

18 MATERIALS AND WASTE

18.1 Introduction

18.1.1 This Chapter, prepared by Wardell Armstrong LLP, reports the likely significant effects of the Proposed Development in terms of recoverable Materials and Waste in the context of the Site and surrounding area, associated with the demolition, construction, and operational phases of the Proposed Development. The effects have been assessed in the context of relevant national, regional, and local waste management policies and regional waste management treatment and disposal capacity.

18.1.2 Waste is likely to be produced because of the development during the demolition, construction and the operational phases. Where opportunities exist to make use of waste as a resource in the redevelopment of the Site these will be taken. Such measures will be detailed in a Site Waste Management Plan.

18.1.3 The principal objective of sustainable resource and waste management is to use materials as efficiently as possible, reduce waste generation, and limit waste disposal to landfill. Where waste is generated, it should be managed in accordance with the Waste Hierarchy as reproduced in Figure 18.1. The Waste Hierarchy advocates an order of preference for the management of wastes.

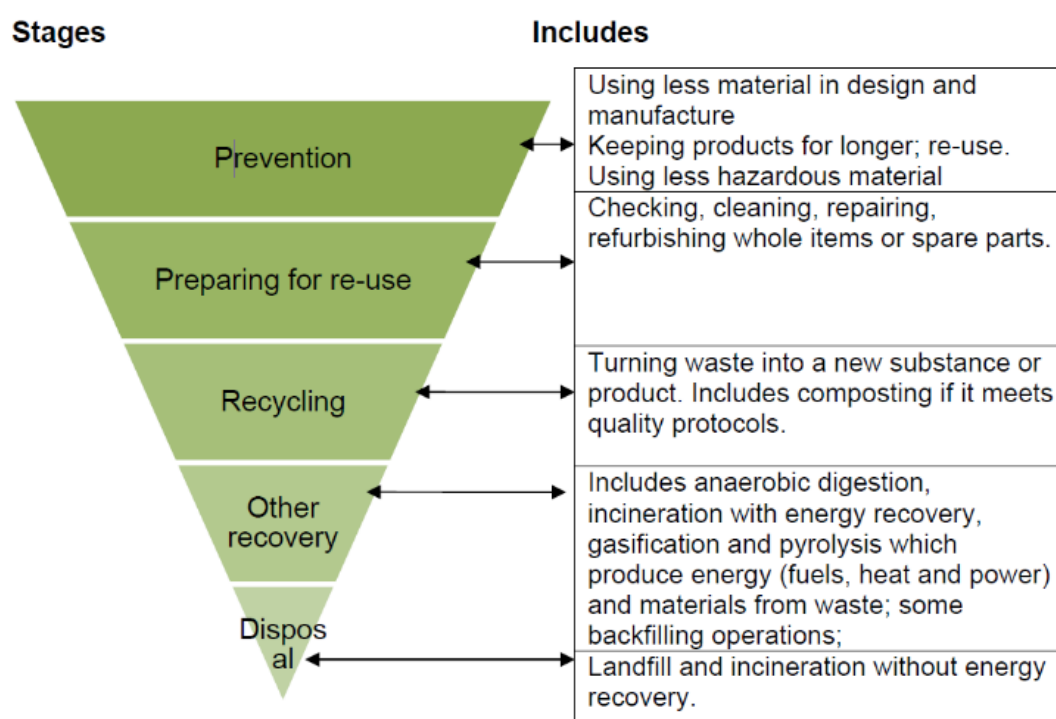


Figure 18.1: The Waste Hierarchy

18.1.4 Resource and waste management should actively contribute to the economic, social, and environmental goals of sustainable development.

18.1.5 This Chapter (and its associated appendices) is not intended to be read as a standalone assessment and reference should be made to the front end of this ES (Chapters 1 – 6), as well as the final chapters, ‘Summary of Residual and Cumulative Effects’ and ‘Conclusions’ (Chapters 21 - 22).

18.2 Legislation, Policy and Guidance

18.2.1 The relevant legislation, policy and guidance are listed below, with details provided in Appendix 18.1.

Legislative Framework

18.2.2 The applicable legislative framework is summarised as follows:

- European Community (EC) Framework Directive for Waste, 2008/98/EC (the Waste Framework Directive)
- EC Landfill Directive, 1999/31/EC

18.2.3 In May 2018, the EU Council adopted a new waste management package which essentially updates the Waste Framework Directive and sets out new rules for establishing legally binding targets for recycling, to work towards a circular economy.

