

*KUR-World*

# Waste Management

## Chapter 15.0

Environmental Impact Statement



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## 15.0 WASTE MANAGEMENT

### 15.1 Introduction

This Chapter comprises a waste management plan (WMP) for the proposed development. The purpose of a WMP is to identify waste sources and propose appropriate waste management measures. Section 7.5 of the draft EIS identifies the construction and operation waste generation and potential impacts.

### 15.2 Targets, monitoring and measurement

High quality waste data can improve the overall level of accuracy, transparency, and confidence in, waste management. It enables meaningful and accurate comparisons and benchmarking to be conducted both within portfolios and between waste contractors. It can also inform strategic resource planning and provide insight into equipment/operational efficiency as well as ensuring accuracy of invoicing and fees. Greater resource recovery can be achieved by accurately measuring current and future waste performance.

#### 15.2.1 Waste targets

During both construction and operation, the requisite landfill diversion targets for the proposed development will be calculated as follows:

$$\frac{\text{total waste (kg)} - \text{landfill waste (kg)}}{\text{total waste (kg)}} \times 100\%$$

Data to monitor progress against this target will be sourced from bin weight data provided by the nominated waste service providers.

#### 15.2.2 Monitoring and measurement

Data pertaining to the proposed development's waste generation will be collected, collated and recorded by the waste service provider to ensure best practice monitoring procedures to help measure progress towards achieving waste targets.

#### 15.2.3 Operational data collection

The nominated waste service provider(s) for the proposed development must adhere to this Waste Management Plan (WMP) and comply with minimum operational safety standards.

The waste service provider must be able to attribute a weight to each bin collected, and weight must be measured according to the individual waste stream with evidence regarding the integrity of any scales/metres used. Weight must be recorded in an agreed format and forwarded on to the preferred contact for the proposed development at the close of each invoicing period.

Where the waste service provider observes contamination in a recycling bin, that bin must be weighed and added to the operational waste management report as a 'contamination incident.' The contents in the contaminated bin must then be disposed of as general waste and the incident reported to the preferred contact for at the proposed development.

The waste service provider must supply equipment (bins, signage/stickers etcetera) colour-coded in accordance with the Australian Standard 4123 and approved by the preferred contact for the proposed development.



#### 15.2.4 Contamination audit

A site-specific contamination audit of each recycling stream is recommended annually. This audit is conducted internally and must be overseen by an independent and competent person.

For two consecutive collections, the contents of the sample are to be audited to determine the level of “non-acceptable” items. The sample will consist of all bins normally presented for collection and non-acceptable items must be as advised by the receiving facility.

Contamination rate is determined as the total mass of ‘non-acceptable’ items expressed as a percentage of the total weight of all bins in the sample.

Where contamination is deemed unacceptable, the preferred contact for the proposed development should seek to address this issue for the proposed development (for example, through educational or other means).

#### 15.2.5 Reporting

The waste service provider is to issue periodic operational waste management reports (for example, on a monthly or quarterly basis) to the preferred contact for the proposed development, including:

- a list quantifying the amount and types of waste generated
- a list of contamination incidents including the masses of contaminated bins
- records and evidence to substantiate data contained within reports to the nominated reporting standard.

### 15.3 Review of Waste Management Plan

The waste service provider and cleaning contractor will annually review the WMP with the preferred contact for the proposed development as well as any other relevant parties to determine enhancements, sustainability initiatives and other waste management initiatives.

### 15.4 Construction waste management

Waste generation and management during the construction phase will be the responsibility of the Principal Contractor and should be handled in accordance with a Construction Waste Management Plan as it relates to materials procurement, handling, storage, and use. Waste generated during construction will be reused and recycled as a priority, and only disposed of to landfill when unavoidable.

Prior to construction, suitable areas will be allocated on-site for each construction area to provide adequate space and access for:

- separated storage of building materials
- separated storage of construction waste
- separated sorting of construction waste
- removal of construction waste for recycling, re-use or landfill.

Construction waste materials are likely to include concrete, bricks, masonry, asphalt, steel, non-ferrous metals, wood, plastic, glass, plasterboard, mixed waste, canteen waste and hazardous waste.

Receptacles and bins for construction waste will be covered to prevent wind, rain, animals or vandalism spreading litter or contaminants. All waste management locations will be kept tidy and well maintained.



Waste that is unable to be reused or recycled will be disposed of off-site at a Department of Environment and Science (DES) approved waste management facility following classification. Details of waste types, volumes and destinations will be recorded in tracking schedules. Prior to transporting waste materials to offsite facilities, it will be verified that the transporter and facility is licensed to handle the material it is designated to carry.

The following procedures will be carried out for hazardous, chemical or hydrocarbon wastes (including suspected contaminated soil):

- Wastes will be stored in a bunded and secure location prior to removal from site.
- In the event of release of waste into the environment, incident response and incident reporting procedures will be followed as per requirements of the Construction Environmental Management Plan.
- Appropriate spill clean-up procedures will be followed as per the Construction Environmental Management Plan.
- Known contamination (for example, minor hydrocarbon spills) caused during construction will be remediated prior to completion of construction.

Further measures and controls that will be implemented resulting in waste minimisation and more sustainable resource and waste management during construction are described in Table 15-1.

**Table 15-1: Construction waste management measures and controls**

Measure/control	Description
Designing out waste	Waste management will be considered at the design stage of the proposed development to minimise waste generation. "Design for deconstruction", the processes by which buildings are demolished and can be deconstructed, re-used and recycled, shall also be investigated during the design stage of the process. Construction staging and works will be scheduled to maximise re-use of materials.
Sustainable procurement	Sustainable procurement practices will be implemented during construction, including: <ul style="list-style-type: none"> <li>• Selection of durable materials to reduce the need for replacement.</li> <li>• Accurate material estimation and minimal packaging to avoid over-ordering</li> <li>• Return packaging to suppliers where feasible</li> <li>• Prioritise the procurement and use of recycled/secondary aggregates and other recycled materials for example, wood for formwork, whilst also giving due consideration to the durability of materials to avoid ongoing replacement and maximise lifespan. Incorporation of contractual clauses that encourage best practice waste management</li> </ul>
Construction waste management plan	A detailed and specific Construction Waste Management Plan (CWMP) will be developed based on an over-arching Waste Strategy that is easy to communicate and disseminate. The CWMP will include detailed procedures for handling, storage, monitoring, measuring and reporting hazardous and non-hazardous waste.
Engagement with supply chain partners	All members of the supply chain will be aware of the CWMP. Workshops will be held throughout the construction period to help reinforce the CWMP and ensure that all partners are kept up to date with developments. Specific targets will be established for the minimisation of waste and the recycling of materials. These targets would then be communicated to the workforce and performance against them would be measured and used to promote positive PR.



