The London Resort Development Consent Order

BC080001

Environmental Statement
Volume 2: Appendices

Appendix 19.1 – Outline Operational Waste Management Strategy (OOWMS)

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Planning Act 2008
The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009
Regulation 5(2)(a)
The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017
Regulation 12(1)

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Revisions

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Executive Summary

The London Resort (henceforth referred to as the Proposed Development) is founded on sustainable and low-carbon principles and is aiming to be one of the most sustainable entertainment resorts in the world. In line with this aspiration, a considered Outline Operational Waste Management Strategy (OOWMS) (Appendix 19.1, this document) has been developed that supports this aim. This report provides an overview of the developing waste strategy, outlining appropriate measures to minimise, collect, transport, store, recycle and treat the estimated 22,800 tonnes of waste generated through the Proposed Development's operations every year. The OOWMS further lays out measures and innovations to incorporate the Circular Economy approach and facilitate a closed loop to operational waste management.

Complementary waste collection strategies for the public realm and building level will enhance efficiency and help reduce transport on-site whilst maximising the segregation of recyclate. All waste collected will be moved to a central waste transfer station where it will be compacted and stored before being transported further to appropriate treatment facilities. The Proposed Development seeks to minimise waste movement by road and the potential impacts from it. The prioritised option for waste movement incorporates water vessels to transport waste on the river to relevant waste facilities.

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Contents

List of Tables

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List of Figures

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Glossary

Term	Definition
ADEPT	Association of Directors of Environment, Economy, Planning & Transport
BS	British Standard
DCO	Development Consent Order
FM	Facility Management
ES	Environmental Statement
OOWMS	Outline Operational Waste Management Strategy

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1 Introduction

1.1 Project description

The Resort will be a nationally significant visitor attraction and leisure resort, built largely on brownfield land at Swanscombe Peninsula in Kent on the south bank of the River Thames and with supporting transport and visitor reception facilities on the northern side of the river in Essex. A detailed description of the Proposed Development is provided in chapter three of the Project ES. The focus of the Resort will be a 'Leisure Core' containing a range of events spaces, themed rides and attractions, entertainment venues, theatres and cinemas, developed in landscaped settings in two phases known as Gate One and Gate Two ('the Gates'). Outside the Gates will be a range of ancillary retail, dining and entertainment facilities in an area known as the Market. The Resort will also include hotels, a water park connected to one of the hotels, a conference and convention centre known as a 'conferention centre', a Coliseum (capable of hosting e-Sports events), creative spaces, a transport interchange including car parking, 'back of house' service buildings, an energy centre, a wastewater treatment works and utilities required to operate the Resort. Related housing is also proposed to accommodate some of the Resort's employees. Substantial improvements are proposed to transport infrastructure. This will include a new direct road connection from the A2(T) and a dedicated transport link between Ebbsfleet International Station, the Resort and a passenger ferry terminal beyond. The ferry terminal would serve visitors arriving by ferry on the River Thames from central London and Tilbury. A coach station is also proposed. On the northern side of the Thames to the east of the Port of Tilbury, additional coach and car parking and a passenger ferry terminal are proposed to serve the Resort. The Proposed Development would involve an extensive restoration of land used in the past for mineral extraction, waste disposal and industrial activities including cement and paper production, with a comprehensive landscape strategy proposed incorporating the retention and enhancement of wildlife habitats.

1.2 Existing land use

The Proposed Development site is located on the Swanscombe Peninsula on the northern border of the county of Kent set over approximately 465 hectares (Figure 1-1), named the Kent Project Site. A much smaller area has been defined at the Port of Tilbury to accommodate visitor parking to allow visitors to transfer across the Thames via boat. Likewise, a third area has been highlighted in the Borough of Thurrock to accommodate upgrades to highway infrastructure to facilitate the arrival of visitors. Both of these areas are classed as the 'Essex Project Site'.

The existing land use of the Kent Project Site includes extensive natural areas including the Swanscombe Marshes. The Marshland, however, is situated adjacent to the Proposed Development and will remain undeveloped. The southern and eastern part of the Kent Project

site is currently in use by different types of industries and business parks which are connected to the road network. The area is highly industrialised and with no residential land uses. The Essex Project Site contains existing pier structures and facilities that will be upgraded as part of the overall development work.

