



Riverview Projects (ACT) Pty Ltd
West Belconnen Waste Management Strategy
Volume 2 - Strategic Waste Management Plan

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Acronyms

ACT	The Australian Capital Territory
AWT	Alternative Waste Technology, a mechanical and/or biological process that typically separates and/or processes the organic fraction of a waste stream
BAU	Business as usual
BDI	Better Design Inputs – design methods used by the Developers to make more efficient use of land for development
C&D	Construction and demolition
C&DRF	Construction and Demolition Recovery Facility – see Volume 1 - Strategic Construction Waste Reduction Plan
CWRP	Construction Waste Reduction Plan – see Volume 1 - Strategic Construction Waste Reduction Plan
DCC	Development Control Code for Best Practice Waste Management in the ACT
Developer	Riverview Projects (ACT) Pty Ltd
EIS	Environmental Impact Statement
MRF	Materials Recovery Facility - A facility at which recyclable materials are separated into individual commodities using a variety of mechanical and manual sorting techniques
MUD	Multi-Unit Dwelling – typically flats, units and apartments
NSW	New South Wales
SCWRP	Strategic Construction Waste Reduction Plan which is this document and applies only during the progressive construction phases
VENM	Virgin Excavated Natural Material
WBD	West Belconnen Development
WBWMS	West Belconnen Waste Management Strategy
WMRRMP	Waste Management and Resource Recovery Master Plan a separate document that applies to the whole site during its on-going occupation

Executive Summary

West Belconnen Development

The West Belconnen Development (WBD) involves the construction of 11,500 dwellings as well as commercial and community elements, at West Belconnen. Of these, 6,500 dwellings will be in the ACT and 5,000 in NSW. Riverview Projects (ACT) Pty Ltd is the project manager for the planning of West Belconnen, acting on behalf of the ACT Government for the ACT land and on behalf of the land owners for the NSW land.

The vision for the development is a model sustainable community and an example of best practice design, construction and long-term liveability. Development is expected to achieve 6 Green Star certification.

West Belconnen Waste Management Strategy

The West Belconnen Waste Management Strategy (WBWMS) covers the whole development including the parts in NSW and the ACT. There are two sub-plan elements - Volume 1 is the Strategic Construction Waste Reduction Plan (SCWRP) which will apply only during the progressive construction phases, Volume 2 is this document, the Waste Management and Resource Recovery Master Plan (WMRRMP) which will apply to the whole site during its on-going occupation.

Only the first 15 stages of the development are dealt with in detail in these strategies. The details of the later stages are likely to change over the course of the development and accurate figures can only be developed and provided as the development proceeds.

Review of Documents

Legislative, regulatory and policy documents were reviewed as well as some other guidelines relating to waste management. The review highlighted the following points:

- The land on which the development is located in the ACT, including the former West Belconnen Landfill, cannot be sold and the ACT Government will always have responsibility for it;
- The Development Control Code for Best Practice Waste Management in the ACT will need to be considered in building design. The proper design of dwellings in the WBD and the provision of regular waste collection services should satisfy the requirements of Yass Valley Council's DCP;
- The waste system for collecting recyclables in the WBD must allow for the collection of the same materials that are collected in the rest of the ACT;
- Certain waste-related developments on the site of the West Belconnen Landfill may trigger the requirement for an Environmental Impact Statement and would likely be subject to several Environment Protection Policies EPPs;
- How residents in the Yass Valley Council part of the WBD will be charged for waste services is an issue of concern for that Council but is expected to be resolved as part of the cross border services agreement; and
- An opportunity exists to implement a place-based (a centrally organised) waste collection system at the commercial and retail precinct.

Waste Quantities and Characteristics

There will be three main waste generating activities at the WBD during ongoing occupation as follows:

- Residential dwellings;
- Commercial operations; and
- Community activities.

Single dwelling households in the ACT produce about 9.63 kg of waste per week and about 3.43 kg of recyclables. The largest proportion of the residential garbage stream is food at around 40%.

By Stage 15, the WBD is estimated to generate about 41 tonnes per week of garbage and about 23 tonnes of recyclables. The proportion of vegetation in the garbage stream is likely to be very low.

In the central commercial areas, the first stage of the shopping centre is estimated to generate about 10.5 m³ of garbage per day and 5.9 m³ of recyclables. This is expected to double when the second stage is built.

Waste will also be generated from other commercial operations in the central area as well as from Community Villages, Two of which will be completed in the first 15 stages. By Stage 15, a total of about 31 m³ of garbage and 12 m³ of recyclables are estimated to be generated per day from commercial areas.

Community facilities such as child care centres, community halls, library, bus stops, schools, medical centres and religious facilities are also estimated to generate about 15 m³ of garbage and 7 m³ of recyclables per day by Stage 15.

Large proportions of the residential, commercial and community waste streams are recoverable. Separated organics particularly, could be used as a feedstock in an organics processing facility which could provide compost and/or energy for use in the WBD.

Business As Usual

The ACT's residential waste collection, recycling and disposal services are commissioned and managed by ACT NOWaste, a Territory Government agency. Canberra's residential kerbside waste system for single dwellings consists of one 140 L mobile bin for garbage per household per week and one 240 L bin for comingled recyclables per fortnight. Multi-unit dwelling complexes use 240 L bins or bulk bins ('hoppers'). There are no official separate kerbside services for garden organics or bulky waste but a number of private operators provide these services.

Domestic garbage and recycling is collected by the Territory Government's contractor and delivered to either the Mugga Lane Landfill or materials recovery facility, both at Hume. Residents may also disposal of waste themselves at either Mugga Lane or Mitchell Transfer Station. The greatest impact of the WBD on existing waste facilities is likely to be an increase in the number of vehicles using Mitchell Transfer Station.

Waste from commercial premises in ACT is mostly collected and disposed of by commercial waste contractors that provide bins of various sizes. Businesses usually choose their own waste contractor which may result in a several waste collection vehicles entering the WBD commercial district each day.

Public place bins and bins at community facilities are currently collected as part of the kerbside service, performed under contract.

Opportunities

With the many difficulties involved in establishing a new waste facility, the presence of the former West Belconnen Landfill site in the WBD area presents significant opportunities for waste transfer and resource recovery.

A Construction and Demolition Recovery Facility (C&DRF) will be developed at the landfill site during the construction phase. When residential occupation has commenced, this facility will also act as a temporary waste transfer station. Later it will be developed into a permanent transfer station and Resource Recovery Centre where waste generated from the development would be initially deposited for transfer to disposal or separated and recovered using one or more of a variety of technologies.

The proximity of a transfer station to the residential areas of the WBD would provide an opportunity for smaller kerbside collection vehicles to be used, perhaps 15 m³ capacity rather than the more common 25 m³. Smaller vehicles would mean lower impact on road surfaces and lower emissions. Road widths could also be smaller without compromising the efficiency of the waste collection service. Bin collection could also be undertaken on both sides of the road by using vehicles with dual hydraulic collection arms, one either side of the vehicle, to allow it to pass only once down narrow streets and lanes.

If LPG was used as a fuel, a refuelling depot could be established at the WBD which would encourage other vehicles to also use LPG.

Place-based contracting or licencing could be implemented in the commercial area. This would involve waste services for all commercial operations in the precinct provided under one contract. Advantages include a more efficient collection system with fewer trucks, lower impacts, greater control over services, types of vehicles used, collection times and the recording and reporting of waste quantities.

Standard services would mean standard bins and a standard storage system could be used along with a computer managed sensor system that detects when bins are full.

Disadvantages include that the variety of waste generated by many businesses may not fit with a standard service, that central management of the service would be required, there may be a lack of support by businesses especially if cheaper services were available and there may be potential competition issues.

Solar-powered public place bins could be installed. These use solar power to compact waste and increase the capacity of the bins. Bins send messages to the collector when they are full which reduces the number of collection vehicle kilometres required to service them.

Targets

Waste audit results show that the diversion rate¹ from single dwellings in the ACT was about 38%, contamination in recycling was 5% and the proportion of the garbage stream that was unrecovered recyclables was 11%. These figures do not include garden organics which are disposed of using separate systems. Quantities of green waste are expected to be very low from WBD residences. Food is the largest proportion of landfilled waste and significant increases in diversion will not be achieved unless food is recovered.

Appropriate targets therefore for residential dwellings in the WBD would be:

- Recovery – 85%;
- Diversion – 38%;

¹ This is the proportion of the whole waste stream that is diverted from landfill.

- Contamination in recycling – 5%;
- Proportion of garbage stream that is recyclable – 10%;
- Potential diversion if food included in kerbside collection – 60%.

Diversion rates of between 70% and 90% have been achieved where recycling programs have been implemented in commercial and retail operations. With recovery systems in place in the ACT for common recyclables a diversion target of 70% is possible. For businesses that generate significant proportions of food, waste diversion rates could be high if food was diverted for processing.

Place-based contracting would allow tighter control over what materials were separated, collected and diverted.

Users of community facilities may be more inclined to recycle if equipped with appropriate bins and information. Where community facilities are used for similar functions as commercial and retail operations, similar targets can be set.

Resource Recovery Facility

A simple Resource Recovery Facility and waste transfer station will be developed at the West Belconnen Landfill site in the initial stages of the development to accept waste and recyclables delivered by the kerbside collection truck. It should be run by the Operators of the C&DRF.

At about Stage 13 (2029) the Resource Recovery Facility should be developed into a permanent structure for long-term use. By this stage residential development will have reached the southern boundary of the former landfill site and construction and operation should be completed before development gets much closer. Almost five loads of kerbside waste and recyclables will be collected over three days at this stage of the project.

