Appendix A: Economic Impact Assessment

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Rye Park Wind Farm

386 MW Option

Economic Impact Assessment Update

Final Report

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1 Executive Summary

The proposed Rye Park Wind Farm is a major new wind farm proposal in the Yass area of NSW which has been in active development since late 2008 when the first wind monitoring mast was installed. The proposed wind farm is located to the north of Yass and east of Boorowa, New South Wales, on the edge of the Southern Tablelands and the South West Slopes in the vicinity of the township of Rye Park.

The project will involve the construction and operation of 80 wind turbines, together with the control and maintenance buildings, associated civil works and electrical infrastructure required to connect into the existing transmission network.

The modelling for this paper assumes the project is constructed with the capacity to deliver 386 MW of power.

The closest rural centre is the township of Rye Park located approximately 3 – 4km to the west of the site. Boorowa is located approximately 17 km to the north west and Yass is about 17 km to the south of the site. Young and Harden Murrumburrah are further west.

Hudson Howells has been engaged by Tilt Renewables to undertake an update of the Economic Impact Assessment of the proposed Rye Park Wind Farm Project last updated in 2015.

The objectives of this project include:

- An economic assessment of the Rye Park Wind Farm Project in terms of economic benefits to New South Wales, ACT, the region and also the local community.

- An assessment of the associated benefits of offsetting carbon by displacing the need for further non-renewable generation development, such as coal or gas fired power stations.

This economic impact assessment focuses on the effect of the Rye Park Wind Farm Project on regional incomes and employment associated with the construction and operating phases of the project. This effect arises through the primary expenditure directly associated with the project, and then from further 'rounds' of indirect expenditure that this direct expenditure stimulates as it flows to supplying industries and into incomes and consumption.

The economic modelling for the project has been undertaken using a conservative scenario of impact. This conservative scenario is based on a relatively low proportion of construction and operating inputs being supplied locally (i.e. by the LGA's of Hilltops, Yass Valley and Upper Lachlan, Goulburn-Yass region, the State of NSW and given its proximity to the project, the economy of the ACT). It is assumed that the turbines are imported from overseas, and the major local impact is based on transport, labour in assembly and payments to landowners.

Modelling for this scenario indicates that the project will generate $186 million of value added (which is a net contribution to Gross State Product[1]) **in the State of NSW** and $43 million of value added **to the ACT** – or a total of $229 million, over the period of construction and that this would happen over three years (allowing for lagged flow through effects). 1,204 person years[2] of employment in NSW and 242 in the ACT (total of 1,446) would be supported – or an average of over 401[3] jobs and 81 respectively (total of 482) sustained per year over three years. Once operational the project is

[1] Value added is the way in which economic activity is measured in the National Accounting system. At the national level this is equivalent to Gross Domestic Product (GDP) and is made up of returns to labour (wages and salary and taxes on labour) and returns to capital (gross operating surplus (or profits plus depreciation and financing costs) and company tax and GST). At the state level the national accounts call this amount the Gross State Product.
[2] i.e. the number of full time equivalent annual jobs created over the period. So a project that created 100 full time jobs that last for three years would have an outcome of 300 person years of employment
[3] 1204÷3

estimated to support annually $8.3 million of value added in NSW and $0.4 in the ACT, and support directly and indirectly of the order of 51 and 3 jobs respectively per year. Note that the impact at the national level would be similar to the state level, unless there are constraints in national labour and capital markets. Such constraints would reduce the national level of impact, with the project drawing resources into New South Wales and out of other states.

From a **broad regional perspective**[4], the modelling indicates that the project will generate $67.6 million of value added (contribution to Gross Regional Product) in the region over the period of construction and, again allowing for lagged flow through effects, this would happen over three years. 494 person years of employment would be supported, or an average of 165 jobs sustained per year over three years. Once operational the project is estimated to support annually $14.1 million of value added in the region, and support directly and indirectly (including the induced impact) approximately 119 jobs per year.

From a local perspective[5], the modelling indicates that the project will generate $26.6 million of value added (contribution to Gross Regional Product) in LGA's of Yass Valley, Upper Lachlan and Hilltops over the period of construction and, again allowing for lagged flow through effects, this would happen over three years. 179 person years of employment for local residents would be supported, or an average of 60 jobs sustained per year over three years. Once operational the project is estimated to support annually $4.4 million of value added in the local area, and support directly and indirectly (including the induced impact) approximately 29 jobs per year.

The above economic modelling results are summarised in the following tables:

Table 1: 3 Year Construction Impacts

Contribution to NSW GSP	Total NSW Employment Impact	Contribution to ACT GSP	Total ACT Employment Impact	Contribution to GSP - NSW and ACT	Employment Impact - NSW and ACT	Contribution to GRP - Goulburn Yass Region	Employment Impact - Goulburn Yass Region	Contribution to GRP - Yass Valley, Hilltop & Upper Lachlan LGA's	Employment Impact - Yass Valley, Boorowa & Upper Lachlan LGA's
$186.3 million	1204; or 401 per annum	$42.6 million	242; or 81 per annum	$228.9 million	1446; or 482 per annum	$67.6 million	494; or 165 per annum	$26.6 million	179; or 60 per annum

Source: Modelled Outcomes. GSP is Gross State Product, GRP is Gross Regional Product, and jobs are in FTE's or person years

Table 2: Annual Operational Impacts

Contribution to NSW GSP	Total NSW Employment Impact	Contribution to ACT GSP	Total ACT Employment Impact	Contribution to GSP - NSW and ACT	Employment Impact - NSW and ACT	Contribution to GRP - Goulburn Yass Region	Employment Impact - Goulburn Yass Region	Contribution to GRP - Yass Valley, Hilltop & Upper Lachlan LGA's	Employment Impact - Yass Valley, Boorowa & Upper Lachlan LGA's
$8.3 million	51 per annum	$0.4 million	3 per annum	$8.8 million	55 per annum	$5.2 million	37 per annum	$4.4 million	29 per annum

These outcomes are based on assumed levels of local supply, and where more of the activity could be retained in the region (while acknowledging the specialist nature of the construction itself), the more extensive the degree of economic activity in the local area.

Wind farms can have other positive and negative socio-economic impacts depending on a variety of factors and the specific communities being impacted by the developments. For example, farmers hosting turbines receive positive financial benefits while other communities might be subject to negative visual impacts. Other than employment and income generation, two of the most significant externalities of wind farms are on property values and carbon emissions.

[4] Regional in this context is defined as the Goulburn-Yass South area of New South Wales. These outcomes are included within the whole of NSW results as above.
[5] Local in this context is the LGA's of Yass Valley, Upper Lachlan Shire and Hilltops. . These outcomes are included within the broader results as above.

In relation to property values, many studies[6] by independent organisations around the world have failed to find any correlation between wind turbines and declining property values. Some studies have found positive property value impacts associated with:

- Improved regional amenities and infrastructure including local roads, firefighting access roads, etc.
- Increased regional incomes, jobs and property demand (as assessed above).
- Additional rental income from hosting towers.
- Provision of a drought-proofing income streams.
- Provision of post-retirement income for farmers.
- Improved biodiversity via less intensive farm activity.
- Prevention of land subdivision and slowing down the process of productive agricultural land changing to rural residential uses in the short to medium term with the shift caused by the additional income generated from the wind farm making agricultural use more viable.
- Erosion control and passive wind protection for stock from sub stations and turbine tower structures.

There will be localised positive and negative impacts associated with wind farms depending on individual property locations. Some may appreciate faster than market trends due to improved farm incomes from hosting towers (offsetting the loss of productive land) and improved access to infrastructure. Some may fail to keep pace with market trends due to visual and noise impacts. Potential disruption during tower assembly and infrastructure establishment is also noted. However, the evidence supports no significant overall long-term negative impact on property values associated with wind farm developments.

Finally, renewable wind energy generation has significant environmental benefits through **carbon emissions reduction** where it replaces coal or gas generated electricity.

Based on the project characteristics provided by Tilt Renewables, Rye Park Wind Farm will have the following operating characteristics:

- Total wind farm capacity of up to 386 megawatts.
- Annual average utilisation rate of 36%[7].
- Total generation of 1,396 Gigawatt hours (Gwh) per annum.

If it is conservatively assumed that when electricity is generated through coal fired stations, it produces 0.8 tonnes of carbon per megawatt hour[8] of electricity generated. Therefore, the generation of 1,396 Gwh per annum through coal generation would produce in the order of 1.08 million tonnes of carbon emissions. At a carbon price of $15.75 per tonne (conservative relative to international analyses), the value of carbon emission savings therefore associated with the Rye Park Wind Farm is estimated to be $17.0 million per annum or a net present value of $195 million over a 20 year period (discount rate of 6%).

[6] For example, the Lawrence Berkeley Study, United States, States http://eetd.lbl.gov/ea/ems/reports/lbnl-2829e.pdf, reported in Wind Energy the Facts, Clean Energy Council, March 2013

[7] Defined as the actual output of the project relative to its maximum possible output

[8] Annual carbon emissions from the National Electricity Market amount to of the order of 300 million tonnes (CO2-e) as at December 2019 https://www.tai.org.au/, with 50% of that being through coal powered electricity generation.

2 Introduction and Project Objectives

The proposed Rye Park Wind Farm is a major new wind farm proposal in the Yass area of NSW which Tilt Renewables has been actively developing since late 2008 when the first wind monitoring mast was installed. The Rye Park Wind Farm received planning and environmental approvals in 2017.

The wind farm will connect to the National Electricity Market via TransGrid's 330KV Yass to Gullen Range Line via a new 330kV connection substation. The site has been selected for its exposed windy ridges, cleared grazing land and proximity to the national electricity grid.

On Thursday 23 April 2020, Tilt Renewables lodged the Rye Park Wind Farm Modification Application to the NSW Department of Planning, Industry and Environment (DPIE). DPIE has advised that their statutory consultation process will run from Wednesday, 13 May continuing for 21 days until Wednesday, 3 June. The proposed modification includes:

- Removal of 12 wind turbines from 92 to 80.
- Increase to the wind turbine envelope to a maximum height of 200m (from 157m).
- Revisions to the Development Corridor to accommodate revised indicative Development Footprint.
- Selection of a preferred local transport route.

Figure 1: Location of Rye Park Wind Farm

Source: Google Maps

The closest rural centre is the township of Rye Park located approximately 3 – 4 km to the west of the site. Boorowa is located approximately 17km to the north west and Yass is about 11 km to the south west of the site.

Hudson Howells has been engaged by Tilt Renewables to undertake an updated Economic Impact Assessment of the modified Rye Park Wind Farm Project, and this modelling looks at the development of a 386 MW option.