Figure 1-1 DCO Order Limits for the Proposed Development

1.3 Purpose of document

Planning for future operational waste management will help the Proposed Development to operate efficiently, sustainably and safely, while minimising impacts on building performance, the users of the Project Site (Figure 1-1, both Kent and Essex Sites) and the environment. This document reflects other relevant reports such as the Construction Method Statement (CMS). In line with this, the key objectives of this document are:

- To provide a suite of measures for integrating the principles of the waste hierarchy and circular economy into the Proposed Development's design and operations;
- To provide an estimate of the anticipated waste generation rate for the Proposed Development during operation;
- To ensure that national and local policies, as well as the Applicant's waste management aims and aspirations, are met; and
- To allow waste and recycling to be easily collected, stored and managed by the Facilities Management (FM) team in a sustainable, efficient and discreet manner.

The following tasks have been completed to enable the production of this OOWMS:

- Estimation of baseline waste generation rates;
- Review of actions which have been or will be considered at design stage in order to design out waste; and
- Review of actions which can be taken during operation to reduce waste generation and increase segregation.

1.4 Consultations with local waste treatment facilities

Three private waste companies active in the region were approached as part of the consultation process. As of early July 2020, consultation meetings were conducted with Cory Riverside Energy, Veolia and SUEZ. The companies confirmed an interest to accept certain operational waste streams from the Proposed Development, subject to the agreement of commercial terms for such a service. They also provided valuable input with regard to emerging mitigation measures for waste management. Further consultation has been carried out during the development of the Environmental Statement and is reported in ES Chapter 19: *Waste and materials.*

1.5 Regulation and guidelines

The OOWMS is based on principles of the British Standard code of practice for waste management in buildings (BS 5906:2005). Guiding principles are also laid out by the Association of Directors of Environment, Economy, Planning & Transport (ADEPT) and have been considered. The OOWMS further adheres to national and local legislation, policy and best practice guidance in relation to solid waste which are detailed in full in ES Chapter 19: *Waste and materials.* The chapter covers all likely environmental effects of the Proposed Development with respect to solid waste and materials management. This report forms the basis for the operational assessment and the ES relies on information and estimations from this OOWMS.

2 Waste Strategy

2.1 Circular Economy and Waste Prevention

To facilitate staff, guests and visitors in making sustainable choices and to move beyond the traditional linear approach of 'make, use, dispose', a Circular Economy model will be promoted. This aims for keeping resources in use for as long as possible, so that the maximum possible value can be extracted. Adopting the 'Circular Economy' approach the OOWMS for Proposed Development aims to prioritise 'start-of-pipe' solutions rather than 'end-of-pipe' solutions. The prevention and/or limitation of conventional waste generation through green procurement practices will be prioritised. In line with this ambition, attention has been be paid to possibilities of procurements at all stages that allows reusable product packaging design and reduce waste generation and improve re-usability of materials, such as cutlery, food containers and other usually single-use items.

Table 2-1 shows possibilities of the wide range of waste reduction measures exists to avoid or reduce the generation of waste within different waste streams. It should further be considered to make products more durable, repairable, re-usable and recyclable. An overarching reuse/ return system for the whole Proposed Development could facilitate the minimisation of plastic waste in particular.

Table 2-1 Possible waste reduction measures

Measures	Waste Stream	Possible Solutions
Avoid/minimise	Paper waste	Paperless offices through digital administration and ticketless Resort (for example, apps for admission and Resort map).
	Paper hand towels	Make use of hand driers instead of paper towels.
	Plastic waste	Reusable package material selection and reuse/return systems as well as a ban on plastic straws and stirrers, in line with National Law and in accordance with all vendors/franchisees of the Resort.

	Food waste	Portion control, pre order food, encourage packed lunches with covered areas, picnics.
	All waste	Link department/zone budgets to waste generation and capture data on internal generation rates.
Re-use	Food containers and beverage cups	Overarching re-use/return system for all vendors/franchisees of the Resort. Packaging distribution – use of reusable tote boxes. Reduce cardboard.
Repair	Machines, displays, restaurant furniture	Introduce repair scheme for all vendors/franchisees of the Resort.

Besides measures to reduce the generation of waste, Table 2-2 shows possible measures to increase the recycling rates. Further options should be explored going forward to make sure waste will be adequately recycled where it cannot be avoided.

