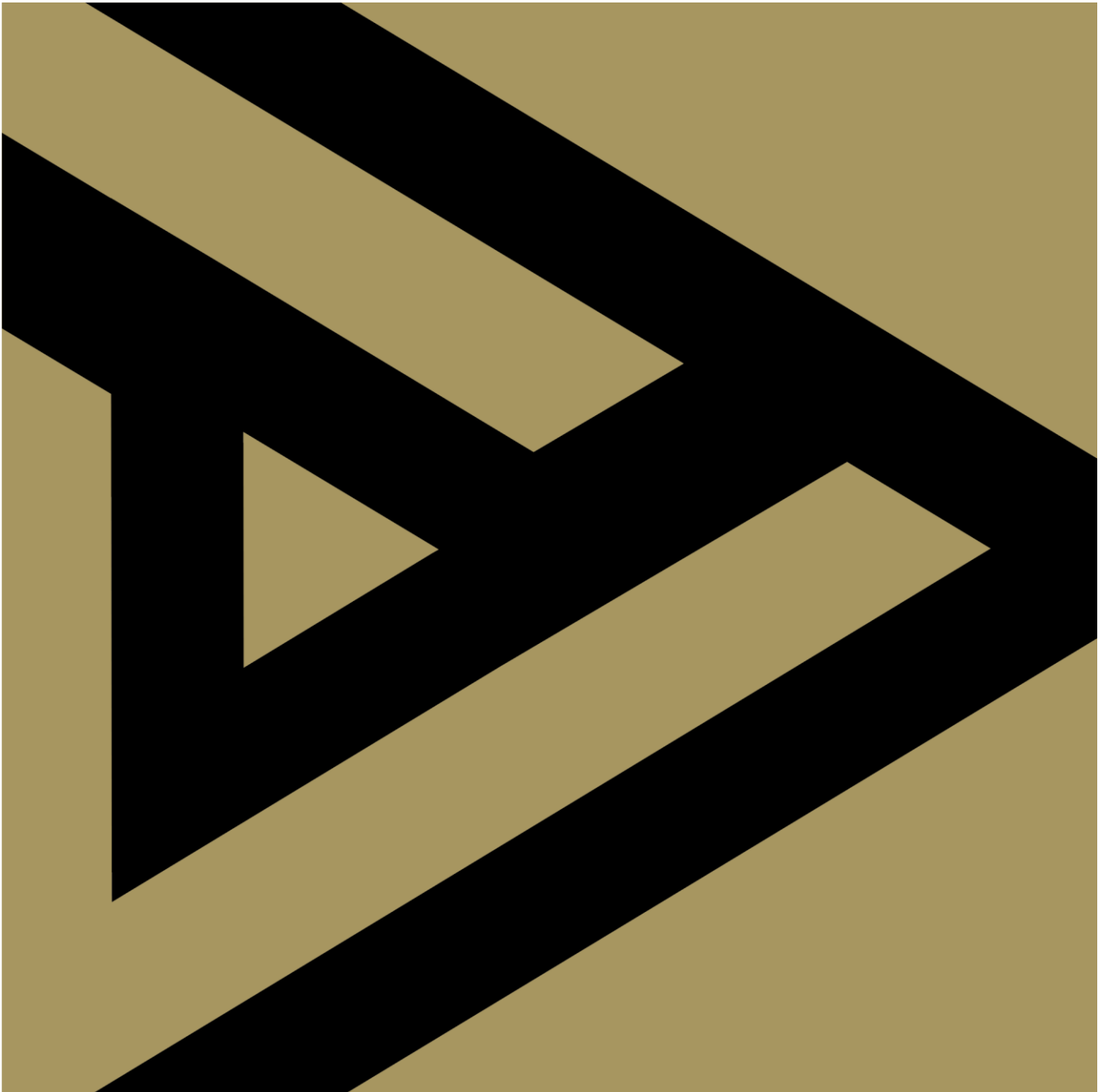

Large-scale waste recycling in the ACT

17 December 2020

A comparative economic impact assessment



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The Fyshwick Business Association is a not-for-profit organisation founded in 2019 and constituted under the *ACT Associations Incorporation Act 1991*. It is governed by a Board with a primary role to “champion the interests of local businesses and their customers and workers”.

Delos Delta has been engaged by the Fyshwick Business Association to prepare this high-level, rapid economic impact assessment of large-scale waste recycling in the ACT.

The goal of this assessment is to assess the relative impact of a resource recovery facility (facility) in either Fyshwick or Hume. A facility in either location will have a set of benefits and costs which are equivalent regardless of a site – the task is to differentiate the relative impacts of one site compared to another.

The assessment provides:

- ▶ a brief profile of waste management in the ACT and how such a facility might interact with that system
- ▶ a simple overview of the two regions in terms of industry and culture to identify what is at stake
- ▶ the preliminary impacts, for any site, and specific impacts that differ between sites.

The methodology and detailed discussions are included as an Appendix.

As a rapid comparative assessment there are limitations to the estimates contained in this report that should be considered. These are also outlined in the Appendix.

Background

In recent years there have been a number of proposals to establish new waste management and recycling facilities in the ACT of varying capacity and scale.

The amount of waste generated in the ACT and in Australia is growing. In 2016-17, the Australian economy generated or imported 68.9 megatonnes of waste, of which 27.6 per cent was sent to landfill and 54.4 per cent was recovered i.e. exported for recycling, recovered for energy production, or collected for domestic recycling (ABS 2019).

The ACT generates around 1 megatonne of waste per year. Over the decade to 2015-16, the percentage diverted from landfill has plateaued at around 73 per cent (ACT Government 2018).

Policy context

The ACT Government aims to achieve full resource recovery and a carbon neutral waste sector. The *ACT Waste Management Strategy 2011-2025* outlines actions to meet ambitious waste reduction and resource recovery targets, including reducing the amount of total waste to landfill to less than 10 per cent by 2025.

The Strategy's overarching goal is supported by four key outcomes.

- ▶ Less waste generated
- ▶ Full resource recovery
- ▶ A clean environment
- ▶ A carbon neutral waste sector.

The Strategy also recognises that the management of waste is a crucial economic issue on a number of levels:

- ▶ waste must be managed at the level of the household or business
- ▶ the waste management sector generates economic activity and employment, and
- ▶ recovery and recycling resources allows them to be used again in economic production.

Benefits of waste recycling

Proponents of waste recycling argue that facilities such as those recently proposed will enable increased diversion of recoverable waste from landfill, thereby increasing the ACT's resource recovery capacity and extending the life of existing resource management sites. Different proposals have identified a range of potential waste for recycling, including:

- ▶ municipal solid waste
- ▶ dry commercial and industrial waste
- ▶ construction and demolition waste
- ▶ liquid waste
- ▶ wood waste
- ▶ soil

- ▶ asbestos containing material
- ▶ paper/cardboard
- ▶ metals
- ▶ inert materials
- ▶ organics
- ▶ gross pollutants and whole containers (glass, aluminium cans, plastic, litter)
- ▶ sand
- ▶ gravel, and
- ▶ clay.

Site selection

While it is not the task of this report to make any recommendations on potential sites for such facilities, it is acknowledged that geography seems to be the primary matter of contention. Proponents have in recent times sought to locate new facilities in or around Fyshwick, while residents and existing businesses in Fyshwick have agreed that the proposals have merit, but that Fyshwick is not the right location given the mix of businesses already operating – Hume has been suggested as the better option.

Irrespective of geography, it is noted that there are a range of conditions that are required for these types of facilities, as identified in recent proposals.

- ▶ Road networks and accessibility (including major roads ingress and egress)
- ▶ Proximity to product markets and waste generation sources within and external to the ACT
- ▶ Buffer distances to sensitive environmental factors and residential settings
- ▶ Utilising existing utilities on site for power, communications, gas, sewer and water supply
- ▶ Permissibility: an appropriate zoning for the activities proposed
- ▶ Compatibility with surrounding land use
- ▶ Land size/suitability of the site for the intended use, for example size, room to manoeuvre onsite, and existing contamination/remediation requirements
- ▶ Proximity to heavy rail including appropriate siding lengths off a main line
- ▶ Opportunities to minimise visual impacts.



This section provides a brief profile of the suggested locations for new waste recycling – Fyshwick and Hume. This is important context for the different arguments being made for and against the proposals as well as the analysis detailed in the following sections.

Fyshwick

Fyshwick is a suburb to the east of the Inner South district of Canberra. With a land area of 976.7 hectares, Fyshwick is predominantly a commercial and light industry suburb.

The area is bound mostly by the Molonglo River, Jerrabomberra Creek and by Canberra Avenue. It borders the suburbs of Kingston, Griffith, Narrabundah and Symonston and is bisected by the Monaro Highway and by the ACT's railway line.

Heading north from Fyshwick, the Monaro highway leads to Pialligo, Duntroon, the Canberra Airport, and the Majura Park business and retail district. Heading south from Fyshwick, the Monaro Highway cuts through Symonston, a district of mostly rural land, to Hume.

Canberra Avenue and the Monaro Highway are the second and third most congested roads in the ACT (Infrastructure Australia 2019). Canberra Avenue is a major road in the ACT and carries particular planning significance as a key gateway route in and out of the ACT to NSW. On its eastern end, it reaches the NSW city of Queanbeyan. It is a major road through the inner south suburbs of Narrabundah, Griffith, Kingston, Barton and Forrest, and meets State Circle on its western end.