Waste and Recycling Collections

Only small amounts of waste will be generated during the early stages of occupation but quantities will increase as each stage is completed. A kerbside collection vehicle would collect recycling in the morning of each collection day and garbage afterwards. As quantities increase, the number of collection days will increase. By Stage 15, the equivalent of almost five loads per day will be collected three days per week.

Staged implementation

The nature of the development process allows for changes and additions to the proposed waste services at different stages.

Before construction commences preparations should be made for the first kerbside collections. This might include tender and contract development, negotiation with a service provider and/or acquisition of staff and vehicles.

During the construction of Stage 1, arrangements for the kerbside collection would be finalised. The Resource Recovery Centre would also be developed to be ready for operation when the first residents occupied after construction has finished and kerbside collections have begun.

The kerbside collection zones would increase from one day per week up to three days per week by Stage 7

Preparations for the place-based contracting system should be made in Stage 9 before the commercial centre and shopping centre are developed in Stage 10. The place-based contract would be let in Stage 10 to be ready when the commercial areas are occupied.

The Resource Recovery Centre and kerbside collections would operate until Stage 13 when a permanent resource recovery centre would be developed.

1. Introduction

1.1 West Belconnen Development

1.1.1 Developers

The West Belconnen Development (WBD) involves the construction of 11,500 dwellings straddling the NSW-ACT border at West Belconnen. Of these, 6,500 dwellings will be in the ACT and 5,000 in NSW. Riverview Projects is the project's Developer and the ACT Government is a partner in the project.

Figure 1 below shows the West Belconnen Development with all stages numbered and the first 15 stages (Stages 1- 15) highlighted. The commercial centre and the two community villages in Stages 1-15 are also shown.

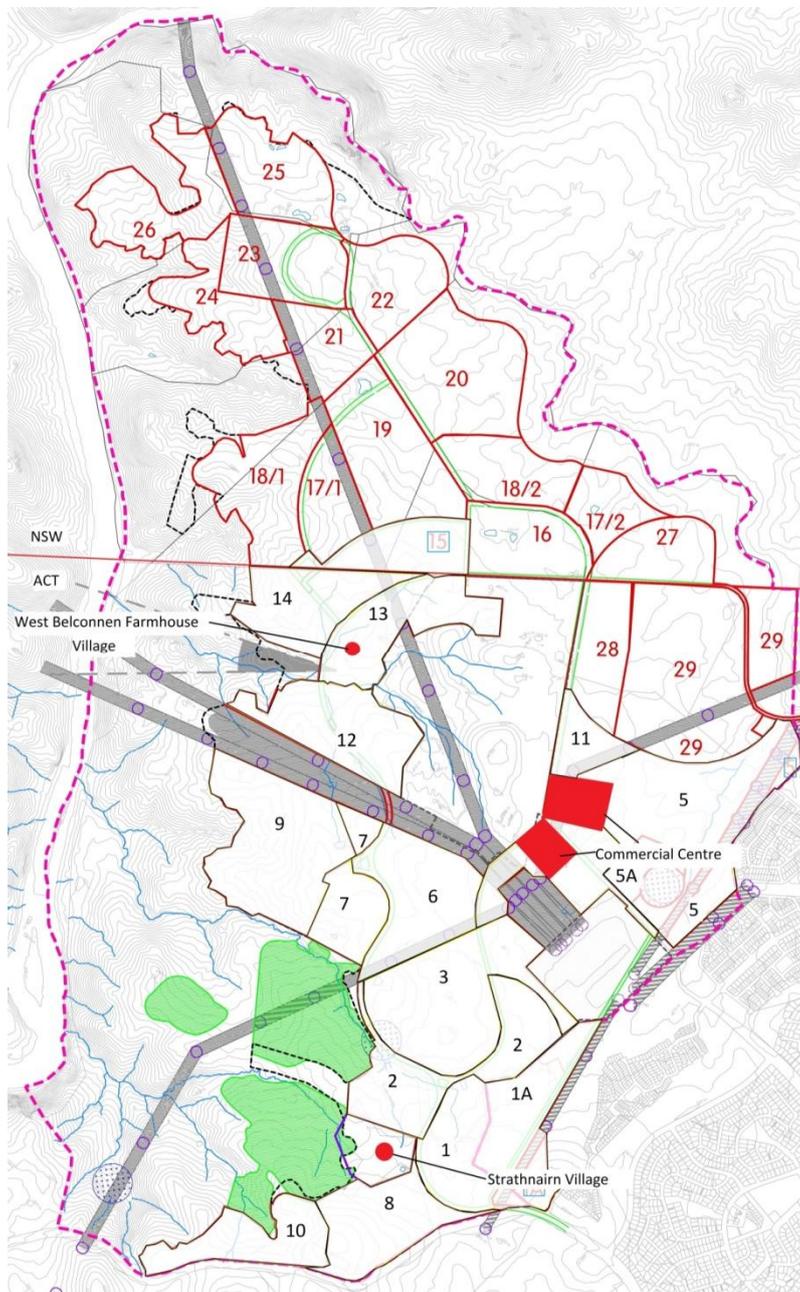


Figure 1 - West Belconnen Development Showing Stages 1-15

1.1.1 Vision

The vision for the development is a model sustainable community. The vision will inspire sustainable living, development practice and awareness. The community will be an example of best practice design, construction and long-term liveability. Developer is aiming for 6 Green Star certification and is employing practices, processes and systems that embody innovation and design excellence.

1.1.2 Composition

The development consists of both residential, commercial and community elements. The residential areas will be a mixture of low density and mixed use properties and will accommodate a final population of about 30,000 people. The commercial elements will include retail, office, services and light industrial operations. There will also be community facilities including primary and secondary schools.

1.2 West Belconnen Waste Management Strategy

1.2.1 Strategy Aim

The West Belconnen Waste Management Strategy (WBWMS) focuses on improved resource recovery outcomes, minimising impact on urban amenity, reducing climate change impacts and delivering a cost-effective waste management solution.

1.2.2 Two Part Strategy

The WBWMS covers the whole development including the parts in NSW and the ACT. There are two sub-plan elements to this strategy. The first (Volume 1) is the Strategic Construction Waste Reduction Plan (SCWRP) which will apply only during the progressive construction phases. The second (Volume 2) is this document, the Waste Management and Resource Recovery Master Plan (WMRRMP) which will apply to the whole site during its on-going occupation.

The WBWMS, including the SCWRP and WMRRMP, has been developed in conjunction with the Site Master Plan and will be integrated into it. Because of the time over which construction will take place, some parts of the development will be occupied while others are under construction. As the site is developed progressively, both the SCWRP and the WMRRMP will be enacted concurrently, although at different stages as construction would precede occupation.

Only the first 15 stages of the development are dealt with in detail in these strategies. The details of the later stages are likely to change over the course of the development and accurate figures can only be developed and provided as the development proceeds.

1.3 Scope and limitations

This report has been prepared by GHD for Riverview Projects (ACT) Pty Ltd and may only be used and relied on by Riverview Projects (ACT) Pty Ltd for the purpose agreed between GHD and the Riverview Projects (ACT) Pty Ltd as set out in this report.

GHD otherwise disclaims responsibility to any person other than Riverview Projects (ACT) Pty Ltd arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no

responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

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2. Review of Documents

2.1 Introduction

Parts of the WBD are in NSW and parts are in the ACT. There are four legal jurisdictions covering different parts of the development; the Commonwealth Government, the ACT Government, the NSW Government and Yass Valley Council.

Legislative, regulatory and policy documents were reviewed as well as some other guidelines relating to waste management.

Full summaries of the documents reviewed can be found in Volume 3 of this report Background Documentation. What follows are only the points relevant to the WBD from only those relevant documents.

- National Waste Policy - The National Waste Policy supports and complements the NSW and ACT Governments' waste reduction and resource recovery policies and programs. These will lead to less waste being generated in the ACT and NSW for landfill disposal and increased opportunities for the development of advanced resource recovery facilities. This WBWMS aligns the WBD with the objectives of the National Waste Policy.
- *Product Stewardship Act 2011 (Commonwealth)* - Operators of the Resource Recovery Facility planned for the former West Belconnen Landfill site should be aware of the provision of this Act and may be in a position to take part in schemes and programs that collect these materials. Should the operators be interested in becoming a service provider or partner with industry in the schemes, relevant environmental and occupational health and safety requirements must be met and fees cannot be charged to householders or small business for the collection of products under the schemes.
- *Seat of Government (Administration) Act 1910 (Commonwealth)* - The most direct consequence of this Act on the WBD is that the West Belconnen Landfill site, at the centre of the development, will always remain in ACT Government hands. The land cannot be sold and the ACT Government will always have responsibility for it.
- AS 4454-2012 Composts, soil conditioners and mulches - The inability of many Alternative Waste Technology facilities (AWT) to produce products to meet the Australian Standard restricts the potential uses of these systems. If an AWT is planned for the former West Belconnen Landfill site the operators should be aware that the quality and potential uses of the products that results from certain waste processing technologies may have impact on the economic viability of any facility they may develop.
- ACT Waste Management Strategy - Towards a Sustainable Canberra, 2011–2025 - Many of the initiatives planned for the WBD align with the ACT Waste Strategy. There are also opportunities in the areas of organics processing and waste to energy that, the Strategy shows, if implemented at WBD, would be supported by the ACT Government.
- Development Control Code for Best Practice Waste Management in the ACT - The DCC applies to the WBD and its provisions need to be addressed. The requirements are typical and not onerous. Details of the WBD are not yet complete enough to be able to say whether the development complies with the DCC. The requirements of the DCC will need to be considered when individual buildings are designed and they are likely to comply if they are of conventional design. The waste management strategy complies with the DCC's requirements.