Measure/control	Description
Avoid wasteful working practices	All construction staff will be given appropriate training both as part of a site induction and at intervals throughout the life of the project such as Toolbox Talks.
Construction materials management	Materials will be appropriately handled and stored throughout their lifecycle from delivery to inclusion, for example, returning surplus materials to storage. Materials will be delivered to the site 'just-on-time', this will limit the need for excess on-site storage and will limit the chance of wastage through damage of the stored materials. There will be a designated area for the storage of materials. Stockpiles of topsoil, sand, aggregate, soil or other materials are not to be located on any drainage line or easement, natural watercourse, footpath or roadway and shall be protected with adequate sediment controls.
Modern Methods of Construction	The introduction of Modern Methods of Construction (MMC) shall be investigated during the construction phase of the proposed development. MMC entails improvements in the products or processes employed in construction, ranging from innovative components to be used on-site through to whole building systems manufactured off-site.
Waste Auditing	The amounts and types of waste will be monitored to allow assessment of the effectiveness of waste minimisation measures implemented. Records will be maintained of the quantity of materials taken off site for recovery.
Management of Contaminated Material	Any contaminated material to be removed from the site shall be disposed of to a DES licensed land fill.

## 15.5 Operational waste management

Each operational precinct within the proposed development will have bin stations comprising general waste and co-mingled recycling receptacles located throughout at appropriate locations, which will be emptied into local storage bins as detailed in Table 15-3 in Section 15.5.5.

Consideration should be given to the use of smart bins at a further project design stage. Smart bin systems, such as Big Belly Solar compactors, can include automated remote sensing to inform facilities management when bins need emptying, as well internal compaction resulting in reduced internal collection frequencies.

Waste streams that have not been possible to estimate (including hard/bulky waste, e-waste, hazardous waste, e- sanitary waste and cooking oil) but are predicted to be minor in quantity will be monitored during operation and the operational waste management system adjusted as required.

Potential alternative measures for operational waste management that were considered for the proposed development but discounted are presented in Table 15-2.

**Table 15-2: Potential alternative waste management measures**

Waste management measure	Suitability to the proposed development
Automated Waste Collection System (AWCS). This is a system that transports waste from one or more locations within a building or complex of buildings, pneumatically through a set of pipes to a central collection point. At a high level it consists of the following elements:	Whilst AWCS can offer advantages such as reduced waste storage requirements, operational servicing and operational cost, AWCS is generally only cost effective for high-density developments with four or more stories and is only just starting to be adopted by a handful of developments in Australia. At lower density



Waste management measure	Suitability to the proposed development
<ul style="list-style-type: none"> <li>A number of multi-material inlet points into which waste and recyclables are deposited;</li> <li>A pipe network used to convey the materials from source to a central collection point; and</li> <li>A central waste collection station where the plant operating the system is housed, and where waste is bulked for collection.</li> </ul>	<p>development such as KUR-World, it is unlikely the reduction in operational cost would be sufficient to offset capital investment.</p> <p>Therefore, this measure has been discounted in favour of manual waste collection.</p>
On-site small-scale thermal energy from waste. This is a system that would incinerate or thermally treat residual waste and generate power and/or heat. Outputs would comprise ash, air pollution control residue and gaseous emissions.	<p>Small scale thermal energy from waste systems exist and are an effective way of diverting waste from landfill and recovering energy in the form of heat and/or power. However capital costs are typically high and gaseous emissions can create amenity, health and environmental concerns if not appropriately controlled. Policy and regulatory requirements for energy from waste is uncertain in Queensland and likely to be onerous.</p> <p>Therefore, this measure has been discounted.</p>
Food waste to sewer. This is a maceration system or similar for each premises/building that grinds food waste and disposes it to mains sewerage systems for treatment at waste water treatment plant.	<p>Directing food waste to sewer will increase the energy costs at the on-site WWTP at KUR-World, while reducing the potential resource-recovery from food waste (compared to the proposed alternative of composting and small scale food waste treatment for BoH food waste, see Section 15.5.2 and 15.5.3) by removing soluble nitrogen to the atmosphere.</p> <p>Furthermore, food waste to sewer systems have a potable water requirement.</p> <p>Therefore this measure has been discounted.</p>
On-site Mechanical Biological Treatment (MBT). This is a process where residual waste is mechanically sorted to extract organic material (biologically processed via composting) and other recyclable materials.	<p>As there is the opportunity to implement source segregated collection of organic waste, this negates the need for sorting general waste. Furthermore, MBT facilities are only commercially viable at much larger scales of waste generation than the proposed development can provide, and there is an MBT facility already operational in the Cairns area (the ARRF in Portsmith).</p> <p>Therefore, this measure has been discounted.</p>
On-site Material Recovery Facility (MRF). This is a facility that sorts recoverable materials from the co-mingled recycling stream and diverts them to recycling facilities.	<p>There is a MRF facility already available to sort the co-mingled recycling stream in Cairns. Furthermore, MRF facilities are only commercially viable at much larger scales of waste generation than the proposed development can provide.</p> <p>Therefore, this measure has been discounted.</p>

The main centralised waste facilities for the proposed development are detailed as follows (also refer to Appendix 2A for a drawing of the proposed operational waste infrastructure – drawing 253251-00-C-RD-501).

