

---

# KIAMA HOUSING STUDY – PRELIMINARY EIA

TRADERS IN PURPLE

JANUARY 2023



---

[aecgrouppltd.com](http://aecgrouppltd.com)

## DOCUMENT CONTROL

---

Job ID: J002278  
 Job Name: Kiama Housing Study in Relation to the “Kiama West” Site  
 Client: Traders in Purple  
 Client Contact: Thomas Zdun  
 Project Manager: James Popovic  
 Email: [james.popovic@aecgrouppltd.com](mailto:james.popovic@aecgrouppltd.com)  
 Telephone: 61 2 9283 8400  
 Document Name: Preliminary EIA - Kiama WDv1.0  
 Last Saved: 13/1/2023 4:24 PM

Version	Date	Reviewed	Approved
DRAFT 1.0	13 January, 2023	JP	ARP

**Disclaimer:**

Whilst all care and diligence have been exercised in the preparation of this report, AEC Group Pty Ltd does not warrant the accuracy of the information contained within and accepts no liability for any loss or damage that may be suffered as a result of reliance on this information, whether or not there has been any error, omission or negligence on the part of AEC Group Pty Ltd or their employees. Any forecasts or projections used in the analysis can be affected by a number of unforeseen variables, and as such no warranty is given that a particular set of results will in fact be achieved.

***Liability Limited by a scheme approved under Professional Standards Legislation***

# EXECUTIVE SUMMARY

## BACKGROUND

Traders in Purple (“Traders”) are in the preliminary stages of preparing background studies to support a Planning Proposal seeking to rezone a substantial property holding of 114.7 hectares located at the western edge of the Kiama town centre urban area. Ownership of the Kiama West site is controlled by Traders.

The Kiama West redevelopment proposal has the potential to deliver approximately 1,140 residential dwellings, which includes a mixture of apartments, small houses, small lots and large lots (also with the inclusion of social and affordable housing). The site is proposed to include an agricultural college with enrolments of approximately 1,800 students, as well as a retail precinct spanning a site area of approximately 10,191sqm.

This report provides the estimated potential economic benefits of the development at the Kiama West site, based on currently known factors.

## KEY FINDINGS

### Construction

Construction of the Kiama development has the potential to generate significant economic impacts within the Kiama LGA including \$108.4 million in GRP directly from construction activity and \$74.9 million in flow on impacts, as shown in Table E.S. 1.

**Table E.S. 1. Total Economic Activity Supported by Construction**

Impact	Output (\$M)	Gross Regional Product (\$M)	Incomes (\$M)	Employment (FTEs)
Direct	\$452.6	\$108.4	\$75.6	748
Type I Flow-On	\$131.2	\$49.6	\$39.2	415
Type II Flow-On	\$42.0	\$25.3	\$13.6	203
<b>Total</b>	<b>\$625.9</b>	<b>\$183.3</b>	<b>\$128.4</b>	<b>1,365</b>

Note: Totals may not sum due to rounding.  
Source: AEC

### Ongoing Impacts

Ongoing economic activity generated from operations of the agricultural college and retail precinct aspects of the development are estimated to include \$19.2 million in GRP directly from operations of the agricultural college and retail precinct whilst also providing an estimated \$7.2 million in flow on impacts. Additional estimated ongoing impacts are displayed in Table E.S. 2. Importantly the project is anticipated to deliver a total of 274 jobs (including direct and indirect), many of which may be filled by locals.

**Table E.S. 2. Total Annual Economic Activity Supported by Ongoing Impacts**

Impact	Output (\$M)	Gross Regional Product (\$M)	Incomes (\$M)	Employment (FTEs)
Direct	\$32.0	\$19.2	\$15.9	217
Type I Flow-On	\$6.2	\$3.2	\$2.4	25
Type II Flow-On	\$6.6	\$4.0	\$2.1	32
<b>Total</b>	<b>\$44.7</b>	<b>\$26.4</b>	<b>\$20.5</b>	<b>274</b>

Note: Totals may not sum due to rounding.  
Source: AEC

# TABLE OF CONTENTS

---

<b>DOCUMENT CONTROL</b> .....	<b>I</b>
<b>EXECUTIVE SUMMARY</b> .....	<b>II</b>
<b>TABLE OF CONTENTS</b> .....	<b>III</b>
<b>1. INTRODUCTION</b> .....	<b>1</b>
1.1 BACKGROUND .....	1
1.2 SCOPE AND APPROACH.....	1
<b>2. MODELLING ASSUMPTIONS</b> .....	<b>2</b>
2.1 CONSTRUCTION PHASE.....	2
2.2 ONGOING IMPACTS .....	4
<b>3. ECONOMIC ACTIVITY AND IMPACTS</b> .....	<b>6</b>
3.1 CONSTRUCTION PHASE.....	6
3.2 ONGOING IMPACTS .....	7
<b>REFERENCES</b> .....	<b>9</b>
<b>APPENDIX A: INPUT-OUTPUT METHODOLOGY</b> .....	<b>10</b>