- ACT NOWaste Recycling Guide - Where does your recycling go? 2004 - The waste system for collecting recyclables in WBD must allow for the collection of the same materials that are collected in the rest of the ACT.
- *Planning and Development Act 2007* - This is the Act that will regulate the development of any new waste facilities at the West Belconnen Landfill site. Certain developments on the site of the Belconnen Landfill may trigger the requirement for an Environmental Impact Statement (EIS). If only inert C&D materials or VENM is proposed to be deposited in the landfill, no EIS would be required. If a waste to energy facility was proposed, an EIS would need to be prepared. If a transfer station or processing facility for green waste or C&D material was proposed, the development of an EIS may well be avoided. If there were no residential or commercial operations within 1 km of the site at the time of application a transfer station or processing facility may be able to be developed on parts of the landfill site without the need for an EIS. However, this should be done in the early stages of the development before new construction comes within the 1 km zone.
- *Environment Protection Act 1997 (ACT)* - Any new composting facility or incinerator planned for the landfill site would need authorisation before it could operate. It is possible that an EIS would need to be prepared. The Act says nothing about transfer stations or the processing or storage of waste in general or C&D waste.
- *Environment Protection Policies (ACT)* - There are no EPPs relating to waste specifically. However, if a transfer station or waste processing facility was to be developed at the former Belconnen Landfill site, it would most likely be subject to several EPPs.
- *Draft NSW Waste Avoidance and Resource Recovery Strategy 2013-21* - Any initiative to increase waste diversion from WBD through just about any means would be consistent with the objectives of the Draft Strategy.
- *Protection of the Environment and Operations Act 1997 (NSW)* - The parts of the WBD that are located in NSW are subject to the Act, as is Yass Valley Council, the local government area in which these parts are situated. The section 88 levy does not currently apply to Yass Valley Council as it is outside the regulated areas. A review of the levy recommended that it be applied across the state although the State Government does not intend to implement this recommendation. Some regional NSW councils, not yet covered by the levy are investigating a voluntary levy system. It is possible that at some stage in the future, a levy will apply to Yass Valley Council and therefore, waste generated from the NSW part of the WBD may be subject to it. However, as the levy can only be collected at NSW landfills, provided the waste generated from the NSW part of the WBD is disposed of in the ACT, the levy would not be required to be paid on this waste.
- *Protection of the Environment Operations (Waste) Regulation 2005 (NSW)* – Those parts of the WBD located in NSW would be subject to the Regulation. However, as there are no waste facilities in this area, its scope would be limited. If Yass Valley Council was to be included in the area subject to a levy, it would be most likely be implemented through this Regulation. Any solid waste product generated by a facility operated by WBD that is to be used on NSW land as a soil conditioner or for agricultural purposes, must comply with the criteria for a resource recovery exemption otherwise it may be subject to licencing conditions and attract the landfill levy.
- *Waste Avoidance and Resource Recovery Act 2001 (NSW)* - Any initiatives by WBD to increase its waste diversion rate through the use of organics processing or AWT would be consistent with the objectives of the WARR Act.
- *NSW Waste Avoidance and Resource Recovery Strategy 2007* - Any move by WBD to increase its waste diversion rate through the use of organics processing or AWT would be

consistent with the objectives of the WARR Strategy and the targets set for municipal resource recovery.

- Energy from Waste Policy - The policy is likely to make it easier for councils and others to develop waste to energy facilities. This will increase the options for WBD when considering technologies or combinations of technologies for processing its waste, but only if the facility was planned to be located in NSW. Development of an energy from waste facility at the WBD would have to include waste separation and recovery elements before the energy conversion phases.
- *Environmental Planning and Assessment Act 1979 (NSW)* - Any waste management facilities planned for the NSW part of the WBD, that meet the criteria in the Act, would be subject to approval by the NSW State Government and would have to undergo an approval process requiring significant time and resources, including the preparation of an EIS.
- State Environmental Planning Policy (State and Regional Development) 2011 - Any waste management facilities planned for the NSW part of the WBD, that meet the criteria, would be subject to this SEPP and require approval by the NSW State Government.
- Yass Valley Local Environmental Plan 2013 - While some elements of the LEP may be relevant to the development of residential dwellings in the NSW section of the WBD, there is little in regard to waste management that is relevant to the WBD. A waste or resource management facility could be developed now, with permission, in the areas zoned RU1 Primary Production.
- Yass Valley Council Development Control Plan (Exempt & Complying Development) 1999 - The proper design of dwellings in the WBD and the provision of regular waste collection services should satisfy the requirements of this plan.
- Community Strategic Plan 2013 – 2030 - The Community Strategic Plan requires the preparation of a waste strategy by Council. It is expected that that part of the WBD in Yass Valley Council area would be mentioned in the strategy as a special case where its proximity to Canberra, position as a contiguous part of the development and remoteness from other Yass residential areas, would require waste services to be provided from the ACT side as part of services provided to the whole development.
- Resourcing Strategy 2013 – 2017 - Regional waste strategies may oblige Yass Valley Council to handle its waste in particular ways and dispose of it at particular places. It may be the case that the WBD would need to be referred to in the strategies as an area exempted from these requirements or, if the ACT is included in the strategies, at least mentioned as an area under the ACT's purview.
- Operational Plan 2013 – 2014 - Future charging of residents for waste services is an issue of concern for Council. The waste services enjoyed by residents of Yass Valley Council in the WBD will not be provided by Council, yet those residents may pay Council for those services. Yass Valley Council and ACT NOWaste will need to agree on the services to be provided by ACT NOWaste and costs to be paid by Council. Council is concerned that there will not be equity between what all residents of Yass pay and the services they receive. According to NSW legislation, Yass cannot charge its residents more than the cost of providing the services.
- Place-Based-Approaches to C&I Waste and Recycling² - Place-based waste management is not a new idea and is already in operation in parts of Australia and elsewhere. A single waste management system organised by building management in an

² Hyder (2012) [Place-Based-Approaches to C&I Waste and Recycling](#)

office building or shopping centre is a form of place-based waste management. An opportunity exists to implement a place-based system on a large scale at the commercial and retail precinct at the WBD.

3. Waste Quantities and Characteristics

3.1 Introduction

There will be three main waste generating activities at the WBD during ongoing occupation as follows:

- Residential dwellings;
- Commercial operations; and
- Community activities.

Waste quantities have been estimated for all three types using data from waste audits conducted in the ACT and elsewhere.

3.2 Residential

3.2.1 Waste Audit Data

Waste audits have been conducted in Canberra since 1997 with most audits undertaken between 2001 and 2011. These have included audits of kerbside, materials recovery facility (MRF) and disposal streams, the reports of many of which are available on the ACT NOWaste web site.

The largest proportion of the residential garbage stream since 1997 has been food, the proportion of which has remained at approximately 40% over this entire period. The proportions of other materials have fluctuated with recyclable containers ranging between 6.9% and 13.5%, recyclable paper and cardboard between 2.9% and 12.3%, and vegetation between 3.2% and 8.5%.

A summary of average ACT household waste quantities are shown in Table 1 and Table 2 below. The data is a compilation of the results of audits reported in the following documents most of which are available on ACT NOWaste's web site

- National Recycling Audit and Garbage Bin Analysis (1997) for the Beverage Industry Environment Council;
- APrince Consulting (2001) Canberra Residual Garbage Audit for ACT NOWaste September 2001;
- APrince Consulting (2003) Canberra Residential Waste Audit for ACT JRG And ACT NOWaste March 2003;
- APrince Consulting (2003) Canberra Residential Waste Audit for ACT JRG And ACT NOWaste October-December 2003;
- APrince Consulting (2004) Canberra Residential Waste Audit for ACT JRG And ACT NOWaste April 2004;
- APrince Consulting (2007) Domestic Waste Audit for Thiess Services And ACT NOWaste November 2007; and
- APrince Consulting (2009) Kerbside Domestic Waste & Recycling Audit for ACT NOWaste December 2009.

Table 1 – Average Composition of the Garbage Stream

Composition	Single Dwellings (kg/hh/week)	Multi-Unit Dwellings (kg/hh/week)
Recyclable containers	0.95	0.85
Recyclable paper and cardboard	0.64	0.63
Vegetation	0.67	0.61
Food	3.91	2.27
Other non-recyclable	3.46	2.03
Total	9.63	5.95

Table 1 shows that according to audit figures, each Canberra single dwelling household produces an average of 9.63 kg of garbage per week and the average multi-unit dwelling (MUD) household 5.95 kg per week.

Table 2 – Average Composition of the Recycling Stream

Composition	Single Dwellings (kg/hh/week)	Multi-Unit Dwellings (kg/hh/week)
Recyclables (paper and containers)	5.18	3.20
Non-recyclable contamination	0.44	0.23
Total	5.63	3.43

Table 2 shows that according to audit figures, each Canberra single dwelling household produces an average 5.63 kg of recycling and the average MUD household 3.43 kg per week.

3.2.2 WBD Waste Estimates

The method for estimating the amount of waste likely to be generated from the WBD is done by multiplying the figures in Table 1 and Table 2 by the number of households proposed. This method assumes that the types and sizes of households in the WBD will be similar enough to those in the rest of Canberra and therefore likely to generate waste of similar quantities and composition.