### 15.5.1 Central waste and recycling storage area

The central waste and recycling storage facility will be located in the services/infrastructure precinct (refer to Appendix 2A), and will store general waste and co-mingled recycling internally collected from the operational precincts listed in Table 15-3: (Section 15.5.5) prior to onward collection by the nominated waste service provider(s). It will comprise the following:



- maintenance hub, storage area and charging station for the Electric Collection Vehicles (ECVs) and Electric Vehicles (EVs) servicing internal collection of general waste and co-mingled recycling
- the storage of spare/extra bins
- a compactor unit (either a separate unit or built into the general waste RORO container) to compact general waste prior to storage to decrease volume
- Roll-on Roll-off (RORO) containers to store compacted general waste and co-mingled recycling prior to onward collection. Based on the operational waste forecast (section 15.7) and an anticipated compaction ratio of 4:1, it is anticipated that 1 x 40 cubic metre RORO container for general waste will be required that will require collection every two days. It is anticipated that 1 x 40 cubic metre RORO container for co-mingled recycling will require collection by the nominated external waste service provider every day. Prior to full RORO containers being collected, an empty RORO container will be first dropped off. At any one time, there will be two general waste RORO containers, and two co-mingled recycling RORO containers. One container will be used for active storage, and the second container will act as redundancy in the event a collection is missed.
- ramped access for ECVs to tip general waste and co-mingled recycling into compactor/RORO containers
- bin washing facilities.

The area requirement for the central waste and recycling storage area is estimated to be approximately 1,000m<sup>2</sup>, however this will be confirmed at a future project design stage.

It should be noted that the central waste and recycling storage facility will not be constructed until Stage 1B, and therefore works associated with Stage 1A (the Farm Theme Park and Equestrian Centre, the Queenslander lots and Produce Garden) will be operational for a period of 21 months prior to the completion of Stage 1B. During this period, a temporary waste and recycling storage area will be utilised in the central composting area located in the Farm Theme Park and Equestrian Centre precinct.

### 15.5.2 Central composting area

The central composting area will be located in the farm theme park and equestrian centre precinct, and will comprise a centralised composting facility that will receive and compost the following waste streams:

- organic green waste from the golf course and resort landscaping/maintenance (estimated at 52.7 tonnes per annum)
- organic manure and used bedding material from the equestrian centre stables (estimated at 528.0 tonnes per annum)

Furthermore, if back of house (BoH) food waste is not treated via on-site small-scale AD systems, it could potentially be composted, subject to the correct composting technology being utilised (see 15.5.3 for more information) (estimated at 1,626 tonnes per annum). Based on the Arup waste forecast (refer Section 15.7), a minimum of approximately 580 tonnes of organic waste and a maximum of 2,206 tonnes of organic waste will be composted per year. The type of composting technology to be employed will be defined at a future project stage, but it is likely to be open window composting or in-vessel composting technology. These types of composting typically achieve mass reduction of around 50%. Therefore, an estimated total of between 290 and 1,103 tonnes of compost could be produced per year.

This quantity of compost will exceed the current threshold of 200 tonnes or more of compost production per year for ERA (Environmentally Relevant Activity) 53<sup>1</sup> – composting and soil conditioner manufacturing (as per Schedule 2 of the *Environmental Protection Regulation 2008*). Therefore, an Environmental Authority (EA) will require submission by the Proponent in order to perform this ERA. The Proponent will be responsible for complying with the general environmental duty as required under the ERA and

<sup>1</sup> As of September 2018. The ERA framework is currently under review and may be subject to change.





understanding and managing the potential for environmental risk as well as taking all reasonable and practical measures to prevent environmental harm from the operation of the composting facility. Organic green waste from the golf course and resort landscaping/maintenance is associated with a low potential for environmental impact under ERA 53, and organic manure and used bedding material is associated with a low to medium potential environmental impact risk under ERA 53. Potential impacts such as odour, contamination of surface water or ground water, noise and dust will need to be managed, and a comprehensive Environmental Management System will be submitted as part of the application for the required environmental authority to operate the composting area, as will further detailed information on the proposed central composting area design and process.

Compost produced by the facility will be applied to land within the proposed development as part of on-going landscaping, golf course management and use in the garden.

The area requirement for the central composting area is estimated to be approximately 500 square metres if just treating green waste and manure. If BoH food waste is treated as well, this area requirement may be greater. This will be confirmed at a future project design stage.

### 15.5.3 Back of house food waste treatment

The following precincts that include restaurants and food hospitality will utilise segregated back of house food waste bins:

- Kur-Village
- Business and Leisure Hotel and Function Centre
- Five Star Eco-Resort
- Health and Wellbeing Retreat.

As the segregation will occur back of house, it should be possible to implement an effective system collecting a contamination free food waste stream. Potential options for the treatment of food waste could include:

- Segregated food waste is treated on-site, either within the respective precincts themselves or at a central location within the proposed development utilising small scale Anaerobic Digestion (AD). AD is the breakdown of organic waste in the absence of oxygen by microorganisms in a digestion tank. The process produces a methane rich biogas which can be burnt for energy in a gas turbine, as well as a solid/liquid digestate which can be used to replace or supplement the use of fertilisers. Small scale 'micro' AD systems that are relatively self-contained and modular are now starting to be available on the international market. An example is the SEaB 'Flexibuster' system that has been utilised in the United Kingdom and Europe. Their systems can process between 180 and 1100 tonnes of food waste per annum, producing 8-70 kilowatts of electricity, so are relatively well matched in capacity to the anticipated back of house (BOH) food waste generation. In addition, the power generated by this process could have the potential for use in charging the ECVs used throughout the proposed development for internal collection. The digestate produced by these systems is typically of an adequate stabilisation grade for direct application to land. Food waste is combined with the green and manure organic waste being composted in the central composting facility. This will only be suitable if the composting technology utilised is in vessel composting, as open windrow composting is not suitable for cooked food waste and food waste containing animal products and meat. It will also depend on the optimum Carbon to Nitrogen ratio and other process variables.

The specific food waste treatment system will be confirmed at a further stage of project design. Digestate or compost outputs may be subject to an EoW (end of waste) code approval. Further information on the type of process as well as output properties will be provided at a later stage to support the approval process.



#### 15.5.4 Wastewater treatment area

The following waste storage will be required within the WWTP area:

- 2 x two cubic metre enclosed skips to store screenings and grit prior to collection
- 2 x six cubic metre enclosed skips to store wet sludge.

Collection of the skips will be twice a week. When a skip is collected, an empty skip will also be delivered in its place. Two skips are required on-site as one skip will be used for active storage, and the other skip kept for redundancy, in the event a collection is missed.