DRAFT

# 1. INTRODUCTION

---

## 1.1 BACKGROUND

The Kiama Local Strategic Planning Statement (LSPS) identifies a number of sites for potential future expansion to support regional population growth. There are 9 sites identified with a combined land area of ~178.9 hectares. The Bombo Quarry site is the largest at ~108.3 hectares, however, the quarry is still operating and when taking into consideration the requirement of quarry rehabilitation post usage, the timing of delivery for any potential housing at the quarry site remains a long term proposition. The LSPS has a timeframe of circa 20 years.

DPE (2019) identifies 3,997 additional residents will live in Kiama with an implied dwelling demand of an additional 1,990 dwellings by 2041. The most recent figures prepared by DPE indicate a higher number of 8,737 additional residents (+119%) and implied dwelling demand of 3,771 dwellings (+90%) by 2041. The material forecast increase for both population growth and implied dwelling demand indicates Kiama LGA has insufficient near-term land stock planned and in place to facilitate these increases, even when including the nine aforementioned release areas.

Traders in Purple (“Traders”) are in the preliminary stages of preparing background studies for a Planning Proposal seeking to rezone a substantial property holding of ~114.7 hectares located at the western edge of the Kiama town centre urban area. Ownership of the Kiama West site is held by Traders.

The proposal has the potential to deliver an estimated ~1,140 residential dwellings comprising a mix of low density, large lots and small lots (affordable housing). Also proposed, are:

- Low impact eco-tourism uses;
- Localised retail uses; and
- Educational uses (proposed as a horticulture and agricultural college/ institute).

The Proposed Project is expected to be delivered over a 7 to 10 year period and will be staged according to market demands.

An illustrative concept has been developed and various other stakeholder engagement materials are being prepared to highlight the economic and social benefits of the project.

The Preliminary Economic Impact Study measures the potential future economic activity and benefits delivered by the project for the local area.

## 1.2 SCOPE AND APPROACH

This report has been prepared to profile the estimated economic benefits that can potentially be generated by the development at the Kiama West site. The Input-Output modelling shows the direct and indirect benefits of both construction and ongoing impacts.

The report is structured as follows:

- **Chapter 2:** Outlines the key modelling assumptions used in Input-Output modelling.
- **Chapter 3:** Overview of the Input-Output modelling outcomes in both a tabular and graphical format.

## 2. MODELLING ASSUMPTIONS

### 2.1 OVERVIEW

This chapter examines the economic activity expected to be associated with the community development at the Kiama West site that may be realised within the Kiama LGA.

An Input-Output model, including the development of a series of specific regional Input-Output transaction tables, was developed to reflect the economic structure of Kiama LGA (refer to **Appendix A**). Input-Output modelling describes economic activity through the examination of four types of impacts, defined and described in Table 2.1.

**Table 2.1. Economic Indicators**

Indicator	Description
Output	Refers to the gross value of goods and services transacted, including the costs of goods and services used in the development and provision of the final product. Output typically overstates the economic impacts as it counts all goods and services used in one stage of production as an input to later stages of production, hence counting their contribution more than once.
Gross Regional Product	Refers to the value of output after deducting the cost of goods and services inputs in the production process. Gross product (e.g., Gross Regional Product) defines a true net economic contribution and is subsequently the preferred measure for assessing economic impacts.
Income	Measures the level of wages and salaries paid to employees of the industry under consideration and to other industries benefiting from the Project.
Employment	Refers to the part-time and full-time employment positions generated by the economic shock, both directly and indirectly through flow on activity, and is expressed in terms of Full-Time Equivalent (FTE) positions. One FTE job is defined as one person working full time for a period of one year.

Source: AEC

Input-Output multipliers can be derived from open (Type I) Input-Output models or closed (Type II) models. Open models show the direct effects of spending in a particular industry as well as the indirect or flow on (industrial support) effects of additional activities undertaken by industries increasing their activity in response to the direct spending. Closed models re-circulate the labour income earned as a result of the initial spending through other industry and commodity groups to estimate consumption induced effects (or impacts from increased household consumption).

In order to understand the economic impacts likely to result from the study, it is necessary to distinguish economic impacts during the construction phase and those economic impacts that will be more permanent in nature following construction completion and operations commencement.