The figures for single dwellings have been used for areas noted as 'residential' in the WBD, and the figures for MUDs used for areas noted as 'mixed use' in the WBD. Different figures have been used for the different dwelling types because mixed use households are likely to be similar to MUD households than single dwellings and are therefore likely to have different waste generation characteristics.

Two stages of the first 15 are planned to include some or all mixed use buildings and these different waste generation characteristics should be considered.

On average 41.3 tonnes of garbage and 23.5 tonnes of recyclables are estimated to be collected each week in Stages 1-15. This is equivalent to 2,148 tonnes of garbage and 1,222 tonnes of recyclables per year.

Strategic implications and considerations for WBD

The most important implication for WBD is that the proportions of vegetation in the garbage stream are very low compared to other local government areas that have no separate kerbside green waste collection. While the ACT Government does not provide a kerbside service for green waste, other operators have satisfied this demand by providing privately-arranged bulky waste collections, known as Trash Packs, that also collect green waste. The figures therefore do not show what quantity of green waste might be potentially available from the domestic stream.

Having said that, anecdotal evidence from GHD's consultation with waste contractors in Canberra and observations of new residential developments, indicates that less green waste is

being collected from new residential developments because they are generally small properties with only small areas for gardens and lawns.

3.3 Commercial

GHD has no access to data from commercial and retail premises in the ACT, if in fact any such data exists. Compositional data by weight from other locations however, shows the types of waste that commercial and retail operations in West Belconnen may generate. This is summarised below:

- Department stores – mostly plastic film and cardboard with some food if there is a café or cafeteria;
- Medical, optical, veterinary – mostly paper;
- Offices – overwhelmingly paper;
- Supermarket (no fresh food) – mostly wooden pallets but also paper and dairy products;
- Supermarkets (fresh food) – mostly food with some paper and cardboard;
- Clothes/fashion – mostly cardboard and plastic film and strapping;
- Accommodation – mostly paper and cardboard, glass and food;
- Café/restaurant – mostly food but also glass and paper and cardboard;
- Schools – mostly paper and cardboard but only slightly less food and plastics;
- Household bulky goods retailers – mostly timber, plastics and paper and cardboard;
- Newsagents – almost all paper and cardboard;
- Personal services (hairdressers, beauticians among others) – paper and cardboard, food and some plastics;
- Pubs and clubs – similar proportions of food, paper and cardboard and glass, some plastics;
- Fruit and vegetable retailer – almost all food, some cardboard;
- Aged care (combination of self-care and hostel/nursing home) – mostly food, some paper; and
- Shopping centre – about a third each food and cardboard and a third everything else.

3.3.1 WBD Waste Estimates

The method used for estimating the amount of commercial waste is similar to that used for calculating residential quantities but more complex because of the greater range of commercial waste generators.

Central Commercial Area

Different commercial operations and premises generate different quantities and types of waste. Typical waste generation rates³ have been applied to the proposed mix of commercial and retail premises⁴ in the central commercial area proposed for Stages 1-15 to estimate possible waste quantities. These are shown in Table 3 below.

³ Commercial and retail waste generation rates have been taken from a survey of retailers conducted by GHD for the NSW EPA in connection with the development of Guidelines for Waste Disposal and Recycling in Commercial Premises, and from other sources.

⁴ Information on the number and size of tenants in the proposed shopping centre were provided by Urbis, the retail and employment consultants for this project

Table 3 - Estimated Shopping Centre Waste Quantities

Retail Type	Litres per 100 m ² Floor Area per Day		Floor Area (m ²)	Garbage (m ³ per day)	Recycling (m ³ per day)
	Garbage	Recycling			
Speciality retail ⁵	76	67	1,400	1.1	0.9
Non-retail specialties ⁶	55	10	1,300	0.7	0.1
Mini Major ⁷	140	75	400	0.6	0.3
Destinational food and beverage ⁸	215	130	1,500	3.2	2.0
Supermarket 1 ⁹	140	75	3,500	4.9	2.6
Supermarket 2 ¹⁰	140	75	0	-	-
Total			8,100	10.5	5.9

Table 3 shows that the shopping centre, which will be the main commercial and retail development, will consist of two supermarkets and a number of food and other retail and non-retail premises. These will be developed in two stages although the figures in the table are for the first stage only.

Community Villages

In addition to this central shopping centre, several other retail and commercial operations are proposed at the central commercial area and at the three community villages – Strathnairn Village, Belconnen Farmhouse Village and Ginninderra Falls Village.

Retail and commercial operations will include:

- Cafes or restaurants – one each at the community villages;
- Accommodation - one 50 room motel or hotel in the central commercial area and one smaller tourist accommodation facility at each of the community villages; and
- Three taverns, hotels or clubs - one at the central commercial area and two others, the locations of which are yet to be determined.

Although sizes and other details are not yet known, estimates of possible waste quantities can be found in Table 4 below. The table does not include figures for the central shopping centre.

⁵ Retailers that specialise in a single or small range of products such as shoes, clothes, jewellery, gifts, toys, as examples, as opposed to department stores which have a range of product lines.

⁶ Service providers such as banks and dry cleaners, as examples.

⁷ Small versions of major retailers such as Target Country.

⁸ Cafes and restaurants.

⁹ A major supermarket such as Coles, Woolworths or IGA, as examples.

¹⁰ A major supermarket such as Coles, Woolworths or IGA, as examples.

Table 4 – Estimated Commercial Waste Quantities

Premises	Location	Measure	Waste Generation Rate (L)		Premises Size	Garbage (m ³ per Day)	Recycling (m ³ per Day)
			Garbage	Recycling			
Café	Strathnairn Village	per 100 m ² floor area per day	190	190	200 m ²	1.1	1.1
	Belconnen Farmhouse Village		190	190	200 m ²	1.1	1.1
Accommodation	Central	per occupied room	12	-	50 rooms	0.6	-
	Strathnairn Village		12	-	5 rooms	0.06	-
	Belconnen Farmhouse Village		12	-	5 rooms	0.06	-
Tavern/Hotel/ Club	Central	per 100 m ² floor area per day	80	35	15,194 m ²	12.2	5.3
	Location to be confirmed		80	35	10,000 m ²	8.0	3.5
	Location to be confirmed		80	35	10,000 m ²	8.0	3.5
Total						31.12	12.3

Table 4 shows that the largest waste generation outside the shopping centre will be the taverns/hotels/clubs which are estimated to generate up to 12.2 m³ of garbage and 5.3 m³ of recycling per location each day. If these premises operate seven days per week, this will amount to about 85 m³ of garbage and 37 m³ of recycling each week per location.

Cafes of the assumed size are estimated to generate about 1.1 m³ of garbage and recycling per day, which amounts to less than 8 m³ per week of each stream per location. Accommodation premises, of the assumed sizes (small bed and breakfast) are estimated to generate only small amounts of waste, less than 500 L per week per location.

Strategic implications and considerations for WBD

Large proportions of the commercial and retail waste streams are recoverable and in many cases, consist of only two or three materials. Separated organics particularly could be used as a feedstock in an organics processing facility which, depending on the technology, could provide either compost for landscaping or horticultural uses or energy for use in the WBD, or both.

3.3.2 Public Place and Community Facilities

GHD has no access to data from public place waste systems in the ACT, and are not aware if any exists. Compositional data by weight from audits undertaken at other locations in Australia¹¹ however, shows the typical composition of public place bins. Assuming WBD public places will be typical, this data will also represent the most likely composition of this stream at WBD.

The largest proportion of the public place stream, as much as 50%, is unrecoverable material including food (as high as 25%) and plastic packaging, depending on the type of public place. By weight the highest proportion of recoverable materials is glass containers (also as high as 50%). Where properly designed public place recycling bins are provided, high recovery of recyclable materials is often possible with low contamination.

Community facilities are likely to include libraries, child care centres and community halls. Facilities of this kind may be subject to low intensity activity with small scale regular users and occasional peak use.

Waste generation characteristics¹² are anticipated to be as follows:

¹¹ This audit data is confidential. Exact figures and results as well as the source cannot be quoted.

¹² This information is based on confidential audit data which cannot be quoted.

- Child care centres – mostly food with some paper. Centres that cater for infants may also generate significant quantities of disposable nappies;
- Community halls – paper, plastic and food;
- Library – mostly paper, some soiled, with a small proportion of food.

3.3.3 WBD Waste Estimates

Community facilities include transport locations, public places, schools as well as medical centres, aged care facilities, community centres and religious buildings.

The details of each of these proposed for WBD are:

- Transport – a bus loop through the development including a layover area with driver facilities and toilets as well as an unknown number of bus stops;
- Schools – primary and secondary high schools. The locations of schools, although not where each particular school type will be, are shown in Figure 1 on page 7;
- Medical – four general practice premises;
- Aged care – one nursing home and hostel;
- Community centre – one district centre;
- Library – one; and
- Religious facility – two small.

Although many of the details of property and facility sizes are not known, estimates of possible waste quantities can be found in Table 5 below.