#### 15.5.5 Operational waste management system

The proposed Waste Management System (WMS) is presented in Table 15-3, and identifies local disposal areas, central disposal and collection points as well as responsibilities associated with waste management.

The following precincts will be served by internal ECVs and EVs, which will reticulate waste to the central waste facilities as appropriate:

- Premium Villas, Lifestyle Villas and Queenslander Lots
- Farm Theme Park and Equestrian Centre
- Kur-Village & Business and Leisure Hotel and Function Centre
- Rainforest Education Centre and Adventure Park.

The following precincts will be served directly by the nominated waste service provider(s), as they will be accessed off the main internal access road (see Appendix 2A):

- Golf Clubhouse and Function Centre
- Sporting Precinct
- Five Star Eco-Resort
- Health and Wellbeing Retreat.

All contracts with staff, cleaners and waste service providers should clearly outline the waste management and collection system for allocating waste management responsibilities. Also refer to the waste management plan drawing (see Appendix 2A).



Table 15-3: Operational WMS

Operational precinct	Service type	Waste stream	Local disposal	Central disposal	Transfer to collection point
Premium Villas, Lifestyle Villas and Queenslander Lots	Routine	General waste	Cleaners/patrons empty smaller internal bins into 1 x 120L Mobile Garbage Bin (MGB) per villa/lot.	Cleaners/patrons/collection staff transfer 120L MGB from villa/lot to the curb side. Electric Collection Vehicle (ECV) empties contents into on-board storage. ECV empties collected waste into general waste compactor/RORO receptacles at central storage.	Central storage receptacles serviced by nominated waste service provider.
	Routine	Co-mingled recycling	Cleaners/patrons empty smaller internal bins into 1 x 120L MGB per villa/lot.	Cleaners/patrons/collection staff transfer 120L MGB from villa/lot to the curb side. Electric Collection Vehicle (ECV) empties contents into on-board storage. ECV empties collected recycling into recycling compactor/RORO receptacles at central storage.	
Farm Theme Park and Equestrian Centre	Routine	General waste	Cleaners/staff empty smaller bins into 10 x 1100L MGBs	Cleaners/staff use Electric Vehicle (EV) and bin trailer to transfer 1100L MGBs to the central storage area, where 1100L MGBs are emptied into compactor/RORO receptacles at central storage.	Central storage receptacles serviced by nominated waste service provider.
	Routine	Co-mingled recycling	Cleaners/staff empty smaller bins into 3 x 1100L MGBs		
	Routine	Organic manure waste	Cleaners/staff collect manure and bedding material from stables in appropriate trolleys/mobile containers	Cleaners/staff transfer collected manure to adjacent composting facility.	N/A
Kur-Village & Business & Leisure Hotel & Function Centre	Routine	General waste	Cleaners/staff empty smaller bins into 29 x 1100L MGBs	Cleaners/staff use Electric Vehicle (EV) and bin trailer to transfer 1100L MGBs to the central storage area, where 1100L MGBs are emptied into compactor/RORO receptacles.	Central storage receptacles serviced by nominated waste service provider.
	Routine	Co-mingled recycling	Cleaners/staff empty smaller bins into 11 x 1100L MGBs		
	Routine	BOH Food waste	Cleaners/staff empty smaller bins into 34 x 240 MGBs	Cleaners/staff transfer food waste into local micro AD on-site treatment/EV and trailer used to transfer to central composting facility.	N/A
	Routine	General waste	Cleaners/staff empty smaller bins into 9 x 1100L MGBs		Central storage receptacles serviced by

Operational precinct	Service type	Waste stream	Local disposal	Central disposal	Transfer to collection point
Rainforest Education Centre and Adventure Park	Routine	Co-mingled recycling	Cleaners/staff empty smaller bins into 3 x 1100L MGBs	Cleaners/staff use Electric Vehicle (EV) and bin trailer to transfer 1100L MGBs to the central storage area, where 1100L MGBs are emptied into compactor/RORO receptacles.	nominated waste service provider.
Golf Clubhouse and Function Centre	Routine	General waste	Cleaners/staff empty smaller bins into 2 x 1100L MGB	Receptacles are transferred by cleaners to the appropriate designated loading zone within the precinct prior to the arrival of waste service provider collection vehicles. Cleaners return receptacles to the local storage area once emptied.	Storage receptacles serviced by nominated waste service provider.
	Routine	Co-mingled recycling	Cleaners/staff empty smaller bins into 2 x 1100L MGB		
Golf Course	Ad-hoc	Organic Green waste	Groundskeeper/staff store grass clippings and landscaping green waste in temporary small stockpiles as required.	Stockpiles are loaded onto trailers and transferred to central composting area, where trailers are emptied into composting facility.	N/A
Sporting Precinct	Routine	General waste	Cleaners/staff empty smaller bins into 1 x 1100 MGB	Receptacles are transferred by cleaners to the appropriate designated loading zone within the precinct prior to the arrival of waste service provider collection vehicles. Cleaners return receptacles to the local storage area once emptied.	Central storage receptacles serviced by nominated waste service provider.
	Routine	Co-mingled recycling	Cleaners/staff empty smaller bins into 1 x 1100 MGB		
Five Star Eco-Resort	Routine	General waste	Cleaners/staff empty smaller bins into 5 x 1100 MGBs	Receptacles are transferred by cleaners to the appropriate designated loading zone within the precinct prior to the arrival of waste service provider collection vehicles. Cleaners return receptacles to the local storage area once emptied.	Central storage receptacles serviced by nominated waste service provider.
	Routine	Co-mingled recycling	Cleaners/staff empty smaller bins into 1 x 1100 MGB		
	Routine	BOH food waste	Cleaners/staff empty smaller bins into 3 x 240 MGBs	Cleaners/staff transfer food waste into local micro AD on-site treatment/EV and trailer used to transfer to central composting facility.	N/A
KUR-World University Campus	Routine	General waste	Cleaners/staff empty smaller bins into 10 x 1100 MGBs	Cleaners/staff use Electric Vehicle (EV) and bin trailer to transfer 1100L central storage area, where 1100L bins are emptied into compactor/RORO receptacles.	Central storage receptacles serviced by nominated waste service provider.
	Routine	Co-mingled recycling	Cleaners/staff empty smaller bins into 2 x 1100 MGBs		