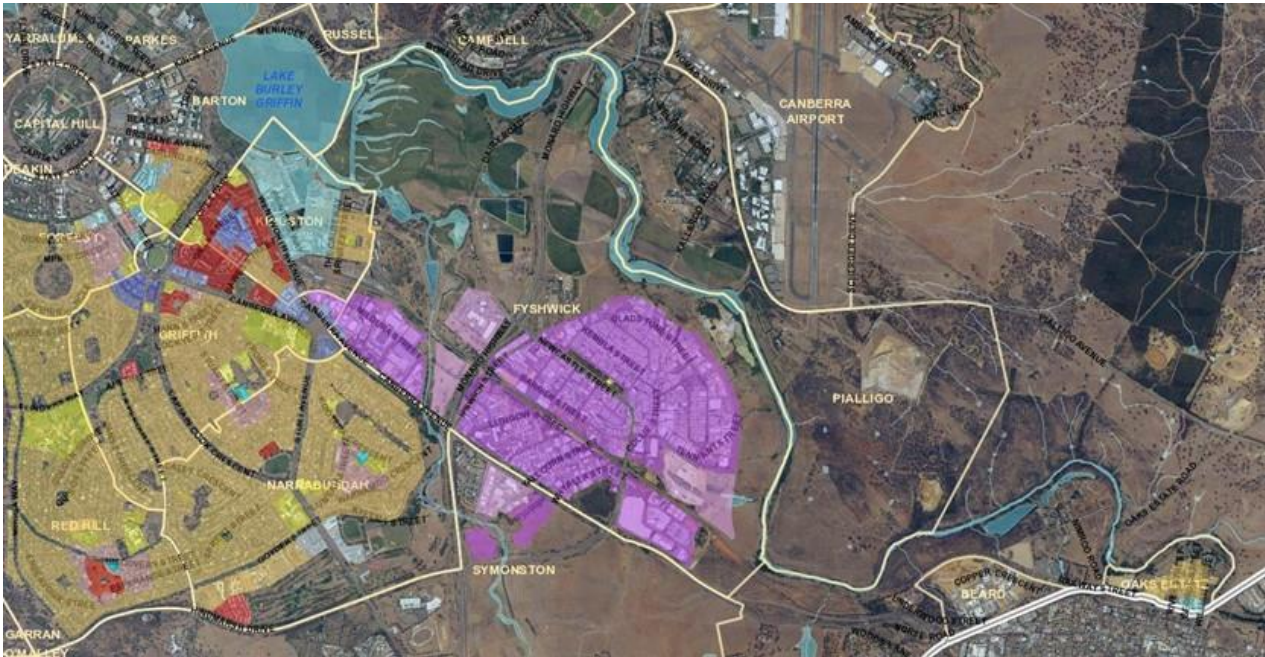
Fyshwick notably contains:

- ▶ the Jerrabomberra Wetlands Nature Reserve
- ▶ farming area, which is bisected by the Monaro Highway
- ▶ the Canberra Railway Museum
- ▶ a retail and wholesale area with mostly food and beverage, which includes the iconic Fyshwick Fresh Food Markets, bordering Griffith and Narrabundah, and
- ▶ a commercial and predominantly light industry area bisected by the railway.

With some of the ACT's busiest major roads, single carriage roads within the suburb, and a high density of businesses attracting high numbers of customers, Fyshwick is highly congested. The intersection of Canberra Avenue, Stuart Avenue and Wentworth Avenue, and the intersection of Canberra Avenue, Hindmarsh Drive and Newcastle are among the top 10 worst intersections for crashes in the ACT (Canberra Times 2016).

The following map shows the zoning of Fyshwick according to the Territory Plan. Light purple is IZ1 – General Industrial. Dark purple is IZ2 – Mixed Use Industrial. As the map shows, the majority of IZ1 and IZ2 land is currently occupied.

ZONING OF FYSHWICK



Source: ACTmapi 2020

Regional industry

Fyshwick is the second largest economic precinct in Canberra, containing a unique mix of light industry and business-to-consumer enterprises. Mechanics, car yards, recycling facilities, freight depots and repair shops sit alongside offices, fresh produce shops, sporting goods retailers, designers, building and hardware supplies retailers, fitness centres, home furnishings retailers, cafes, and, increasingly, specialist boutiques.

As the second largest economic precinct in Canberra, Fyshwick counts nearly all residents of the ACT among its businesses' patrons — 97 per cent of residents frequent Fyshwick, with 51 per cent visiting more than once a year, and 20 per cent visiting the precinct more than once a week (JWS Research 2020).

Commercial activity in Fyshwick is growing, with the number of businesses registered in Fyshwick increasing considerably. As at 30 June 2019, there were 1,512 businesses registered, which is 176 more businesses than were registered at the same time in 2015. With more than 58 per cent of businesses reported as having employees, Fyshwick is a workplace for more than 13,400 workers (ABS 2020).

TABLE 1. NUMBER OF BUSINESSES IN FYSHWICK – AS AT 30 JUNE

	2015	2016	2017	2018	2019
Number of non-employing businesses (no.)	567	567	591	590	632
Number of employing businesses: 1-4 employees (no.)	365	428	430	397	402
Number of employing businesses: 5-19 employees (no.)	307	342	332	351	365
Number of employing businesses: 20 or more employees (no.)	94	93	101	113	112
Total number of businesses (no.)	1,336	1,437	1,455	1,452	1,512

Source: ABS 2020

Fyshwick's profile has changed and is continuing to change. While it is zoned according to the Territory Plan as IZ1 – General Industrial and IZ2 – Industrial Mixed Use, it is no longer dominated by heavy industry, but instead contains a range of commercial activities.

It should be noted that while construction is the sector with the highest number of businesses, accounting for just under 20 per cent of all registered businesses in 2019, limited industrial or construction activity takes place on site in Fyshwick, with uses more likely to include offices, and plant and equipment storage. As such, these businesses contribute to the truck and large vehicle traffic within and in/out of Fyshwick.

The next three largest industries in Fyshwick are 'professional, scientific and technical services', accounting for more than 15 per cent of businesses; 'rental, hiring and real estate services', accounting for nearly 14 cent of businesses; and retail trade, accounting for more than 13 per cent of businesses. It should also be noted that for many of the other industry types, such as 'agriculture, forestry and fishing' and 'mining', the Fyshwick site is a company headquarters or office space.

Manufacturing accounts for less than 6 per cent of businesses, again comprising mostly headquarters, light industry and artisanal workshops, with direct business-to-customer retail onsite, rather than large-scale factories.

Fyshwick also contains a significant number of food and beverage retailers. The popular and busy Fyshwick Fresh Food Markets is a major destination for Canberrans, accommodating more than 38 delicatessens, cafés, greengrocers, specialty stores, bakeries and meat, poultry and seafood vendors. Outside of the Markets there are cafés, bakeries and fast food outlets throughout the commercial district.

Fyshwick's retail and wholesale scenes are dominated by large and bulky goods shops, but it is also characterised by diversity. It is a significant commercial precinct for homewares and furnishings, appliances, sporting goods, car dealers, hardware supplies, toy shops, antique dealers, media outlets, book shops, and more.

TABLE 2. NUMBER OF BUSINESSES IN FYSHWICK BY INDUSTRY – AS AT 30 JUNE 2019

	2015	2016	2017	2018	2019
Agriculture, forestry and fishing (no.)	11	11	11	6	11
Mining (no.)	3	3	3	3	3
Manufacturing (no.)	86	92	86	89	85
Electricity, gas water and waste services (no.)	--	3	3	6	5
Construction (no.)	193	204	237	247	289
Wholesale trade (no.)	90	86	81	84	83
Retail trade (no.)	213	208	207	197	204
Accommodation and food services (no.)	55	52	52	57	59
Transport, postal and warehousing (no.)	15	25	29	25	22
Information media and telecommunications (no.)	12	17	13	14	14
Financial and insurance services (no.)	90	100	89	86	89
Rental, hiring and real estate services (no.)	201	200	209	205	207

Professional, scientific and technical services (no.)	176	233	232	229	233
Administrative and support services (no.)	61	71	73	81	71
Public administration and safety (no.)	11	8	8	6	16
Education and training (no.)	11	8	8	9	7
Health care and social assistance (no.)	5	4	5	10	6
Arts and recreation services (no.)	8	16	15	16	14
Other services (no.)	80	85	90	87	87
Currently unknown (no.)	9	7	11	4	5
Number of Businesses by Industry - Total (no.)	1 336	1 437	1 455	1 452	1 512

Source: ABS 2020

Hume

Hume is a suburb in East Canberra with a land area of 858.3 ha. It borders:

- ▶ rural blocks, including the ACT Government-run Mugga Lane Resource Management Centre, in the suburb of Symonston
- ▶ the railway, which runs along the ACT-NSW border
- ▶ the Wanniasa Hill Special Purpose Reserve, which separates Hume from the Tuggeranong suburbs of Macarthur and Gilmore and
- ▶ rural blocks in NSW.

The residential population of Hume was estimated at 434 in 2018, presumably due to the Alexander Maconochie Centre, the ACT's prison, being located in Hume. The Centre is surrounded by rural land and is at least a kilometre from the edge of the IZ2 land at the north eastern edge of the Hume industrial area.

Hume notably contains:

- ▶ rural blocks
- ▶ part of West Jerrabomberra Nature Reserve and Jerrabomberra East Grasslands Nature Reserve
- ▶ the Alexander Maconochie Centre (ACT Corrective Services)
- ▶ a commercial and industrial area, zoned IZ1 – General Industrial Zone and IZ2 – Mixed Use Industrial Zone.

The following map shows the zoning of Hume according to the Territory Plan. Light purple is IZ1 – General Industrial. Dark purple is IZ2 – Mixed Use Industrial. As the map shows, a large portion of Hume land zoned IZ1 and IZ2 is not currently occupied by industrial activity and is still to be released to market by the ACT Government's Suburban Land Agency, suggesting that there is a healthy pipeline of industrial land available in this area.

It should be noted that the IZ2 land is bisected by the dual carriageway Monaro Highway, and that the railway track runs along a significant length of the IZ2 land. While this portion of the railway is inactive, the potential for reinstatement of a short spur to support rail freight to this part of Canberra has been raised. A recent feasibility

study by Transport for NSW has found that the more significant connection from Canberra to the Port of Eden is not economically viable.

The Mugga Lane Resource Management Centre, an existing landfill and resource recovery site, is located very close to the IZ2 land in Hume, and Mugga Lane joins the Monaro Highway.

ZONING OF HUME



Source: ACTmapi 2020

Regional industry

From 2014-15 to 2018-19, the number of businesses registered in Hume increased by 28, bringing the number to 216. There are significantly fewer businesses in Hume than in Fyshwick, with Hume containing approximately 14 per cent of the total number of businesses that Fyshwick contains.