Table 5 - Estimate of Community Waste Quantities

Premises	Measure	Waste Generation Rate (L) ¹³		Premises Size ¹⁴	Garbage (m ³ per Day)	Recycling (m ³ per Day)
		Garbage	Recycling			
Bus stops	per day	10	10	10	0.1	0.1
Transport layover		120	120	1	0.12	0.12
Primary Education 1 ¹⁵	per 100 m ² floor area per day	6.4	3.0	¹⁶ 40,000 m ²	2.6	1.2
Primary Education 2		6.4	3.0	40,000 m ²	2.6	1.2
Primary Education 3		6.4	3.0	40,000 m ²	2.6	1.2
Secondary Education High School		6.4	3.0	¹⁷ 86,000 m ²	5.5	2.6
Medical GP 1		35.0	10.0	¹⁸ 200 m ²	0.07	0.02
Medical GP 2		35.0	10.0	200 m ²	0.07	0.02
Medical GP 3		35.0	10.0	200 m ²	0.07	0.02
Medical GP 4	35.0	10.0	200 m ²	0.07	0.02	
Aged Care	kg per bed per week	5.6	1.0	¹⁹ 200 beds	1.1	0.2
Community Centre - District	per 100 m ² floor area per day	20.2	2.5	²⁰ 1,600 m ²	0.32	0.04
Library		7.0	1.1	²¹ 1,200 m ²	0.08	0.01
Religious facility 1		20.2	2.5	²² 250 m ²	0.05	0.01
Religious facility 2		20.2	2.5	²³ 250 m ²	0.05	0.01
Total					15.4	6.77

The table shows that the largest waste producers will be schools, with other community facilities generally generating only relatively small amounts of waste.

Strategic implications and considerations for WBD

Installing properly designed public place garbage and recycling stations can deliver high recovery rates for certain materials with low contamination. Although likely to collect only small quantities of materials compared to residential and commercial streams, public place bins are highly visible and play a key educational role in an integrated waste system. The waste systems must be consistent across all publicly used areas and community facilities.

3.4 Other Waste and Recycling Audit Data

3.4.1 Landfill Audit

An audit of Mugga Lane landfill, transfer station and Mitchell Transfer Station was undertaken by GHD in 2010²⁴. A summary of the composition of the waste being deposited at the landfill and at Mitchell Transfer Station is shown in Table 6 below.

¹³ Commercial and retail waste generation rates have been taken from a survey of retailers conducted by GHD for the NSW EPA in connection with the development of Guidelines for Waste Disposal and Recycling in Commercial Premises, and from other sources. Some information is based on confidential audit data which cannot be quoted.

¹⁴ Indicative requirements for social infrastructure - Elton Consulting.

¹⁵ Information on number and types of schools is indicative only

¹⁶ Indicative requirements for social infrastructure - Elton Consulting. 4 ha including an oval

¹⁷ Indicative requirements for social infrastructure - Elton Consulting. 8.6 ha including an oval

¹⁸ Indicative requirements for social infrastructure - Elton Consulting. 200 m² for facility of four doctors and one nurse

¹⁹ Indicative requirements for social infrastructure - Elton Consulting. 75 m² per resident, 1.5 ha property

²⁰ Indicative requirements for social infrastructure - Elton Consulting

²¹ Indicative requirements for social infrastructure - Elton Consulting

²² Indicative requirements for social infrastructure - Elton Consulting. Small local churches are generally 150-250 m², while larger churches are between 500 m² and 1250 m².

²³ Indicative requirements for social infrastructure - Elton Consulting

²⁴ GHD (2010) Report for ACT Landfill Audits Combined Final Audit Report for APC January 2010

Mitchell Transfer Station is located in northern Canberra and is used generally by small vehicles. It may be a good model for a small transfer station at West Belconnen.

Table 6 – Composition of Landfilled Waste by Volume

Material	Mugga Lane Landfill	Mitchell Transfer Station
Paper and cardboard	10.7%	9.2%
Organics	9.0%	18.9%
Wood and timber products	5.4%	19.3%
Textiles and rubber	3.9%	14.4%
Glass	0.4%	0.7%
Plastics	5.8%	13.3%
Metals	1.1%	3.0%
Building material	3.0%	7.6%
Hazardous	0.0%	0.1%
Bags and loose garbage	59.9%	10.5%
E-waste and office equipment	0.2%	1.4%
Other	0.6%	1.8%
Total	100.0%	100.0%
Potentially recoverable²⁵	39.5%	87.8%

The data shows that the largest proportion of waste by volume deposited at Mugga Lane was garbage bags, the contents of which were not known without them being opened and audited further. The bags originated from domestic and commercial sources so it is likely that the contents consisted of organic materials (mainly food), paper and plastic.

In contrast, the composition of the transfer station stream had lower proportions of paper and cardboard and bags of garbage, and higher proportions of organics, wood and timber, textiles and rubber, plastics, metals and building materials. Not counting garbage bags, as much as 39.5% of the landfilled stream at Mugga Lane and 87.8% at Mitchell Transfer Station is potentially recoverable should markets and systems exist for certain materials.

The landfill audit also included a small sample of Trash Packs, the composition of which is shown in Table 7 below.

Table 7 - Composition of Trash Packs

Material	Percent by Weight
Greenwaste	39.1%
Bags and loose garbage	40.4%
Plastics	9.6%
Textiles and rubber	5.6%
Building material	3.7%
E-waste and office equipment	0.9%
Glass	0.4%
Other	0.1%
Wood and timber products	0.1%
Metals	0.1%
Food / Kitchen	0.0%
Hazardous	0.0%
Total	100%

²⁵ Includes paper and cardboard, organics, wood and timber products, textiles and rubber, glass, plastics, metals, building material, e-waste and office equipment.

Although only a small sample of seven, the combined composition is a fair reflection of the composition of each sample. The contents were dominated by green waste and loose or bagged garbage (a total of 79.5%), the proportions of which across all samples ranged between 69% and 98%.

The proportion of green waste in the Trash Packs stream was high compared to the proportion of green waste in audited landfill and transfer station streams. Although it is likely that customers are delivering green waste directly to recovery facilities at Mugga Lane, it is clear that many households use the Trash Pack service in the absence of a kerbside green waste collection. Many Trash Pack operators also deliver green waste directly to recovery facilities but it is clear that Trash Pack contents deposited into the landfill also contain significant proportions of green waste.

Strategic implications and considerations for WBD

The most important implication for WBD that can be drawn from the disposal audit data is from the proportions of recoverable materials in the different streams.

Assuming recoverable materials make up half the contents of the garbage bags, as much as 59.5% of the landfilled stream could be recoverable. By contrast the proportion of plastic bags deposited at the transfer station is much smaller and proportions of other recoverable materials higher. This evens out however, with the total proportion of potentially recoverable materials estimated to be 56.6%. Either way, a recovery facility on the former West Belconnen Landfill site that targets as few as five or six materials available from self-haul customers, could reduce the amount of waste to be landfilled by about half.

In addition, the amount of organics available from West Belconnen residents, particularly green waste, could influence both the viability of an organics processing facility and which technologies might be suitable. Systems may need to be used that attract green waste from other sources.

3.5 Summary

Proportions of vegetation in the residential garbage stream are very low compared to other local government areas that have no separate kerbside green waste collection. This is most likely due to privately-arranged bulky waste collections known as Trash Packs. The quantities of green waste that might be available from the domestic stream could be higher than the audit data suggest. On the other hand anecdotal evidence and observations indicates that less green waste is being collected from new residential developments because they are generally small properties with only small areas for gardens and lawns.

The potentially low amount of organics available from West Belconnen residents could influence both the viability of an organics processing facility and which technologies might be suitable. Systems may need to be used that attract green waste from other sources.

Large proportions of the commercial and retail waste streams are recoverable and in many cases, consist of only two or three materials. Separated organics particularly could be used as a feedstock in an organics processing facility which, depending on the technology, could provide either compost for landscaping or horticultural uses or energy for use in the WBD, or both.

Installing properly designed public place garbage and recycling stations can deliver high recovery rates for certain materials with low contamination. Public place bins are highly visible and play a key educational role in an integrated waste system which must be consistent across all publicly used areas and community facilities.

Disposal audit data shows that there are significant proportions of recoverable materials in waste being landfilled. If this material is delivered to a transfer station or recovery facility on the

former Belconnen Landfill, targeting as few as five or six materials in from self-haul customers, could significantly reduce the amount of waste to be landfilled.

4. Business As Usual

4.1 Introduction

The Business as Usual model for waste collection, recycling and disposal of waste generated from the WBD would be expected to be consistent with the current residential waste systems in Canberra, which are summarised below.

4.2 Residential

4.2.1 ACT NOWaste

The ACT's waste collection, recycling and disposal services are commissioned and managed by ACT NOWaste, a Territory Government agency part of the Department of Territory and Municipal Services.

4.2.2 Garbage and Recycling

Canberra's residential kerbside waste system for single dwellings currently consists of one 140 L mobile bin for garbage per household collected weekly and one 240 L bin for comingled recyclables (paper, cardboard, recyclable glass, metal cans and plastic containers) collected fortnightly.

Smaller multi-unit dwelling (MUD) complexes have 240 L bins for garbage and recycling which are shared between the units. Larger MUD complexes use bulk bins of 1.5 m³, 3 m³ or 4.5 m³ capacity and 1.1 m³ bulk bins for recyclables. These bins are referred to as 'hoppers'. The collection frequencies for bins from MUDs also vary from twice a week up to fortnightly depending on the particular property.

4.2.3 Garden Organics and Bulky Waste

No separate kerbside service for garden organics or bulky waste is provided by ACT NOWaste. However, a number of private operators provide services using wool packs of approximately one cubic metre capacity. Known as 'trash packs', these operators charge customers fees for individual services.

4.2.4 Collection and Disposal

All domestic garbage and recycling bins from single dwellings and MUDs are collected by the Territory Government's contractor, currently Sita Australia. The contents of the garbage bins are delivered to ACT NOWaste's Mugga Lane Landfill at Hume while contents of the recycling bins are delivered to the materials recovery facility also at Hume. Both the landfill and MRF are operated under contract by Remondis.