- **Construction Phase:** Construction activity will draw resources from and thereby generate economic activity in Kiama LGA as well as from outside the LGA. Assumptions are made on the proportion sourced from within and from outside the LGA.
- **Ongoing Impacts:** On completion of agricultural college and retail precinct, the site is expected to generate ongoing economic/ operational activity through the following:
  - Direct turnover generated by the agricultural college.
  - Direct turnover generated by retail precinct.

### 2.2 DEVELOPMENT AREA

The examination of economic activity supported by the development (both during the construction phase and ongoing impacts) has regard to residential and commercial development, the indicative gross floor area (GFA) delivered for these developments, and the potential land uses carried out. For the purposes of modelling, the following was assumed regarding building footprint by type of use, based on the potential uses:

- 411,825 sqm for residential development (approximately 1,140 residential dwellings).
- 26,062 sqm for roads, the agricultural college, and the retail precinct.

In addition to the above, it has been assumed approximately 385,763 sqm of recreation public open space/ garden areas will be developed.

## 2.3 CONSTRUCTION PHASE ACTIVITY

The total development is anticipated to require approximately \$717.0 million. Approximately \$534.2 million of the project costs are residential dwelling construction costs of the development with \$47.9 million of the costs allocated to the construction of the agricultural college and retail precinct. An estimated \$135.0 million is allocated to works including subdivision and civil infrastructure costs (e.g. roads, drainage).

The estimated \$5.5 million Special SIC (Special Infrastructure Contribution) cost was not included in the economic modelling as this reflects a transfer of payment, which does not generate genuine economic activity. The construction costs modelled are displayed in Table 2.2.

**Table 2.2. Construction Costs Modelled**

Component	Total Cost (\$M)
Apartments	\$209.7
Smaller Lots- Mews	\$59.5
Small Lots	\$36.6
Standard / Gully	\$173.4
Hobby Lots	\$55.0
Other Uses / Activation	\$20.4
Agricultural College	\$27.5
Subdivision Works	\$58.6
Electrical Lead	\$1.7
Sydney Water Lead In	\$3.5
VPA Drainage	\$45.9
VPA Open Space	\$7.6
VPA Traffic & Transport	\$17.7
<b>Total</b>	<b>\$717.0</b>

Source: Traders in Purple (unpublished).

Construction costs listed in Table 2.2 were broken down and allocated to Input-Output industries for the purpose of Input-Output modelling. Breakdowns into industries were developed based on assumptions by AEC regarding the most appropriate industries for each construction activity and the relevant expenditure allocated. Table 2.3 displays the construction component and its proportional expenditure breakdown into the relevant Input-Output industries.

**Table 2.3. Input-Output Industry Allocation**

Component	Industry Allocation
Apartments	<ul style="list-style-type: none"> <li>Residential Building Construction (90%)</li> <li>Construction Services (10%)</li> </ul>
Smaller Lots- Mews	<ul style="list-style-type: none"> <li>Residential Building Construction (90%)</li> <li>Construction Services (10%)</li> </ul>
Small Lots	<ul style="list-style-type: none"> <li>Residential Building Construction (90%)</li> <li>Construction Services (10%)</li> </ul>
Standard / Gully	<ul style="list-style-type: none"> <li>Residential Building Construction (90%)</li> <li>Construction Services (10%)</li> </ul>
Hobby Lots	<ul style="list-style-type: none"> <li>Residential Building Construction (90%)</li> <li>Construction Services (10%)</li> </ul>
Other Uses / Activation	<ul style="list-style-type: none"> <li>Non-Residential Building Construction (90%)</li> <li>Construction Services (10%)</li> </ul>
Agricultural College	<ul style="list-style-type: none"> <li>Non-Residential Building Construction (90%)</li> <li>Construction Services (10%)</li> </ul>

Component	Industry Allocation
Subdivision Works	<ul style="list-style-type: none"> <li>Construction Services (100%)</li> </ul>
Electrical Lead	<ul style="list-style-type: none"> <li>Heavy and Civil Engineering Construction (90%)</li> <li>Construction Services (10%)</li> </ul>
Sydney Water Lead In	<ul style="list-style-type: none"> <li>Heavy and Civil Engineering Construction (90%)</li> <li>Construction Services (10%)</li> </ul>
VPA Drainage	<ul style="list-style-type: none"> <li>Heavy and Civil Engineering Construction (90%)</li> <li>Construction Services (10%)</li> </ul>
VPA Open Space	<ul style="list-style-type: none"> <li>Construction Services (80%)</li> <li>Heavy and Civil Engineering Construction (20%)</li> </ul>
VPA Traffic & Transport	<ul style="list-style-type: none"> <li>Heavy and Civil Engineering Construction (90%)</li> <li>Construction Services (10%)</li> </ul>

Source: Traders in Purple (unpublished), AEC.