Table 2-2 Measures to maximise recycling rates

Measures	Waste Stream	Possible Solutions
Maximise recycling rates	All waste	Incentives such as the adequate provision of litter bins.
		Prominent signage on or around rubbish bins; feedback posters or real time feedback solutions.
	All waste	Highly visible signage to show what bins should be used for.
	Recycling, plastic bottles	Enforcement through shaped litter bins that only allow for plastic bottles.

2.1.1 Innovation

With the variety of interpretations, ideas and innovations of the circular economy comes a wide range of possibilities. The Proposed Development aims to incorporate new, innovative, forward-looking – and circular solutions rather than following existing, established practices. Taking the idea of innovation within the circular economy concept one step further, a supplementary option to waste reduction measures could potentially involve the use of automation and servicing robots.

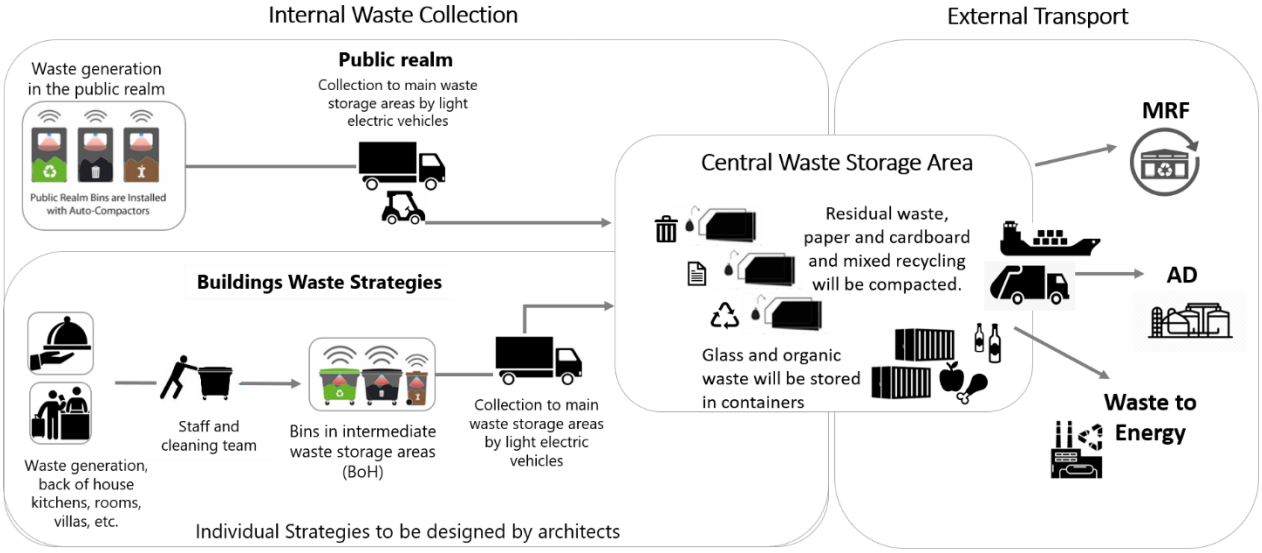
In future, robots could help deliver food and products and transport used food and beverage containers back to a central cleaning station and, thus, facilitate a reuse/return system with food containers. This innovative system could support a return system that would close the loop, reduce waste generated and collected in bins within the public realm and reduce waste transport on site with refuse vehicles. At the same time, servicing robots could add to an exciting visitor experience.

Such ideas of innovation including their necessary infrastructures such as charging points, docking and cleaning areas will depend on the final design and will be explored going forward. At this stage, the implementation of this type of innovation has not been considered in the operational strategy. Possible options and synergies to include robots in the waste strategy should be further explored during the detailed design stages and the operational planning of the Resort.

2.2 Waste collection strategy

A coherent strategy for all event areas and buildings and for the public realm allows for efficient waste management that can reduce transport on-site. Two main sources of waste are anticipated within the Proposed Development. These are waste from public bins within the public realm of the Resort and waste generated by the hospitality, retail and event assets of the Resort. A summary of the proposed waste collection and transport strategy is shown in Figure 2-1.