This is the system for residential waste that would operate at West Belconnen under a Business as Usual Model.

4.2.5 Self-Hauled

Residents are able to disposal of waste themselves. The closest waste disposal facility to the WBD is Mitchell Transfer Station, Flemington Road, Mitchell. This site is about 18 km (20 min drive) from the entrance to WBD at Parkwood Road. The Mitchell Transfer Station accepts only small vehicles.

Other facilities that residents could use include Yass Valley Council's landfill (soon to be developed into a transfer station) at Murrumbateman, 36 km (28 min driving time) from

Parkwood Road, ACT NOWaste's Mugga Lane Landfill and Transfer Station at Hume, 31 km away (26 min driving time) and Queanbeyan City Council's Waste Minimisation Centre, although this site is for Queanbeyan residents and accepts only recyclable materials.

4.2.6 Impacts

There would be two main impacts as a result of this kerbside service. The first impact would be increased truck movements along roads between WBD and Mugga Lane. The most likely route would be along Southern Cross Drive, Kingsford Smith Drive, William Hovell Drive, Tuggeranong Parkway, Hindmarsh Drive, Yamba Drive and Long Gully Road. This is shown in Figure 2 below.

If garbage and recycling vehicles of sizes similar to those already collecting residential waste in Canberra were used, one of each would most likely operate making two, possibly three journeys to the Mugga Lane site per day. This is a total of between four and six additional return vehicle journeys per day along this route, which is hardly a significant impact.

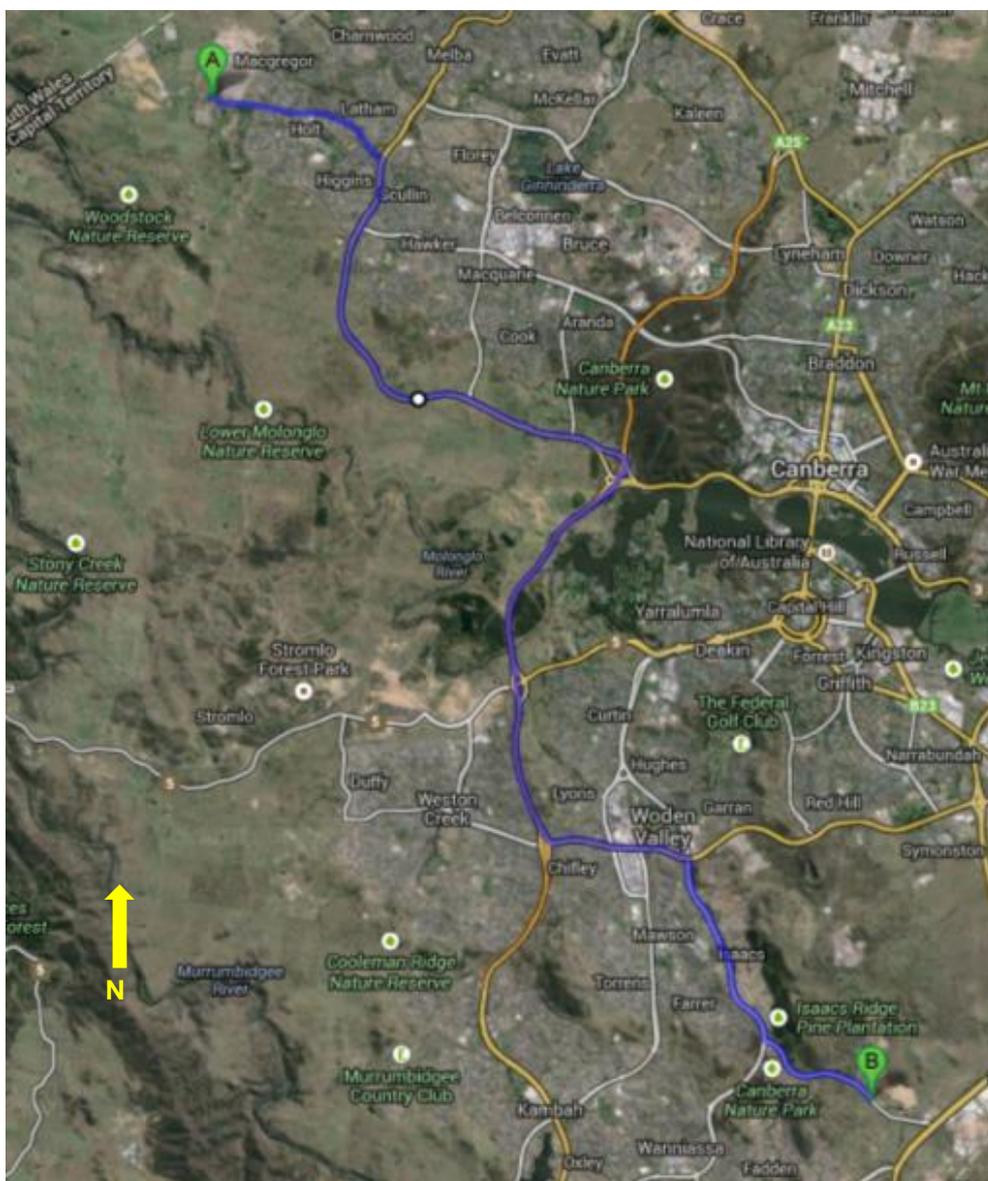


Figure 2 - Likely waste collection vehicle route from WBD to Mugga Lane

The second impact would be an increase in waste and recyclables delivered to the landfill and the MRF. Section 3.2 of this report details residential garbage and recycling quantities likely to be generated from WBD. A maximum of close to 6,000 tonnes of garbage is estimated to be

delivered to the landfill and as much as 3,500 tonnes of recyclables is estimated to be delivered to the MRF.

These figures would only be generated when WBD was complete and fully occupied some years into the future. Currently Mugga Lane Landfill receives about 200,000 tonnes per year of waste. An additional 6,000 tonnes even if delivered now would represent an increase of just 3%. Similarly, ACT NOWaste plans to develop a new MRF in the next few years and the additional 3,500 tonnes of recyclables could be easily processed even if generated sooner.

There would also most likely be an increase in the number of vehicles entering the Mitchell Transfer Station. Mitchell Transfer Station receives an average of about 1100 vehicles per week of which half visit on the weekend. With a population in northern Canberra, the assumed catchment for Mitchell Transfer Station, of about 190,000²⁶, the 1100 vehicles represents about 0.6% of the population.

Applying this proportion to the expected WBD population of 30,000 results in an estimate of about 180 vehicles per week delivering to the transfer station by 2054. As this figure is the maximum that might be possible when the WBD is complete and fully occupied, it is not likely to occur for a number of years, during which time the transfer station may well be expanded or redeveloped.

4.3 Commercial

Waste from commercial premises in ACT is collected and disposed of in two main ways. The first is that some small business operators may take their own waste to either Mitchell Transfer Station or the small vehicles transfer station at Mugga Lane Landfill.

By and large however, commercial waste is collected by commercial waste contractors of which there are three large operators in the ACT; Remondis (formerly Thiess Services), SITA Australia and Transpacific Cleanaway. All three operate similar operational models by providing bins of various sizes from 240 L mobile bins up to large roll-on-roll-off (RORO) open bins or compactors of about 30 m³.

Bins are collected using either rear lift vehicles for smaller bins up to about 3 m³ capacity, front lift vehicles for bins of between about 2 m³ and 4.5 m³, and RORO vehicles (typically 'hook' lift) for large bins and compactors up to about 30 m³ capacity.

Typically businesses in a commercial precinct choose their own waste contractor, mostly based on price. If the businesses in the WBD commercial area chose more than one service provider, several vehicles will be likely enter the WBD commercial district each day. Most likely, waste contractors will add the WBD services onto runs that already collect from customers in Belconnen, which is only about ten minutes driving time away.

If one contractor acquires more customers than others in this precinct, it will be able to provide services more cheaply to individual customers and may then be able offer lower prices than other contractors to new customers. If one contractor dominates this local market, fewer trucks would be likely to enter the area each day.

As the commercial areas of the WBD are on central roads, close to the WBD entrance on Parkwood Road and away from most residential areas, the impact is expected to be slight.

4.4 Public Place and Community

Public place bins and bins at community facilities are currently collected as part of the kerbside service, performed under contract. Under a Business as Usual model, the same system is expected to apply at WBD where these bins would be serviced by the kerbside collection

²⁶ North Canberra about 48,000, Belconnen about 93,000 and Gungahlin about 47,000.

vehicle. The collection frequency for these bins will depend on where they are located and how they are used. Some locations or facilities will be used often and the bins there may fill up more quickly than others. These bins would require more frequent servicing but collection vehicles would have to visit all the bins regularly even if they are not full.

5. Opportunities

5.1 Introduction

It is extremely difficult to establish new waste facilities in just about any location, and near impossible near urban areas. Developers can expect significant community opposition, close regulatory oversight and high cost for environmental investigations and approvals. The presence of the former West Belconnen Landfill site, a licenced site within the WBD area, is therefore a valuable asset and presents significant opportunities for waste transfer and resource recovery during both the construction and on-going use phases of the development.

However, it is likely that there will be some challenges and costs. Any development is likely to require an EIS and there may well be community opposition, although on a lesser scale than might be expected if a new facility was proposed on a greenfield site.