The three largest sectors by number of businesses in Hume are construction, at 29 per cent; rental, hiring and real estate, at 21 per cent; and manufacturing, at 10 per cent.

'Wholesale trade', 'retail trade', 'transport, postal and warehousing', and 'professional, scientific and technical services' each account for 5 per cent of industry in Hume.

Whereas in Fyshwick, professional, scientific and technical services and retail trade together make up 29 per cent of businesses, they account for just 10 per cent of businesses in Hume.

Hume notably contains no businesses under the category of 'accommodation and food services', whereas there are 59 businesses of this type registered in Fyshwick. With the absence of accommodation and food services, considerably fewer retail businesses, and only three, as opposed to fourteen, arts and recreation businesses, Hume's commercial composition does not attract as many visitors.

TABLE 3. NUMBER OF BUSINESSES IN HUME – AS AT 30 JUNE

	2015	2016	2017	2018	2019
Number of non-employing businesses (no.)	82	84	90	92	99
Number of employing businesses: 1-4 employees (no.)	51	43	46	49	50
Number of employing businesses: 5-19 employees (no.)	41	43	52	51	48
Number of employing businesses: 20 or more employees (no.)	17	20	23	26	22
Total number of businesses (no.)	188	188	209	212	216

Source: ABS 2020

TABLE 4. NUMBER OF BUSINESSES BY INDUSTRY IN HUME – AS AT 30 JUNE

	2015	2016	2017	2018	2019
Agriculture, forestry and fishing (no.)	--	--	--	--	3
Manufacturing (no.)	25	23	21	24	22
Electricity, gas water and waste services (no.)	3	3	3	3	--
Construction (no.)	48	54	58	60	63
Wholesale trade (no.)	12	12	11	16	11
Retail trade (no.)	10	5	11	11	11
Accommodation and food services (no.)	--	3	--	--	--
Transport, postal and warehousing (no.)	12	13	17	11	11
Information media and telecommunications (no.)	--	3	3	3	4
Financial and insurance services (no.)	5	4	12	5	8
Rental, hiring and real estate services (no.)	31	37	44	45	46
Professional, scientific and technical services (no.)	6	6	10	10	11
Administrative and support services (no.)	4	9	9	10	9
Public administration and safety (no.)	3	3	3	3	3
Education and training (no.)	3	6	4	4	3
Arts and recreation services (no.)	3	--	3	3	3
Other services (no.)	19	16	19	17	14
Number of Businesses by Industry - Total (no.)	188	188	209	212	216

Source: ABS 2020

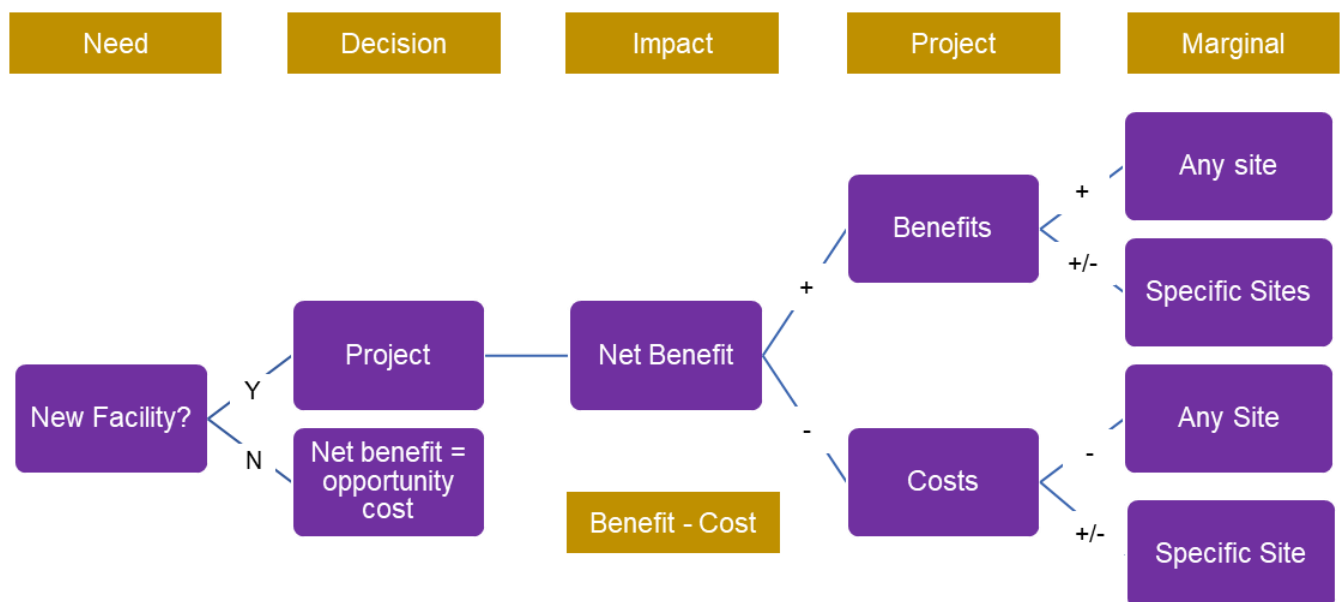


This analysis is not intended as a method to select whether a facility should be built, it aims to look at marginal impacts from alternative sites in different locations. The more detailed method is discussed in the Appendix.

Relative site impacts

To achieve an understanding of relative site impact contributions, we have developed a two-part decision and impact framework. The staging moves from need to decision, which has an impact based on overall project benefits and costs. Those benefits and costs are differentiated between whether a project exists or not (common ACT impacts) and the location of the project (site). The flow and logic are illustrated below.

DECISIONS AND DIFFERENTIATED IMPACTS



Under this framework, noting an absence of any actual business case or analytical materials, the assessment has assumed:

- ▶ the need for a new facility has been decided and one (or more) will be built
- ▶ a project will be created to build a new facility (or facilities) somewhere in the ACT
- ▶ the location of the facility will either be Fyshwick or Hume as other retail, commercial or industrial areas within the ACT do not meet site selection criteria
- ▶ the ACT economy will benefit from the projects across a range of categories, and these are not site dependent
- ▶ specific sites will impact on the overall project net benefits in different ways — these impacts feed into the whole of ACT impacts.

This section summarises the common and marginal site impacts under this framework.

Common Impacts

No projects that have proposed new waste management approaches in the ACT have been required to present a publicly available ex ante impact evaluation. Based on the research they have submitted, and our expertise in ex ante assessment, the table below outlines the impacts a facility may deliver regardless of site. We do not have actual inputs, and these are not estimated for magnitude or direction. Some of these are extracted and tested. The whole matrix is for guidance only and a complete specification of impacts is provided in the Appendix.

TABLE 5. MUTUAL IMPACTS

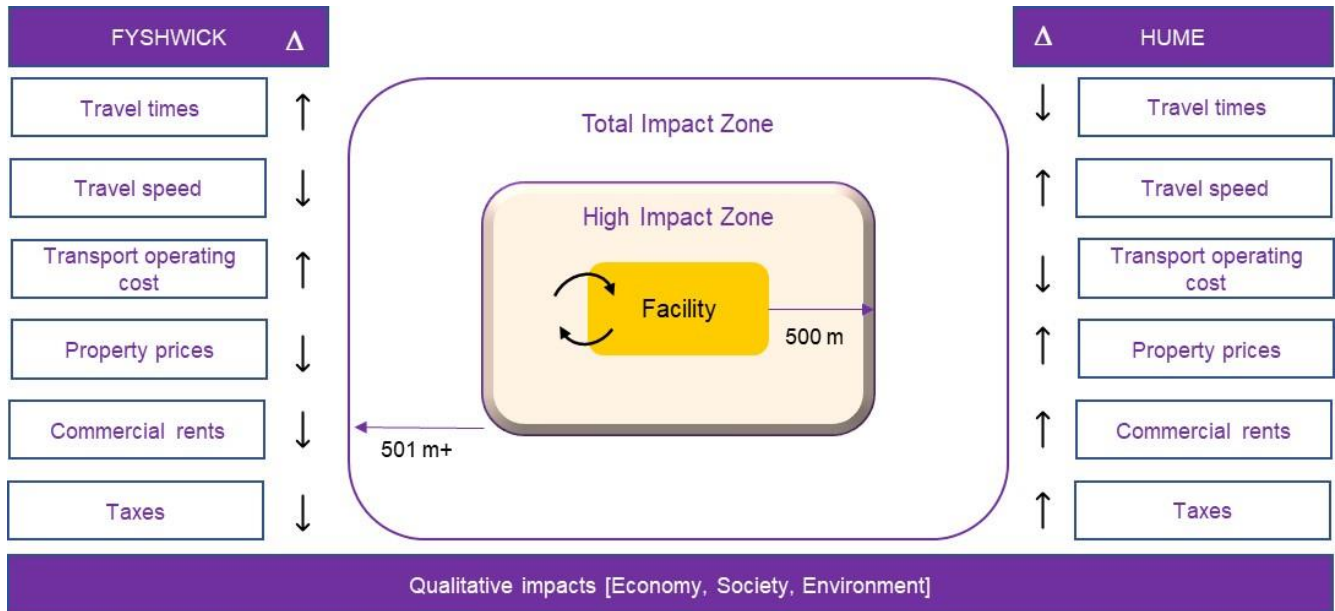
	Impact
Economy	<ul style="list-style-type: none"> ▶ Construction benefits, including construction jobs and secondary impacts ▶ Operational jobs ▶ Providing a regional approach to waste management facilitates regional collaboration and promotes regional economic development ▶ Utilising proven and innovative waste treatment technology increases the efficiency of resource recovery than previously the case in the ACT ▶ New capability to make products that utilise materials received and processed to supply the local and surrounding regions ▶ Extension of the Mugga Lane landfill's life and reduced need for future expansion ▶ Increased utilisation of heavy rail infrastructure for freight access ▶ Potential additional taxation from operations (payroll, property taxes, GST and Company) ▶ Providing capital investment in the ACT that is not taxpayer funded ▶ Potential diversion of long-haul trucks to rail ▶ Temporary negative externalities associated with construction (traffic, noise and inconvenience) ▶ Persistent negative externalities associated with operations (traffic, air quality, odour and visual amenity)
Society	<ul style="list-style-type: none"> ▶ Reduced road safety due to increased heavy truck movements ▶ A better range of low, medium and high skilled non-government job opportunities ▶ Educational opportunities across the waste hierarchy ▶ Potential health benefits from improvements in environmental outcomes ▶ Promotion of the ACT as an innovative and advanced waste management jurisdiction
Environment	<ul style="list-style-type: none"> ▶ Recovery of low-cost recycled materials for reuse ▶ Potential waste distribution/littering on road during transport ▶ Potential increase in vermin and pest animals impacting health and amenity ▶ Increased resource recovery of the highest volume waste streams generated in the ACT, including construction and demolition, timber, concrete, asphalt and soils ▶ Potential capacity to process waste streams not previously available in the ACT ▶ Diverting resources for re-use locally and regionally that would otherwise go to landfill ▶ Reduced greenhouse gas emissions from landfill ▶ The capability to provide efficient and beneficial reuse of soils and further organic materials contributing to carbon emission reduction

Site Impacts

Understanding locational differences in the impacts helps determine where might be a good place to generate the perceived positive contribution to the ACT. A representation of how we have differentiated impacts is illustrated below.