18.2.4 Following Brexit, the UK government has indicated that it will be adopting the revisions to the Waste Framework Directive. However, the EU (Withdrawal) Act 2018 will ensure existing EU environmental law continues to have effect in UK law after Brexit. This includes any commitments from the Circular Economy Package (CEP) in relation to waste and recycling that were part of UK legislation on 29th March 2019.

National Planning Policy

- Future Wales: The National Plan 2040 (February 2021)
- Planning Policy Wales, (Edition 11, February 2021)

National Waste and Resource Management Policy

- The Waste Prevention Programme for Wales, December 2013
- Welsh Assembly Government ‘Towards Zero Waste. One Wales: One Planet’ (2010)

Local Planning Policy

- Cardiff Local Development Plan 2006 – 2026 (Adopted January 2016)

Guidance

The applicable guidance is summarised as follows:

- City of Cardiff Council Supplementary Planning Guidance ‘Waste Collection and Storage Facilities’ (2016)
- Institute of Environmental Management and Assessment (IEMA) ‘Materials and Waste in Environmental Impact Assessment – Guidance for a proportionate approach’ (2020)
- Technical Advice Note 21: Waste (February 2014)

18.3 Assessment Methodology and Significance Criteria

Scope of the Assessment

18.3.1 The baseline conditions set out in this Chapter will be used to identify sensitive receptors for assessment via a sensitivity review. It is considered that the construction materials used for the Proposed Development may be sensitive receptors based on availability and subsequent depletion of natural resources. There will be a procurement strategy in place to encourage sourcing of materials with recycled content, and to reuse materials on Site.

18.3.2 For waste, landfill capacity is anticipated to be a sensitive receptor for assessment when considering waste disposal requirements in relation in the Proposed Development. Plans for the removal of waste materials off site for treatment will be considered also.

18.3.3 This Materials and Waste assessment will consider waste generation and disposal across the construction (including demolition and enabling works) and operational phases of the Proposed Development.

18.3.4 The Proposed Development may lead to potential direct impacts on sensitive receptors in relation to material consumption and the generation and disposal of waste.

18.3.5 Potential indirect effects may arise from material consumption and waste generation with regard to haulage, noise, dust, nuisance, vehicle emissions and water pollution.

18.3.6 It is anticipated that these effects will be considered as part of the other relevant EIA disciplines outlined within this Environmental Statement.

18.3.7 Several assumptions have been made to assess the nature and extent of effects of waste materials generated by the Proposed Development to include:

- where uncontaminated excavated material arises during construction, this will be considered for re-use on Site; contaminated excavated material (if encountered) will either be treated on Site or removed offsite for treatment and disposal;
- where materials are available and suitable for re-use, measures will be taken to incorporate this within the construction process;
- where figures are not available for the calculation of waste arisings, assumptions will be made based on similar, constructed major infrastructure projects;
- where information on waste quantities and waste types is unavailable, this will typically be based on a defined plot size; therefore, will consider development parameters using the Rochdale Envelope (worst-case) principles, applied across the developable land extents; and
- any topsoil to be removed within the Site will either be re-used on Site or transported offsite to (if possible) another development site requiring topsoil, or (as a last resort) inert landfill.

Extent of the Study Area

18.3.8 For the assessment of local waste treatment capacity an area extending 10 kilometres (km) from the Site has been analysed. This includes the majority of Cardiff and its immediate surrounding waste management infrastructure.

Consultation Undertaken to Date

18.3.9 Table 18.1 provides a summary of the consultation activities undertaken in support of the preparation of this Chapter.