5.2 Residential Occupation

5.2.1 C&DRF/Transfer Station/Resource Recovery Centre

A Construction and Demolition Recovery Facility (C&DRF) will be developed at the former Belconnen landfill site during the construction phase (see Volume 1 - Strategic Construction Waste Management Plan). Once residential occupation has commenced and during the initial stages of the WBD, the C&DRF would also act as a temporary transfer station for daily residential kerbside collections and self-hauled waste.

At a later stage a permanent transfer station and Resource Recovery Centre would be developed at which waste generated from the development during its on-going life could be disposed of, separated and recovered using one or more of a variety of technologies including possibly, a MRF, organics processing facility, AWT or waste to energy facility.

5.2.2 Residential Collections

The proximity of a transfer station to all parts of the WBD would provide an opportunity for a slightly different type of waste collection. Normally collection kerbside vehicles have as large a capacity as possible to reduce the number of times they have to leave the collection areas and travel to the disposal point. Travelling to the disposal point is unproductive time and is minimised as much as possible.

In the case of WBD, no part of the development will be more than three or four kilometres from the West Belconnen transfer station. With mostly only local traffic on the roads, the return travel time to and from the transfer station is likely to be less than 10 minutes from most parts of the development. In addition, as there would be little or no other commercial or contractor traffic at the transfer station, disposal will be immediate and without delay.

This proximity would allow for smaller vehicles to be used, for example of 15 m³ capacity rather than more common 25 m³ or more. Smaller vehicles would mean lower impact on road surfaces, particularly important as waste collection vehicles are likely to be among the most regular and the heaviest vehicles using roads in WBD. Furthermore, road widths could be smaller without compromising the waste collection service or increasing the likelihood of damage to houses, cars and infrastructure. Smaller vehicles also means lower emissions especially if liquefied petroleum gas is used instead of diesel.

In addition, collection could be undertaken on both sides of the road by installing dual hydraulic collection arms, one either side of the vehicle. This will have the advantage of allowing vehicles

to pass only once down narrow streets and lanes rather than twice to collect on one side, turn around and then collect on the other.

5.2.3 LPG refuelling depot

The use of LPG as proposed above would mean that a refuelling depot would need to be established in the WBD. This could be done at the transfer station and may encourage other vehicle users to use LPG fuel.

5.2.4 Place-based commercial collections

An opportunity exists for place-based contracting or licencing to be implemented in the commercial area of the development. This would involve waste services for all commercial operations in the precinct provided under one contract. The contract would be publicly tendered and let to a single contractor.

There are a number of advantages to a system like this including a more efficient collection system with fewer trucks and lower impacts. It would also allow for greater control over what services would be provided (for example, recycling could be a standard service for all customers), what types of vehicles would be used, what times services would be provided as well as the recording and reporting of waste quantities. Performance requirements could also be specified as part of the contract putting the onus for achieving specified targets and standards onto the contractor.

With a standard range of services could come standard bins and a standard storage system in retail and commercial buildings. A computer managed sensor system, like that proposed for public place bins (see below), could be used to detect when bins were full and automatically add these bins and customers to daily generated collection routes.

Customers who wanted bins collected at other times could log onto the development's web site and set up regular or one-off collection services which would also be automatically added to collection routes.

There are however, a number of issues with this system. The variety of waste generated by many businesses may require different service types and frequencies which may not fit well with a standard service. The service would also need to be co-ordinated by a central management body and the system may not be supported by businesses especially if similar services could be obtained more cheaply from other contractors. There may also be competition issues and the need to gain approval from the Australian Competition and Consumer Commission.

5.2.5 Public Place Bins

To avoid the need for collection vehicles to visit every public place bin even when empty or only partially filled, a system such as that developed by Big Belly Solar²⁷ could be installed. Big Belly Solar is a bin technology that features a solar-powered compactor that compresses waste and increases the capacity of the bin²⁸. Bins can also be installed for recyclables. Bins send messages to the collector when they are full. The system reduces the number of collection vehicle kilometres and journeys required to service the bins.

The first solar waste bin was developed and manufactured in 2003 in the US and first installed in Colorado in 2004. The bins are now located in a number of US cities as well as in Canada, Europe and Scandinavia. The cost of the system depends on the number of bins and a range of other factors. Big Belly Solar bins are more expensive than normal bins but there are savings in reduced vehicle movements and potential income from advertising.

²⁷ See <http://www.bigbelly.com> and <http://www.solarbins.com.au>

²⁸ Solar power can also provide lighting for side panels to provide a platform for advertising.

Combining the system with routing or waste collection system software, will allow collection runs to be automatically generated to take vehicles past only those bins that need emptying by the most efficient route.

6. Targets

6.1 Residential

Waste audit results shown in Sections 3.1 and 3.2 show the figures for residential waste management performance. The average recovery²⁹ rate from single dwellings recorded in the most recent, 2009, audit was 85%. This means that 85% of all the recyclables in the garbage and recycling streams generated from single dwellings was recovered. Only 15% of all recyclables were landfilled. This figure has been rising since 2001 when recovery was only around 70%.

The diversion rate³⁰ from single dwellings in the most recent, 2009, audit was 38%. This has also risen from 2001 when it was 30%. This means that on average, of all the waste generated by single dwellings in Canberra, 38% is diverted from landfill, while the remaining 62% is landfilled.

The most recent 2009 audit also showed that contamination in recycling was 5%, which is reasonably low. The proportion of the garbage stream that was unrecovered recyclables was 11% which is at the lower end of a typical range.

The figures however, are not completely representative as they do not include garden organics, which are not collected as part of ACT NOWaste's kerbside service. The small proportion of garden organics in the single dwelling garbage stream, only 5.8% in the 2009 audit, is unusual for a service of this type and indicates that garden organics are being disposed by other means (see Section 4.2). Having said that, councils that provide kerbside garden organics services using bins usually achieve recovery rates of more than 90% and add significantly to diversion.

Food is the largest proportion of landfilled waste according to the audits results. In the 2009 audit it was 40.1% of the single dwelling garbage stream. This proportion has been steady across all audits since 2001. No more significant increase in recovery or diversion will be achieved unless food is recovered.

Appropriate targets therefor for residential dwellings in the WBD would be:

- Recovery – 85%;
- Diversion – 38%;
- Contamination in recycling – 5%;
- Proportion of garbage stream that is recyclable – 10%;
- Potential diversion if food included in kerbside collection – 60%.

6.2 Commercial and retail

Normal diversion rates from commercial and retail operations based on typical quantities shown in Section 3.3 would be in the order of 20% to 30% perhaps as high as 50% in some cases. However, diversion rates of between 70% and 90% have been achieved where recycling programs have been implemented in retail outlets.

Potential diversion rates will depend on what services are available for recovery of some materials. Systems are in place in the ACT for common recyclables such as cardboard, glass and plastics and these make up much of the waste stream for some business. In these cases a target of 70% is possible. For other businesses that generate significant proportions of food

²⁹ This is the proportion of all recyclables in the waste stream that is recovered.

³⁰ This is the proportion of the whole waste stream that is diverted from landfill.

waste, such as restaurants and fruit and vegetable retailers, recovery of this material is not possible currently.

The main driver for waste reduction and recovery in the commercial and retail environment is cost. Operators will be interested and motivated if significant costs savings can be made. Place-based contracting would allow targets and stipulations to be written into commercial leases, requiring operators to divert certain materials as part of the lease conditions.

6.3 Community

Community facilities are used on less formal and less financially pressing arrangements compared to commercial and retail operations. Users of these facilities may be more inclined to recycle if equipped with appropriate bins and information and, as with commercial operations, requirements to recycle could form parts of hire agreements.

Where community facilities are used for similar functions as commercial and retail operations, similar targets can be set.

7. Resource Recovery Facility

7.1 Initial Operations

In the initial stages of the development, a relatively simple Resource Recovery Facility including a waste transfer station will be developed at the West Belconnen Landfill site at, or next to the C&DRF. The facility will accept waste and recyclables delivered by a truck collecting from kerbsides in the WBD. It may also be open to residents or others self-hauling waste. During these early stages, it will probably be most efficient if it is run by the Operators of the C&DRF and be incorporated into its operations.

The Resource Recovery Facility will also be available for residents to drop of reusable and recyclable items and materials. Residents may also be able to purchase items and materials from the recovery area.

7.1.1 Development and Location

The Resource Recovery Facility will be located on the former West Belconnen Landfill site (see Figure 3). Conversion of the initial Transfer Station to a permanent long-term structure should take place during the development of Stage 13 which is proposed for 2029. There are two main reasons for this timing.

The first is that by this time residential development will have reached the southern boundary of the WBLS. Subsequent Stages 14 and 15 will be located close to the landfill site in an arc on the western side. Construction and operation should be completed before residential development gets much closer.

7.2 Buffer Distances

7.2.1 Landfills

Landfills can generate litter, odour, noise, dust, leachate and landfill gas, potentially resulting in detrimental health and amenity impacts to sensitive neighbouring land users (receptors) such as residential properties.

To protect sensitive receptors from the impact of these emissions and from landfill design or management failure, buffer distances (separation distances) between the landfill and the receptors are specified in statutory land use planning instruments. In the ACT this instrument is the Territory Plan 2008.

Buffer distances also prevent sensitive land use development encroaching too close to an industrial site such as a landfill, which could result in the operation of the site becoming untenable as it seeks to meet regulatory requirements to minimise impacts and risks to receptors.

The Territory Plan 2008 currently requires a 500 metre 'Clearance Zone' around the WBLS, which prevents new residential and community uses being established in this area.