We have assumed that a facility will be built. The facility will activate new movements into and out of the site — mostly heavy vehicles and staffing. The facility, like all industrial sites, will have an impact on its surroundings. In this assessment we have considered two zones: a high impact zone and a total impact zone. We have simplified the high impact zone to an additional 500 metres in each direction from the boundary, and we have not estimated impacts beyond the 500-metre zone. The key issue is what types of impact will occur, and how will they be different?

UNDERSTANDING RELATIVE CHANGES



As noted previously, it is assumed that the facility will have a similar impact on the ACT regardless of location. However, we have observed that sites in Hume or Fyshwick will differ on a range of impacts. A full summary is presented in the preliminary impact assessment matrix.

Reflecting on the illustration and the matrix, impacts which we can partially quantify include:

- ▶ travel times and speeds within the traffic systems
- ▶ consequential transport operating costs
- ▶ property price impacts from negative externalities
- ▶ commercial rent impacts from negative externalities, and
- ▶ consequential impacts on property taxes.

These are summarised below and discussed in detail in the Appendix.

TABLE 6. MARGINAL IMPACT ASSESSMENT MATRIX

Category	Category	Description	Type	Impact	Direction [+0/-]		Magnitude [0-5]		Layer
					F	H	F	H	
Economic	Government	Impact on property taxes from negative externalities on property values	Indirect	Marginal	-	-	4	3	Qn
	Productivity	Impact on high impact zone property prices from change in hedonic/locational preferences settings	Direct	Marginal	-	-	4	3	Qn
		Demand for changes in commercial rents to offset negative externalities	Direct	Marginal	-	-	4	3	Qn
	Enterprises	Impact on consumption spending in nearby shops, cafes and restaurants	Indirect	Marginal	-	-	3	1	Ql
	Investment and Economic Growth	Hedonic wealth effects from permanent (odour, air quality, noise, traffic) externalities	Direct	Marginal	-	-	2	2	Ql
		Possible capability to make products that utilise materials received and processed to supply the local and surrounding regions.	Direct	Marginal	+	+	1	1	Ql
	Traffic	Increased congestion in local system creating delays and increased travel time	Direct	Marginal	-	-	1	1	Qn
		Reduced average network speed impacting travel times	Direct	Marginal	-	-	2	2	Qn
		Increased vehicle operating costs within local systems from impacted travel times	Indirect	Marginal	-	-	2	2	Qn
Social	Occupation	Reduced road safety due to increased truck movements in populated environments.	Direct	Marginal	-	-	2	1	Ql
		Colocation with labour force requiring supported development opportunities (e.g. prison, disability services etc.)	Indirect	Marginal	+	+	2	3	Ql
Environmental	Landscape changes	Risk of negative impact to sensitive and collocated rich ecosystems (waterways, reserves and other significant environmental assets)	Direct	Marginal	-	-	3	1	Ql

Notes: F=Fyshwick, H=Hume, Qn = Quantitative, Ql = Qualitative

Quantifiable relative impacts

Traffic

A new facility will generate new access and ingress movements, especially of heavy vehicles and staff. This is unavoidable. The facility will be located within an existing traffic system and will have differential impacts based on that system.

Differences are extremely complicated to measure. For example, traffic generated by the facility is dependent on the amount of material processed and the number of employees at the site, the existing use and efficiency of the traffic system and investments to offset road transport to other modes like rail. We do not have complete information about these matters.

From what we can estimate based on publicly available data and standard transport pricing models:

- ▶ Fyshwick has many more base traffic movements than Hume, caused by a much higher level of employment and Fyshwick receiving many more customer visitations per year
- ▶ More than 85 per cent of staff use cars to enter either area (based on ABS journey-to-work data) — we assume visitors primarily use cars
- ▶ the facility will increase delays within the networks, where the base delays are higher in Fyshwick than Hume (other than Monaro Hwy) — the increase in delay would be proportionately equivalent between locations, but different between the AM and PM peaks
- ▶ additional movements across the day would reduce the average speed experienced in each system, where the average speed in Fyshwick would be generally lower than Hume — we assume about five per cent but this could be more significant
- ▶ increased delays and lower speeds would impact on the value of an individual's time and workplace productivity, which can be measured, and
- ▶ the lowering of the average speed across the network would increase the average vehicle operating costs.

A facility will have the same internal traffic and ingress and egress movements wherever it is located, which is not estimated. The impacts we estimate are traffic network effects from these movements. Also none of these estimates deal with ACT system level traffic feedback effects. We note 97 per cent of the ACT visit Fyshwick at least annually, suggesting any additional congestion in that environment has enormous potential for system wide traffic impacts.

Based on the model parameters we can estimate the total traffic impact over 10 years would be \$16.7 million in Fyshwick, compared to \$2.9 million in Hume. In net present value terms (7 per cent discount), after 10 years Fyshwick has a \$10.4 million excess negative traffic impact. These are deliberately conservative estimates and we note again there are low quality inputs on the public record.

Property

There are two areas where properties will be impacted in the high impact zone — one off lowering of property prices and longer-term falls in commercial rentals.

Without question, the introduction of a waste facility will impact negatively on the desirability of property within the high impact zone. This is based in general willingness to pay theory, where price formation is hedonic and linked to the desirability of an area — high desirability leads to higher prices, lower desirability leads to lower prices. Property values will fall around the facility.

Related to this hedonic owner effect, tenants will demand rent relief to either occupy properties in the area or be compensated for operational impacts from the negative externalities. Tenanted properties in the zone will receive lower rents.

To estimate this impact, we have assumed the following.

- ▶ The facility will occupy, say, 20,000 square metres (sqm).
- ▶ The high impact zone is an additional 500 metres from the facility boundary. The total area will be 432,843 sqm, after allowing a 15 per cent offset for roads and related circulation requirements.
- ▶ Zoning, especially land considered at its highest and best value potential usage, will impact on the relative base values, with general industrial zoning (Hume) less valuable than mixed use industrial and commercial (Fyshwick).
- ▶ The nature of activity in Fyshwick will create a one-off value reduction of at least 15 per cent, whereas in Hume it might reduce values by 10 per cent.
- ▶ Similarly, the attraction of Fyshwick as a mixed-use commercial hub will lead to a persistent 15 per cent reduction in face rents, whereas in Hume the reduction might be 10 per cent. We have capped this estimate at 5 years.

Based on the model we estimate the one-off reduction in Fyshwick will be \$24 million, and \$13 million in Hume. In gross terms, over 10 years, the rental loss in Fyshwick would be \$21 million and \$11 million in Hume. In net present value terms (7 per cent discount), after 10 years Fyshwick has a \$18.8 million excess negative impact.

Taxes

ACT property taxes are mostly linked to property value. This means reduced property values will impact on land rates collections. We have modelled the impact on commercial rates from reduced property values. To determine this, we have assumed the following.

- ▶ The high impact area is distributed to blocks at an average 3,000 sqm (144 blocks)
- ▶ The 2019-20 commercial rates model will hold for 10 years, including a one-off rebate equivalent to the fixed charge.
- ▶ The value changes will apply uniformly over all properties after allowing for zoning.

After applying this model, we estimate the base annual tax at stake is \$4.1 million in Fyshwick and \$3.1 million in Hume. The impact of reduced unimproved values is a fall to \$3.3 million and \$2.7 million respectively. Over a 10-year period the Fyshwick nominal tax loss is \$7.2 million and \$3.9 million in Hume. In net present value terms (7 per cent discount), after 10 years Fyshwick has a \$2.5 million excess negative tax impact.

Other Impacts

From the impact matrix there are a range of moderate and minor other impacts which have not been quantified.

Without question, the impact most concerning for the Fyshwick site compared to the Hume site is the potential for offsite environmental and social impacts from potential impacts on the water table, odour generated and the release of industrial gases and dust affecting air quality.

- ▶ There is very rich biodiversity and pristine environmental settings in the outstanding reserves and water ways associated with the Jerrabomberra Wetlands adjacent to Fyshwick and nearby shorelines of Lake Burley Griffin.

- ▶ The proximity of residential settings. For Hume, the closest existing residential uses are single rural residences located approximately 700 metres and 820 metres to the north west and south east with the closest scale residential developments in the suburbs of Macarthur (~1.3 kilometres to the west), Gilmour to the south west (~1.15 kilometres) and in NSW, Jerrabomberra (~4.3 kilometres to the east). East Lake and Narrabundah residential areas are within 450m of the major areas of Fyshwick and the proposed development near Dairy Road is closer again.

There are risk mitigation options, however the potential magnitude of these qualitative impacts suggests again that Hume is a better location on the balance of probabilities.

General Conclusions

We can observe from this rapid assessment that without question, the introduction of a waste facility will impact negatively on the desirability of property within the high impact zone.