Table 2.4 provides a summary of the construction expenditure by Input-Output Industry for modelling.

**Table 2.4. Construction Cost by Input-Output Industry**

Component	Total Cost (\$M)
Residential Building Construction	\$480.8
Construction Services	\$129.8
Heavy and Civil Engineering Construction	\$63.4
Non-Residential Building Construction	\$43.1
<b>Total</b>	<b>\$717.0</b>

Source: AEC.

For the above capital in Table 2.4, it is assumed that 70% of residential building construction can be sourced locally within the Kiama LGA, 50% of construction services can be sourced locally within the Kiama LGA, 40% of heavy and civil engineering construction can be sourced locally within the Kiama LGA and 60% of non-residential building construction can be sourced locally within the Kiama LGA.

## 2.4 ONGOING ACTIVITY

The following ongoing impacts of the development at the Kiama West site were examined:

- **Agricultural College:** Value of economic activity associated with the agricultural college.
- **Retail Precinct:** Value of economic activity associated with the retail precinct (reported as Other Uses / Activation in concept designs).

### Agricultural College

Table 2.5 summarises the employment estimates of the proposed agricultural college of the development, which were developed based on standard benchmarks of Students per FTE from previous AEC research. For modelling purposes, estimated operational employment levels for the agricultural college were allocated to their respective Input-Output industries. This breakdown was developed based on assumptions on the most appropriate industries for each employment role.

**Table 2.5. Operational Employment Allocation for Agricultural College**

Employment Role	Students per FTE	Employment	Input-Output Industry
Academic	34	53	<ul style="list-style-type: none"> <li>Technical, Vocational and Tertiary Education Services (incl undergraduate and postgraduate) (100%)</li> </ul>
Admin/Enrolments	300	6	<ul style="list-style-type: none"> <li>Employment, Travel Agency and Other Administrative Services (100%)</li> </ul>
Receptionist	1,800	1	<ul style="list-style-type: none"> <li>Employment, Travel Agency and Other Administrative Services (100%)</li> </ul>



Employment Role	Students per FTE	Employment	Input-Output Industry
Cleaner	600	3	• Building Cleaning, Pest Control and Other Support Services (100%)
Buildings & Grounds	1,800	1	• Other Repair and Maintenance (100%)

Source: Traders in Purple (unpublished), AEC.

### Retail Precinct

Table 2.6 provides an assumed land use breakdown of the Other Uses/ Activation area of the proposed development to model a retail precinct, which includes carparking, a supermarket/ grocer, retail trade and food outlets and other uses (footpaths, nature strips etc.).

**Table 2.6. Assumed Precinct Land Use of Retail Precinct**

Precinct Land Use	Sqm	Proportion
Carparking	4,586	45.0%
Supermarket / Grocers	3,057	30.0%
Retail Trade & Food	2,038	20.0%
Other Uses	510	5.0%
<b>Total</b>	<b>10,191</b>	<b>100.0%</b>

Source: Traders in Purple (unpublished), AEC.

Table 2.7 displays the estimated employment of the supermarket/ grocers and retail trade and food aspects of the retail precinct, which were developed based on standard benchmarks of GFA per employee from previous AEC research. For modelling purposes, estimated operational employment levels for the retail precinct were allocated to their respective Input-Output industries. This breakdown was developed based on assumption on the most appropriate industries for each retail precinct shop.

**Table 2.7. Operational Employment Allocation for Retail Precinct**

Retail Precinct Shop	Sqm	Sqm per FTE	Employment	Input-Output Industry
Supermarket / Grocers	3,057	60	51	• Retail Trade (100%)
Retail Trade & Food	2,038	20	102	• Retail Trade (81.6%) • Food and Beverage Services (18.4%)

Source: AEC.

Employment by industry estimates were converted to an output value using a multiplier based on the national transaction table (ABS, 2021a; ABS, 2021b). The resultant estimates of output were modelled as the direct activity associated with the agricultural college and retail precinct which are displayed in Table 2.8.

