issue of recreational access and the type of activities that should be permitted or restricted on the storage.

12.10.3 Potential commercial opportunities

There is potential to establish a range of commercial activities (both relating to and independent of the dam) on or around the storage area. These may include:

- kiosk/shop/restaurant/bar/cafe
- conference centre/sport and recreation camp
- flying fox/climbing ropes
- house boats
- amphitheatre/outdoor cinema/ entertainment venue
- heritage centre
- golf/mini golf
- gondola/sky rail
- commercial fishing farm
- helicopter transport/tours
- adventure cycling/bike hire
- competitions/festivals
- environmental studies camp complex
- water bikes

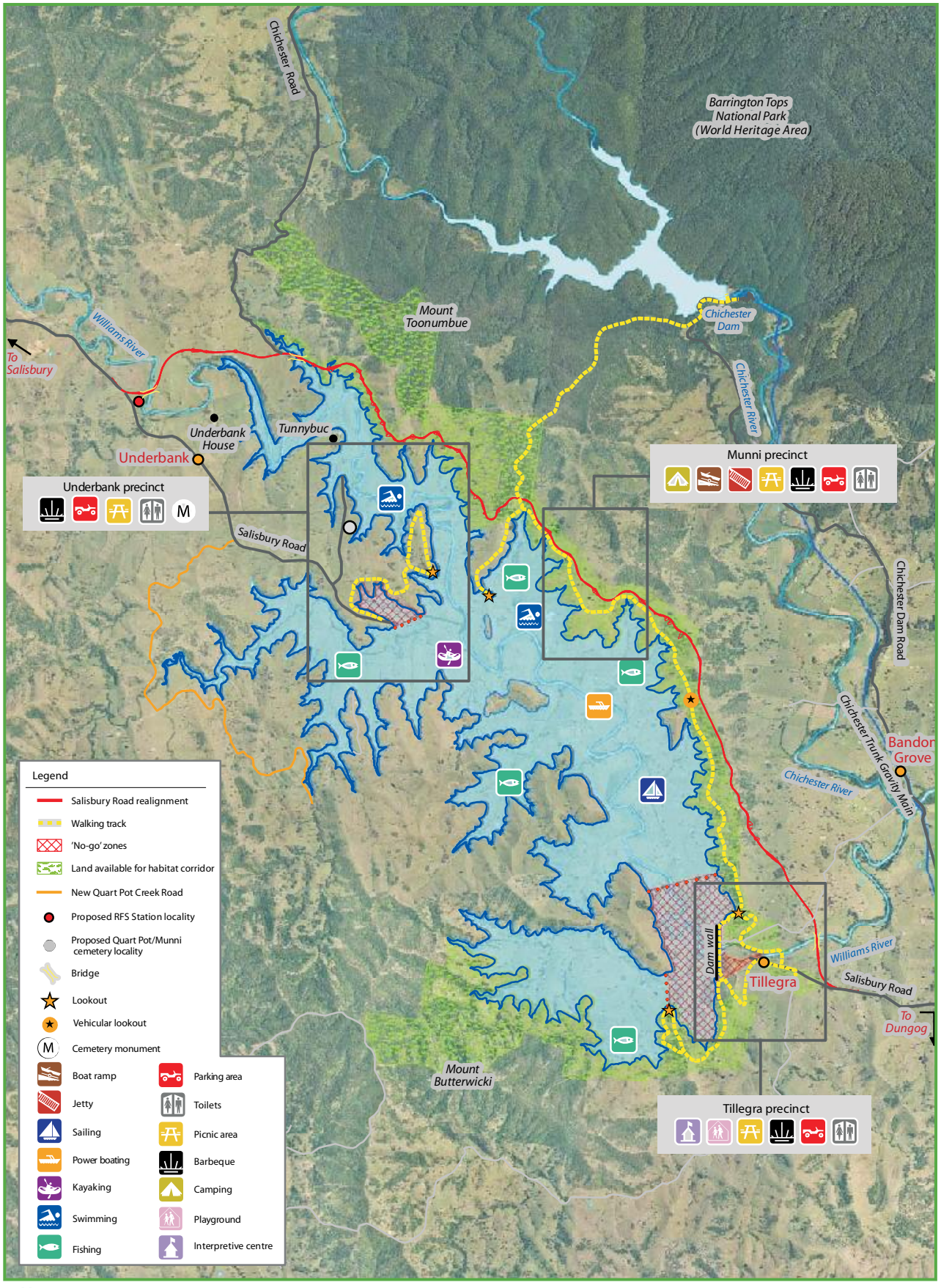

FIGURE 12.10 POTENTIAL RECREATIONAL OPPORTUNITIES

12.10.4 Potential visitation numbers

Visitor numbers would depend to a large degree on the perceived attractiveness of the dam to both the local and wider community. This may be influenced by such factors as the quality of the freshwater fishing and whether large specialist groups, such as school camps, water skiers and other specialist recreational groups such as canoe clubs are attracted to the dam and the facilities provided. Given the limited information currently available with respect to these factors, it is not possible to provide an accurate estimate of visitation numbers.