For operating landfills the buffers are primarily set to manage odour, which is of most concern during the landfill operation, and landfill gas, for which there is a risk of explosion and/or asphyxiation and which can be present for up to 30 years after the landfill has closed.

Buffer distances around landfills recommended in a number of Australian jurisdictions range from 150 m to 500 m depending on the type of landfill. Usually landfills that accept inert material (non-putrescible) have smaller buffer distances as the emissions are likely to be less and have less of an impact.

While the landfill at the WBLS still operates, the 500 m buffer distance is likely to be in place. However, if it closes, the opportunity may exist to reduce the buffer distance.

Sensitive receptors lie as close as 150 m from the transfer station building at Mitchell Transfer Station and only about 60 m from the site boundary. If this case can be taken as a model and precedent, a more carefully and sympathetically designed facility at West Belconnen may result in buffer distances of 100 m or less.

7.2.2 Resource Recovery Facilities

Resource recovery facilities also generate litter, odour, noise, dust and contaminated stormwater that affect receptors in the same way as landfills. Similarly, buffer distances for resource recovery facilities are also specified in some statutory land use planning instruments.

There are no specific statutory requirements for resource recovery facilities in the ACT although the existing buffer distance set from the boundary of the WBLS does not differentiate between activities undertaken there, for example, landfilling, green waste processing or recycling. In other jurisdictions however, there is a range of buffer distances for different facility types that feature a number of conditions and specifications. These are shown in Table 8 below.

Table 8 - Resource Recovery Facility Buffer Distances

Facility	Jurisdiction	Buffer (m)	Comments
Waste Transfer Station	Victoria, South Australia	300	
Waste Depot	Western Australia	200	
Composting facilities	Western Australia	150	Green waste, outdoor, uncovered
		1000	Manures and food waste, outdoor, uncovered
		0	Green waste, enclosed
		250	Manures and food waste, enclosed
	Victoria	200	
	South Australia	300	20-200 t per year
		1000	More than 200 t per year
Green Waste Facility	Victoria	200-2500	Based on site specific circumstances
Green Waste Transfer Station	South Australia	150	
Waste – Resource Recovery Plant	Western Australia	Not specified	Case by case
Recycling Centre	Victoria	200	
Recycling Transfer Station	South Australia	300	
Scrap Metal Recycling	Western Australia	300-500	
Automotive Wreckers	Western Australia	300	
Used Tyre Storage	Western Australia	100-200	
Household Chemical Waste Facility	Western Australia	300	

No specific buffer distances are provided in NSW, Queensland or Tasmania. In NSW, site specific assessments are used to determine buffer distances, in fact for many of the facility types listed in Table 8 site specific analysis or circumstances can result in amendments or refinements to the buffer distances required for certain facilities.

Factors that could affect buffer distances include the type of technology proposed, the results of environmental audits, any history of community complaints, plant size and the scale of operation, topographic and meteorological characteristics as well as potential risks and impacts.

7.3 Waste and Recycling Collections

Because of the staged nature of the development, increases in residential waste will take place with each stage. Only small amounts of waste will be generated during the early stages and the services and infrastructure to handle this will be sized accordingly.

Assuming 15 m³ collection vehicles are used, Figure 4 below shows the number of loads, vehicles and collection zones that would be required to be in operation at each stage of the development. It is proposed that vehicles collect recycling in the morning of each collection day and garbage afterwards, rather than have two trucks for the different services.

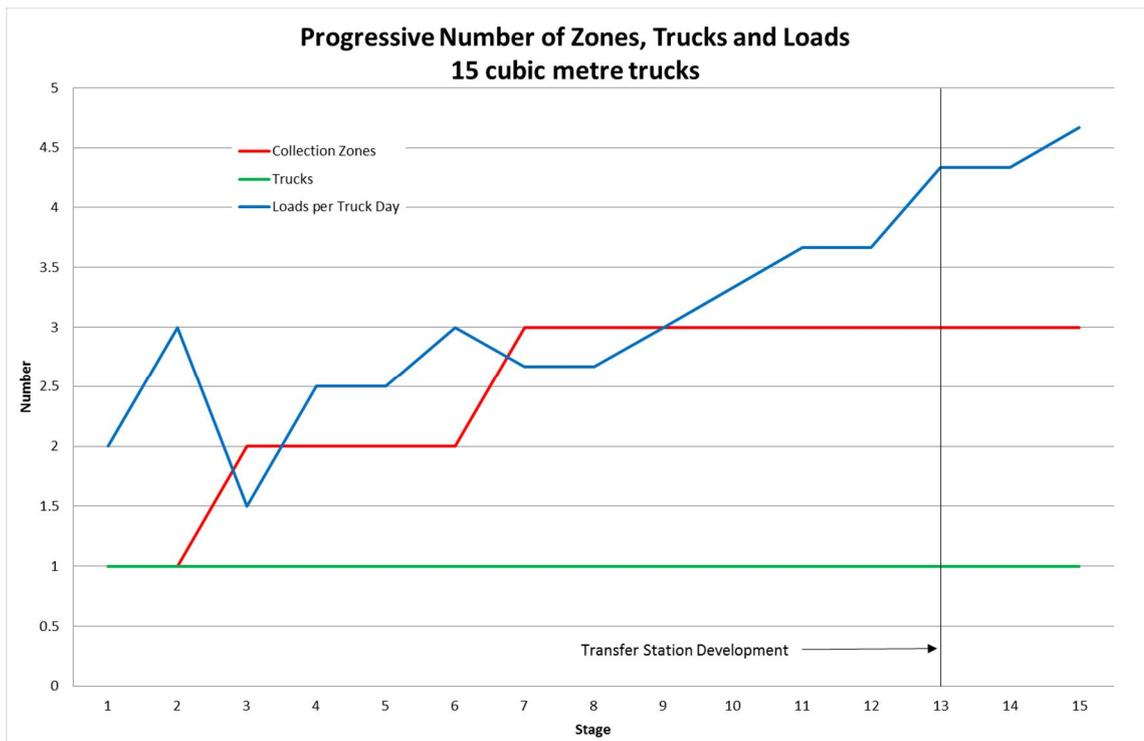


Figure 4 - Number of Zones, Trucks and Loads – Stages 1-15

Figure 4 shows that for Stage 1, one collection vehicle would be required to collect two loads on one day. When Stage 2 is occupied, one truck would still be required and collection would still take place over one day but the number of loads would rise to three. In Stage 3, the number of days would increase to two and initially 1.5 loads per day but the number of loads would increase with each stage until a third day is required for Stage 7. The number of loads would increase to almost 4.5 by Stage 13.

The model assumes a weekly service is five week days per week and ultimately two trucks would be required. Another option is to operate a seven day per week collection service. This may negate the need to acquire another collection vehicle and could result in significant cost savings. The disadvantages are that residents may be upset by the noise and visual disamenity of collections on the weekends. However, these impacts would be mitigated by the use of smaller vehicles and adjusting the size of the weekend collection zones so that collections need not start very early in the morning. In addition, the collections would on take place in two of the seven collection zones which could be those in the mixed use and higher density residential areas.

8. Staged Implementation

Table 9 below shows the proposed staging and implementation of the various waste strategies, operations and facilities planned for the WBD.

Table 9 - Staged Approach to Master Plan - Stages 1-15

Stage	Year	Feature	Jurisdiction	SCWRP	Distribution Centre	C&DRF	Transfer Station	Resource Recovery Centre	Kerbside Collections	Other
Pre-Construction	2014-15			Finalise	Establish	Establish			Prepare	
Stage 1	2016	R, S, 1	ACT	Review	Operate	Operate	Establish simple facility		1 truck, 1 zone	
Stage 2	2017	R	ACT	Review	Operate	Operate	Operate	Operate	1 truck, 1 zone	
Stage 3	2018	R, S	ACT	Review	Operate	Operate	Operate	Operate	1 truck, 2 zones	
Stage 4	2019	R, M	ACT	Review	Operate	Operate	Operate	Operate	1 truck, 2 zones	
Stage 5	2020	R	ACT	Review	Operate	Operate	Operate	Operate	1 truck, 2 zones	
Stage 6	2021	R	ACT	Review	Operate	Operate	Operate	Operate	1 truck, 2 zones	
Stage 7	2022	R	ACT	Review	Operate	Operate	Operate	Operate	1 truck, 3 zones	
Stage 8	2023	R	ACT	Review	Operate	Operate	Operate	Operate	1 truck, 3 zones	
Stage 9	2024	R	ACT	Review	Operate	Operate	Operate	Operate	1 truck, 3 zones	Prepare place-based collection contract
Stage 10	2025	R, S, C ³¹	ACT	Review	Operate	Operate	Operate	Operate	1 truck, 3 zones	Let place-based collection contract
Stage 11	2026	M	ACT	Review	Operate	Operate	Operate	Operate	1 truck, 3 zones	
Stage 12	2027	R	ACT	Review	Operate	Operate	Operate	Operate	1 truck, 3 zones	
Stage 13	2028	R	ACT	Review	Operate	Operate	Develop permanent facility		1 truck, 3 zones	
Stage 14	2029	R	ACT	Review	Operate	Operate	Operate	Operate	1 truck, 3 zones	
Stage 15	2030	R	ACT	Review	Operate	Operate	Operate	Operate	1 truck, 3 zones	

Legend:

R = Residential
M = Mixed Use

S = School
C = Commercial

O = Open Space

1 = Strathnairn Village
2 = Belconnen Farmhouse Village

³¹ Shopping Centre First Stage

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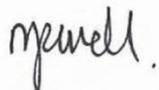
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