**Table 2.8. Operational Output Drivers**

Input-Output Industry	Employment (FTE)	Output (\$M)
<b>Agricultural College</b>		
Technical, Vocational and Tertiary Education Services (incl undergraduate and postgraduate)	53	\$10.8
Employment, Travel Agency and Other Administrative Services	7	\$1.1
Building Cleaning, Pest Control and Other Support Services	3	\$0.4
Other Repair and Maintenance	1	\$0.2
<b>Sub-Total</b>	<b>64</b>	<b>\$12.5</b>
<b>Commercial Precinct</b>		
Retail Trade	134	\$17.4
Food and Beverage Services	19	\$2.1
<b>Sub-Total</b>	<b>153</b>	<b>\$19.5</b>
<b>Total</b>	<b>217</b>	<b>\$32.0</b>

Source: AEC.

### 3. ECONOMIC ACTIVITY & IMPACTS

The economic activity supported by the development (through construction and ongoing annual activity thereafter) can be traced through the economic system via:

- **Direct impacts**, which represent the economic activity of the industry or industries directly experiencing the stimulus.
- **Indirect Impacts (Flow-on impacts)**, which are disaggregated to:
  - **Indirect Impact (Type I)**, which comprise the effects from:
    - Direct expenditure on goods and services by the industry experiencing the stimulus (direct suppliers to the industry), known as the first round or direct requirements effects.
    - The second and subsequent round effects of increased purchases by suppliers in response to increased sales, known as the industry support effects.
  - **Indirect Impact (Type II)**, which represent the consumption induced activity from additional household expenditure on goods and services resulting from additional wages and salaries being paid within the economic system.

The premise behind Type I and Type II indirect impacts applies across both the construction phase and from ongoing impacts, except the impacts on industry will be different. For example, Type I impacts during the construction phase may include professional services (e.g. architects, engineers), manufacturing (steel, construction materials) while examples of Type I impacts from ongoing impacts may include accommodation and food services (retail trade and food and beverage services), and education and training (e.g. Technical, Vocational and Tertiary Education Services (incl undergraduate and postgraduate)).

The following sections outline the economic activity attributed to assumed future land uses on the Site.

#### 3.1 CONSTRUCTION PHASE

The construction phase associated with the housing development in Kiama has the potential to support the following economic activity through direct and flow-on impacts:

- \$625.9 million in output (including \$452.6 million in direct activity).
- \$183.3 million in Gross Regional Product (GRP) (including \$108.4 million in direct activity).
- \$128.4 million in incomes and salaries paid to households (including \$75.6 million in direct wages).
- 1,365 FTE jobs (including 748 FTE jobs directly related to the construction activity).

**Table 3.1. Construction Activity Supported (\$M)**

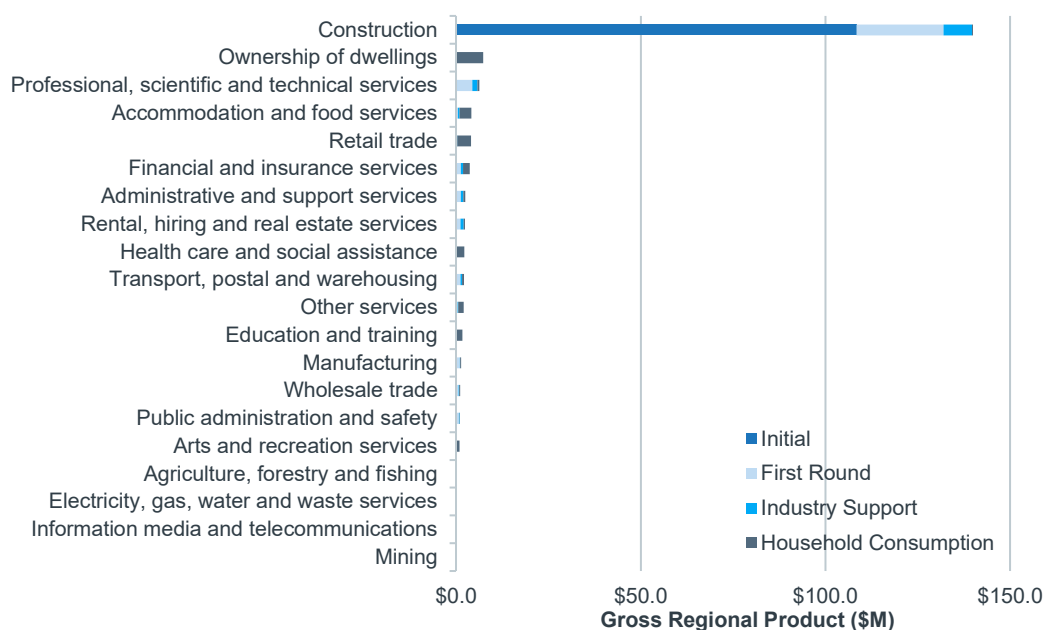
Impact	Output (\$M)	Gross Regional Product (\$M)	Incomes (\$M)	Employment (FTEs)
Direct	\$452.6	\$108.4	\$75.6	748
Type I Flow-On	\$131.2	\$49.6	\$39.2	415
Type II Flow-On	\$42.0	\$25.3	\$13.6	203
<b>Total</b>	<b>\$625.9</b>	<b>\$183.3</b>	<b>\$128.4</b>	<b>1,365</b>