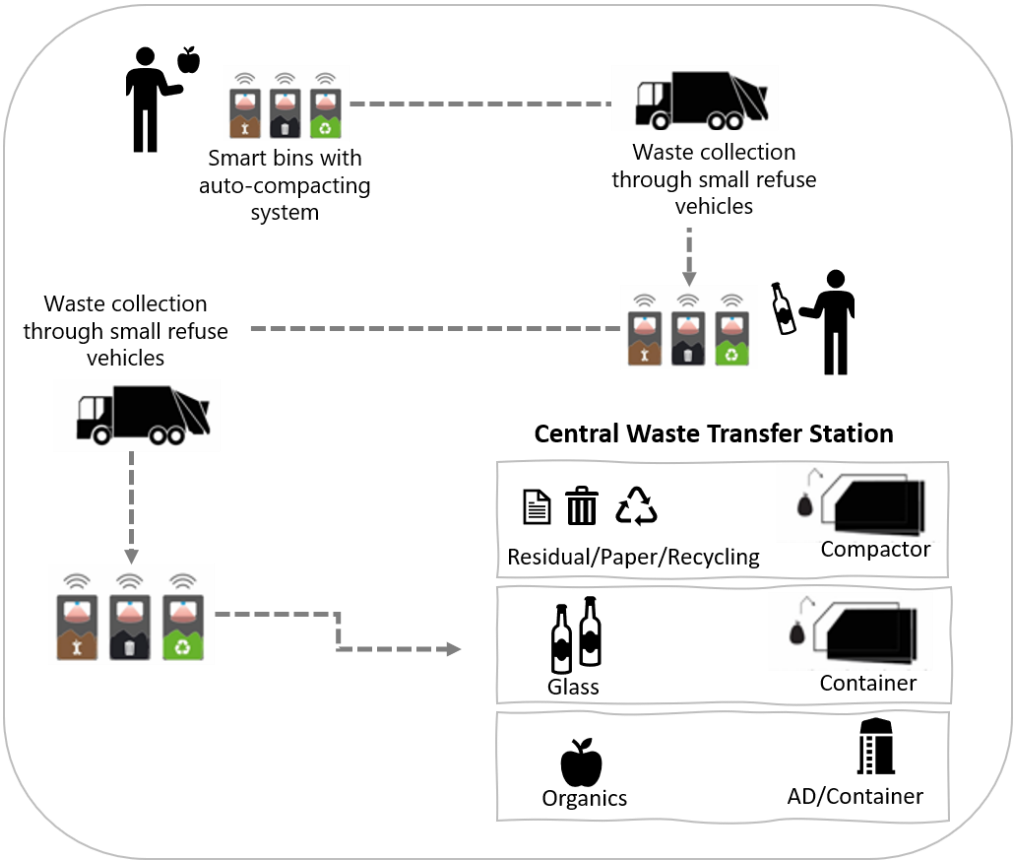
Figure 2-1 Overall waste collection and transport strategy



2.2.1 Waste in the public realm

In the public realm, visitors will dispose of their waste into smart waste bins. Mixed recycling, organic and residual waste will be segregated at source. Ideally, the smart waste bins will incorporate auto-compacting systems to increase the bin capacity and reduce collection frequencies and potential littering. During the day, staff will collect the different waste streams with small refuse vehicles in several trips to the central waste transfer station. The transport would take place by electric waste collection vehicles ideally during off-peak hours and before and after the Resort is open for visitors. Once the waste arrives at the transport station, the mixed recyclables, residual and organic waste will be stored in containers before being transported further to appropriate treatment facilities. A combination of waste compactors and receptacles is proposed to store waste. Once in there, waste will be collected by an appointed external contractor who will take the waste off-site.