The objectives of this project include:

- An economic assessment of the Rye Park Wind Farm Project in terms of economic benefits to local community, the broader region and also to the ACT and the state of NSW.

- An assessment of the associated benefits of offsetting carbon by displacing the need for further non-renewable generation development, such as coal or gas fired power stations.

In addition to the above, consideration is given in this assessment to the potential impact of the project on local property values (within the Rye Park project area).

3 Project Assumptions

The economic modelling undertaken for this project is based on the following expenditure estimates supplied by Tilt Renewables for construction and operation of the Rye Park Wind Farm. These figures are best estimates for the purposes on economic assessment. Final costs will depend on the turbine model selected:

- Total wind farm capacity of 386 megawatts.
- Total construction cost of $1.865 million per megawatt - $720 million apportioned over 3 years as follows:
    - Year 1 – 45%
    - Year 2 – 45%
    - Year 3 – 10%
- The total construction cost of $720 million includes all construction and associated works, as in Table 3. Note that imports in this context are imports into Australia.

Table 3: Project Budget

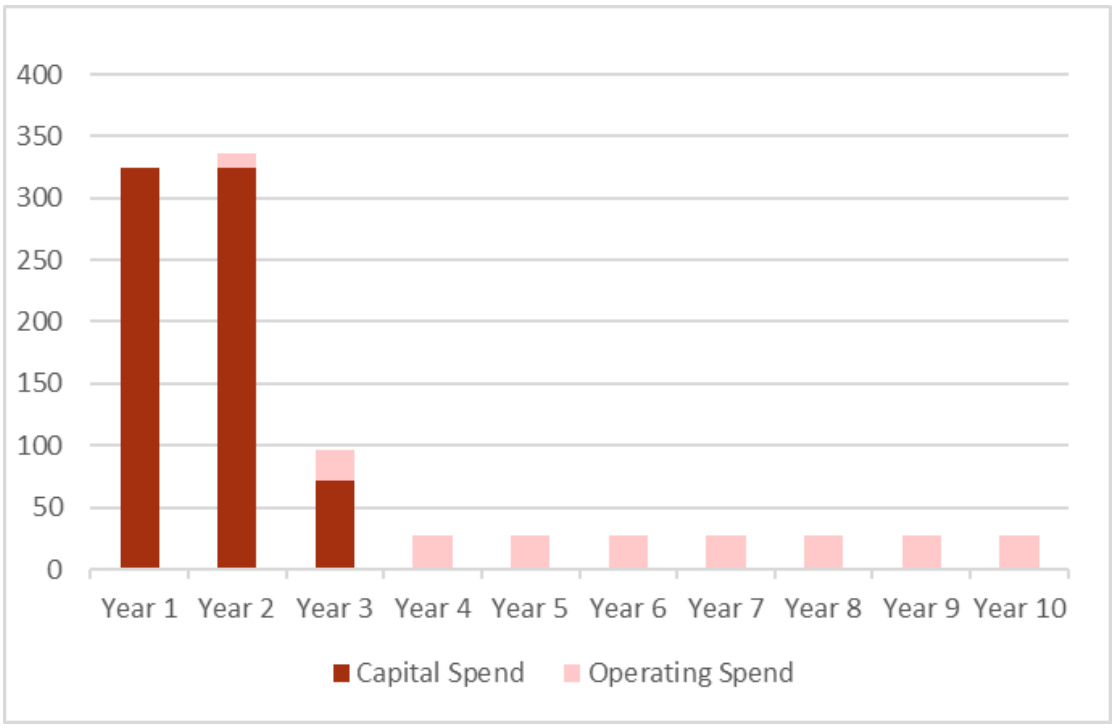
	Local	Imported	
Wind Turbines Supply and Installation			
Imported Turbines		$ 440	
Installation Labour	$ 15		
Local Transport	$ 15		
Civil Balance of Plant	$ 110		
Electric Balance of Plant	$ 30	$ 6	
Transmission Lines	$ 15	$ 20	
Project Management	$ 9		
Native Offset	$ 23		
Development and Finance Costs	$ 22		
Landowner payments and Land Acquisition	$ 15		
	Total Australia	Total Imported	Total CAPEX
	$ 254	**$ 466**	**$ 720**
	35%	65%	

Source: Tint Renewables

- Annual operating costs are based on an estimated $22 per megawatt hour and an average utilisation rate of 36% - or $26.78 million per annum once fully operational. $$0.71 million locally sourced labour and local procurement, while a further $2.5 million is an annual payment to landowners (increasing with CPI), with 60% of landowners assumed to reside in the local area – and the rest elsewhere in NSW.

An indicative timeline of the expenditure profile is provided in Figure 2 below.

Figure 2: Assumed Expenditure Profile - Rye Park Wind Farm, $ million



Source: Tilt Renewables

4 Broad Project Methodology

This economic impact assessment focuses on the effect of the Rye Park Wind Farm Project on State, regional and local incomes and employment associated with the construction and operating phases of the project. This effect arises through the primary expenditure directly associated with the project, and then from further 'rounds' of indirect expenditure that this direct expenditure stimulates as it flows to supplying industries and into incomes and consumption.

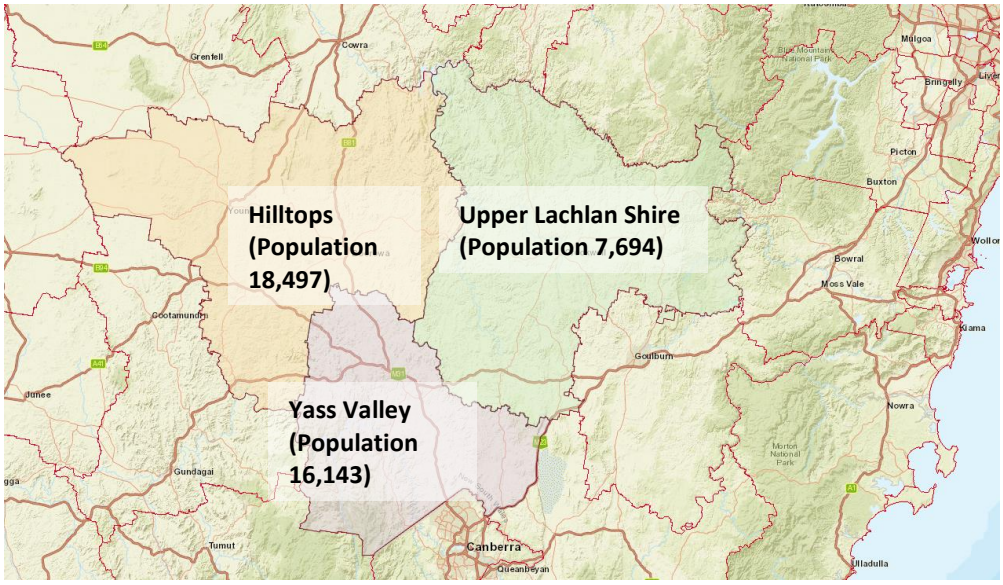
The importance of the construction and operating expenditure identified above is that it will sustain turnover in local industry and will support local jobs and incomes. The use of economic impact assessments based on State and Regional Input Output Models has been a prominent process[9] for translating directly created expenditure (a final demand stimulus) into jobs and incomes, and for establishing the extent of the flow-on impacts.

The use of these Input Output Models allows an assessment of the impact of a certain event or events (in this case the Rye Park Wind Farm Project) on the incomes (value added or Gross State/Regional Product) and employment of a specified region or regions. This is consistent with national accounting frameworks.

The assessment for this project looks at the impact across 4 regions:

- **The local impact** – measured in terms of the contribution in the LGA's of Hilltops[10], Yass Valley and Upper Lachlan. This region is as mapped in Figure 3 below. The majority of the operational impact is expected to occur in the townships which are the major localities in closer vicinity of the project – Yass (population of 6,506 in the 2016 census), Boorowa (population of 1,211), Crookwell (population of 2,641), and Rye Park (population of 258). A little further west in the Hilltops Council is the town of Young (population of 10,295).

  Figure 3: LGA map for local impact



Source: ABS Table Builder (population as per 2016 Census)

9 Alternative economy wide models are available, including econometric models or CGE models. Input-Output models are general equilibrium models (in that the impacts of one sector are considered across the broader economy), but they assume infinite elasticity of supply. The other models include the impact of resource constraints (under varying assumptions). The evidence suggests that at the regional and state geographic levels such constraints are minimal in a long run perspective – as capital and labour can flow relatively easily across borders, and as such input output provides an appropriate methodology.

10 The 2015 study of the economic impact was based on Boorowa Councils the local area, but this Council was merged in 2016 and is now the Eastern part of Hilltops Council.

- **The broader region**, as defined by the ABS in is regional definitions of Goulburn-Yass. This region adds in the major town of Goulburn (population of 23,835) – which is on the western transport route between the town of Yass and Sydney/Wollongong.

- **The state of NSW** – it should be noted that this region is inclusive of the regions above and the estimates of economic activity in the region are not additive to that of the state.

- **The ACT** – which as seen in the map above in close proximity to the region, to the south of Yass. The economic impact estimates in this context are additive to those of the state of NSW.

Table 4 below illustrates the employment base of these regions, as estimated by the ABS 2016 census place of work data, adjusted to match Labour Force statistics. ABS Census data underestimates employment at the State level, so more detailed sector numbers are adjusted up proportionally.