Note: Totals may not sum due to rounding.  
Source: AEC

Potential major industry beneficiaries of the construction activity include:

- Construction (\$139.9 million in GRP)
- Ownership of dwellings (\$7.3 million in GRP)
- Professional, scientific and technical services (\$6.3 million in GRP)

**Figure 3.1 Potential Gross Regional Product (GRP) Impacts by Industry, Construction Phase**



Source: AEC

### 3.2 ONGOING IMPACTS

Once fully developed and operational, the agricultural college and retail precinct components of the development has the potential to generate the following annual economic activity within the Kiama LGA through the direct and flow-on impacts (per annum):

- \$44.7 million in output (including \$32.0 million in direct activity).
- \$26.4 million contribution to GRP (including \$19.2 million in direct activity).
- \$20.5 million in incomes and salaries paid to households (including \$15.9 million in direct wages).
- 274 FTE jobs (including 217 FTE jobs from direct activity, comprised of 153 FTE jobs related to retail development and 64 FTE jobs from the agricultural college).

**Table 3.2. Potential Ongoing Annual Activity Supported (Agricultural College & Retail Precinct) (\$M)**

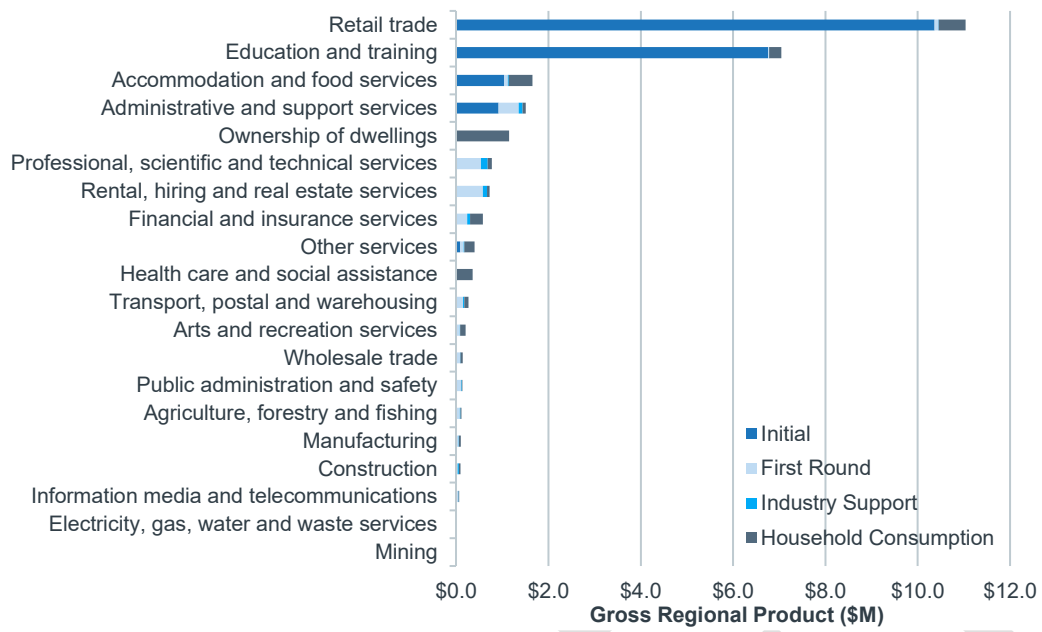
Impact	Output (\$M)	Gross Regional Product (\$M)	Incomes (\$M)	Employment (FTEs)
Direct	\$32.0	\$19.2	\$15.9	217
Type I Flow-On	\$6.2	\$3.2	\$2.4	25
Type II Flow-On	\$6.6	\$4.0	\$2.1	32
<b>Total</b>	<b>\$44.7</b>	<b>\$26.4</b>	<b>\$20.5</b>	<b>274</b>

Note: Totals may not sum due to rounding.  
Source: AEC.

Potential major industry beneficiaries of ongoing impacts of the agricultural college and retail precinct include:

- Retail trade (GRP \$11.0 million per annum)
- Education and training (GRP \$7.0 million per annum)
- Accommodation and Food Services (GRP \$1.6 million per annum).