Operational precinct	Service type	Waste stream	Local disposal	Central disposal	Transfer to collection point
Health and Wellbeing Retreat	Routine	General waste	Cleaners/staff empty smaller bins into 2 x 1100 MGBs located within a local storage area within the precinct	Receptacles are transferred by cleaners to the appropriate designated loading zone within the precinct prior to the arrival of collection vehicles. Cleaners return receptacles to the local storage area once emptied.	Receptacles serviced by nominated waste service provider.
	Routine	Co-mingled recycling	Cleaners/staff empty smaller bins into 1 x 1100 MGB located within a local storage area within the precinct		
	Routine	BOH food waste	Cleaners/staff empty smaller bins into 3 x 240 MGBs	Cleaners/staff transfer food waste into local micro AD on-site treatment/EV and trailer used to transfer to central composting facility.	N/A
WWTP	Routine	Screenings and grit	Stored in enclosed 1 x 2m <sup>3</sup> skip within the WWTP	N/A	Skips are collected twice a week directly from the WWTP by the nominated waste service provider.
		Sludge (wet)	Stored in enclosed 1 x 6m <sup>3</sup> skips within the WWTP	N/A	

Bulky waste and e-waste will be stored in dedicated storage cages with collection arranged as required in each of the following precincts of the proposed development:

- Business and Leisure Hotel and Function Centre
- KUR-World Campus
- Five Star Eco-Resort.

Any e-waste generated from the Premium Villas, Lifestyle Villas or Queenslander lots will be left for collection by cleaners/staff at the end of a patron's stay, and it will be transferred to one of the aforementioned precincts for temporary storage.



## 15.6 Waste facilities design

### 15.6.1 Signage

Signage will be provided in all waste disposal, storage and collection areas demonstrating how to use the waste management system, including what materials are acceptable in each of the recycling bins. All waste streams will be stored in clearly labelled, colour coded bins as appropriate to ensure that waste streams are not inadvertently mixed.

The standard colours of each bin are outlined in Table 15-4 as per the AS4123.7-2006. These measures are necessary in order to encourage the appropriate separation of waste streams and the recovery of resources.

**Table 15-4: Standard receptacle colours**

Bin	Colour
General waste	Red lid and dark green body
Co-mingled recycling	Yellow lid and dark green body
Food organics	Burgundy lid and dark green body
Green waste/organics	Lime green lid with dark green body

### 15.6.2 Waste facilities design

The following best practice design requirements will be implemented for the central waste and recycling storage area:

- The floors of waste storage rooms will be constructed of concrete of at least 75mm thickness and graded and drained to the sewerage system. The floors will be finished to a smooth, even surface and covered at their intersection with walls and plinths. Ramps to doorways will be provided if necessary.
- The walls, ceilings and floors of the storage room will be finished with a light colour. The walls of the waste storage rooms will be constructed of approved solid impervious material and will be cement rendered internally to a smooth even surface covered at all intersections. The storage area will be constructed and finished to prevent absorption of liquids and odours, and will be easily cleanable.
- A close-fitting and self-closing door or gate operable from within the room must be fitted to all waste and recycling storage areas (rooms or bin bays).
- Doors/gates to the waste storage rooms must provide a minimum clearance of 1,200mm. At least one door or gate to the waste and recycling storage area must have sufficient dimensions to allow the entry and exit of waste containers of a capacity nominated for the development.
- Lightweight roller shutter-type doors or grilles should be considered for access to waste and recycling storage areas, as these do not impact on the available storage space. If these types of doors or grilles are used, the requirement for a close-fitting and self-closing door remains, so that waste collectors can access the waste storage area other than through the roller door or grille.
- Hot and cold water will be provided to the waste storage rooms. Water will be mixed through a centralised mixing valve with hose cock.
- Adequate lighting will be provided for all rooms, controllable from a switch located both outside and inside the room. Lighting will ensure safe access to the area at night. Automatic light sensors may be installed for ease of manual handling during transfer of bins.
- The waste storage rooms, areas and containers will be constructed in a manner so as to prevent the entry of vermin.



- The waste storage rooms will be supplied with a mechanical exhaust ventilation system exhausting at a rate of five litres per second per square metre of floor area, with a minimum rate of 100 litres per second.
- Smoke detectors will be fitted in accordance with AS1670 Automatic Fire Detection and Alarm Systems and connected to the fire prevention system of the building.
- Waste compactors will be fully fire proofed and child proofed. Only trained building management and waste contracting staff will have access to compactor equipment.
- All equipment will be protected from theft and vandalism.

### 15.6.3 Waste collection

All waste collection will only be undertaken by appropriately licensed nominated waste collection contractors.

#### 15.6.3.1 RORO container collection

Collection of RORO containers from the central waste and recycling storage area by the nominated waste service provider will require a vehicle with the indicative specifications presented Table 15-5. The central waste and recycling storage area will need to be designed to accommodate these specifications at a further stage of project design.

**Table 15-5: Indicative collection vehicle specifications for RORO containers**

Specification	Value
Total length	9.2m
Operating length	Up to 20m
Overall width	2.5m
Height (travel)	4.3m
Height (in operation)	5.6m
Weight (vehicle only)	13.0 tonnes
Weight (payload only)	14.5 tonnes
Turning circle	25.0m

#### 15.6.3.2 Mobile Garbage Bin collection

Collection of MGBs will occur from the following precincts:

- Golf Clubhouse and Function Centre
- Sporting Precinct
- Five Star Eco-Resort
- Health and Wellbeing Retreat.

This will require a rear lifting collection vehicle of the indicative specifications presented in Table 15-6. The waste loading zones for these precincts will need to be designed to accommodate these specifications at a further stage of project design.



**Table 15-6: Indicative collection vehicle specifications for MGBs**

Specification	Value
Total length	8.0m
Overall width	2.5m
Height (travel)	3.4m
Height (in operation)	3.4m
Weight (vehicle only)	13.0 tonnes
Weight (payload only)	9.5 tonnes
Turning circle	25.0m

### 15.6.3.3 WWTP residues skip collection

Collection of screenings and grit and biosolids skips will be via a skip loader truck. This will require a vehicle of the indicative specifications presented in Table 15-7. The skip loading zone will need to be designed to accommodate these specifications at a further stage of project design.