Table 4: Employment by Industry and Region

	Hilltops	Yass Valley	Upper Lachlan Shire	Total of Local Area	Goulburn-Yass Region	NSW	ACT
Agriculture, Forestry and Fishing	1,616	638	953	3,207	3,693	77,364	732
Mining	92	24	0	116	381	40,173	31.3524
Glass and polymer product manufacturing	5	0	0	5	16	11,777	127
Other Manufacturing	452	189	70	711	1,576	259,101	3,999
Electricity generation	0	0	0	0	13	2,992	29
Electricity transmission/distribution	41	34	27	102	167	13,707	704
Other energy and water	13	12	9	35	46	8,956	529
Waste Collection	16	0	0	16	23	9,508	306
Residential Building Construction	256	188	42	485	803	72,894	3,075
Non-Residential Building Construction	15	6	13	34	58	35,089	2,038
Heavy and Civil Engineering Construction	58	34	20	111	217	30,472	617
Construction Services	307	271	97	674	1,341	205,234	9,486
Wholesale Trade	229	94	46	368	628	131,569	2,421
Retail Trade	902	385	205	1,492	2,964	367,109	16,308
Accommodation and Food Services	449	521	180	1,150	2,254	270,010	16,635
Road transport	205	82	43	330	688	77,887	2,054
Other transport	83	32	21	136	309	122,107	3,111
Information Media & Telecommunications	43	31	21	95	186	86,609	3,531
Finance & Insurance Services	160	42	14	216	380	183,602	3,848
Property Services	68	61	11	140	318	66,579	3,321
Professional, scientific & technical services	299	274	125	698	1,279	383,787	26,862
Administrative services	162	94	60	316	681	142,663	5,472
Public administration and safety	365	228	159	752	2,139	218,820	60,832
Education & Training	590	366	202	1,158	2,202	308,276	19,832
Health care and social assistance	931	460	269	1,660	3,888	489,020	23,627
Arts, sport and recreation	58	63	19	140	326	64,914	6,065
Other Services	316	150	116	582	1,121	143,540	6,399
Total	**7,733**	**4,276**	**2,723**	**14,732**	**27,698**	**3,823,756**	**221,991**

Source: ABS Table Builder, data for Census 2016, place of work, and adjusted to match Labour Force survey data

The analysis develops estimates of economic impact for the regions based on indicative input-output tables developed for the regions above. These tables have been prepared at the 28 sector level with sectors defined as appropriate to energy and renewables projects, and at the state level have been derived using the 2016/17 Australian Input Output Model as prepared by the ABS (latest available), and using the location quotient method with superior data from the national accounts (based on the data in Table 4), adjusting for inflation. The tables for the smaller regions also use the location quotient method, but the regional table is derived from the underlying NSW table, while the local table is based on the regional table.

5 Economic Assessment

This section of the report details the economic impact assumptions and findings of the project assuming low levels of direct supply from local industry. In short, the economic modelling for the project has been undertaken for a scenario which could be considered conservative. This base scenario is based on a low proportion of construction and operating inputs being supplied locally. It is assumed that the towers are imported from interstate or overseas.

The assumptions regarding transport inputs and assembly are similar in each case, with the main variations being in materials inputs and construction.

5.1 Core Assumptions

Table 5 - Table 7 below show the Scenario assumptions for capital and operating expenditure by category and source. The assumed distributions are based on the nature of the spend and specific assumptions regarding the expenditure profiles for the State, region and shire, and for the ACT. It should be noted that the major assumption that impacts economic outcomes is the percentage of imported material (expenditure on inputs from outside the specified region, not just from overseas). The distribution of local product to other sectors is not as critical (in an order of magnitude perspective). Table 5 presents the assumptions in terms of the broad basis of expenditure (i.e. nature of expenditure). These are indicative only, and in terms of capital expenditure derived from Table 3, with the following assumptions:
:

- The civil balance of the plant and transmission lines are assumed to be contracted to construction firms, with none from the local area, 30% from the region (Goulburn) and a further 40% from other NSW, with 30% from ACT based firms.
- Non imported electrical equipment ($30 million) is assumed to be 20% supplied from in the region (0% local), 75% from NSW based firms and 25% from ACT based suppliers.
- Transport is mostly road transport and is assumed to be 20% from local suppliers, 50% from the region as a whole, 75% from NSW and 25% from ACT suppliers.
- Labour is assumed to be 30% local, 75% from the region, none form the rest of NSW and 25% from the ACT.
- Payments to landowners and land acquisition is assumed to be payments to locals.

With respect to operating expenditure:

- The project proponents have estimated that operations will involve annual employment of 10 contractors. It is assumed that 50% of those will come from the local area and the 30% from the broader region and 20% from the ACT. Local contractors are assumed to have an average annual gross salary payment of $75.000, while for those from the ACT it is assumed as $95,000.
- For every $ spent on labour for contractors etc. there is an additional spend of $0.25 on materials and equipment and $0.5 spent on transport, including of materials, travel re contractors and of site inspections etc
- The payments to landowners are assumed as an annual $2 million, with 60% of the landowners living in the local area (the three LGA's is 60%), 20% in the broader region and 20% in other NSW (Sydney especially).

Table 6 extends the detail of the distribution to match the 28 sector Input Output Models that have

been developed for this project. The spend of labour wages and salaries is distributed based on the average consumption vector for each region. 50% of the payments to landowners is assumed to be investment in the local property with a supply elasticity ratio of 2, and spent in the local area (irrespective of where the landowner lives, and 50% is spend on landowner general consumption (which occurs where they reside and based on the average consumption function from the respective input output table)

Table 7 details the conversion of these values from purchasers' prices to basic prices, as the raw data includes margins, taxes and subsidies. All monetary values in Input Output models are expressed as basic values. The prime differences between purchaser prices and basic values are that:

- Basic values exclude the cost of transport and wholesale and retail trade embedded in the purchase price (and allocate these to the transport and trade sectors).

- GST is allocated to Gross Operating Surplus

The core assumptions to make the adjustments from purchaser price distributions to basic values are:

- The average value added in each of the industry sectors is extracted and then the GST component (at 10% - which is only paid on the value added) is deducted and separately identified.

- The purchaser price is adjusted for the average margin for wholesale, retail and transport sectors, as identified in national Input Output Models.

Table 5: Assumed Expenditure Distributions

	Capital				Operating			
	Shire	Region	NSW	ACT	Shire	Region	NSW	ACT
Building Construction	0.0%	5.2%	12.2%	5.2%	0.0%	0.0%	0.0%	0.0%
Electrical Equipment	0.0%	0.8%	3.1%	1.0%	0.4%	0.6%	0.6%	0.2%
Transport	0.3%	0.8%	1.6%	0.5%	0.8%	1.2%	1.2%	0.4%
Spend on labour/contractors	0.5%	1.2%	1.6%	0.5%	1.5%	2.4%	2.4%	0.8%
Payments to landowners/land acquisition	2.1%	2.1%	2.1%	0.0%	6.8%	9.1%	11.4%	0.0%
Imports	97.1%	89.9%	79.5%	92.7%	90.5%	86.7%	84.4%	98.7%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Source: Assumptions based on information provided in Table 3

Table 6: Assumed Expenditure Distributions by Detailed Sector

	Capital - Shire	Capital - Region	Capital - NSW	Capital - ACT	Operating - Shire	Operating - Region	Operating - NSW	Operating - ACT
Agriculture, Forestry and Fishing	2.1%	2.1%	2.1%	0.0%	11.4%	11.5%	11.5%	0.0%
Mining	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Glass and polymer product manufacturing	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Other Manufacturing	0.1%	1.0%	3.4%	1.1%	0.7%	1.2%	1.5%	0.2%
Electricity generation	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%
Electricity transmission/distribution	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.1%	0.0%
Other energy and water	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%
Waste Collection	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Residential Building Construction	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Non-Residential Building Construction	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Heavy and Civil Engineering Construction	0.0%	2.6%	6.1%	2.6%	0.0%	0.0%	0.0%	0.0%
Construction Services	0.0%	2.6%	6.1%	2.6%	0.0%	0.0%	0.0%	0.0%
Wholesale Trade	0.1%	0.1%	0.1%	0.0%	0.2%	0.3%	0.6%	0.0%
Retail Trade	0.2%	0.3%	0.3%	0.0%	0.6%	1.0%	1.2%	0.0%
Accommodation and Food Services	0.1%	0.2%	0.2%	0.0%	0.4%	0.6%	0.8%	0.0%
Road transport	0.3%	0.8%	1.6%	0.5%	0.8%	1.4%	1.4%	0.4%
Other transport	0.0%	0.0%	0.1%	0.0%	0.1%	0.1%	0.3%	0.0%
Information Media & Telecommunications	0.0%	0.0%	0.1%	0.0%	0.1%	0.1%	0.3%	0.0%
Finance & Insurance Services	0.1%	0.1%	0.3%	0.0%	0.2%	0.3%	1.2%	0.0%
Ownership of dwellings	0.5%	0.6%	0.7%	0.1%	1.6%	2.2%	2.7%	0.1%
Property Services	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Professional, scientific & technical services	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%
Administrative services	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%
Public administration and safety	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Education & Training	0.1%	0.2%	0.2%	0.0%	0.4%	0.5%	0.7%	0.0%
Health care and social assistance	0.1%	0.2%	0.2%	0.0%	0.4%	0.7%	0.8%	0.0%
Arts, sport and recreation	0.0%	0.0%	0.1%	0.0%	0.1%	0.1%	0.2%	0.0%
Other Services	0.1%	0.1%	0.1%	0.0%	0.2%	0.3%	0.4%	0.0%
Imports	96.1%	89.0%	78.2%	92.9%	82.5%	79.4%	76.0%	99.0%
Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**

Source: Assumptions. Imports in Table 6 are greater than those in Table 5 because it adds in imports in the consumption vector (i.e. wages spent on goods imported into the region) onto the direct imports.

Table 7: Assumed Expenditure Distributions in Basic Values

	Capital - Shire	Capital - Region	Capital - NSW	Capital - ACT	Operating - Shire	Operating - Region	Operating - NSW	Operating - ACT
Agriculture, Forestry and Fishing	1.9%	1.9%	1.9%	0.0%	10.5%	10.5%	10.5%	0.0%
Mining	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Glass and polymer product manufacturing	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Other Manufacturing	0.1%	0.9%	3.1%	1.0%	0.7%	1.1%	1.4%	0.2%
Electricity generation	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%
Electricity transmission/distribution	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.1%	0.0%
Other energy and water	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Waste Collection	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Residential Building Construction	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Non-Residential Building Construction	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Heavy and Civil Engineering Construction	0.0%	2.4%	5.7%	2.4%	0.0%	0.0%	0.0%	0.0%
Construction Services	0.0%	2.4%	5.6%	2.4%	0.0%	0.0%	0.0%	0.0%
Wholesale Trade	0.1%	0.1%	0.1%	0.0%	0.2%	0.3%	0.5%	0.0%
Retail Trade	0.2%	0.2%	0.3%	0.0%	0.6%	0.9%	1.0%	0.0%
Accommodation and Food Services	0.1%	0.2%	0.2%	0.0%	0.4%	0.6%	0.7%	0.0%
Road transport	0.3%	0.7%	1.5%	0.5%	0.8%	1.2%	1.3%	0.4%
Other transport	0.0%	0.0%	0.1%	0.0%	0.1%	0.1%	0.3%	0.0%
Information Media & Telecommunications	0.0%	0.0%	0.1%	0.0%	0.0%	0.1%	0.3%	0.0%
Finance & Insurance Services	0.1%	0.1%	0.3%	0.0%	0.2%	0.2%	1.1%	0.0%
Ownership of dwellings	0.4%	0.6%	0.6%	0.1%	1.4%	2.0%	2.4%	0.1%
Property Services	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Professional, scientific & technical services	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%
Administrative services	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Public administration and safety	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Education & Training	0.1%	0.1%	0.2%	0.0%	0.3%	0.5%	0.6%	0.0%
Health care and social assistance	0.1%	0.2%	0.2%	0.0%	0.3%	0.6%	0.7%	0.0%
Arts, sport and recreation	0.0%	0.0%	0.1%	0.0%	0.1%	0.1%	0.2%	0.0%
Other Services	0.1%	0.1%	0.1%	0.0%	0.2%	0.3%	0.4%	0.0%
Imports	96.1%	89.0%	78.2%	92.9%	82.5%	79.4%	76.0%	99.0%
GST	0.4%	0.9%	1.6%	0.5%	1.5%	1.8%	2.1%	0.1%
Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**

Source: Assumptions

5.2 Modelling Results – State Level Outcomes

5.2.1 New South Wales

Table 8 - Table 10 show the results of shocking the Input Output Model for New South Wales with the aggregated expenditures, in the context that they would represent an increase in final demand11, and distributed as per Table 7 through the Input Output Model .