Figure 2-2 Waste collection strategy in the public realm



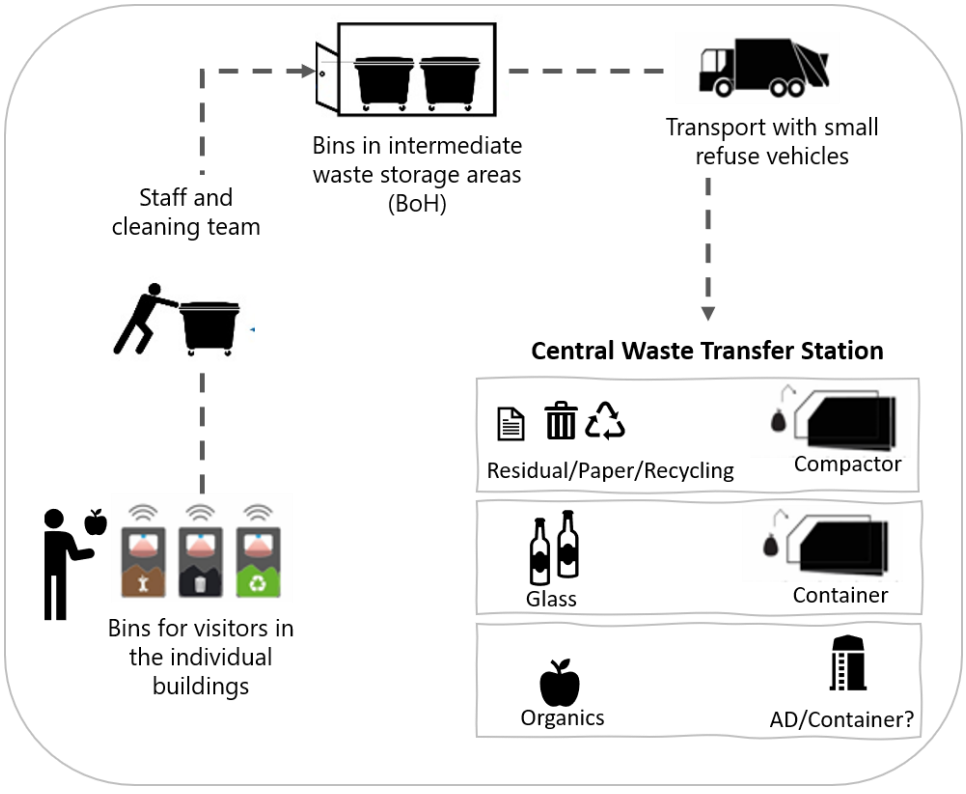
2.2.2 Waste within the individual buildings

Within hospitality and event buildings, visitors and staff will dispose waste separately into five waste streams. The waste streams include paper and cardboard, glass, mixed recycling consisting of plastics and metals as well as residual and organic waste. Waste from bins used by

visitors as well as bins used during operation will be moved and emptied regularly by staff and the cleaning team ideally during off-peak hours throughout the day and after opening hours. All waste streams will then be moved to intermediate 'back of house' waste storage areas and stored in wheeled bins.

From the intermediate waste storage areas of the individual assets, all waste streams will be collected daily by small refuse vehicles. Waste collection from the assets will take place before or after the Resort is closed for visitors to move the waste discretely and without any interference for the Resort visitors. The waste will then be moved to the central waste transfer station where it will be compacted and stored before being transported further to appropriate treatment facilities. From the waste transfer station, waste will be collected by an appointed external contractor who will take waste off-site.

Figure 2-3 Waste collection strategy within the buildings



2.3 Waste transport strategy

In order to reduce the impact of transporting waste on the existing road network, the Proposed Development will seek to minimise road transport for waste management. The prioritised option would incorporate barges to transport waste on the River Thames to the nearest waste facilities on the river sides. However, using barges for waste transport requires adequate infrastructure as well as storage of waste in adequate containers, which can be later transferred

onto the barges. At present, it is anticipated that Bell Wharf will be re-developed and could function as a main transfer point to move the waste on barges. Another option would be to use Tilbury 2 on the northern banks of the River Thames (Thurrock), which is anticipated to be used for logistics and could facilitate the moving of waste on barges. Alternatively, if options to transport waste on the river are not feasible, collected waste would be transported by road. In such a case, transport vehicles would move waste in closed containers from the waste transfer station through the proposed back of house routes towards the A2 for transfer to treatment facilities in the region.