**Table 15-7: Indicative skip loader specifications for WWTP residue collection**

Specification	Value
Total length	6.7m
Total length (in operation)	15.0m
Overall width	2.5m
Height (travel)	4.0m
Height (in operation)	4.5m
Weight (gross)	18 tonnes
Turning circle	25.0m

WWTP residues are considered regulated waste under Schedule 2E of the Environmental Protection Regulation 2008. Therefore, they will require collection and transport by waste contractors licensed to collect regulated waste. Once collected by the nominated licensed waste contractor, WWTP residue management will be the responsibility of the waste contractor. It is likely that biosolids will undergo beneficial use to agricultural land as per current management for WWTP residues from the MSC and CRC waste water treatment plants (see Chapter 7.5). It will be the waste contractor's responsibility to ensure compliance with the relevant guideline adopted by the Queensland Department of Environment and Science; *Environmental Guideline: Use and disposal of biosolids products, NSW EPA (2000)*.





## 15.7 Detailed operational waste forecast

The following schedule forecasts waste generation for each element of the KUR-World project.



Precinct	Stage	Development reference Enter manually	Country Select from drop-down list	Landuse Select from drop-down list	Waste generation rate	Units	Quantum Enter manually	Quantum units Enter manually	Waste generated (tonnes/annum)	Composition assumption Select from drop-down list	Organic (tonnes/annum)	Paper & Cardboard (tonnes/annum)	Plastics (tonnes/annum)	Glass (tonnes/annum)	Metals (tonnes/annum)	Wood (tonnes/annum)	Textiles (tonnes/annum)	Inerts (tonnes/annum)	Other/Residual (tonnes/annum)
Farm Theme Park and Equestrian Centre (excl stables)	1a	Arrival point 1 parking/booth	Australia	Car parks	0.0039	tonnes/m2/annum	1,496	GFA m2	5.90	Australia - MSW	1.53	0.41	0.29	0.29	0.29				3.07
Farm Theme Park and Equestrian Centre (excl stables)	1a	Activities cluster	UK	Entertainment complex/Leisure centre	0.0416	tonnes/m2/annum	765	GFA m2	31.86	UK - Leisure centres	3.19	17.49	5.45	1.94	2.01				1.78
Farm Theme Park and Equestrian Centre (excl stables)	1a	Show ring ground floor (seating and amenities)	UK	Entertainment complex/Leisure centre	0.0416	tonnes/m2/annum	1,213	GFA m2	50.52	UK - Leisure centres	5.05	27.73	8.64	3.08	3.18				2.83
Farm Theme Park and Equestrian Centre (excl stables)	1a	Show ring first floor (circulation and VIP viewing)	UK	Entertainment complex/Leisure centre	0.0416	tonnes/m2/annum	344	GFA m2	14.33	UK - Leisure centres	1.43	7.87	2.45	0.87	0.90				0.80
Farm Theme Park and Equestrian Centre (excl stables)	1a	Pavilion (viewing platform & circulation)	Australia	Office	0.0017	tonnes/m2/annum	355	GFA m2	0.59	UK - Offices	0.06	0.43	0.05	0.03	0.01				0.01
Farm Theme Park and Equestrian Centre (excl stables)	1a	Cafe/activity cluster	Australia	Takeaway	0.0468	tonnes/m2/annum	406	GFA m2	18.99	UK - Quick Service Restaurants	10.24	4.50	2.05	0.57	0.53		0.08	0.68	0.27
Farm Theme Park and Equestrian Centre (excl stables)	1a	Shed (ARV equipment and storage)					720	NO WASTE GEN											
Farm Theme Park and Equestrian Centre (excl stables)	1a	Chapel/Function Centre	Australia	Office	0.0017	tonnes/m2/annum	316	GFA m2	0.53	UK - Hotels	0.21	0.13	0.08	0.05	0.01		0.01	0.02	0.01
Farm Theme Park and Equestrian Centre (excl stables)	1a	Restaurant	Australia	Restaurant	0.4619	tonnes/m2/annum	780	GFA m2	360.28	UK - Restaurants	158.52	87.19	32.79	49.36	9.37		3.24	13.33	5.04
Farm Theme Park and Equestrian Centre (excl stables)	1a	Public amenities and storage					487	NO WASTE GEN											
Farm Theme Park and Equestrian Centre (excl stables)	1a	Deck area	Australia	Office	0.0017	tonnes/m2/annum	686	GFA m2	1.14	Australia - MSW	0.30	0.08	0.06	0.06	0.06				0.59
Farm Theme Park and Equestrian Centre (stables only)	1a	Stables	Germany	Stables	11.0000	tonnes/horse/annum	48	Horses	528.00	Manure waste	528.00								
Farm Theme Park and Equestrian Centre (excl stables)	1a	Homestead (including retail/amenities)	Australia	Shops >100m2	0.0585	tonnes/m2/annum	350	GFA m2	20.46	UK - Retail	1.84	13.71	2.66	0.61	0.20		0.41		0.41
Farm Theme Park and Equestrian Centre (excl stables)	1a	Homestead First floor restaurant/viewing deck/Circulation	Australia	Restaurant	0.4619	tonnes/m2/annum	472	GFA m2	218.01	UK - Restaurants	95.93	52.76	19.84	29.87	5.67		1.96	8.07	3.05
Farm Theme Park and Equestrian Centre (excl stables)	1a	Grand arena ground floor	UK	Entertainment complex/Leisure centre	0.0416	tonnes/m2/annum	3,083	GFA m2	128.40	UK - Leisure centres	12.84	70.49	21.96	7.83	8.09				7.19
Farm Theme Park and Equestrian Centre (excl stables)	1a	Grand arena first floor (circulation and VIP viewing)	UK	Entertainment complex/Leisure centre	0.0416	tonnes/m2/annum	416	GFA m2	17.33	UK - Leisure centres	1.73	9.51	2.96	1.06	1.09				0.97