Table 8 and Table 9 show the detailed outcomes for capital expenditure (for the 3 years of operation) and operating expenditure (annually) respectively – with the level of activity generated by industry sector. Table 10 provides a summary of the outcomes.

The modelling indicates that the project will generate $186 million of value added[12] (incomes created or contribution to Gross State Product) in the State of NSW over the period of construction and that this would happen over three years (allowing for lagged flow through effects). 1,204 person years[13] of employment would be supported – or an average of 401 jobs sustained per year over three years. Once operational the project is estimated to support annually $8.3 million of incomes, and support directly and indirectly of the order of 51 jobs per year.

Table 8: Estimates of Economic Activity by Sector Related to Aggregate Capital Spend for New South Wales– Outcomes over 3 Year construction period

	Expend-iture ($m)	Value Added ($m)			Income ($m)			Employment (Person Years)		
		First Round	Induced	Total	First Round	Induced	Total	First Round	Induced	Total
Direct employment		**$11.25**		**$11.25**	**$11.25**		**$11.25**	**142.1**		**142.1**
Agriculture, Forestry and Fishing	$13.94	$6.57	$4.26	$10.83	$1.15	$0.75	$1.90	45.6	29.5	75.1
Mining	$0.06	$0.03	$2.24	$2.27	$0.01	$0.39	$0.39	0.1	5.7	5.8
Glass and polymer product manufacturing	$0.04	$0.02	$1.02	$1.03	$0.01	$0.67	$0.68	0.1	5.0	5.1
Other Manufacturing	$22.56	$7.13	$8.18	$15.32	$4.55	$5.22	$9.77	50.9	58.4	109.3
Electricity generation	$0.15	-$0.01	-$0.07	-$0.08	$0.00	$0.04	$0.04	0.0	0.3	0.3
Electricity transmission/distribution	$0.14	$0.06	$1.22	$1.28	$0.02	$0.39	$0.41	0.1	2.8	3.0
Other energy and water	$0.09	$0.08	$0.70	$0.77	$0.03	$0.26	$0.29	0.1	0.9	1.0
Waste Collection	$0.01	$0.00	$0.69	$0.70	$0.00	$0.28	$0.28	0.0	2.3	2.3
Residential Building Construction	$0.00	$0.00	$0.99	$0.99	$0.00	$0.42	$0.42	0.0	8.9	8.9
Non-Residential Building Construction	$0.00	$0.00	$0.34	$0.34	$0.00	$0.17	$0.17	0.0	2.6	2.6
Heavy and Civil Engineering Construction	$41.08	$10.14	$0.27	$10.41	$4.76	$0.13	$4.89	53.1	1.4	54.6
Construction Services	$40.65	$14.36	$10.76	$25.12	$7.07	$5.30	$12.38	120.8	90.5	211.3
Wholesale Trade	$0.96	$0.50	$6.10	$6.60	$0.31	$3.82	$4.13	2.4	29.5	32.0
Retail Trade	$1.99	$1.24	$6.40	$7.64	$0.84	$4.33	$5.18	13.6	70.1	83.8
Accommodation and Food Services	$1.33	$0.74	$3.69	$4.44	$0.51	$2.54	$3.05	7.6	37.5	45.1
Road transport	$10.55	$5.42	$2.59	$8.01	$2.71	$1.29	$4.00	42.8	20.4	63.3
Other transport	$0.60	$0.22	$3.72	$3.94	$0.12	$1.92	$2.03	1.8	30.4	32.2
Information Media & Telecommunications	$0.57	$0.25	$3.73	$3.97	$0.10	$1.55	$1.65	1.0	15.4	16.4
Finance & Insurance Services	$2.03	$1.26	$15.66	$16.92	$0.37	$4.66	$5.03	2.9	36.3	39.2
Ownership of dwellings	$4.50	$3.51	$12.71	$16.22	$0.00	$0.00	$0.00	0.0	0.0	0.0
Property Services	$0.00	$0.00	$5.21	$5.21	$0.00	$1.77	$1.77	0.0	15.8	15.8
Professional, scientific & technical services	$0.15	$0.08	$12.26	$12.34	$0.06	$8.74	$8.79	0.6	89.5	90.1
Administrative services	$0.09	$0.06	$5.72	$5.77	$0.05	$4.83	$4.88	0.3	28.8	29.1
Public administration and safety	$0.04	$0.02	$1.79	$1.81	$0.02	$1.44	$1.46	0.1	10.7	10.8
Education & Training	$1.13	$0.78	$3.07	$3.85	$0.67	$2.64	$3.31	6.7	26.4	33.1
Health care and social assistance	$1.40	$0.97	$3.74	$4.71	$0.82	$3.15	$3.96	9.1	34.8	43.9
Arts, sport and recreation	$0.44	$0.20	$0.97	$1.17	$0.12	$0.61	$0.73	1.7	8.5	10.3
Other Services	$0.72	$0.39	$3.04	$3.43	$0.29	$2.22	$2.51	4.3	33.4	37.8
Total	**$145.22**	**$65.28**	**$120.98**	**$186.27**	**$35.85**	**$59.50**	**$95.35**	**508**	**696**	**1,204**

Source: Modelled Result (employment should be interpreted as person years of employment rather than number of jobs at a point of time, see Footnote [13])

11 This analysis assesses the contribution of the project in isolation. It does not compare the project with other possible projects, nor does it investigate the change in expenditure levels at existing energy providers as this project takes on market share, although this is expected to be negligible given the fixed cost context of the industry.

12 Contribution to Gross State or Regional Product (GSP/GRP) – and defined as the returns to labour and the returns to capital as per the national accounting framework.

13 Person years are the number of full time annual job equivalents over the period of construction

Table 9: Estimates of Annual Economic Activity by Sector Related to Operating Spend for New South Wales

	Expend-iture ($m)	Value Added ($m)			Income ($m)			Employment (FTE's)		
		First Round	Induced	Total	First Round	Induced	Total	First Round	Induced	Total
Direct employment impact		**$0.77**		**$0.77**	**$0.77**		**$0.77**	**8.0**		**8.0**
Agriculture, Forestry and Fishing	$3.04	$1.43	$0.31	$1.74	$0.25	$0.05	$0.31	9.9	2.1	12.1
Mining	$0.01	$0.00	$0.06	$0.06	$0.00	$0.01	$0.01	0.0	0.1	0.2
Glass and polymer product manufacturing	$0.01	$0.00	$0.01	$0.02	$0.00	$0.01	$0.01	0.0	0.1	0.1
Other Manufacturing	$0.41	$0.13	$0.23	$0.36	$0.08	$0.15	$0.23	0.9	1.7	2.6
Electricity generation	$0.02	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	0.0	0.0	0.0
Electricity transmission/distribution	$0.02	$0.01	$0.05	$0.06	$0.00	$0.02	$0.02	0.0	0.1	0.1
Other energy and water	$0.01	$0.01	$0.03	$0.05	$0.00	$0.01	$0.02	0.0	0.0	0.1
Waste Collection	$0.00	$0.00	$0.02	$0.02	$0.00	$0.01	$0.01	0.0	0.1	0.1
Residential Building Construction	$0.00	$0.00	$0.01	$0.01	$0.00	$0.01	$0.01	0.0	0.1	0.1
Non-Residential Building Construction	$0.00	$0.00	$0.01	$0.01	$0.00	$0.00	$0.00	0.0	0.1	0.1
Heavy and Civil Engineering Construction	$0.00	$0.00	$0.01	$0.01	$0.00	$0.00	$0.00	0.0	0.1	0.1
Construction Services	$0.01	$0.00	$0.12	$0.12	$0.00	$0.06	$0.06	0.0	1.0	1.0
Wholesale Trade	$0.15	$0.08	$0.23	$0.31	$0.05	$0.15	$0.19	0.4	1.1	1.5
Retail Trade	$0.30	$0.19	$0.23	$0.42	$0.13	$0.16	$0.28	2.1	2.5	4.6
Accommodation and Food Services	$0.20	$0.11	$0.13	$0.24	$0.08	$0.09	$0.17	1.2	1.3	2.4
Road transport	$0.36	$0.19	$0.09	$0.28	$0.09	$0.04	$0.14	1.5	0.7	2.2
Other transport	$0.09	$0.03	$0.14	$0.18	$0.02	$0.07	$0.09	0.3	1.2	1.4
Information Media & Telecommunications	$0.09	$0.04	$0.14	$0.18	$0.02	$0.06	$0.07	0.2	0.6	0.7
Finance & Insurance Services	$0.31	$0.19	$0.68	$0.87	$0.06	$0.20	$0.26	0.4	1.6	2.0
Ownership of dwellings	$0.68	$0.53	$0.46	$1.00	$0.00	$0.00	$0.00	0.0	0.0	0.0
Property Services	$0.00	$0.00	$0.20	$0.20	$0.00	$0.07	$0.07	0.0	0.6	0.6
Professional, scientific & technical services	$0.02	$0.01	$0.38	$0.40	$0.01	$0.27	$0.28	0.1	2.8	2.9
Administrative services	$0.01	$0.01	$0.21	$0.22	$0.01	$0.18	$0.19	0.0	1.1	1.1
Public administration and safety	$0.01	$0.00	$0.05	$0.06	$0.00	$0.04	$0.05	0.0	0.3	0.3
Education & Training	$0.17	$0.12	$0.11	$0.23	$0.10	$0.10	$0.20	1.0	1.0	2.0
Health care and social assistance	$0.21	$0.15	$0.14	$0.29	$0.12	$0.12	$0.24	1.4	1.3	2.7
Arts, sport and recreation	$0.07	$0.03	$0.04	$0.07	$0.02	$0.02	$0.04	0.3	0.3	0.6
Other Services	$0.11	$0.06	$0.11	$0.17	$0.04	$0.08	$0.12	0.7	1.2	1.9
Total	**$6.31**	**$4.10**	**$4.23**	**$8.33**	**$1.86**	**$1.99**	**$3.84**	**28**	**23**	**51**

Source: Modelled Result

Table 10: Estimates of Economic Activity for New South Wales

	Total GSP Impact (3 yrs)	Average Annual GSP Impact	Total Jobs Impact (Person Years - over 3 yrs)	Average Annual Jobs Impact *
Construction Phase				
• Direct	$65.3 million	$21.8 million	508	169
• Indirect	$121 million	$40.3 million	696	232
• Total	$186.3 million	$62.1 million	1,204	401
Operating Phase				
• Direct		$4.1 million		28
• Indirect		$4.2 million		23
• Total		$8.3 million		51

*Source: Modelled Result, *Full Time Equivalent Jobs*
Note – these numbers are rounded versions of the numbers in the tables above, as the modelling should be interpreted in terms of order of magnitude, but it means that not all numbers are exactly additive.