It is likely that visitor numbers, at least those relating to water-based recreational activities, would not be significant until the storage had reached its intended normal operating level, that is between 90–100 per cent of FSL (full supply level).

Appendix 5 to the *Dungog Local Government Area Situational Analysis* (Planning Workshop Australia 2008) provides an assessment of recreation and tourism potential associated with Tillegra Dam. It includes a review of potential visitation levels based on a comparison with other water storage dams, both in the Hunter Valley and wider NSW.

In terms of storage volume, Tillegra Dam is comparable to other large water storages in NSW but in terms of the recreational facilities that would be provided as part of the Project (refer Chapter 6 and Working Paper N), it is likely more comparable to smaller dams with limited visitor facilities. Existing storages in inland NSW near Tillegra include Chichester Dam, Lostock Dam, Lake St Clair, Lake Liddell and Glenbawn Dam. Visitation rates and facilities for these dams are as follows:

- Chichester Dam: a few thousand visitors per annum; facilities are limited to adjacent picnic areas
- Lostock Dam: a few thousand visitors per annum; facilities comprise a picnic area and boat ramp (with boating, windsurfing and canoeing allowed on the storage area), and a caravan park
- Lake St Clair: 10,000 to 15,000 visitors per annum; facilities are a picnic area, boat ramp and a caravan park, with fishing, swimming, power and non-power boating, waterskiing and wake boarding permitted
- Lake Liddell: estimated at 3,000 visitors per annum; facilities are a picnic area, boat ramp and camp ground; activities include powered and unpowered boating and fishing.
- Glenbawn Dam: visitation rates estimated at between 30,000 and 70,000 when the storage is at full capacity. Facilities inlcude a caravan park, camping grounds cabins, picnic areas, playgrounds, amateur club facilities for fishing, rowing, archery and water skiing, a kiosk boat ramp and similar visitor facilities. A number of premier water-based activities are also organised and held on the storage including bass fishing tournaments and the Glenbawn classic swim event.

These provide an indication of possible visitation rates to Tillegra Dam. However, the analysis notes that the level of visitation to water storage dams is dependent on a range of factors including activities permitted on the storage and any restrictions (eg boat speed limits) that may be in place, water levels, and the diversity and quality of the facilities available.

HWC is supportive of use of the storage for recreational uses subject to the overarching water quality management objectives. Feedback from the community to date has also shown that this would be extremely desirable. HWC has consequently undertaken planning activities, such as the draft ILUP, to facilitate access however it should be noted that HWC's role is simply to provide water and wastewater services to the Hunter region, not to manage recreational activities in isolation from other authorities. Recreational boating, fishing and general use of public space is generally managed by NSW Maritime, DPI, local government by laws and input from other relevant government agencies

working under a variety of legislative responsibilities. Consequently submissions are invited from the public on the issue of recreational access and the type of activities that should be permitted or restricted on the storage.

Submissions made during the exhibition period would be collated and shared with relevant government agencies and Dungog Shire Council to gauge support for recreational access. If recreational access to the dam is considered to have a detrimental impact on other public infrastructure, such as for example, roads, access to the dam/storage or the types of activities could be restricted if requested by the local community and Dungog Shire Council, or in order to avoid any adverse impact.

Initially in the period immediately following construction, and as the storage fills, visitation numbers would probably be toward the lower end of this range. While it is proposed to provide several boat ramps as part of the public area facilities, initially these would be well above the storage water level. Additionally, power boating is unlikely to be permitted for navigational safety reasons until water level had risen to a suitable level to reduce the risk of striking submerged objects such as trees and fence posts.

Tillegra Dam is closer to the coast than other dams, and the presence of a substantial number of other competing recreational facilities/attractions (including other water storage areas mentioned above) both locally and within the wider region could impact on visitor numbers. Due to these factors, visitation rates could be anywhere from a few thousand to 50,000 per year depending on the extent of facilities provided, extent of complimenting private investment into the tourism industry and the extent of recreational activities permitted. On this basis, visitation rates for Tillegra Dam cannot be accurately estimated at this stage.

Should recreational access to the dam be fully supported by the community, experience at several other dams in the region indicates that the timeframe and staging of various facilities could be brought forward through the involvement of HWC and private developers in the provision of facilities and support infrastructure that have been facilitated through appropriate planning and through successfully securing available funding.