Table 18.1: Summary of Consultation Undertaken to Date			
Organisation	Individual(s)	Meeting Date and other forms of Consultation	Summary of Outcome of Discussion
Cardiff City Council	Planning Department	Scoping report and request for formal scoping opinion submitted to City Council. June 2021.	Waste and material management within scope of Environmental Impact Assessment

Assessment Methodology

- 18.3.10 Effects on the environment have been assessed with reference to standards and legislative guidance where this is available. Where quantification of effects has not been possible, qualitative assessments have been carried out based on professional judgement and current knowledge. Uncertainties are also noted where this is appropriate.
- 18.3.11 The method of baseline data collection and assessment is in accordance with current guidance and industry best practice. Waste streams generated through the demolition of the existing Travelodge hotel, Red Dragon Centre, and Cardiff Council County Hall building have been calculated based on the size of the buildings in line with industry practice, and reference data. For all buildings an approximation of the building dimensions is used, multiplied by 0.33¹ (i.e., a third) to account for air space within the buildings. This provides a volume of waste generation, which is converted to tonnage using the national conversion factors produced by the EA Wales, the environment Agency (EA) and the Scottish Environment Protection Agency (SEPA). The conversion factor applied to all demolition waste is 0.32 tonnes per cubic metre (m³).
- 18.3.12 Consideration has been given to the estimated amount of waste in terms of the volume of excavated material that will be generated through the cut and fill activities as part of the development. This activity is likely to be carried out during the same phase as demolition, and forms the ground preparation works, prior to the construction of the proposed buildings and associated infrastructure. Due to the prior developed nature of the Site, local topography, proposed plans, and lack of available information indicating otherwise, it is assumed that there will be a net zero balance from cut and fill activities.
- 18.3.13 For the construction phase, waste streams have been identified and the mass of each waste stream likely to be generated during the construction phase of the Proposed Development has been estimated using Building Research Establishment (BRE) SMARTWaste Benchmarks. This estimates the proportion of materials required for construction that will be unavoidable waste. This has been based on the proposed floor areas of the proposed buildings within the illustrative masterplan.

¹ Standard assumption based on US Federal Emergency Management Agency calculations for estimating rubble quantities generated from building collapse in disaster situations. See FEMA guidance 329 (September 2010) - https://www.fema.gov/pdf/government/grant/pa/fema_329_debris_estimating.pdf.

- 18.3.14 The future predictions of operational phase waste generation from the Proposed Development have been based on British Standard (BS) 5906:2005. The operational waste types that are likely to arise can be broadly sub-divided into commercial waste, industrial waste, and household waste. The development has been subdivided by use, with the most appropriate metric used dependent upon the type of development, for example domestic, office, leisure, and shopping.
- 18.3.15 Following the assessment, appropriate mitigation measures have been identified to reduce the quantity of waste sent for final disposal and to apply sustainable waste management practices within the Proposed Development. These include a detailed Site Waste Management Plan (SWMP) for the demolition and construction phase in order that waste is minimised, and litter is managed properly; optimising of construction scheduling for material use; identification of neighbouring businesses / land users for reuse of waste materials; and partnership with local recycling facilities.
- 18.3.16 Extending into the operational phase each occupant of the Proposed Development will establish their own waste management strategies for the management of generated materials. All waste arising forecasts will be annualised, with demolition works spread over four years, and construction works spread over 10 years in line with the Proposed Development phasing programme.

Significance Criteria

- 18.3.17 Effects that are deemed to be significant for the purposes of this assessment are those that are described as being of a moderate or major beneficial or adverse level.
- 18.3.18 The generation of waste associated with the demolition / construction and operational phases of the Proposed Development will have an impact upon the local and sub-regional waste management infrastructure. An assessment of the impacts of the Proposed Development on waste management infrastructure during construction and operation has been carried out.
- 18.3.19 The proposed assessment criteria are consistent with those adopted for other developments when waste management has been considered as part of an EIA, and some degree of professional judgement has been used for this purpose. The criteria relate to scheme effects and the approximate expected increase in waste generation from the Proposed Development. The assessment criteria, detailed in Table 18.2, range from major, where the Proposed Development results in a 10% increase in

construction waste (during the construction phase) or commercial waste (during the operational phase), to neutral, where no net waste generation is anticipated.