In the absence of other information, we would say on the balance of probability the facility makes sense for the ACT, and within the ACT it makes more sense in Hume than Fyshwick. In a quantitative sense, the short time series and totals of the results are summarised in the table below. From this summary we can see:

- ▶ negative impacts at Fyshwick outweigh impacts at Hume in every category
- ▶ in nominal terms, Hume is a better location to the tune of \$26.3 million (NPV) compared to Fyshwick
- ▶ the largest impacts are from negative externalities impacting property, and this will always impact Fyshwick more as it has more and relatively higher valued properties.

All results are subject to assumptions which may impact the overall results.

Year	Fyshwick compared to Hume			
	Property	Travel	Tax	Total
2020	-\$12.231	-\$1.383	-\$0.337	-\$13.229
2021	-\$1.010	-\$1.383	-\$0.337	-\$2.007
2022	-\$1.010	-\$1.383	-\$0.337	-\$2.007
2023	-\$1.010	-\$1.383	-\$0.337	-\$2.007
...2029	-\$1.010	-\$1.383	-\$0.337	-\$2.007
NPV 7	-\$18.811	-\$10.394	-\$2.531	-\$26.308
Total	-\$21.320	-\$13.831	-\$3.368	-\$31.296

Appendix – Detailed Impact Assessment

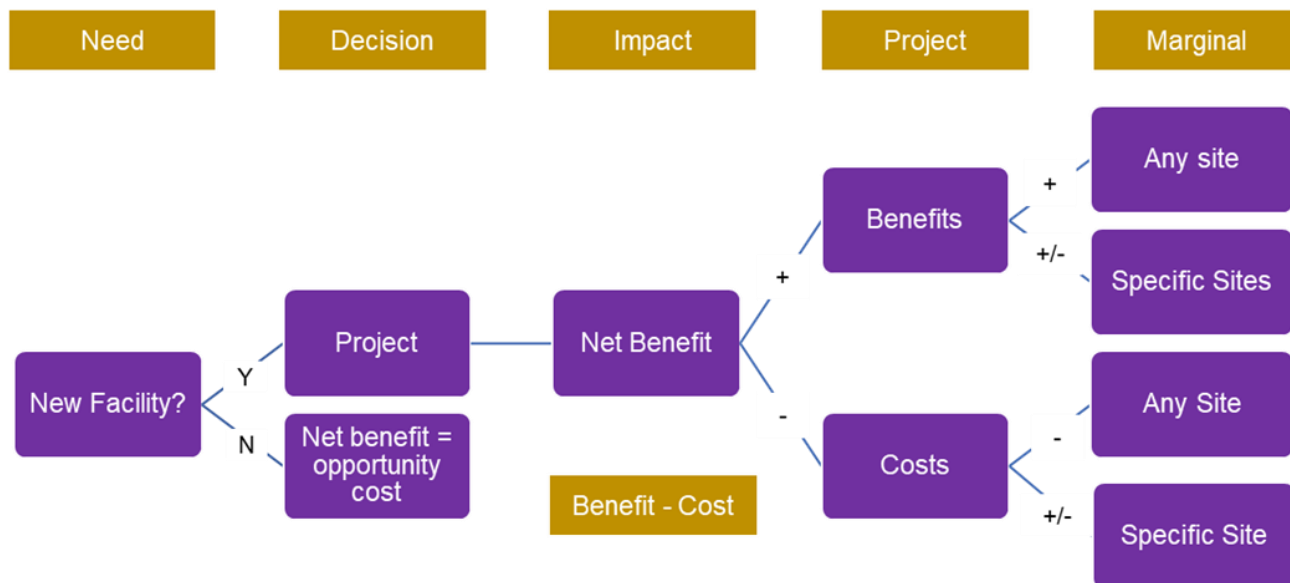
The object of this assessment is to understand and compare the positive and negative impacts of a resource recovery/large scale recycling centre either in Fyshwick or Hume. The main impacts of interest are the economic, employment and fiscal impacts from the proposed approach. This assessment is a rapid preliminary benefit cost assessment made from the conceptual documentation and it seeks to address the main areas of impact by drawing on ex-ante benefit cost assessment principles in a triple bottom line format (i.e. examining the economic, social and environmental impacts).

The assessment outlines the project context, the method and key concepts, outlines the impact assessment, identifies limitations and draws observations and recommendations for further consideration.

Project impact

The essential precondition for any impact assessment is that something is changing from a current state to a future state, and that these are different. The current state is the baseline, and the future state(s) are counterfactual(s). The difference between the baseline and counterfactual is the nature of the impact and the assessment method and concepts define how those will be treated. In this project, the basic approach is summarised below.

Decision and impact logic



This assessment is slightly different to a traditional impact assessment, in that:

- ▶ the broad future state is a given — the need for a new facility has been assumed and one will be built
- ▶ the location of the facility will impact on the net impacts, and will either be Fyshwick or Hume
- ▶ the ACT economy will benefit from the project across a range of categories, and these are not site dependent

- ▶ specific sites will impact on the overall project net benefits in different ways — these impacts feed into the whole of ACT impacts.

The counterfactual to watch for is more favourable relative location impacts, as opposed to absolute impacts to determine overall contributions to society.

Method

An economy is a complex system of transactions occurring between a range of participants, local and external to a location, including consumers, producers, government and other institutions.

Assessing the impact of changes to such a system is subjective and depends on a host of predictable and unpredictable matters. No matter the quality of the tools and resources, impact assessments rely upon the concept of additionality. The central question that needs to be addressed is ‘what is the consequence of a decision compared to the absence of a decision?’ The additionality dimension seeks to define what has improved (a gain in welfare) against what has not improved (neutral or loss in welfare) from the intervention.

The method we have used to understand the additionality of the proposed approach is benefit cost assessment, specifically *ex-ante* assessment. This approach uses the planned change as a frame to identify the expected benefits and costs of the project, and measure qualitatively and quantitatively whether the expected benefits outweigh the expected costs of the proposal. If the benefits exceed the costs, actually or on a reasonable balance of probabilities, the proposal has a potential welfare gain. To be clear, the BCA process assesses only what changes as a direct consequence of an investment, by comparing the baseline to one or many counterfactuals.

The key to interpreting our assessment is understanding the type of impacts being captured, the participants who are impacted and the framework for allocating the impacts to the affected parties.

Type of Impact

The assessment approach considers three category groupings of impact across three layers of impact.

The groupings we have adopted are economic, social and environmental impacts. This differentiation is conventionally called ‘triple bottom line’ assessment. We have adopted this as it supports current evaluation policy in the ACT Government and is consistent with the international research experience of urban renewal projects.

The table below defines the meaning of the category groups in this assessment. The objective is to assist in understanding the many forms of impact and make value-based decisions about the highest priority impacts to manage in a project planning sense.

	Category Definition
Economic	Economic impacts affect the level and allocation of resources. Economic impacts are generally changes in the market value of some system, process, or resource caused directly by an intervention. They may be changes in basic economic indicators such as unemployment or the presence/absence of an industrial sector. Some indicators might be profits, wages, property values, productivity, business activity, and the quality or quantity of jobs.
Social	Social impacts consider the 'social sector' — the impacts on humans. Some indicators might include changes in the way in which a community is organised, community safety, changes to the ethnic composition of a neighbourhood, burden of disease or the number and types of active community organisations. Social impacts necessarily incorporate cultural impacts. Social impacts are difficult to quantify.
Environmental	This category has roots in 'environmental impact assessment'. The environmental impact is akin to 'socio-environmental'. It considers the impact of changes in environmental services such as air, water, soil, ecosystems and wildlife habitat as they affect social interaction. Environmental impacts can cause changes to the environment perceived to be deleterious or undesirable.

The way impacts are built up in this framework include:

- ▶ identification and classification of impacts in a preliminary assessment matrix. This includes an approximate expectation of the magnitude and direction of the impact
- ▶ allocation of the impacts to a layer of impact, and
- ▶ where feasible the estimation of direct impacts (in dollars or volumes) and indirect impacts in a quantitative sense. For economic impacts this assessment utilises direct impacts as a first round effect and draws on extant multipliers to capture potential economy wide impacts.

Magnitude and direction have meaning. Direction is literal, an increase or decrease, however care must be taken to interpret the impact (e.g. a negative cost increase is a benefit). Magnitude is subjective and has two properties. First it scales impact to specific context. For example, if the impact is 'increase in travel time' this is a local context, so the scale would be relative to the local area; if the impact is 'increase in economic activity', the scale would be relative to the ACT economy. Generally, the values mean: 1. +/- 0 to 2.5%, 2. +/- 2.6 to 5%, 3. +/- 5.1 to 10%, 4. +/- 10.1 to 15% and 5. >15%.

The layers of impact considered in this assessment are transfers and quantitative or qualitative impacts.

- ▶ A value transfer occurs when there is no additionality even though there is change in wellbeing. This is an issue with subregional analyses because some activity effectively reorganises resources — an intervention will have an impact in one area, which will have consequent offsets in another area.
- ▶ Quantitative impacts are those that are additional and measurable. These impacts might have a reliable data source or defensible assumptions that can be used to measure actual marginal gains or losses. These impacts are likely to have established markets, well-formed prices and quantities and can be measured in dollar terms.
- ▶ Qualitative impacts are those that can be identified in-principle based on research or reasonable assumption, but can only be understood in terms of expected magnitude and direction. They generally cannot be measured because they lack the properties of quantitative impacts or lack a methodology to quantify the impacts. Qualitative assessments can be summarised and ranked using ordinal techniques.

Finally, impacts, particularly economic impacts, can be direct or indirectly incurred.

A direct impact is measured based upon the actual resources consumed or induced from a project (such as buildings or new wages). Indirect impacts are those that are consequent on the direct impacts, where a benefit

or cost will have an impact beyond the immediate effect (such as the additional employment created from additional expenditures in service industries).

This assessment reports the proposed direct impacts of the project and for quantitative indirect effects on the ACT economy uses multiplier analysis, drawing on extant multiplier research. This is consistent with a rapid conceptual assessment and the limitations outlined, but we note it is not the most desirable form of analysis in the longer term. The limits of multiplier assessment are acknowledged¹ and we recommend that if the project concept is adopted by the ACT Government, the assessment matrix outlined is used as a tool in more robust economic modelling during the development application and approval phase.