It should be noted that the impact at the national level would be similar to that estimated for the State level (i.e. NSW plus ACT) unless there are constraints in national labour and capital markets. Such constraints would reduce the State level of impact, with the project drawing resources into New South Wales and out of other states. If such constraints existed (i.e. at extended times with very low

unemployment rates, or where the project might have significant effects on exchange rates) the national outcomes would be best modelled using a CGE model to allow for those constraints.

5.2.2 Australian Capital Territory

Table 11 - Table 13 show the results of shocking the Input Output Model for Australian Capital Territory with the aggregated expenditures, in the context that they would represent an increase in final demand, and distributed as per Table 7 through the Input Output Model.

The modelling indicates that the project will generate $42.7 million of value added (incomes created or contribution to Gross State Product) in the ACT over the period of construction and that this would happen over three years (allowing for lagged flow through effects). 242 person years of employment would be supported – or again an average of over 181 jobs sustained per year over three years. Once operational, the project is estimated to support annually $0.4 million of incomes, and support directly and indirectly of the order of 3 jobs per year.

Table 11: Estimates of Economic Activity by Sector Related to Aggregate Capital Spend for Australian Capital Territory – Outcomes over 3 year construction period

	Expend-iture ($m)	Value Added ($m)			Income ($m)			Employment (Person Years)		
		First Round	Induced	Total	First Round	Induced	Total	First Round	Induced	Total
Direct employment impact		**$3.75**		**$3.75**	**$3.75**		**$3.75**	**39.5**		**39.5**
Agriculture, Forestry and Fishing	$0.00	$0.00	$0.03	$0.03	$0.00	$0.02	$0.02	0.0	1.0	1.0
Mining	$0.00	$0.00	$0.01	$0.01	$0.00	$0.01	$0.01	0.0	0.0	0.0
Glass and polymer product manufacturing	$0.00	$0.00	$0.05	$0.05	$0.00	$0.03	$0.03	0.0	0.3	0.3
Other Manufacturing	$7.05	$1.85	$0.44	$2.29	$1.31	$0.31	$1.62	17.2	4.1	21.3
Electricity generation	$0.01	$0.00	-$0.01	-$0.01	$0.00	$0.00	$0.00	0.0	0.0	0.0
Electricity transmission/distribution	$0.02	$0.01	$0.21	$0.22	$0.00	$0.02	$0.02	0.0	0.4	0.4
Other energy and water	$0.01	$0.01	$0.14	$0.16	$0.00	$0.01	$0.01	0.0	0.2	0.2
Waste Collection	$0.00	$0.00	$0.09	$0.09	$0.00	$0.01	$0.01	0.0	0.3	0.3
Residential Building Construction	$0.00	$0.00	$0.32	$0.32	$0.00	$0.17	$0.17	0.0	2.3	2.3
Non-Residential Building Construction	$0.00	$0.00	$0.11	$0.11	$0.00	$0.07	$0.07	0.0	0.7	0.7
Heavy and Civil Engineering Construction	$17.61	$5.15	$0.03	$5.18	$2.93	$0.02	$2.95	21.4	0.1	21.5
Construction Services	$17.41	$7.29	$3.39	$10.67	$4.30	$2.00	$6.29	46.5	21.6	68.1
Wholesale Trade	$0.05	$0.03	$0.51	$0.54	$0.02	$0.30	$0.32	0.1	2.0	2.1
Retail Trade	$0.20	$0.14	$1.23	$1.37	$0.08	$0.69	$0.77	1.1	9.6	10.7
Accommodation and Food Services	$0.19	$0.13	$1.09	$1.22	$0.10	$0.81	$0.91	0.8	6.6	7.4
Road transport	$3.44	$2.30	$0.32	$2.62	$1.16	$0.16	$1.32	9.5	1.3	10.8
Other transport	$0.04	$0.02	$0.46	$0.48	$0.01	$0.24	$0.25	0.1	1.9	2.0
Information Media & Telecommunications	$0.07	$0.03	$0.65	$0.68	$0.01	$0.22	$0.23	0.1	2.7	2.9
Finance & Insurance Services	$0.14	$0.09	$1.62	$1.71	$0.02	$0.43	$0.45	0.2	3.7	3.9
Ownership of dwellings	$0.64	$0.45	$2.87	$3.32	$0.00	$0.00	$0.00	0.0	0.0	0.0
Property Services	$0.00	$0.00	$0.90	$0.90	$0.00	$0.33	$0.33	0.0	2.2	2.2
Professional, scientific & technical services	$0.02	$0.01	$2.73	$2.74	$0.01	$2.17	$2.18	0.1	19.9	20.0
Administrative services	$0.01	$0.01	$0.74	$0.75	$0.00	$0.39	$0.39	0.0	4.5	4.5
Public administration and safety	$0.01	$0.00	$0.44	$0.44	$0.00	$0.38	$0.38	0.0	2.2	2.2
Education & Training	$0.16	$0.14	$0.92	$1.06	$0.13	$0.88	$1.01	0.5	3.2	3.7
Health care and social assistance	$0.17	$0.13	$0.85	$0.98	$0.11	$0.75	$0.86	0.9	5.7	6.6
Arts, sport and recreation	$0.07	$0.04	$0.33	$0.37	$0.03	$0.24	$0.27	0.2	1.7	1.9
Other Services	$0.08	$0.05	$0.55	$0.60	$0.03	$0.34	$0.37	0.5	5.4	5.8
Total	**$47.42**	**$21.62**	**$21.03**	**$42.65**	**$14.01**	**$10.98**	**$24.99**	**139**	**104**	**242**

Source: Modelled Result

Table 12: Estimates of Annual Economic Activity by Sector Related to Operating Spend for the Australian Capital Territory

	Expend-iture ($m)	Value Added ($m)			Income ($m)			Employment (FTE's)		
		First Round	Induced	Total	First Round	Induced	Total	First Round	Induced	Total
Direct employment impact		$0.19		$0.19	$0.19		$0.19	2.0		2.0
Agriculture, Forestry and Fishing	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	0.0	0.0	0.0
Mining	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	0.0	0.0	0.0
Glass and polymer product manufacturing	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	0.0	0.0	0.0
Other Manufacturing	$0.06	$0.01	$0.00	$0.02	$0.01	$0.00	$0.01	0.1	0.0	0.1
Electricity generation	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	0.0	0.0	0.0
Electricity transmission/distribution	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	0.0	0.0	0.0
Other energy and water	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	0.0	0.0	0.0
Waste Collection	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	0.0	0.0	0.0
Residential Building Construction	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	0.0	0.0	0.0
Non-Residential Building Construction	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	0.0	0.0	0.0
Heavy and Civil Engineering Construction	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	0.0	0.0	0.0
Construction Services	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	0.0	0.0	0.0
Wholesale Trade	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	0.0	0.0	0.0
Retail Trade	$0.01	$0.01	$0.01	$0.02	$0.00	$0.00	$0.01	0.1	0.1	0.1
Accommodation and Food Services	$0.01	$0.01	$0.01	$0.01	$0.01	$0.00	$0.01	0.0	0.0	0.1
Road transport	$0.10	$0.07	$0.00	$0.07	$0.03	$0.00	$0.04	0.3	0.0	0.3
Other transport	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	0.0	0.0	0.0
Information Media & Telecommunications	$0.00	$0.00	$0.00	$0.01	$0.00	$0.00	$0.00	0.0	0.0	0.0
Finance & Insurance Services	$0.01	$0.01	$0.01	$0.02	$0.00	$0.00	$0.00	0.0	0.0	0.0
Ownership of dwellings	$0.04	$0.03	$0.02	$0.04	$0.00	$0.00	$0.00	0.0	0.0	0.0
Property Services	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	0.0	0.0	0.0
Professional, scientific & technical services	$0.00	$0.00	$0.01	$0.01	$0.00	$0.01	$0.01	0.0	0.1	0.1
Administrative services	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	0.0	0.0	0.0
Public administration and safety	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	0.0	0.0	0.0
Education & Training	$0.01	$0.01	$0.01	$0.01	$0.01	$0.01	$0.01	0.0	0.0	0.0
Health care and social assistance	$0.01	$0.01	$0.01	$0.01	$0.01	$0.00	$0.01	0.1	0.0	0.1
Arts, sport and recreation	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	0.0	0.0	0.0
Other Services	$0.00	$0.00	$0.00	$0.01	$0.00	$0.00	$0.00	0.0	0.0	0.1
Total	**$0.27**	**$0.35**	**$0.10**	**$0.45**	**$0.27**	**$0.05**	**$0.32**	**3**	**0**	**3**

Source: Modelled Result

Table 13: Estimates of Economic Activity for Australian Capital Territory

	Total GSP Impact (3 yrs)	Average Annual GSP Impact	Total Jobs Impact (Person Years - over 3 yrs)	Average Annual Jobs Impact *
Construction Phase				
• Direct	$21.6 million	$7.2 million	139	46
• Indirect	$21 million	$7 million	104	35
• Total	$42.6 million	$14.2 million	242	81
Operating Phase				
• Direct		$0.3 million		3
• Indirect		$0.1 million		0
• Total		$0.4 million		3

*Source: Modelled Result, *Full Time Equivalent Jobs. Tables do not always sum due to rounding*

5.3 Modelling Results – Goulburn-Yass Region Outcomes

Table 14 - Table 16 show the results of applying the regional expenditures as per Table 7 above to the regional Input Output Model for the Goulburn-Yass Region. It should be noted these results are inclusive in the NSW results.