Farm Theme Park and Equestrian Centre (excl stables)	1a	Arrival point 2a & 2b (tickets, amenities, circulation)	Australia	Office	0.0017	tonnes/m2/annum	1,955	GFA m2	3.26	Australia - MSW	0.85	0.23	0.16	0.16	0.16				1.69
Queenslander lots	1a	21 Lots and road	Australia	Residential	1.3104	tonnes/unit/annum	21	No. units	27.52	Australia - MSW	7.15	1.93	1.38	1.38	1.38				14.31
Produce Garden		Additional Planting						NO WASTE GEN											
Kur-Village & Business & Leisure Hotel & Function Centre	1b	Retail and restaurant precinct	Australia	Restaurant	0.4619	tonnes/m2/annum	2,719	GFA m2	1,255.88	UK - Restaurants	552.59	303.92	114.29	172.06	32.65		11.30	46.47	17.58
Kur-Village & Business & Leisure Hotel & Function Centre	1b	Lobby, function & restaurant	Australia	Restaurant	0.4619	tonnes/m2/annum	2,965	GFA m2	1,369.51	UK - Restaurants	602.58	331.42	124.63	187.62	35.61		12.33	50.67	19.17
Kur-Village & Business & Leisure Hotel & Function Centre	1b	Pool					952	NO WASTE GEN		Australia - MSW									
Kur-Village & Business & Leisure Hotel & Function Centre	1b	Village plaza & tower (circulation)	Australia	Office	0.0017	tonnes/m2/annum	201	GFA m2	0.33	Australia - MSW	0.09	0.02	0.02	0.02	0.02				0.17
Kur-Village & Business & Leisure Hotel & Function Centre	1b	Cafe cluster 1 & 2 (retail, BOH, amenities)	Australia	Takeaway	0.0468	tonnes/m2/annum	670	GFA m2	31.34	UK - Quick Service Restaurants	31.34	7.43	3.38	0.94	0.88		0.13	1.13	0.44
Kur-Village & Business & Leisure Hotel & Function Centre	1b	Accommodation	Australia	Hotel (per m2)	0.0585	tonnes/m2/annum	26,900	GFA m2	1,572.77	UK - Hotels	629.11	402.63	232.77	155.70	39.32		23.59	53.47	31.46
Kur-Village & Business & Leisure Hotel & Function Centre	1b	Cluster 1 (tiered building)	Australia	Residential	1.3104	tonnes/unit/annum	32	No. units	41.93	Australia - MSW	10.90	2.94	2.10	2.10	2.10				21.81
Kur-Village & Business & Leisure Hotel & Function Centre	1b	Cluster 1 pool					234	NO WASTE GEN											
Kur-Village & Business & Leisure Hotel & Function Centre	1b	Cluster 2 (tiered building)	Australia	Residential	1.3104	tonnes/unit/annum	27	GFA m2	35.38	Australia - MSW	9.20	2.48	1.77	1.77	1.77				18.40
Kur-Village & Business & Leisure Hotel & Function Centre	1b	Cluster 2 pool					647	NO WASTE GEN											
Kur-Village & Business & Leisure Hotel & Function Centre	1b	Cluster 3 & 4	Australia	Residential	1.3104	tonnes/unit/annum	44	GFA m2	57.66	Australia - MSW	14.99	4.04	2.88	2.88	2.88				29.98
Kur-Village & Business & Leisure Hotel & Function Centre	1b	Cluster 3 & 4 pool					906	NO WASTE GEN											
Kur-Village & Business & Leisure Hotel & Function Centre	1b	Cluster 5 & 6	Australia	Residential	1.3104	tonnes/unit/annum	33	GFA m2	43.22	Australia - MSW	11.24	3.03	2.16	2.16	2.16				22.49
Kur-Village & Business & Leisure Hotel & Function Centre	1b	Cluster 5 & 6 pool					769	NO WASTE GEN											
Kur-Village & Business & Leisure Hotel & Function Centre	1b	Cluster 7	Australia	Residential	1.3104	tonnes/unit/annum	56	GFA m2	73.38	Australia - MSW	19.08	5.14	3.67	3.67	3.67				38.16
Kur-Village & Business & Leisure Hotel & Function Centre	1b	Restaurants	Australia	Restaurant	0.4619	tonnes/m2/annum	500	GFA m2	230.95	UK - Restaurants	101.62	55.89	21.02	31.64	6.00		2.08	8.55	3.23
Kur-Village & Business & Leisure Hotel & Function Centre	1b	Parking	Australia	Car parks	0.0039	tonnes/m2/annum	500	GFA m2	1.97	Australia - MSW	0.51	0.14	0.10	0.10	0.10				1.02
Lifestyle Villas	1b	56 Lots and roads	Australia	Residential	1.3104	tonnes/unit/annum	56	No. units	73.38	Australia - MSW	19.08	5.14	3.67	3.67	3.67				38.16
Lifestyle Villas	1b	Open Space	Australia	Green waste	0.0001	tonnes/m2/annum	17,526	GFA m2	1.96	Green waste	1.96								
Rainforest Education Centre and Adventure Park	1b	Bunkhouse style accommodation cabins	Australia	Residential	1.3104	tonnes/unit/annum	14	No. units	18.35	Australia - MSW	18.35	1.28	0.92	0.92	0.92				9.54
Rainforest Education Centre and Adventure Park	1b	Function centre/kitchens/dining	Australia	Restaurant	0.4619	tonnes/m2/annum	1,380	GFA m2	637.41	UK - Restaurants	280.46	154.25	58.00	87.33	16.57		5.74	23.58	8.92
Rainforest Education Centre and Adventure Park	1b	Education centre lecture/research/lab	Australia	Education/training	0.0197	tonnes/m2/annum	1,380	GFA m2	27.20	UK - Education	8.54	5.77	1.41	1.41		0.63	0.46	0.71	6.28
Golf Clubhouse and Function Centre	2	Golf Clubhouse change rooms/pro shop/buggy hire	UK	Entertainment complex/Leisure centre	0.0416	tonnes/m2/annum	2,772	GFA m2	115.45	UK - Leisure centres	11.54	63.38	19.74	7.04	7.27				6.47
Golf Clubhouse and Function Centre	2	Conference centre/bar/restaurants/meeting rooms	UK	Entertainment complex/Leisure centre	0.0416	tonnes/m2/annum	2,000	GFA m2	83.30	UK - Leisure centres	8.33	45.73	14.24	5.08	5.25				4.66