Impact Assessment

Our assessment has identified around 44 potential impacts for a facility in the ACT.

Drawing on the research, project documentation and applying the framework outlined, the assessment has identified an array of potential impacts — these are outlined in terms of the economic, social and environmental categories in a preliminary impact assessment matrix.

The matrix is an identification and targeting tool. All the impacts are likely, but many are unable to be measured at this time. The matrix is mostly used as a ranking tool for non-quantified impacts to allow some assessment of impact.

¹ Multiplier assessments do not effectively deal with behavioural aspects of economic systems. Some of the key assumptions underpinning multiplier analysis include constant prices, fixed technology, fixed import shares and relatively unlimited supplies of all resources, including labour and capital. Where an economy or sector are deeply constrained or open to major competitive forces these analyses become redundant quickly, in the economy wide impact sense.

TABLE 7. PRELIMINARY ASSESSMENT MATRIX

Category	Category	Description	Type	Impact	Direction [+/-]		Magnitude [0-5]		Layer
					F	H	F	H	
Economic	Government	Potential expansion of tax base (payroll, rates, land tax, consumption and income/corporate) and taxable activity (new turnover, profit)	Direct	Common	+	+	1	1	QI
		Consequential capex required by Government otherwise not included in the project scope (roads, amenities, rectification, public facilities etc)	Direct	Common	-	-	1	1	QI
		Impact on property taxes from negative externalities on property values	Indirect	Marginal	-	-	4	3	Qn
	Productivity	Impact on high impact zone property prices from change in hedonic/locational preferences settings	Direct	Marginal	-	-	4	3	Qn
		Utilising proven waste treatment technology increases the efficiency of resource recovery than previously the case in the ACT.	Direct	Common	+	+	2	2	QI
		Potential diversion of long-haul trucks to rail.	Indirect	Common	+	+	1	1	QI
		Demand for changes in commercial rents to offset negative externalities	Direct	Marginal	-	-	4	3	Qn
		A shift in the industry sectors generating economic activity, plus increased activity, lowering covariance risk in the business cycle (economic diversification)	Direct	Common	+	+	1	1	QI
		Create network effects from colocation with waste generators close to site (additional businesses)	Direct	Common	+	+	1	1	QI
	Jobs	Consequential employment effects of temporary and permanent activity changes	Indirect	Common	+	+	1	1	QI
	SMEs	Impact on consumption spending in nearby shops, cafes and restaurants	Indirect	Marginal	-	-	3	1	QI

Category	Category	Description	Type	Impact	Direction [+/-]		Magnitude [0-5]		Layer	
					F	H	F	H		
		Temporary activity interference from redevelopment activity, diversions and truck movements during construction	Direct	Common	-	-	1	1	QI	
	Investment and Economic Growth	Temporary stimulus from new capital expenditures to deliver the project.	Direct	Common	+	+	1	1	QI	
		Business profit impacts and induced capital investment from changes in economic activity	Indirect	Common	+	+	1	1	QI	
		Indirect economy wide multiplier impacts from temporary stimulus and permanent changes in activity within the value chain, potentially absorbing underutilised economic capacity.	Indirect	Common	+	+	1	1	QI	
		Hedonic wealth effects from permanent (odour, noise, traffic) externalities	Direct	Marginal	-	-	2	2	QI	
		New capability to make products that utilise materials received and processed to supply the local and surrounding regions.	Direct	Marginal	+	+	1	1	QI	
	Traffic	Increased congestion in local system creating delays and increased travel time	Direct	Marginal	-	-	1	1	Qn	
		Reduced average network speed impacting travel times	Direct	Marginal	-	-	2	2	Qn	
		Increased vehicle operating costs within local systems from impacted travel times	Indirect	Marginal	-	-	2	2	Qn	
		Additional heavy vehicle movements across entire ACT.	Direct	Common	-	-	1	1	QI	
	Social	Health	Potential health benefits from improvements in environmental outcomes and better health and safety of individuals (life expectancy, mortality and morbidity) from positive socio-economic impacts (working environment, income, employment, inclusion). Avoided health costs and productivity gains from additional health.	Direct	Common	+	+	2	2	QI
		Occupation	Wider range of meaningful new job opportunities.	Direct	Common	+	+	1	1	QI
			Reduced road safety due to increase truck movements in populated environments.	Direct	Marginal	-	-	2	1	QI

Category	Category	Description	Type	Impact	Direction [+ / 0 / -]		Magnitude [0-5]		Layer
					F	H	F	H	
		More and different industries and employment opportunities raises welfare, increased chances of employment and enhances productivity from diversity of choices.	Direct	Common	+	+	1	1	QI
		Colocation with labour force requiring supported development opportunities (e.g. prison, disability services etc)	Indirect	Marginal	+	+	2	3	QI
	Skills	A better range of low, medium and high skilled non-government job opportunities.	Direct	Common	+	+	1	1	QI
		Educational opportunities to teach avoiding waste.	Direct	Common	+	+	2	2	QI
		Potential health benefits from improvements in environmental outcomes.	Direct	Common	+	+	2	2	QI
		Reputation and promotion of the ACT as an innovative and advanced waste management hub.	Direct	Common	+	+	2	2	QI
Environmental	Landscape changes	Impact of scenic value of the landscape surrounding the new precinct, increased blight.	Indirect	Common	-	-	1	1	QI
		Potential increase in vermin and pest animals impacting health and amenity.	Indirect	Common	-	-	2	2	QI
		Risk of negative impact to sensitive and collocated rich ecosystems (waterways, reserves and other significant environmental assets)	Direct	Marginal	-	-	3	1	QI
	Environment quality	Lower consumption of environmental services through smart metering, targeted usage, and real-time management in a modernised site management system	Direct	Common	+	+	3	3	QI
		Potential additional waste distribution on road during transport.	Direct	Common	-	-	2	2	QI
		Increased odours and negative sensual amenity	Direct	Common	-	-	2	2	QI
		The capability to provide efficient and beneficial reuse of soils and further organic materials contributing to carbon emission reduction.	Direct	Common	+	+	2	2	QI
		Diverting resources for re-use locally and regionally that would otherwise go to landfill.	Direct	Common	+	+	3	3	QI

Category	Category	Description	Type	Impact	Direction [+ / 0 / -]		Magnitude [0-5]		Layer
					F	H	F	H	
		Less water consumed through smart design and management gains compared to landfill sites	Direct	Common	+	+	2	2	QI
	Climate Change mitigation	Reduced greenhouse gas emissions from landfill.	Direct	Common	+	+	3	3	QI
		Lower consumption of energy through modernised on-site co-generation and renewable energy sources.	Direct	Common					
	Waste	Creation of low-cost recycled materials for reuse.	Indirect	Common	+	+	1	1	QI
		Potential to provide capacity to process waste streams not previously available in the ACT e.g. liquid wastes (grease trap and oily wastewater).	Indirect	Common	+	+	5	5	QI
		Increased resource recovery of the highest volume waste streams generated in the ACT (noting that the impact of importing waste from other jurisdictions has not been accounted for here).	Direct	Common	+	+	4	4	QI
		Waste is likely to be minimised and reused on site.	Direct	Common	+	+	1	1	QI

Notes: F=Fyshwick, H=Hume, Qn = Quantitative, QI = Qualitative

Quantifiable Impacts

Of the impacts identified six have the potential to be quantified. Some of these are directly related to actions on specific sites, others are consequent upon those actions. Further quantification would be feasible with project build and facility operating costs, however these are not available.

The three groups of quantitative impacts are property, fiscal and travel/traffic.

Property Impacts

Property will be impacted in two ways within the high impact zone—one off lowering of property prices and longer-term falls in commercial rentals.

Without question, the introduction of a waste facility will impact negatively on the desirability of property within the high impact zone. This is due to the imposition of externalities within the zone. Typically, property prices contain a hedonic dimension which is linked to the desirability of an area — closer to transport, services, more desirable location and higher footfall will increase prices, whereas noise, remoteness, pollution, and low economic activity will reduce prices.

We are unaware of recent or appropriate studies on the hedonic impact of introducing a waste management facility into an established industrial suburb. In one study looking at transport benefit cost analysis design, it was noted “multiple factors affect property values, including the economic, social and amenity values of a location. When... factors are highly correlated, it is hard to identify the true drivers of property prices.”² A recent example of a negative externality (shadowing) showed it impacted existing properties, and that ‘access to sunlight’ generates a 17 per cent price premium in north facing apartments.³

Prices will be negatively impacted in the facility high impact zone in part because of perception, and partly because of likely operational impacts, although in an entirely industrial area this may be less concerning. Add to this traffic movements, industrial sounds, vibrations, and wider environmental impacts generated by the facility and property values come into scope.

The key parameters derived and assumed for estimating price impacts are:

- ▶ raw unimproved values based on ACT rates data suggest an average square metre rate of \$150 for Fyshwick, compared to \$130 in Hume. This is reasonable given the more diversified nature of Fyshwick (see profile)
- ▶ improved capital values can be inferred from unimproved values, basically being double
- ▶ the facility size would be at least 20,000 sqm, while the high impact zone would extend beyond the facility boundary by at least 500 metres in each direction. The total area will be 432,843 sqm, after allowing a 15 per cent offset for roads and related circulation requirements, and
- ▶ the price impact will be a one-off reduction reflecting the externality induced fall in willingness to pay. However, due to the nature of activity in Fyshwick the externality would be marginally larger than in Hume with a one-off reduction of at least 15 per cent, compared to 10 per cent in Hume.

² Applied Economics, ‘The Treatment of Value Uplift in Cost-Benefit Analysis’, 2016
<<http://www.applieconomics.com.au/pubs/pdf/2016%20Applied%20Economics%20Value%20Uplift%20and%20CBA.pdf>>. p 17

³ Peter Nunns, ‘The Costs and Benefits of Urban Development’ (MRCagnrey, 2017)
<<https://www.transport.govt.nz/assets/Uploads/Research/Documents/2017-Transport-Knowledge-Presentations/2df0045d2f/The-costs-and-benefits-of-urban-development-theory-and-evidence.pdf>>.