From a regional perspective, the modelling indicates that the project will generate $67.6 million of value added (incomes created or contribution to Gross Regional Product) in the region over the period of construction and, again allowing for lagged flow through effects, this would happen over three years. 494 person years of employment would be supported, or again an average of 165 jobs sustained per year over three years. Once operational the project is estimated to support annually $5.2 million of incomes in the region, and support directly and indirectly (including the multiplier impact) approximately 37 jobs per year.

Table 14: Estimates of Economic Activity by Sector Related to Aggregate Capital Spend for the Goulburn-Yass Region – Outcomes over Life of Project

	Expend-iture ($m)	Value Added ($m)			Income ($m)			Employment (Person Years)		
		First Round	Induced	Total	First Round	Induced	Total	First Round	Induced	Total
Direct employment impact		**$8.44**		**$8.44**	**$8.44**		**$8.44**	**112.5**		**112.5**
Agriculture, Forestry and Fishing	$13.86	$6.53	$2.00	$8.53	$1.15	$0.35	$1.50	45.3	13.9	59.2
Mining	$0.05	$0.03	$0.70	$0.73	$0.00	$0.12	$0.13	0.1	1.8	1.9
Glass and polymer product manufacturing	$0.01	$0.00	$0.07	$0.07	$0.00	$0.04	$0.05	0.0	0.3	0.3
Other Manufacturing	$6.76	$2.14	$2.44	$4.58	$1.36	$1.56	$2.92	15.3	17.4	32.7
Electricity generation	$0.08	$0.00	-$0.01	-$0.02	$0.00	$0.01	$0.01	0.0	0.0	0.1
Electricity transmission/distribution	$0.13	$0.06	$0.39	$0.44	$0.02	$0.12	$0.14	0.1	0.9	1.0
Other energy and water	$0.06	$0.05	$0.17	$0.22	$0.02	$0.06	$0.08	0.1	0.2	0.3
Waste Collection	$0.00	$0.00	$0.07	$0.07	$0.00	$0.03	$0.03	0.0	0.2	0.2
Residential Building Construction	$0.00	$0.00	$0.39	$0.39	$0.00	$0.17	$0.17	0.0	3.5	3.5
Non-Residential Building Construction	$0.00	$0.00	$0.03	$0.03	$0.00	$0.01	$0.01	0.0	0.2	0.2
Heavy and Civil Engineering Construction	$17.61	$4.34	$0.09	$4.44	$2.04	$0.04	$2.09	22.8	0.5	23.3
Construction Services	$17.43	$6.16	$3.75	$9.91	$3.03	$1.85	$4.88	51.8	31.6	83.4
Wholesale Trade	$0.55	$0.29	$1.42	$1.71	$0.18	$0.89	$1.07	1.4	6.9	8.3
Retail Trade	$1.77	$1.11	$2.13	$3.24	$0.75	$1.44	$2.20	12.2	23.4	35.6
Accommodation and Food Services	$1.19	$0.66	$1.16	$1.82	$0.46	$0.79	$1.25	6.8	11.8	18.5
Road transport	$5.39	$2.77	$0.93	$3.70	$1.38	$0.46	$1.85	21.9	7.3	29.2
Other transport	$0.18	$0.07	$0.39	$0.45	$0.04	$0.20	$0.23	0.6	3.1	3.7
Information Media & Telecommunications	$0.15	$0.06	$0.27	$0.34	$0.03	$0.11	$0.14	0.3	1.1	1.4
Finance & Insurance Services	$0.51	$0.31	$1.42	$1.73	$0.09	$0.42	$0.51	0.7	3.3	4.0
Ownership of dwellings	$4.02	$3.14	$4.00	$7.13	$0.00	$0.00	$0.00	0.0	0.0	0.0
Property Services	$0.00	$0.00	$0.99	$0.99	$0.00	$0.34	$0.34	0.0	3.0	3.0
Professional, scientific & technical services	$0.06	$0.03	$1.62	$1.65	$0.02	$1.15	$1.17	0.2	11.8	12.0
Administrative services	$0.05	$0.03	$1.09	$1.12	$0.03	$0.92	$0.95	0.2	5.5	5.6
Public administration and safety	$0.03	$0.02	$0.56	$0.58	$0.02	$0.45	$0.47	0.1	3.4	3.5
Education & Training	$0.97	$0.67	$0.92	$1.59	$0.58	$0.79	$1.37	5.8	7.9	13.7
Health care and social assistance	$1.25	$0.87	$1.15	$2.02	$0.73	$0.97	$1.70	8.1	10.7	18.8
Arts, sport and recreation	$0.27	$0.12	$0.20	$0.32	$0.08	$0.13	$0.20	1.0	1.8	2.8
Other Services	$0.64	$0.35	$1.04	$1.39	$0.26	$0.76	$1.02	3.9	11.4	15.3
Total	**$73.04**	**$38.26**	**$29.37**	**$67.63**	**$20.71**	**$14.20**	**$34.90**	**311**	**183**	**494**

Source: Modelled Result

Table 15: Estimates of Annual Economic Activity by Sector Related to Operating Spend for the Goulburn-Yass Region

	Expend-iture ($m)	Value Added ($m)			Income ($m)			Employment (FTE's)		
		First Round	Induced	Total	First Round	Induced	Total	First Round	Induced	Total
Direct employment impact		**$0.60**		**$0.60**	**$0.60**		**$0.60**	**8.0**		**8.0**
Agriculture, Forestry and Fishing	$3.04	$1.43	$0.27	$1.70	$0.25	$1.45	$1.70	9.9	1.9	11.8
Mining	$0.01	$0.00	$0.03	$0.04	$0.00	$0.04	$0.04	0.0	0.1	0.1
Glass and polymer product manufacturing	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	0.0	0.0	0.0
Other Manufacturing	$0.33	$0.10	$0.13	$0.23	$0.07	$0.17	$0.23	0.7	0.9	1.7
Electricity generation	$0.01	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	0.0	0.0	0.0
Electricity transmission/distribution	$0.02	$0.01	$0.03	$0.04	$0.00	$0.04	$0.04	0.0	0.1	0.1
Other energy and water	$0.01	$0.01	$0.02	$0.02	$0.00	$0.02	$0.02	0.0	0.0	0.0
Waste Collection	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	0.0	0.0	0.0
Residential Building Construction	$0.00	$0.00	$0.01	$0.01	$0.00	$0.01	$0.01	0.0	0.1	0.1
Non-Residential Building Construction	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	0.0	0.0	0.0
Heavy and Civil Engineering Construction	$0.00	$0.00	$0.01	$0.01	$0.00	$0.01	$0.01	0.0	0.0	0.0
Construction Services	$0.00	$0.00	$0.06	$0.07	$0.00	$0.07	$0.07	0.0	0.5	0.6
Wholesale Trade	$0.08	$0.04	$0.10	$0.14	$0.03	$0.12	$0.14	0.2	0.5	0.7
Retail Trade	$0.25	$0.16	$0.14	$0.29	$0.11	$0.19	$0.29	1.7	1.5	3.2
Accommodation and Food Services	$0.17	$0.09	$0.07	$0.16	$0.06	$0.10	$0.16	1.0	0.7	1.7
Road transport	$0.36	$0.18	$0.06	$0.24	$0.09	$0.15	$0.24	1.4	0.5	1.9
Other transport	$0.03	$0.01	$0.03	$0.04	$0.01	$0.03	$0.04	0.1	0.2	0.3
Information Media & Telecommunications	$0.02	$0.01	$0.02	$0.03	$0.00	$0.02	$0.03	0.0	0.1	0.1
Finance & Insurance Services	$0.07	$0.04	$0.11	$0.15	$0.01	$0.14	$0.15	0.1	0.3	0.4
Ownership of dwellings	$0.57	$0.45	$0.26	$0.70	$0.00	$0.70	$0.70	0.0	0.0	0.0
Property Services	$0.00	$0.00	$0.06	$0.06	$0.00	$0.06	$0.06	0.0	0.2	0.2
Professional, scientific & technical services	$0.01	$0.00	$0.08	$0.08	$0.00	$0.08	$0.08	0.0	0.6	0.6
Administrative services	$0.01	$0.00	$0.07	$0.07	$0.00	$0.07	$0.07	0.0	0.3	0.4
Public administration and safety	$0.00	$0.00	$0.03	$0.03	$0.00	$0.03	$0.03	0.0	0.2	0.2
Education & Training	$0.14	$0.10	$0.06	$0.15	$0.08	$0.07	$0.15	0.8	0.5	1.3
Health care and social assistance	$0.18	$0.12	$0.07	$0.20	$0.10	$0.09	$0.20	1.2	0.7	1.8
Arts, sport and recreation	$0.04	$0.02	$0.01	$0.03	$0.01	$0.02	$0.03	0.1	0.1	0.3
Other Services	$0.09	$0.05	$0.07	$0.12	$0.04	$0.08	$0.12	0.5	0.7	1.3
Total	**$5.43**	**$3.44**	**$1.80**	**$5.24**	**$1.48**	**$3.76**	**$5.24**	**26**	**11**	**37**

Source: Modelled Result

Table 16: Estimates of Economic Activity for the Goulburn-Yass Region

	Total GSP Impact (3 yrs)	Average Annual GSP Impact	Total Jobs Impact (Person Years - over 3 yrs)	Average Annual Jobs Impact *
Construction Phase				
• Direct	$38.3 million	$12.8 million	311	104
• Indirect	$29.4 million	$9.8 million	183	61
• Total	$67.6 million	$22.5 million	494	165
Operating Phase				
• Direct		$3.4 million		26
• Indirect		$1.8 million		11
• Total		$5.2 million		37

Source: Modelled Result. Tables do not always sum due to rounding

5.4 Modelling Results – LGA's of Hilltops, Yass Valley and Upper Lachlan Outcomes

Table 17 - Table 19 show the results of applying the expenditures as per Table 7 above to the regional Input Output Model for the LGA's of Hilltops, Yass Valley, and Upper Lachlan.

From a local perspective, the modelling indicates that the project will generate $26.6 million of value added (incomes created or contribution to Gross Regional Product) mainly in the transport sector, in the three LGA's over the period of construction and, again allowing for lagged flow through effects, this would happen over three years. 179 person years of employment would be supported, or again an average of 60 jobs sustained per year over three years. Once operational the project is estimated to support annually $4.4 million of incomes in the region, and support directly and indirectly, including the multiplier impact, approximately 29 jobs per year.