**Figure 3.2. Potential Gross Regional Product (GRP) Impacts by Industry, Ongoing Impacts**



Source: AEC.

DRAFT

## REFERENCES

---

ABS (2021a). *Australian National Accounts: Input-Output Tables – Electronic Publication, 2018-19 tables*. Cat. No. 5209.0.55.001, Australian Bureau of Statistics, Canberra.

ABS (2021b). *Labour Force, Australia, Detailed, Quarterly*. Cat. No. 6291.0.55.003, Australian Bureau of Statistics, Canberra.

ABS (2021c). *Wage Price Index, Australia*. Cat. No. 6345.0, Australian Bureau of Statistics, Canberra.

Flegg, A.T., Lamonica, G.R., Chelli, F.M., Recchioni, M.C. and Tohmo, T. (2021). *A new approach to modelling the input-output structure of regional economies using non-survey methods*. *Journal of Economic Structures*, 2021, 10:12.

Traders in Purple (unpublished). 230109 Kiama Development Cost Summary [Microsoft Excel Spreadsheet].

## APPENDIX A: INPUT-OUTPUT METHODOLOGY

### INPUT-OUTPUT MODEL OVERVIEW

Input-Output analysis demonstrates inter-industry relationships in an economy, depicting how the output of one industry is purchased by other industries, households, the government and external parties (i.e. exports), as well as expenditure on other factors of production such as labour, capital and imports. Input-Output analysis shows the direct and indirect (flow-on) effects of one sector on other sectors and the general economy. As such, Input-Output modelling can be used to demonstrate the economic contribution of a sector on the overall economy and how much the economy relies on this sector or to examine a change in final demand of any one sector and the resultant change in activity of its supporting sectors.

The economic contribution can be traced through the economic system via:

- **Initial stimulus (direct) impacts**, which represent the economic activity of the industry directly experiencing the stimulus.
- **Flow-on impacts**, which are disaggregated to:
  - **Production induced effects (type I flow-on)**, which comprise the effects from:
    - Direct expenditure on goods and services by the industry experiencing the stimulus (direct suppliers to the industry), known as the first round or direct requirements effects.
    - The second and subsequent round effects of increased purchases by suppliers in response to increased sales, known as the industry support effects.
  - **Household consumption effects (type II flow-on)**, which represent the consumption induced activity from additional household expenditure on goods and services resulting from additional wages and salaries being paid within the economic system.

These effects can be identified through the examination of four types of impacts:

- **Output:** Refers to the gross value of goods and services transacted, including the costs of goods and services used in the development and provision of the final product. Output typically overstates the economic impacts as it counts all goods and services used in one stage of production as an input to later stages of production, hence counting their contribution more than once.
- **Gross product:** Refers to the value of output after deducting the cost of goods and services inputs in the production process. Gross product (e.g., Gross Regional Product) defines a true net economic contribution and is subsequently the preferred measure for assessing economic impacts.
- **Income:** Measures the level of wages and salaries paid to employees of the industry under consideration and to other industries benefiting from the project.
- **Employment:** Refers to the part-time and full-time employment positions generated by the economic shock, both directly and indirectly through flow-on activity, and is expressed in terms of full time equivalent (FTE) positions.

Input-Output multipliers can be derived from open (Type I) Input-Output models or closed (Type II) models. Open models show the direct effects of spending in a particular industry as well as the indirect or flow-on (industrial support) effects of additional activities undertaken by industries increasing their activity in response to the direct spending.

Closed models re-circulate the labour income earned as a result of the initial spending through other industry and commodity groups to estimate consumption induced effects (or impacts from increased household consumption).

## MODEL DEVELOPMENT

Multipliers used in this assessment are derived from sub-regional transaction tables developed specifically for this project. The process of developing a sub-regional transaction table involves developing regional estimates of gross production and purchasing patterns based on a parent table, in this case, the 2018-19 Australian transaction table (ABS, 2021a).

Estimates of gross production (by industry) in the study areas were developed based on the percent contribution to employment (by place of work) of the study areas to the Australian economy (ABS, 2012; ABS, 2017; ABS, 2021b; DoESE, 2021), and applied to Australian gross output identified in the 2018-19 Australian table.

Industry purchasing patterns within the study area were estimated using a Flegg Location Quotient approach, as described in Flegg *et al.* (2021), with a fixed degree of convexity applied to the regional size scalar. Regional final demand estimates (except exports) developed based on the regional inter-industry sales estimated using the Flegg Location Quotient relative to national inter-industry sales and final demand estimates for each industry (noting regional exports are assumed to reflect the remainder of total uses).