A genuine unknown is the distribution of zoning and land use for the high impact zone and facility site. Zoning is an essential site criterion and determines the highest and best value potential usage for land. To control for this, and to distribute the impact zone in a sensible way we have assumed zoning premia, and distributions at each location, summarised in Table 8. In general, better zones are more valuable, and Hume has generally more industrial zoning compared to actual or potential mixed-use industrial and commercial zoning in Fyshwick.

TABLE 8. ZONING PREMIA AND DISTRIBUTION

	Unit	IZ1/2	CZ1	CZ2	CZ3
Premium	x	1	1.2	1.4	1.6
Fyshwick structure	%	35	25	25	15
Hume structure	%	50	30	15	5

Additionally, the same externality will make tenancies less attractive around each site, and for many of the same reasons. There is a relationship between rents and property values. However, in this assessment it is assumed that tenants will independently adjust their willingness to pay for rents, this will be over a longer time frame and it is a separate decision to willingness to invest. The parameters used to estimate adjusted rents are:

- ▶ the same higher property distribution outlined, including impact zone
- ▶ a general yield of nine per cent per annum (gross)
- ▶ the reduction occurs across the entire zone, which effectively controls for different yields and underlying values other than zone premia
- ▶ a similar reduction in pricing given the attraction of Fyshwick as a mixed-use commercial hub, leading to a persistent 15 per cent reduction in face rents, as opposed to Hume where the reduction might be 10 per cent. We have capped this estimate at 10 years.

While there are obvious limits to this assessment, the summary annual results are outlined in Table 9. The impacts are higher in Fyshwick than Hume, with a Hume location offering \$18.8 million in less impact. We have not controlled the potential of other waste businesses or elements of the supply chain collocating neutralising some of the externality.

TABLE 9. PROPERTY IMPACTS [\$MILLION, 2020 PRICES]

Time	Fyshwick		Hume	
	Value loss	Yield loss	Value loss	Yield loss
2020	24.1	2.2	12.9	1.2
2021		2.2		1.2
2022		2.2		1.2
2023		2.2		1.2
...2029		2.2		1.2

Fiscal Impacts

There are a host of potential new tax revenues available across the life of the facility and some potential additional off-site expenditures required to integrate the facility into the existing footprint. These warrant consideration in a depressed fiscal environment, however, this assessment looks at one easy impact, the impact on land rates.

When property values fall, they will impact on the baseline values upon which property taxes are collected. The ACT commercial rating system has two elements dependent on average unimproved values. The tax impact is estimated by applying the one-off value reduction to the AUV Rates base and estimating the lost tax.

- ▶ The 2019-20 commercial rates settings are used and it is assumed that these will hold for 10 years. These settings include valuation-based ratings charges and fire and emergency services levy and fixed charges per property. We have allowed for an annual one-off rebate equivalent to the fixed charge advertised in the Revenue Office materials.
- ▶ The high impact area is distributed to blocks at an average 3,000 sqm.
- ▶ The value changes outlined will apply to average unimproved values after allowing for zoning.

We estimate the base annual tax at stake is \$4.1 million in Fyshwick and \$3.1 million in Hume. The impact of reduced unimproved values is a fall to \$3.3 million and \$2.7 million respectively. For each of the 10 years the nominal loss in Fyshwick is \$0.3 million per annum compared to \$0.2 million in Hume. Over a 10-year period the Fyshwick nominal tax loss is \$7.2 million and \$3.9 million in Hume. In net present value terms (7 per cent discount), after 10 years Fyshwick has a \$2.5 million excess negative tax impact.

Traffic Impacts

A new facility will generate new egress and ingress movements, especially heavy vehicles, and staff. While estimating transport system dynamics is specialised profession, there are two key principles that affect the marginal traffic impact of sites:

- ▶ a facility will generate additional traffic, typically heavy vehicles — the volume of traffic cannot be estimated without a specific design and business case, however we can assume an equivalent site in either Fyshwick or Hume would have similar access and ingress parameters (the same baseline traffic problem)
- ▶ the generated heavy vehicle and staffing movements would need to interact with the existing traffic systems within the high impact zone, and each location will have unique extant parameters and consequently different traffic system outcomes.

Estimating the latter is difficult and modelling the impacts is genuinely complex. The natural complexity is confounded by a lack of publicly available baseline movements data to accurately determine vehicle operating costs, vehicles per day, vehicle km travels, or vehicular travel time with any accuracy.

Estimating traffic

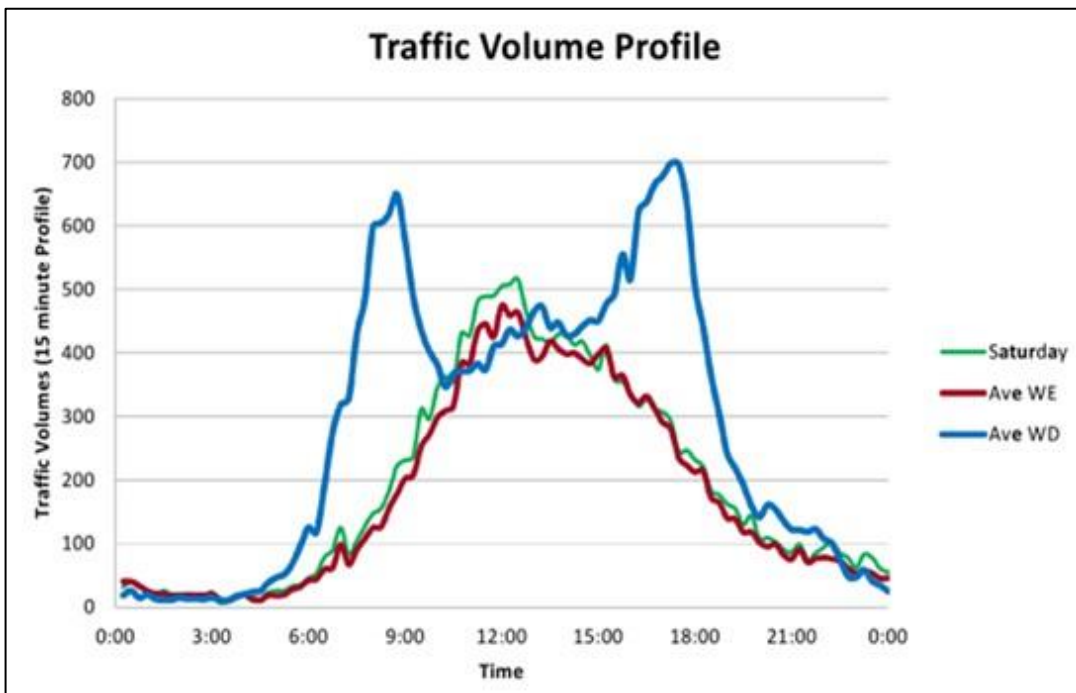
Traffic generated by the facility is dependent on the amount of material processed, the volume and frequency of heavy vehicle movements and the number of employees at the site. These may also be influenced by the existing use and efficiency of the traffic system and investments to offset road transport to other modes like rail.

For the Tennant Street facility proposed to EPSDD the net addition to traffic was an average 230 additional truck movements per day. In that study the vehicles represent approximately 5 per cent of the existing heavy vehicle movements throughout the road network, presenting 0.2 per cent of the total vehicles during AM peak. Other

projects estimated fewer trucks, based on different business models, ranging around 62-75 additional truck movements per day.

On a quick map scan, Hume has around three major intersections across boundaries of around 4 kilometres by 0.8 kilometres. Fyshwick has at least nine major intersections and is spread across a span of 4 kilometres by 1.7 kilometres. Fyshwick is naturally more complex and dynamic traffic system with many internal high-volume high utilisation intersections.

One view of Fyshwick traffic is shown in the image below. This represents vehicle movements per hour (vph) across 15-minute intervals on an average weekday, weekend, and Saturday. This assessment uses weekdays, where the AM and PM peaks are around 650 and 700 vph, respectively.



Source: AECOM Traffic and Transport Assessment, Block 9 and 11 – Section 8 Fyshwick ACT, 2018

Systemic Hume data is not readily available. A 2017 study reported that the AM peak at Tralee Street was 279 vph and the PM peak was 294 vph. The same study indicated that the Monaro Highway flow faced coming out of Hume was 3,534 vph in the AM North bound peak and 2,814 vph in the PM South bound Peak. The AM peak in Hume is around 42.9 per cent of that in Fyshwick; and PM peak is 42 per cent. This excludes the Monaro Highway, but we note Monaro arguably is an issue for both locations.

Estimating impacts

We propose that there will be two types of traffic impact from the location decision. An increase in heavy vehicle movements will increase delays at intersections during weekdays. Also, the increased traffic will slow the average travel speed within the locations. A consequential impact of the reduced average speed and increased delays is an increase in vehicle operating costs. Following are the major assumptions deriving values for these impacts.

- ▶ Fyshwick has more traffic movements than Hume, caused by higher employment and higher customer visits per year. Vehicles per day values reflect worker and customer data estimates.
- ▶ More than 85 per cent of staff use cars to enter either area (based on ABS journey-to-work data). We assume visitors primarily use cars.

- ▶ The increase in delays is proportionately equivalent at locations, however different in time because of different baseline AM and PM peaks. The change values are trivial, based on the most comprehensive modelling we could find, with an increase in AM peak delays of one per cent, and PM peak of six per cent.
- ▶ The average speed reduction will be material but trivial, assumed at five per cent.
- ▶ Distance travelled is within the location (not travel to or from), and for simplicity is the same 3.5 kilometres.
- ▶ Only two trips per day are impacted, arriving at, and leaving the location. Typically, more than this would be involved, but perhaps at shorter trip lengths.
- ▶ Only business days matter, the total is 250 (excluding weekends and public holidays).
- ▶ Vehicle occupancy is at 1.2 per vehicle (below ATAP suggested urban levels).
- ▶ Base vehicle operating costs (VOC)— fuel, oil, tyres, R&M, depreciation—are based on ATAP urban Stop-Start VOC model parameters, updated to June 2020, as an average of a small, medium, and large passenger car parameters.
- ▶ Travel time values are a compound of private and business purpose travel values assumed from ATAP guidance, updated to June 2020 values, set at \$31.30 per hour.