Table 17: Estimates of Economic Activity by Sector Related to Aggregate Capital Spend for the LGA's of Hilltops, Yass Valley and Upper Lachlan – Outcomes Over Life of Project

	Expend-iture ($m)	Value Added ($m)			Income ($m)			Employment (Person Years)		
		First Round	Induced	Total	First Round	Induced	Total	First Round	Induced	Total
Direct employment impact		**$3.38**		**$3.38**	**$3.38**		**$3.38**	**45.0**		**45.0**
Agriculture, Forestry and Fishing	$15.09	$7.11	$1.30	$8.41	$1.25	$0.23	$1.48	47.0	8.6	55.5
Mining	$0.03	$0.01	$0.07	$0.08	$0.00	$0.01	$0.01	0.0	0.2	0.2
Glass and polymer product manufacturing	$0.00	$0.00	$0.00	$0.01	$0.00	$0.00	$0.00	0.0	0.0	0.0
Other Manufacturing	$0.81	$0.26	$0.50	$0.75	$0.16	$0.32	$0.48	1.7	3.4	5.1
Electricity generation	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	0.0	0.0	0.0
Electricity transmission/distribution	$0.11	$0.05	$0.12	$0.17	$0.02	$0.04	$0.05	0.1	0.3	0.4
Other energy and water	$0.05	$0.04	$0.08	$0.12	$0.02	$0.03	$0.04	0.1	0.1	0.1
Waste Collection	$0.00	$0.00	$0.02	$0.02	$0.00	$0.01	$0.01	0.0	0.1	0.1
Residential Building Construction	$0.00	$0.00	$0.04	$0.05	$0.00	$0.02	$0.02	0.0	0.4	0.4
Non-Residential Building Construction	$0.00	$0.00	$0.01	$0.01	$0.00	$0.00	$0.00	0.0	0.0	0.0
Heavy and Civil Engineering Construction	$0.00	$0.00	$0.03	$0.03	$0.00	$0.01	$0.01	0.0	0.1	0.1
Construction Services	$0.02	$0.01	$0.29	$0.30	$0.00	$0.14	$0.15	0.1	2.3	2.4
Wholesale Trade	$0.48	$0.25	$0.49	$0.74	$0.16	$0.31	$0.46	1.1	2.3	3.4
Retail Trade	$1.42	$0.89	$0.61	$1.50	$0.60	$0.41	$1.02	9.3	6.4	15.7
Accommodation and Food Services	$0.96	$0.54	$0.31	$0.85	$0.37	$0.21	$0.58	5.2	3.0	8.2
Road transport	$2.44	$1.26	$0.26	$1.51	$0.63	$0.13	$0.76	9.4	1.9	11.4
Other transport	$0.13	$0.05	$0.10	$0.15	$0.02	$0.05	$0.08	0.4	0.8	1.2
Information Media & Telecommunications	$0.12	$0.05	$0.08	$0.13	$0.02	$0.03	$0.05	0.2	0.3	0.5
Finance & Insurance Services	$0.44	$0.27	$0.54	$0.82	$0.08	$0.16	$0.24	0.6	1.2	1.8
Ownership of dwellings	$3.56	$2.78	$1.23	$4.01	$0.00	$0.00	$0.00	0.0	0.0	0.0
Property Services	$0.00	$0.00	$0.26	$0.26	$0.00	$0.09	$0.09	0.0	0.8	0.8
Professional, scientific & technical services	$0.05	$0.03	$0.39	$0.42	$0.02	$0.28	$0.30	0.2	2.7	2.9
Administrative services	$0.04	$0.02	$0.28	$0.30	$0.02	$0.24	$0.26	0.1	1.3	1.5
Public administration and safety	$0.02	$0.01	$0.09	$0.10	$0.01	$0.07	$0.08	0.1	0.5	0.6
Education & Training	$0.82	$0.57	$0.27	$0.84	$0.49	$0.24	$0.72	4.6	2.2	6.9
Health care and social assistance	$0.86	$0.60	$0.28	$0.88	$0.50	$0.24	$0.74	5.3	2.5	7.8
Arts, sport and recreation	$0.18	$0.08	$0.05	$0.13	$0.05	$0.03	$0.08	0.7	0.4	1.1
Other Services	$0.52	$0.29	$0.32	$0.61	$0.21	$0.24	$0.45	3.0	3.4	6.4
Total	**$28.15**	**$18.53**	**$8.04**	**$26.57**	**$8.01**	**$3.54**	**$11.55**	**134**	**45**	**179**

Source: Modelled Result

Table 18: Estimates of Annual Economic Activity by Sector Related to Operating Spend for the LGA's of Hilltops, Yass Valley and Upper Lachlan

	Expend-iture ($m)	Value Added ($m)			Income ($m)			Employment (FTE's)		
		First Round	Induced	Total	First Round	Induced	Total	First Round	Induced	Total
Direct employment		**$0.37**		**$0.37**	**$0.37**		**$0.37**	**5.0**		**5.0**
Agriculture, Forestry and Fishing	$3.30	$1.55	$0.28	$1.83	$0.27	$0.05	$0.32	10.3	1.8	12.1
Mining	$0.00	$0.00	$0.01	$0.01	$0.00	$0.00	$0.00	0.0	0.0	0.0
Glass and polymer product manufacturing	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	0.0	0.0	0.0
Other Manufacturing	$0.22	$0.07	$0.09	$0.16	$0.04	$0.06	$0.10	0.5	0.6	1.1
Electricity generation	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	0.0	0.0	0.0
Electricity transmission/distribution	$0.01	$0.01	$0.02	$0.03	$0.00	$0.01	$0.01	0.0	0.0	0.1
Other energy and water	$0.01	$0.01	$0.02	$0.02	$0.00	$0.01	$0.01	0.0	0.0	0.0
Waste Collection	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	0.0	0.0	0.0
Residential Building Construction	$0.00	$0.00	$0.01	$0.01	$0.00	$0.00	$0.00	0.0	0.1	0.1
Non-Residential Building Construction	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	0.0	0.0	0.0
Heavy and Civil Engineering Construction	$0.00	$0.00	$0.01	$0.01	$0.00	$0.00	$0.00	0.0	0.0	0.0
Construction Services	$0.00	$0.00	$0.05	$0.05	$0.00	$0.03	$0.03	0.0	0.4	0.4
Wholesale Trade	$0.06	$0.03	$0.09	$0.12	$0.02	$0.06	$0.08	0.2	0.4	0.6
Retail Trade	$0.19	$0.12	$0.10	$0.22	$0.08	$0.07	$0.15	1.2	1.1	2.3
Accommodation and Food Services	$0.13	$0.07	$0.05	$0.12	$0.05	$0.04	$0.08	0.7	0.5	1.2
Road transport	$0.25	$0.13	$0.05	$0.17	$0.06	$0.02	$0.09	0.9	0.4	1.3
Other transport	$0.02	$0.01	$0.02	$0.02	$0.00	$0.01	$0.01	0.0	0.1	0.2
Information Media & Telecommunications	$0.02	$0.01	$0.01	$0.02	$0.00	$0.01	$0.01	0.0	0.0	0.1
Finance & Insurance Services	$0.06	$0.04	$0.09	$0.13	$0.01	$0.03	$0.04	0.1	0.2	0.3
Ownership of dwellings	$0.47	$0.36	$0.20	$0.57	$0.00	$0.00	$0.00	0.0	0.0	0.0
Property Services	$0.00	$0.00	$0.04	$0.04	$0.00	$0.01	$0.01	0.0	0.1	0.1
Professional, scientific & technical services	$0.01	$0.00	$0.07	$0.07	$0.00	$0.05	$0.05	0.0	0.5	0.5
Administrative services	$0.01	$0.00	$0.05	$0.05	$0.00	$0.04	$0.04	0.0	0.2	0.2
Public administration and safety	$0.00	$0.00	$0.01	$0.02	$0.00	$0.01	$0.01	0.0	0.1	0.1
Education & Training	$0.11	$0.07	$0.04	$0.12	$0.06	$0.04	$0.10	0.6	0.4	1.0
Health care and social assistance	$0.11	$0.08	$0.05	$0.12	$0.07	$0.04	$0.10	0.7	0.4	1.1
Arts, sport and recreation	$0.02	$0.01	$0.01	$0.02	$0.01	$0.01	$0.01	0.1	0.1	0.2
Other Services	$0.07	$0.04	$0.05	$0.09	$0.03	$0.04	$0.07	0.4	0.5	0.9
Total	**$5.04**	**$2.98**	**$1.43**	**$4.41**	**$1.09**	**$0.62**	**$1.71**	**21**	**8**	**29**

Source: Modelled Result

Table 19: Estimates of Economic Activity for the LGA's of Hilltops, Yass Valley and Upper Lachlan

	Total GSP Impact (3 yrs)	Average Annual GSP Impact	Total Jobs Impact (Person Years - over 3 yrs)	Average Annual Jobs Impact *
Construction Phase				
• Direct	$18.5 million	$6.2 million	134	45
• Indirect	$8 million	$2.7 million	45	15
• Total	$26.6 million	$8.9 million	179	60
Operating Phase				
• Direct		$3 million		21
• Indirect		$1.4 million		8
• Total		$4.4 million		29

Source: Modelled Result. Tables do not always sum due to rounding

6 Additional Economic Impacts

This report focusses primarily on the potential employment and income benefits of the proposed Rye Park Wind Farm Project. Job creation is an important community benefit and, at the regional level, the level of job creation is dependent upon two key factors:

- The amount of investment and operational activity that can be captured by the region; and
- The preparedness of the region and its people to apply for and accept available job vacancies. Having suitably trained people and geared up companies will maximize regional employment and incomes.

Examples of jobs created in the construction phase include:

- Project developers
- Field engineers
- Environmental managers and consultants
- Legal support
- Administrative and office support
- Numerous construction-related positions
- Transportation managers
- Contract and sub-contract managers
- On-site quarry operation
- Project controls engineers
- Safety technicians

Examples of jobs created in the operational phase include:

- Project managers
- Project coordinators
- Production managers
- Wind turbine technicians
- Wind turbine maintenance
- Environmental consultants
- Administrative and office support

Wind farms generally can have positive and negative socio-economic impacts depending on a variety of factors and the specific communities being impacted by the developments. For example, farmers hosting turbines receive positive financial benefits (as captured in the economic modelling above) while other communities are concerned about being subject to negative visual impacts. Other than employment and income generation, two of the most significant externalities relating to the establishment of wind farms are on property values and carbon emissions. These are discussed below.

6.1 Property Values

Many studies by independent organisations around the world have failed to find any correlation between wind turbines and declining property values. Some studies found positive property value impacts associated with:

- Improved regional amenities and infrastructure including local roads, firefighting access roads, etc.
- Increased regional incomes, jobs and property demand (as assessed above).
- Additional rental income from hosting towers.

- Provision of a drought-proofing income streams.
- Provision of post-retirement income for farmers.
- Improved biodiversity via less intensive farm activity.
- Prevention of land subdivision and slowing down the process of productive agricultural land changing to rural residential uses in the short to medium term with the shift caused by the additional income generated from the wind farm making agricultural use more viable.
- Erosion control and passive wind protection for stock from sub stations and turbine tower structures.