Table 18.2 Magnitude of Change	
Magnitude	Environmental Impact
Very High	<i>>10% increase in waste generation and treatment relative to sub-regional baseline.</i> Severe or irreversible adverse environmental or human health effects (e.g., pollution of controlled waters and terrestrial habitats, and/or uncontrolled landfill gas emissions), or major detrimental effects to local amenities from dust, litter, odour, or pests. Severe permanent reduction in landfill void space capacity on a local and regional scale. Need for large-scale waste treatment facilities to protect against adverse environmental effects. During construction this is a short-term effect. When operational this is a long-term effect.
High	<i>5-10% increase in waste generation and treatment relative to sub-regional baseline.</i> Major environmental or human health effects or major effects to local amenities. Major, local-scale reduction in landfill void space capacity. Need for appropriate waste treatment facilities to protect against adverse environmental effects.
Medium	<i>2-5% increase in waste generation and treatment relative to sub-regional baseline.</i> Moderate environmental or human health effects or moderate adverse effects to local amenities. Moderate, local-scale reduction in landfill void space capacity. Need for medium-scale waste treatment facilities to protect against adverse environmental effects.
Low	<i>Up to 2% increase in waste generation and treatment relative to sub-regional baseline.</i> Minor environmental or human health effects or insignificant detrimental effects to local amenities. Slight local scale reduction in landfill void space capacity reversible with time. Need for small-scale waste treatment facilities to protect against adverse environmental effects. No appreciable adverse environmental or human health effects or detrimental effects to local amenities.
Very Low	<i>No change in net waste generation.</i> No impact is predicted.

18.3.20 Construction phase and operational phase effects will differ by timescales as well as magnitude. Construction phase effects will be relatively short-term in impact, and operational phase effects are likely to have more long-term impacts.

18.4 Baseline Conditions

Site Description

18.4.1 The Site is located within the Inner Harbour area of Cardiff Bay, Cardiff. The Site description and a description of the Proposed Development are included within Chapters 2 and 3 of the ES (Site Description and Development Description).

18.4.2 The Site of the Proposed Development is currently utilised for commercial and leisure use, including Cardiff Council's County Hall building, the Red Dragon Centre and a Travelodge hotel.

Current waste volumes

18.4.3 Demolition and construction waste generation tonnages are notoriously difficult to quantify due to the lack of sufficiently detailed reporting requirements in this sector. Nevertheless, an estimate of the generation of waste was conducted by Natural Resource Wales in 2012 through the Wales Construction and Demolition Waste Generation Survey 2012. This identified an annual generation of 1,437,000 tonnes of construction and demolition waste in South East Wales.

18.4.4 Commercial waste arisings are similarly difficult to quantify due to lack of relevant reporting metrics. Typically, the quantity of commercial and industrial waste arisings generated by an area is similar in quantity to those from households. Household waste generation in Cardiff for 2019/2020, was 171,528 tonnes.

18.4.5 The baseline waste management of the local region is a factor of both the current waste generation amount and the capacity of local facilities to handle the waste, as described below.

Current waste facilities

18.4.6 There are numerous permitted waste facilities available for the management of construction, commercial, and industrial waste in the Cardiff area. Table 18.3 shows the facilities near to the Site.

18.4.7 Cardiff Energy Recovery Facility (ERF), Trident Park, is the largest ERF in Wales treating waste from the local authority and local business contracts. The facility, which has operated since 2014, handles around 350,000 tonnes of residual waste (non-recyclable) waste, per year. It diverts at least 95% of South Wales residents' waste away from landfill and generates 250 Gigawatt hours (GWh) of electricity for the National Grid. Trident Park ERF is operating around 35% above the energy efficiency threshold.

18.4.8 Businesses in Cardiff are encouraged to use the Commercial Recycling Centre to dispose of recycling and trade waste, to increase the amount of commercial waste diverted from landfill. This service is available for commercial businesses, including the building and construction industry. In relation to the different phases of the Proposed

Development, this service can be used for the demolition, construction, and operational phases.

Site	Permit Number	Type	Category	Distance from Site (straight line)	Capacity (tonnes per annum)	Operator	Phase applicable
Barry Plant	BB3096CB	Physical treatment infrastructure	Use / treatment of inert waste for land reclamation or construction	10km	75,000	BDC Aggregates Ltd	Demolition and construction
British Soil Western Ltd	WP3299FE			6km	74,999	British Soil Western Ltd	
URA Cardiff Docks Site	PB323-RV			1km	75,000	United Recycled Aggregates Ltd	
Horan Clipper Road Site	TB3690HP			1km		Horan Construction Ltd	
South Wales Exports LTD	BB3293NH	Disposal Infrastructure	Metal Recycling Site	10km	75,000	South Wales Exports Ltd	Demolition and construction
Sims Tremorfa	AB3993ZF		1.5km	74,999	Sims Group UK Limited		
Biffa Viking Place Waste Transfer Stn	SP3795FZ		I&C MRF	1km	74,999	Biffa Waste Management Ltd	Operational
Soil Screening and Recycling Facility	FB3937RH	Disposal Infrastructure	Inert Landfill Site	3km	74,999	Green Circle Sustainable Developments Ltd	Demolition and construction
ERF	LP3030XA	Thermal treatment infrastructure	Energy Recovery Facility	0.5km	350,000	Viridor	Operational
Whitehall Landfill	MP3036SS	Disposal Infrastructure	Inert Landfill Site	7.5km	200,000	CEMEX UK Materials Ltd	Operational