12.11 Impact mitigation

It is generally recognised that in addition to construction and operational impacts, there are also socioeconomic-related impacts during the planning stage of major dam projects. In addition to impacts on ecosystems, large dams also affect communities, both those within the immediate vicinity of the dam and inundation area, and also the wider community. Impacts, both positive and negative, occur to varying degrees throughout the planning and project cycles. At the planning and design stage, an important social impact is the delay between the decision to build a dam and the onset of construction. This can have consequences through discouraging investment within and adjacent to the inundation area. A related issue can be the psychological effect on people within the affected area (World Commission on Dams 2000).

Cognisant of these types of impacts, HWC has undertaken or would undertake the following activities:

- provision of funding of $323,000 to Dungog Shire Council in partnership with the Department of Planning to undertake a planning and land use study to support revision of the LEP. This will allow the local community to take advantage of development opportunities arising from the construction of Tillegra Dam

- provision of funding of $100,000 to Dungog Shire Council to support a dedicated project manager to identify and secure funding for commercial and business opportunities that may arise from the Project
- provision of funding of $30,000 to the Dungog Information and Neighbourhood Services to provide support services for affected members of the community
- contribution of funds of $200,000 to the Dungog Advantage Fund (administered by the Department of State and Regional Development) to facilitate and promote local business enterprises
- provision of funding (approximately $170,000) to contribute toroad maintenance (refer also Section 16.3.4)
- provision of funding to compensate Dungog Shire Council for loss of rates income as a result of the project ($80,000 annually for the three years following commencement of filling)
- allowing (with the community's support) recreational facilities and activities on and around the storage to boost tourism in the area
- potential job opportunities for the region during the construction and operation phases of the dam
- undertaking property acquisition consistent with and beyond what is statutorily required under the *Land Acquisition (Just Terms Compensation) Act 1991*.

12.12 Summary

Improvements in water scarcity through provision of additional yield at the proposed Tillegra Dam is partly a function of existing and forecast increases in water scarcity relative to the baseline economic growth expected.

The Tillegra Dam project would generate predominantly positive short and long term economic impacts while lesser negative economic impacts would be localised in the proposed inundation area. The positive impacts are significant and would accrue at the Dungog Shire, Lower Hunter regional and New South Wales levels. At the Lower Hunter regional level, the provision of water storage capacity of 450 gigalitres would effectively double the existing storage capacity of the Lower Hunter region. This increase in capacity in HWC's water supply network and enhanced water supply security through provision of additional yield would be pivotal in underpinning and supporting continued population and economic growth in the region.

Population in the Lower Hunter region is forecast to increase from the current 500,000 persons to about 660,000 in 2026. Economic activity in the Hunter Valley region is forecast to continue to expand with this population growth and other major commercial and industrial development likely to be attracted to the region.

CGE Modelling undertaken by Monash University in 2008 indicated a number of benefits from the Project over the period 2009 to 2030. These arise from the capital and recurrent expenditure required for the Project. The modelled benefits include:

- a discounted national welfare benefit of around $2.3 billion, as measured by deviations in real household consumption for the Hunter region, rest of NSW and rest of Australia. This occurs firstly through additional investment in the construction period that stimulates short-run employment
- increased real GRP of approximately $1.18 billion in the Hunter region. Impacts during construction are relatively modest because the significant gains expected from increased water security are only realised as yield increases

- increased aggregate employment in the Lower Hunter through the construction and operation periods, generating an additional 1,849 jobs. A rise in capital stocks as the increased supply of water as a consequence of the Project makes the Hunter region more conducive to investment, with an increase in aggregate investment over 25 years of $588 million (undiscounted).

The CGE economic results are considered conservative since the modelling period extends for 25 years to 2030. There would be trailing economic benefits to the region beyond 2030 since the asset life of the Tillegra Dam would extend beyond 50 years.

Most significantly, the CEA modelling supports the Tillegra Dam water supply option when compared to other competing project scenarios to meet the region's yield objective. The Tillegra Dam option produces a levelised cost of $1,661 per megalitre from a present value of total costs of $378 million. This represents the lowest cost option to meet future expected water demand over the next 50 years.

The Project would reduce land available for agricultural activities by approximately 2,200 hectares, this relating principally to the inundation area (2,100 hectares at FSL) but also to the vegetated buffer zone around the storage and to the establishment of several recreation areas. This would occur on top of other already occurring land use changes, with deregulation of the dairy industry being a key driver in the reduction in the number of dairy farms.

It is anticipated there would be minimal demand placed on local housing and health resources due to the general accessibility of the Project site to other settlements in the Lower Hunter region.

When operational with storage water level between 90-100 per cent full, the dam (and storage) would represent a significant asset to the local and wider communities with regard to the variety of recreational activities that could be undertaken on and around the storage. Protection of water quality is an overriding operational objective. Management of activities which could pose a risk to water quality would be undertaken within the framework of a structured plan that complements and is consistent with the Standard LEP currently under preparation.

The storage and surrounding area would represent a substantial opportunity in relation to a diverse range of recreational activities that could take place on an around the storage. There would be associated commercial opportunities to cater to visitors.