A report on community acceptance of rural wind farms by the CSIRO's Science into Society found that rural landowners with wind farms on their properties stood to gain from such benefits.[14]

For properties without wind turbines but in the line of sight of turbines, statistical evidence supports that property values do not perform worse than properties in comparable regions without wind turbines. Examples of studies that review the impact of wind farms on property prices include:

- Vyn and Mccullogh[15] found that wind turbine developments had no effect on property values of nearby homes and farms in a study of more than 7,000 home and farm sales in Melancthon Township and 10 surrounding townships in Dufferin, Grey, Simcoe and Wellington counties. Melancthon, located about 100 kilometres northwest of Toronto, is home to one of Ontario's first and largest wind farms; 133 wind turbines were erected between 2005 and 2008.
- A 2013 study conducted by the NSW Department of Lands looked at properties located near eight wind farms and found no evidence that wind turbines caused property values to drop. The report found that wind farms "do not appear to have negatively affected property values in most cases". The report also found that "no reductions in sale price were evident for rural properties or residential properties located in nearby townships with views of the wind farm".[16]
- Another 2013 publication reported on a decade long study across nine different states in the US by the Lawrence Berkeley National Research Laboratory found no negative relationship between wind turbines and property values. The study found "neither the view of the wind facilities nor the distance of the home to those facilities is found to have any consistent, measurable, and statistically significant effect on home sales prices".[17]
- Also, the University of New Hampshire's Impact of the Lempster Wind Power Project on Local Residential Property Values from January 2012 found no evidence that the project had an impact on property values in the region. The study also said "this is consistent with the near unanimous findings of other studies—based their analysis on arms-length property sales

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14 CSIRO report http://www.csiro.au/Organisation-Structure/Flagships/Energy-Transformed-Flagship/Exploring-community-acceptance-of-rural-wind-farms-in-Australia.aspx, reported in Wind Energy the Facts, Clean Energy Council, March 2013.

15 Richard J. Vyn, Ryan M. McCullough. The Effects of Wind Turbines on Property Values in Ontario: Does Public Perception Match Empirical Evidence? Canadian Journal of Agricultural Economics/Revue canadienne d'agroeconomie, 2014; 62 (3): 365 DOI: 10.1111/cjag.12030

16 NSW Department of Lands report http://www.lpi.nsw.gov.au/__data/assets/pdf_file/0018/117621/t0L51WT8.pdf reported in Wind Energy the Facts, Clean Energy Council, March 2013.

17 Lawrence Berkeley study, United States http://eetd.lbl.gov/ea/ems/reports/lbnl-2829e.pdf, reported in Wind Energy the Facts, Clean Energy Council, March 2013. This study was further confirmed in the August 2013 study by the Berkley National Laboratory "A Spatial Hedonic Analysis of the Effects of Wind Energy Facilities on Surrounding Property Values in the United States" which used data for 50,000 home sales across the USA for homes from within 1 mile to within 10 miles of a wind farm to conclude that "we find no statistical evidence that home values near turbines were affected in the post-construction or post-announcement/pre-construction periods"

transactions—that have found no conclusive evidence of wide spread, statistically significant changes in property values resulting from wind power projects".[18]

- A 2016 study conducted by Urbis Pty Ltd based on a literature review of Australian and international studies on the impact of wind farms on property values "revealed that the majority of published reports conclude that there is no impact or a limited definable impact of wind farms on property values. Those studies which identified a negative impact are based in the northern hemisphere and are associated with countries with higher population densities and a greater number of traditional residential and lifestyle properties affected by wind farms. This is generally contrary to the Australian experience, with most wind farms being located in low population density environments that derive the majority of their value from productive farming purposes".[19]

While the above studies and evidence support that wind farms have no long term detrimental impact on overall property values, it must be recognised that over time many other factors impact property values such as general market conditions, population trends and the local property supply/demand balance. Studies that indicate some impact generally conclude the impact is small. Sunak And Madlener[20] conclude that properties whose view was strongly affected decreased marginally, while properties with a minor or marginal view of the turbines experienced no devaluation.

There will be localised positive and negative impacts associated with wind farms depending on individual property locations and characteristics. Some may appreciate faster than market trends due to improved farm incomes from hosting towers (offsetting the loss of productive land) and improved access to infrastructure. Some may fail to keep pace with market trends due to perceptions of visual and noise impacts. Potential disruption during tower assembly and infrastructure establishment is also noted. However, the evidence supports no overall long-term negative impact on property values associated with wind farm developments, and in general the outcomes can be managed by appropriate site selection and design.

6.2 Carbon Emissions

Renewable wind energy generation has significant environmental benefits through carbon emissions reduction where it replaces coal or gas generated electricity. The debate in this area comes down conclusively on the carbon reduction benefits of wind farms relative to fossil fuels.[21]

To estimate the value of this reduction it is assumed that the Rye Park Wind Farm will have the following operating characteristics:

- Total wind farm capacity of 386 megawatts.
- Annual average utilisation rate of 36%.
- Total generation of 1,396 Gigawatt hours per annum.

Wind farms generate miniscule carbon emissions in operation and maintenance, whereas it can be (conservatively from a modelling perspective) assumed that coal generated electricity produces 0.8

18 *Impact of the Lempster Wind Power Project on Local Residential Property Values*, January 2012 http://antrim-wind.com/files/2012/05/14B_lempster_property_value_impacts_final-copy-copy.pdf reported in Wind Energy the Facts, Clean Energy Council, March 2013

19 *Review of the Impact of Wind Farms on Property Values*, Urbis Pty Ltd, July 2016

20 Sunak, Y., and Madlener, R., *The impact of wind farms on property values: A locally weighted hedonic pricing model*, Papers in Regional Science, December 2015

21 The arguments re carbon emissions in wind versus fossil fuels generated electricity is summarized by Professor Barry Brooks (University of Adelaide) at http://bravenewclimate.com/2010/09/01/wind-power-emissions-counter/

tonnes of carbon per megawatt hour[22], this would produce in the order of 0.779 million tonnes of carbon emissions. Via the secondary market for carbon abatement in the Australian carbon market, the current price for carbon abatement is $15.75 per tonne. Indicative prices vary significantly based on method and approach that is used. Voluntary offset issuance indicates prices of less than US$5 in 2015. (https://carbonpricingdashboard.worldbank.org/what-carbon-pricing). In 2019, the NY times cited the price in Australia as US $10 per metric ton of CO2 (falling from $23 under the labour government cap and trade program) - https://www.nytimes.com/interactive/2019/04/02/climate/pricing-carbon-emissions.html .

However, *The Economics of Climate Change: The Stern Review* indicates a higher social cost of carbon of US $25-$30 per tonne. Therefore, using the lower price as a base for the valuation may be considered conservative.

At a conservative carbon price of $15.75 per tonne, the value of carbon emission savings associated with the Rye Park Wind Farm is estimated to be $17.0 million per annum or a present value of $165 million over a 20 year period (discount rate of 6%). At price more aligned with the Stern review of A$30.00 per tonne, the value of carbon emission savings associated with the Rye Park Wind Farm is estimated to be $32.5 million per annum or a present value of $372 million over a 20 year period (discount rate of 6%).

[22] Annual carbon emissions from the National Electricity Market amount to of the order of 300 million tonnes (CO2-e) as at December 2019 https://www.tai.org.au/, with 50% of that being through coal powered electricity generation. While the proportion of carbon emissions from brown coal power generation has declined over the last decade, the long term levels of emissions remains relatively flat

7 Conclusion

The proposed Rye Park Wind Farm is a major new wind farm proposal in the Yass area of NSW which has been in active development since late 2008.

This economic impact assessment has focused on the effect of the Project on regional incomes and employment associated with the construction and operating phases of the project.

The economic modelling for the project has been undertaken using a conservative scenario of impact. This conservative scenario is based on a relatively low proportion of construction and operating inputs being supplied locally (i.e. by the LGA's of Hilltops, Yass Valley and Upper Lachlan, Goulburn-Yass region, the State of NSW and given its proximity to the project, the economy of the ACT). It is assumed that the turbines are imported from overseas, and the major local impact is based on transport, labour in assembly and payments to landowners.

Modelling for this scenario indicates that the project will generate $186 million of value added (which is a net contribution to Gross State Product[23]) **in the State of NSW** and $43 million of value added **to the ACT** – or a total of $229 million, over the period of construction and that this would happen over three years (allowing for lagged flow through effects). 1,204 person years[24] of employment in NSW and 242 in the ACT (total of 1,446) would be supported – or an average of over 401[25] jobs and 81 respectively (total of 482) sustained per year over three years. Once operational the project is estimated to support annually $8.3 million of value added in NSW and $0.4 in the ACT, and support directly and indirectly of the order of 51 and 3 jobs respectively per year. Note that the impact at the national level would be similar to the aggregate state level, unless there are constraints in national labour and capital markets. Such constraints would reduce the national level of impact, with the project drawing resources into New South Wales and out of other states.

From a **broad regional perspective**[26], the modelling indicates that the project will generate $67.6 million of value added (contribution to Gross Regional Product) in the region over the period of construction and, again allowing for lagged flow through effects, this would happen over three years. 494 person years of employment would be supported, or an average of 165 jobs sustained per year over three years. Once operational the project is estimated to support annually $5.2 million of value added in the region, and support directly and indirectly (including the induced impact) approximately 37 jobs per year.

From a local perspective[27], the modelling indicates that the project will generate $26.6 million of value added (contribution to Gross Regional Product) in LGA's of Yass Valley, Upper Lachlan and Hilltops over the period of construction and, again allowing for lagged flow through effects, this would happen over three years. 179 person years of employment for local residents would be supported, or an average of 60 jobs sustained per year over three years. Once operational the project is estimated to support annually $4.4 million of value added in the region, and support directly and indirectly (including the induced impact) approximately 29 jobs per year.

[23] Value added is the way in which economic activity is measured in the National Accounting system. At the national level this is equivalent to Gross Domestic Product (GDP) and is made up of returns to labour (wages and salary and taxes on labour) and returns to capital (gross operating surplus (or profits plus depreciation and financing costs) and company tax and GST). At the state level the national accounts call this amount the Gross State Product.
[24] i.e. the number of full time equivalent annual jobs created over the period. So a project that created 100 full time jobs that last for three years would have an outcome of 300 person years of employment
[25] 1204÷3
[26] Regional in this context is defined as the Goulburn-Yass South area of New South Wales.
[27] Local in this context is the LGA's of Yass Valley, Upper Lachlan Shire and Hilltops.