While this list is comprehensive, it is useful to review some parameters side by side. Major impact drivers are summarised in Table 10. Immediately it is clear that Hume starts from a better position.

TABLE 10. MAJOR TRAFFIC PARAMETERS

	Unit	Fyshwick	Hume
Vehicles per day (vpd)	#	12,956	2,884
Staff vpd	#	10,217	2,492
Customer vpd	#	2,740	391
Base average speed	km/hr	40	50
Median AM delay (base)	secs	13.5	1.4
Median PM delay (base)	secs	14.8	5.7
Base travel time	mins	2.9166667	2.33
Base operating costs	c/km	33.83	27.07

The actual impacts are relatively straight forward to understand conceptually.

- ▶ The facility will increase delays within either network, where the base delays are higher in Fyshwick than Hume (other than Monaro Hwy).
- ▶ Additional movements across the day would reduce the average speed experienced in each system, where the average speed in Fyshwick is be generally lower than Hume already.
- ▶ Increased delays and lower speeds would impact on the value of individuals' time, which can be measured.
- ▶ The lowering of the average speed and increased delays across the network will increase the average vehicle operating costs.

The modelled results are illustrated in Table 11 by impact and location.

TABLE 11. TRAVEL IMPACTS [\$MILLION, 2020 PRICES]

Time	Fyshwick			Hume		
	Time-delay	Time-speed	VOC	Time-delay	Time-Speed	VOC
2020	0.07	1.1	0.5	0.01	0.2	0.09
2021	0.07	1.1	0.5	0.01	0.2	0.09
2022	0.07	1.1	0.5	0.01	0.2	0.09
2023	0.07	1.1	0.5	0.01	0.2	0.09
2024	0.07	1.1	0.5	0.01	0.2	0.09

Based on the model parameters we can estimate the total traffic impact over 10 years would be \$16.7 million in Fyshwick, compared to \$2.9 million in Hume. In net present value terms (7 per cent discount), after 10 years Fyshwick has a \$10.4 million excess negative traffic impact.

Please note that these are deliberately conservative estimates, and we note again there are low quality inputs on the public record. We have not modelled any additional vehicles per day, which may happen if additional colocated product is developed. None of these estimates deal with ACT system level traffic feedback effects. We note 97 per cent of the ACT community visits Fyshwick at least annually, suggesting any additional congestion in that environment has enormous potential for system wide traffic feedback impacts.

Qualitative impacts

The preliminary impact matrix lists qualitative impacts for which there is too little, or too unreliable, data and information to make quantitative assessments. Total impact counts are summarised in Table 12. There are clearly more qualitative (38) than quantitative impacts (6). Without the majority being quantified the information is general, and high level about the facility itself. However, most of the quantitative impacts inform the marginal impacts, which assists assessing the location.

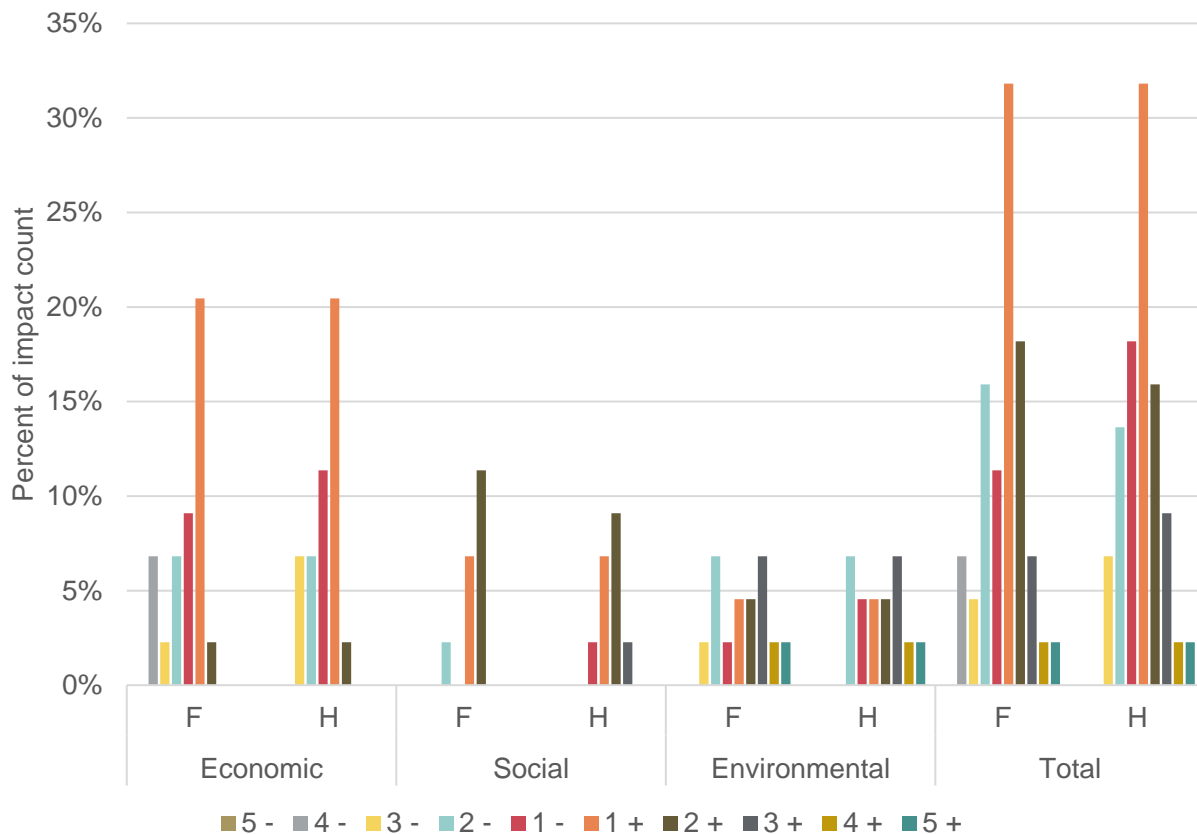
TABLE 12. TYPES OF IMPACTS

	Qn	QI	Total
Economic	6	15	21
Social	0	9	9
Environmental	0	14	14
Total	6	38	44

Result summary

Based on the array of impacts, the facility has proportionately more positive impacts (61.4 per cent) than negative impacts (38.6 per cent). Most impacts are magnitude one positive economic benefits. While there are 21 economic impacts identified, there are also 14 environmental impacts of which there are double the positive impacts to negative (ex-magnitude).

DISTRIBUTION OF PRELIMINARY IMPACTS BY CATEGORY AND LOCATION



In the absence of other information, we would say on the balance of probability the facility makes sense for the ACT, and within the ACT it makes more sense in Hume than Fyshwick. In a quantitative sense, the short time series and totals of the results are summarised in Table 13 on the following page.

From this summary we can see:

- ▶ negative impacts at Fyshwick outweigh impacts at Hume in every category
- ▶ in nominal terms, Hume is a better location to the tune of \$26.3 m (NPV) compared to Fyshwick
- ▶ the largest impacts are from negative externalities impacting property, and this will always impact Fyshwick more as it has more and relatively higher valued properties.

All results are subject to assumptions which may impact the overall results.

TABLE 13. TIME SERIES OF AGGREGATE QUANTIFIED IMPACTS [\$M, REAL 2020 VALUES]

Year	Fyshwick				Hume				Fyshwick compared to Hume			
	Property	Travel	Tax	Total	Property	Travel	Tax	Total	Property	Travel	Tax	Total
2020	\$26.310	\$1.674	\$0.722	\$27.985	\$14.079	\$0.291	\$0.386	\$14.756	-\$12.231	-\$1.383	-\$0.337	-\$13.229
2021	\$2.172	\$1.674	\$0.722	\$3.847	\$1.163	\$0.291	\$0.386	\$1.839	-\$1.010	-\$1.383	-\$0.337	-\$2.007
2022	\$2.172	\$1.674	\$0.722	\$3.847	\$1.163	\$0.291	\$0.386	\$1.839	-\$1.010	-\$1.383	-\$0.337	-\$2.007
2023	\$2.172	\$1.674	\$0.722	\$3.847	\$1.163	\$0.291	\$0.386	\$1.839	-\$1.010	-\$1.383	-\$0.337	-\$2.007
...2029	\$2.172	\$1.674	\$0.722	\$3.847	\$1.163	\$0.291	\$0.386	\$1.839	-\$1.010	-\$1.383	-\$0.337	-\$2.007
NPV 7	\$40.464	\$12.583	\$5.429	\$53.047	\$21.653	\$2.188	\$2.897	\$26.739	-\$18.811	-\$10.394	-\$2.531	-\$26.308
Total	\$45.862	\$16.743	\$7.223	\$62.605	\$24.542	\$2.912	\$3.855	\$31.309	-\$21.320	-\$13.831	-\$3.368	-\$31.296

Limitations

Idiosyncratic Limitations

As the project is mostly a proposal at this stage there are distinct limitations on what analyses and assumptions can be made. Specifically:

- ▶ this assessment assumes the inputs available are sufficient to undertake high level preliminary assessments, and that these assessments can be adapted when new information comes to light
- ▶ survey or original research on the localised impacts or perception of the project has not been undertaken, so market and non-market impacts are adapted from extant sources, and
- ▶ extensive applied economic or econometric modelling was not in scope.

Common Limitations

As for any assessment there are limitations on data availability, quality and comparability that are beyond our control.

- ▶ Data at an ACT scale, or a sub-ACT scale, are commonly not available in the public domain.
- ▶ Search costs have been minimised by drawing on extant assessment material. Not all of these sources, particularly academic and third-party research, relate to the ACT or its distinct features. This may affect the translation of those results to the ACT market, and consequently this assessment.
- ▶ The quality of the data is relatively low. Other than Census derived data, most other information is survey or assumptions based with high statistical error rates. This is a common problem with small scale regions, and there are no controls.
- ▶ The data that are used in the assessment are drawn from a variety of sources that may not be complementary to one another. For example, they have different geographic contexts, different reference frames and potentially different taxonomy or definitions. To the extent possible we have compared like-to-like, however this cannot be guaranteed.

All results and assessment conclusions need to be considered considering these limitations.



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