Employment estimates were rebased from 2018-19 (as used in the Australian national Input-Output transaction tables) to current year values using the Wage Price Index (ABS, 2021c).

## MODELLING ASSUMPTIONS

The key assumptions and limitations of Input-Output analysis include:

- **Lack of supply-side constraints:** The most significant limitation of economic impact analysis using Input-Output multipliers is the implicit assumption that the economy has no supply-side constraints so the supply of each good is perfectly elastic. That is, it is assumed that extra output can be produced in one area without taking resources away from other activities, thus overstating economic impacts. The actual impact is likely to be dependent on the extent to which the economy is operating at or near capacity.
- **Fixed prices:** Constraints on the availability of inputs, such as skilled labour, require prices to act as a rationing device. In assessments using Input-Output multipliers, where factors of production are assumed to be limitless, this rationing response is assumed not to occur. The system is in equilibrium at given prices, and prices are assumed to be unaffected by policy and any crowding out effects are not captured. This is not the case in an economic system subject to external influences.
- **Fixed ratios for intermediate inputs and production (linear production function):** Economic impact analysis using Input-Output multipliers implicitly assumes that there is a fixed input structure in each industry and fixed ratios for production. That is, the input function is generally assumed linear and homogenous of degree one (which implies constant returns to scale and no substitution between inputs). As such, impact analysis using Input-Output multipliers can be seen to describe average effects, not marginal effects. For example, increased demand for a product is assumed to imply an equal increase in production for that product. In reality, however, it may be more efficient to increase imports or divert some exports to local consumption rather than increasing local production by the full amount. Further, it is assumed each commodity (or group of commodities) is supplied by a single industry or sector of production. This implies there is only one method used to produce each commodity and that each sector has only one primary output.
- **No allowance for economies of scope:** The total effect of carrying on several types of production is the sum of the separate effects. This rules out external economies and diseconomies and is known simply as the “additivity assumption”. This generally does not reflect real world operations.
- **No allowance for purchasers’ marginal responses to change:** Economic impact analysis using multipliers assumes that households consume goods and services in exact proportions to their initial budget shares. For example, the household budget share of some goods might increase as household income increases. This equally applies to industrial consumption of intermediate inputs and factors of production.
- **Absence of budget constraints:** Assessments of economic impacts using multipliers that consider consumption induced effects (type two multipliers) implicitly assume that household and government consumption is not subject to budget constraints.

Despite these limitations, Input-Output techniques provide a solid approach for taking account of the inter-relationships between the various sectors of the economy in the short-term and provide useful insight into the quantum of final demand for goods and services, both directly and indirectly, likely to be generated by a project.

In addition to the general limitations of Input-Output analysis, there are two other factors that need to be considered when assessing the outputs of sub-regional transaction table developed using this approach, namely:

- It is assumed the sub-region has similar technology and demand/ consumption patterns as the parent (Australia) table (e.g. the ratio of employee compensation to employees for each industry is held constant).
- Intra-regional cross-industry purchasing patterns for a given sector vary from the national tables depending on the prominence of the sector in the regional economy compared to its input sectors. Typically, sectors that are more prominent in the region (compared to the national economy) will be assessed as purchasing a higher proportion of imports from input sectors than at the national level, and vice versa.

DRAFT



DRAFT

THIS PAGE INTENTIONALLY LEFT BLANK

**BRISBANE**

Level 5, 131 Leichhardt Street  
Spring Hill QLD 4000  
Australia  
T: +61 (0)7 3831 0577

**DARWIN**

Level 1, 48-50 Smith Street  
Darwin NT 0800  
Australia  
T: 1300 799 343

**TOWNSVILLE**

233 Flinders Street East  
Townsville QLD 4810  
Australia  
T: +61 (0)7 4771 5550

**MELBOURNE**

Level 13, 200 Queen Street  
Melbourne VIC 3000  
Australia  
T: +61 (0)3 8648 6586

**SYDNEY**

Level 14, 25 Bligh Street,  
Sydney NSW 2000  
Australia  
T: +61 (0) 2 9283 8400

**PERTH**

Level 2, 580 Hay Street  
Perth WA 6000  
Australia  
T: +61 (0) 8 6555 4940

**AFFILIATED OFFICES:****BANGKOK**

2024/129-130 Sukhumvit 50  
Prakanong Klongtoey,  
Bangkok, Thailand 10260  
T: +66 2 107 0189

**SHANGHAI**

Level 35, 1st Building,  
700 Liqun Road, Putuo District,  
Shanghai, China 200333  
T: +8618 516293312

[aecgrouppltd.com](http://aecgrouppltd.com)

OUTCOME DRIVEN