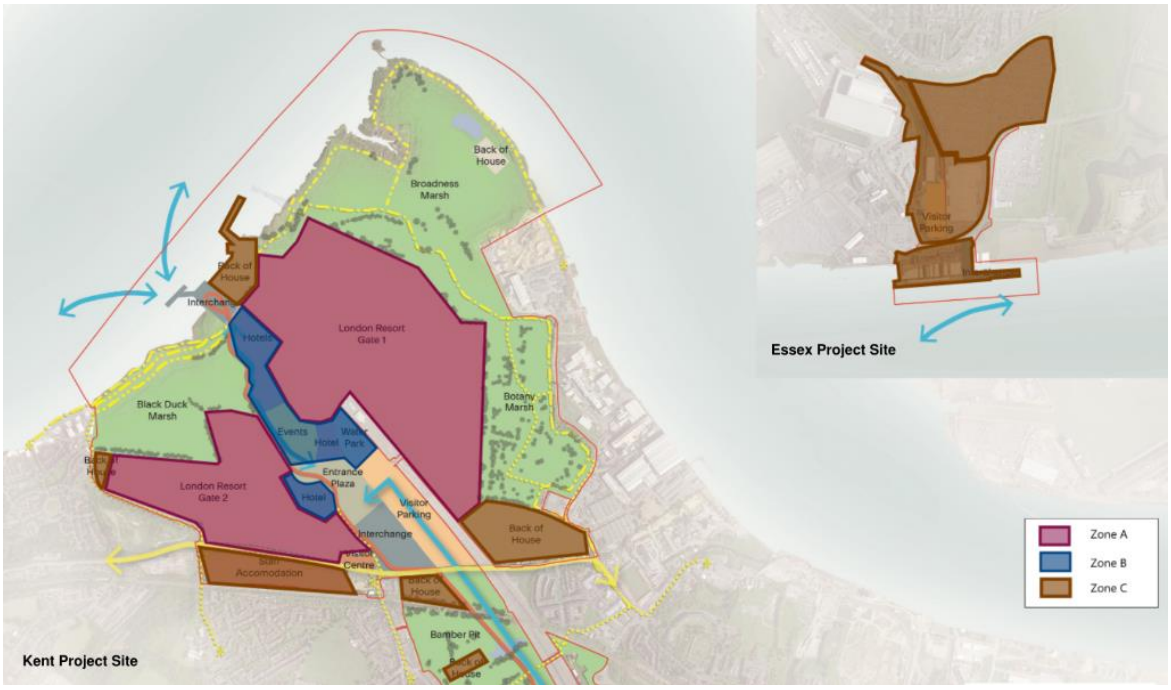
3 Basis of design

The waste generation resulting from the operation of the Proposed Development has been assessed using the different areas or zones of the development. Zone A, B and C as described in the following are shown in Figure 3-1.

- Zone A (Gates One and Two) includes attractions, rollercoasters and general retail and food and beverages in the Resort. This part will be further developed at a later stage and therefore, waste generation rates have been estimated based on peak visitor numbers to show a worst-case scenario. This ensures resiliency and flexibility in later stages of the Proposed Development;
- Zone B of the Proposed Development includes three major hotels, retail and event areas such as an e-Sports Arena and a 'Conferention Centre'; and
- Zone C includes the back of house areas with assets such as a visitor centre, terminals including the Essex Site where visitors arrive and, Related Housing (for staff accommodation).

Paragraph 3.1.1 explains how waste generation rates have been calculated for Zones B and C.

Figure 3-1 Land use areas for the Kent Project Site



3.1.1 Benchmarks

In order to determine the likely servicing requirements for waste management within the Proposed Development, it is necessary to understand the volume of waste which may be generated. For the waste forecast, industry benchmarks of resorts have been used. To enhance the level of detail, further assumptions have been made for land uses within the Proposed Development, such as hotels or venues for events. This further allows estimations on spatial requirements for the individual assets to be made.

Two benchmarks, from 2014 data[1], have been used for hotel land uses to reflect the fact that luxury hotels tend to generate higher quantities of waste than other hospitality assets. Different benchmarks have been used related to entertainment land uses, such as the e-Sports Arena or the Conferention Centre. This is due to the different nature of the assets and whether visitors would consume any food, beverages or goods within the different assets. The table below provides the waste generation benchmarks that have been used.

Table 3-1 Waste generation benchmarks

Land use	Waste generation benchmark	Units
Leisure Core (high)	1.15	kg per visitor per annum
F&B (high street)	241.8	kg per m^2 per annum
Retail (high street)	50	kg per m^2 per annum
Offices	19.23	kg per m^2 per annum
Maintenance / Back of House	5	kg per m^2 per annum
Hotel (luxury)	99.9	kg per room per month
Hotel (budget)	60.2	kg per room per month
Entertainment (high)	71	kg per m^2 per annum
Entertainment (low)	9	kg per m^2 per annum
Entertainment (Event)	0.8	Kg per m^2 per annum
Related Housing	1.4	kg/resident/day

3.1.2 Waste estimates

The waste forecast aims to provide an estimate of waste likely to be generated and therefore in need of management. It is estimated that the Proposed Development will generate approximately 63 tonnes of waste daily and 22,800 tonnes of waste annually. A breakdown of daily generation is summarised in Table 3-2.