Golf Clubhouse and Function Centre	2	Second floor event centre circulation/public amenities	UK	Entertainment complex/Leisure centre	0.0416	tonnes/m2/annum	1,389	GFA m2	57.85	UK - Leisure centres	5.78	31.76	9.89	3.53	3.64				3.24
Golf Clubhouse and Function Centre	2	Grandstand canteen/change rooms/amenities	Australia	Office	0.0017	tonnes/m2/annum	742	GFA m2	1.24	Australia - MSW	0.32	0.09	0.06	0.06	0.06				0.64
Golf Clubhouse and Function Centre	2	Grandstand first floor seating	Australia	Office	0.0017	tonnes/m2/annum	742	GFA m2	1.24	Australia - MSW	0.32	0.09	0.06	0.06	0.06				0.64
Golf Clubhouse and Function Centre	2	Gym/carparking/change rooms/office/amenities	Australia	Office	0.0017	tonnes/m2/annum	3,800	GFA m2	6.33	Australia - MSW	1.65	0.44	0.32	0.32	0.32				3.29
Golf Course	2	12 Holes	Australia	Green waste	0.0001	tonnes/m2/annum	463,900	GFA m2	51.87	Green waste	51.87								
Sporting Precinct (soccer field only)	2	Soccer field	Australia	Green waste	0.0001	tonnes/m2/annum	6,800	GFA m2	0.76	Green waste	0.76								
Sporting Precinct (excl soccer field)	2	Tennis					1,636	NO WASTE GEN											
Sporting Precinct (excl soccer field)	2	Netball/basketball courts/bar area					3,292	NO WASTE GEN		UK - Leisure centres									
Sporting Precinct (excl soccer field)	2	Parking	Australia	Car parks	0.0039	tonnes/m2/annum	1,140	GFA m2	4.49	Australia - MSW	1.17	0.31	0.22	0.22	0.22				2.34
Sporting Precinct (excl soccer field)	2	Outdoor basketball						NO WASTE GEN											
Five Star Eco-Resort	2	200 Rooms/Villas	Australia	Residential	1.3104	tonnes/unit/annum	200	GFA m2	262.08	Australia - MSW	68.14	18.35	13.10	13.10	13.10				136.28
Five Star Eco-Resort	2	Pools					30	NO WASTE GEN		UK - Restaurants									
Five Star Eco-Resort	2	Parking	Australia	Car parks	0.0039	tonnes/m2/annum	2,000	GFA m2	7.88	Australia - MSW	2.05	0.55	0.39	0.39	0.39				4.10
Five Star Eco-Resort	2	Back of house	Australia	Restaurant	0.4619	tonnes/m2/annum	475	GFA m2	219.40	UK - Hotels	87.76	56.17	32.47	21.72	5.48		3.29	7.46	4.39
KUR-World University Campus	2	Precinct 1 units (Blds 1-6)	Australia	Residential	1.3104	tonnes/unit/annum	18	No. units	23.59	Australia - MSW	6.13	1.65	1.18	1.18	1.18				12.27
KUR-World University Campus	2	Precinct 2 units (Blds 1-7)	Australia	Residential	1.3104	tonnes/unit/annum	14	No. units	18.35	Australia - MSW	4.77	1.28	0.92	0.92	0.92				9.54
KUR-World University Campus	2	Precinct 3 units (Serviced accommodation)	Australia	Residential	1.3104	tonnes/unit/annum	108	No. units	141.52	Australia - MSW	36.80	9.91	7.08	7.08	7.08				73.59
KUR-World University Campus	2	Carparking	Australia	Car parks	0.0039	tonnes/m2/annum	1,010	GFA m2	3.98	Australia - MSW	1.04	0.28	0.20	0.20	0.20				2.07
KUR-World University Campus	2	Communal refectory, BOH Kitchen, Public amenities	Australia	Restaurant	0.4619	tonnes/m2/annum	400	GFA m2	184.76	UK - Restaurants	81.29	44.71	16.81	25.31	4.80		1.66	6.84	2.59
KUR-World University Campus	2	Lecture/research	Australia	Education/training	0.0197	tonnes/m2/annum	12,000	GFA m2	236.52	UK - Education	74.27	50.14	12.30	12.30		5.44	4.02	6.15	54.64
KUR-World University Campus	2	Office space	Australia	Office	0.0017	tonnes/m2/annum	2,000	GFA m2	3.33	UK - Offices	0.33	2.40	0.27	0.17	0.03				0.03
KUR-World University Campus	2	Additional carparking	Australia	Car parks	0.0039	tonnes/m2/annum	2,200	GFA m2	8.67	Australia - MSW	2.25	0.61	0.43	0.43	0.43				4.51
KUR-World University Campus	2	Building 1: Public foyer/exhibition space/library/lecture (3 levels)	Australia	Office	0.0017	tonnes/m2/annum	10,401	GFA m2	17.33	Australia - MSW	4.51	1.21	0.87	0.87	0.87				9.01
KUR-World University Campus	2	Building 1: Ground Carparking/services	Australia	Car parks	0.0039	tonnes/m2/annum	1,000	GFA m2	3.94	Australia - MSW	1.02	0.28	0.20	0.20	0.20				2.05
KUR-World University Campus	2	Building 2: Lecture/tutorial/office (3 levels)	Australia	Education/training	0.0197	tonnes/m2/annum	3,600	GFA m2	70.96	Australia - MSW	18.45	4.97	3.55	3.55	3.55				36.90
KUR-World University Campus	2	Building 2: Ground carparking/services	Australia	Car parks	0.0039	tonnes/m2/annum	1,200	GFA m2	4.73	Australia - MSW	1.23	0.33	0.24	0.24	0.24				2.46
Premium Villas	2	Lot 638	Australia	Residential	1.3104	tonnes/unit/annum	39	No. units	51.11	Australia - MSW	13.29	3.58	2.56	2.56	2.56				26.57
Premium Villas	2	Building 1 units	Australia	Residential	1.3104	tonnes/unit/annum	No. units	No. units	0.00	Australia - MSW	0.00	0.00	0.00	0.00	0.00				0.00
Premium Villas	2	Building 2 units	Australia	Residential	1.3104	tonnes/unit/annum	No. units	No. units	0.00	Australia - MSW	0.00	0.00	0.00	0.00	0.00				0.00
Premium Villas	2	Lot 720	Australia	Res															