18.4.9 Total capacity identified for utilisation during the demolition and construction phases of the development is 525,000 tonnes per annum, predominantly consisting recovery to land, but also inert landfill for non-recoverable materials, and recycling facilities for segregated and high value streams.

18.4.10 Total capacity identified for utilisation during the operational phase is 625,000 tonnes per annum, including recycling, recovery, and disposal outlets.

Receptors

18.4.11 The receptors which have been considered in the assessment relating to construction and operational waste are identified in Table 18.4.

Designation	Receptors
Very High (e.g., International)	Recycling and material recovery infrastructure internationally
High (e.g., National)	Recycling and material recovery infrastructure in the UK
Medium (e.g., Regional / County)	Recycling and material recovery infrastructure in South East Wales Inert and residual landfill and recovery infrastructure in South East Wales
Low (e.g., Local)	Recycling and material recovery infrastructure in Cardiff Inert and residual landfill and recovery infrastructure in Cardiff
Negligible	Residents, businesses, and other sites e.g., habitats and other designated sites, from litter and other wind-blown waste dispersal.

18.4.12 The receptors identified reflect that the overwhelming majority of generated waste during both the demolition / construction phases and the operational phase should be controlled and collected in specifically designed infrastructure before processing at a suitable location locally and within the overall sub-region. During the construction and operational phases of the Proposed Development there is the potential for airborne litter to leave the Site, however this would be limited by the implementation of a SWMP. It is expected that occupants at the individual plots will provide suitable litter bins and waste receptors e.g., at vehicle parking locations, and encourage employees and contractors / visitors to act responsibly. Any litter bins will be emptied regularly by the operation of the waste management contractors at the Site.

18.4.13 Receptors have been identified as detailed above within Table 18.3 outlining local waste management infrastructure. Suitable receptors are those that accept the specified material, as permitted by the national regulator, Natural Resources Wales (NRW) Receptors have been reviewed and are based on their ability to accept the waste material, capacity available, geographic proximity to the Proposed Development Site, and position in the waste hierarchy.

18.4.14 The receptor facility will differ by material produced. During the demolition and construction phases most waste is anticipated to be inert, non-hazardous construction and demolition waste materials. This will typically either be reused on Site, recycled

as aggregate, or as a last resort, disposed of to landfill. Some construction materials will be recoverable for either recycling or energy recovery applications such as metals, plastics and wood. Where possible waste will be separated and a suitable Materials Recycling Facility (MRF) or Energy Recovery Facility (ERF) utilised, if available.

18.4.15 During the operational phase of the Proposed Development a range of wastes will be generated, such as commercial, green, food, packaging, and residual material streams. Where possible waste will be separated into different material streams at the point of generation.

18.4.16 Appropriately sized access and turning areas will be available for waste collection vehicles, which will be managed under waste collection contracts using registered waste carriers.

Limitations

18.4.17 The baseline data is limited by availability of up-to-date data regarding both construction and demolition, and commercial and industrial waste arisings at a local level. To compensate for this data limitation the local treatment capacity is also assessed. All treatment capacities are maximum permitted throughputs and do not necessarily reflect the sites current operations.

18.5 Assessment of Effects

Design Solutions and Assumptions

18.5.1 During all phases of the development the assessment assumes that no mitigation measures are put in place to limit the generation of waste arisings over and above legislative requirements and typical industry practice.

Assessment of Effects

18.5.2 The generation of waste associated with the demolition / construction and operational phases of the Proposed Development will have an impact upon the local and sub-regional waste management infrastructure. An assessment of the impacts of the Proposed Development on waste management infrastructure during construction and operation has been carried out.