[1] *Walt Disney Village: Comfort Inn vs. Hilton Hotel Chicago, 2014 data*

Table 3-2 Waste forecast by development zone

Land use	Generation in kg per day					
	Total Generation	**Paper and Cardboard**	**Glass**	**Mixed recyclables**	**Organic**	**Residual**
Zone A	39,100	9,100	5,200	5,200	15,600	4,000
Zone B	10,400	2,600	1,000	1,800	3,600	1,400
Zone C	3,100	800	300	500	1,100	300
Total	52,600	12,500	6,500	7,500	20,300	5,700

3.1.3 Hazardous waste

A portion of the total residual waste from the Proposed Development is expected to be hazardous. From previous studies of similar land uses, it is estimated that approximately 2% of residual waste will be classified as hazardous. Therefore, of the total annual generation of 22,800 tonnes per year, approximately 520 tonnes will be classed as hazardous waste, that will require separate handling, collection and transport to ensure safe processing.

3.1.4 Other waste

Solid waste in the form of sludge will be generated from the on-site wastewater treatment plant of the Proposed Development. Sludge will be sent for treatment at specialist treatment facilities either within Kent, Essex or elsewhere. The most common processes used to treat sludge are anaerobic digestion, lime stabilisation and incineration. Which facility this stream of waste will be sent to depends on the management and private waste contractor involved. Further detail on wastewater treatment can be found in the ES Chapter 17: *Water Resources and Flood Risk*, and information on demands in the Energy Statement and Utilities Statement.

4 Waste storage

By providing adequate waste storage for all waste streams on a building level as well as within the public spaces of the Proposed Development, the Proposed Development encourages source separation of recyclables and to significantly reduce contamination of recyclate. Optimal bin placements and waste storage requirements which should be considered at design stage are described in the following section.

4.1 Public realm waste storage

Ideally, public litter bins would be clustered in key areas, such as junctions or near public seating areas or food outlets, where it is likely that waste will be generated. Colour coded smart bins are suggested serving three waste streams including mixed recycling, residual and organic waste to make sorting the waste at source as easy as possible for visitors. This can help to increase recycling participation and to avoid cross-contamination. Further options to maximise recycling participation can be found in the waste prevention section in Table 2-1. Criteria for the bins within the public realm include an aesthetically pleasing design to fit into the overall landscape design, robustness and durability as well as an inclusive design in order to be easy to use for all. The exact specification of litter bins in the public realm will be confirmed at later stage.
For the public realm of the London Resort, the use of smart bins is suggested. These can measure the fill height of bins with sensors and interact with collection vehicles to be only collected when full. A further option could be an automatic compaction system in the bins to increase bin capacity. These systems can significantly shorten the route of waste collection and therefore minimise waste transport within the Proposed Development. The number of trips required daily to collect waste will ultimately depend on the storage capacity of the bins.

4.2 Internal Waste storage requirements

Each development area will need to include a designated location for the internal storage of waste. Depending on the size of the development, multiple intermediate storage rooms may be required. Ideally, waste should be segregated into five waste streams including paper and cardboard, glass, plastic and metals, organic and residual waste. Where this is not possible, the separation of waste into mixed recyclables, residual and organic waste are a minimum requirement. The type of waste containers used should be appropriate for the quantities and nature of the waste that will likely be generated.

The indicative waste storage requirements have been estimated based on the number of bins for a daily collection frequency. Residual and mixed recycling will be stored in 1,100l bins with an approximate spatial requirement of 3.5m^2, while organic waste bins hold 660l and require a space of 3m^2. All primary waste management infrastructure has been sized to provide sufficient operational resilience in the event of technical issues with the Proposed Development's waste collection system. As a minimum, waste storage should be made available for a days' worth of waste within individual assets/buildings. Indicative waste storage requirements for each asset area are shown in Table 4-1 below.

Table 4-1 Indicative intermediate waste storage requirement

Asset	**Indicative storage area per day (m2)**
H1 - Hotel	100
H2 - Hotel	180
H3 - Hotel	100
H4 - Hotel	60
Market	75
e-Sports Arena	55
Conferention Centre	40
Related Housing (staff accommodation)	135
Visitor Centre and Staff Training Facility	20

4.2.1 Further assumptions on land use for indicative waste storage

Table 4-2 highlights further assumptions made to support the calculation for estimating waste generations and the interventions needed to manage and store the waste.

Table 4-2 Assumptions for annual waste generation and indicative waste storage

Land use area		Assumptions for indicative waste storage
Zone A	Gate One	Indicative waste storage requirements will be included in the estimates at a later design stages due to limited detail available on Gates One and Two
	Gate Two	
Zone B	Hotels	The indicative waste storage areas within the hotels are based on hotel keys as well as different qualitative standards of rooms (i.e. standard rooms, suites)
	Market	Assumptions for indicative waste storage areas are based on retail floor area.
	e-Sports Arena	Spatial requirements for waste storage are estimated based on maximum utilisation of seat numbers on event days.
	Conferention Centre	Spatial requirements for waste storage was estimated based on GEA including auditoriums, workshops and assembly areas.
Zone C	Related Housing (staff accommodation)	Spatial requirements for waste storage was estimated based on number of units for staff housing and occupancy rates.
	Visitor Centre and Staff Training Facility	Indicative waste storage was estimated based on office floor space as well as restaurant/ canteen areas.

4.2.2 Design of waste storage areas

When designing internal waste storage areas, this should be in line with British Standard 5906(2006), Building Code, Building Regulations 2010 Part H6 and the following key parameters should be adhered to:

- All waste storage areas should be adequately lit, well ventilated and sealed against vermin;
- Space: At every disposal point, options for recycling waste should be provided. Waste stores are to be fitted out so that they can be easily cleaned and maintained. Enough space should be provided to allow for the easy access and manoeuvring of bins;
- Access: A designated collection point should be identified with easy access to a service road or the main highway. Waste operatives should be required to move bins manually no further than 15m. Users should not be required to carry waste any further than 30m; and
- In addition, space for a lockable storage cabinet should be provided for hazardous waste streams (e.g. chemicals) as these materials are likely to be generated.

4.3 Central waste storage requirements

All waste generated within the public realm and within the assets of the Proposed Development will be moved to the central waste transfer station close to the wharf. The CMS details how waste and materials will be managed off-site including use of Bell and Tower Wharf. Dry recyclables, as well as paper and cardboard, will be compacted in stationary compactors. All waste streams will be moved into shipping containers with a volume of approximately 33m^3. To enhance resilience, the containers within the waste transfer station will be able to store three days' worth of waste. The shipping containers will be transported either by refuse vehicles using the road network or by barge along the River Thames to the appropriate waste treatment facility according to their waste stream.

A waste transfer station of around 6,500m^2 will serve as the central waste storage area. This space includes unloading areas for all waste streams, five loading bays, space for three stationary compactors, containers for three days' worth of waste storage for all waste streams excluding organic waste as well as storage area for container stacker parking.

4.4 Other waste storage requirements

Additional to the central waste storage, a dedicated parking area will be needed to store vehicles for waste collection and cleaning. This area will be approximately 550m^2 and will include a storage area for street cleaning vehicles, an area for waste collection vehicles, office space for the facility management and staff facilities. The location of the vehicle parking and offices is proposed to be co-located to the waste transfer station adjacent to Bell Wharf.

5 Conclusion

Significant opportunities exist that will reduce waste arising from the operation of the Proposed Development. The recommendations in this report have the potential to significantly reduce the waste generated from the baseline estimate.

This report is a live document and it will be continually updated throughout the design and construction process. The next steps to take are as follows:

- Waste demands and waste collection strategy will be refined once more detailed information on Gate One and Two is progressed through detailed design;
- Options for the feasibility and potential collaborations with services providers for on-site treatment of organic waste will be further explored; and
- Further consultations on commercial agreements with local waste treatment facilities (waste to energy, recycling facility, organic waste treatment facility) will be held at later stages of the Proposed Development.

6 References

Pirani, Sanaa & Arafat, Hassan. (2014). Solid waste management in the hospitality industry: A review. Journal of Environmental Management.

Zero Waste Scotland (2011). The Composition of Mixed Waste from Scottish Health and Social Care, Education, Motor, Wholesale and Retail Sectors in 2011.

EPA (2012). Industry fact sheet Reducing business waste Commercial offices.

Encycle consulting (2013). A study into commercial & industrial (C&I) waste and recycling in Australia by industry division.

WRAP (2011). The Composition of Waste Disposed of by the UK Hospitality Industry.