18.5.3 Construction and demolition waste is stated to be “waste materials which arise from the construction or demolition of buildings and/or civil engineering infrastructure, including hard construction and demolition waste and excavation waste, whether

segregated or mixed”. This is the definition given in the survey of Arisings and use of Demolition and Construction Waste in England and Wales (2012).

Demolition phase

- 18.5.4 During the development of the Site, demolition will comprise the demolition of the buildings associated with the existing Travelodge hotel, Red Dragon Centre, and the County Hall Building Some of these buildings may contain asbestos which is a hazardous waste. Asbestos will need to be disposed of according to the Control of Asbestos Regulations 2012.
- 18.5.5 Other wastes from the demolition of the properties such as bricks, wood, metal, and stone have the potential to be re-used on-site or recycled off-site.
- 18.5.6 Under the waste hierarchy it is expected that the vast majority of material to be discarded (waste) can and will be recycled or recovered for another purpose.
- 18.5.7 The total quantity of waste generated through the demolition of existing buildings on the Site is estimated at 153,450m³. This converts to approximately 49,104 tonnes of waste. Given a four-year demolition period, the average annual waste generation at the Site from demolition activities will be **12,276 tonnes**. This represents 2.3% of the available local treatment capacity and therefore has a minor environmental impact. The generation of demolition waste forecast from the Proposed Development, as shown in Table 18.5, does **not constitute a significant effect**.

Table 18.5 Significance of Effect – Demolition Phase				
Nature of Impact	Receptor Sensitivity	Environmental Impact	Significance of Effect	Confidence Level
Generation of waste for treatment or disposal using local infrastructure	Low	Medium	Minor adverse	Medium / High

Construction phase

- 18.5.8 The likely quantities of mixed construction waste arisings have been assessed using the Building Research Establishment’s (BRE) SMARTwaste Benchmark Data. Two Environment Performance Indicators (EPis) are available using this benchmark. For this assessment the calculation based on land use, rather than project value, has been used due to the higher confidence level associated with this metric.

18.5.9 The data from approximately 1,500 projects has been analysed and the average EPIs for different project types relevant to the Proposed Development are provided in Table 18.6.

18.5.10 To convert the volume of waste from volume to mass, a conversion factor of 0.32 has been applied to the volume of construction waste.

Table 18.6 BRE SMARTwaste benchmark for New Build Construction waste		
Project type	Average EPI (m ³ Waste/100m ² floor area)	Tonnage of waste
Residential (C3)	11,020	3,526.4
Public Buildings (D1)	3,654	1,169.28
Leisure (D2)	1,660.5	531.36
Commercial Retail (A1 & A3)	1,882.5	602.4
Commercial Offices (B1)	3,919.5	1,254.24
Total	22,136.5	7,083.68

18.5.11 The construction will be phased over a 10-year period. The annual construction waste will be 2,213.65m³ which is equivalent to **708.37 tonnes**, and 0.13% of local infrastructure.

18.5.12 Given the high priority accorded to reduction of site general waste, arisings during the construction phase will be minimised. It is difficult to quantify general site waste, and this type of waste will include waste from workers using the compounds at the Site and some mixed construction waste unsuitable for re-use at the Site. It is anticipated that some of this may be stored and re-used elsewhere on the Site during the phased construction, although most of this waste is expected to be taken off-site for disposal or recycling. With the implementation of an SWMP it is expected that adverse environment effects will not occur from the storage, handling, and transportation of general site waste. The need to dispose of this off-site is considered to be a negligible / minor and temporary adverse effect.

18.5.13 The generation of construction waste forecast from the Proposed Development **does not constitute a significant effect**, see Table 18.7.

Table 18.7 Significance of Effect – Construction Phase				
Nature of Impact	Receptor Sensitivity	Magnitude of Change	Significance of Effect	Confidence Level
Generation of waste for treatment or disposal using local infrastructure	Low	Low	Negligible	High

Operational phase

18.5.14 The waste generation amounts for the operational phase of the Proposed Development has been estimated using BS 5906:2005 Waste Management in Buildings. For this assessment and in terms of the predicted amounts of waste generated, this can be divided into commercial, entertainment and residential waste types. However, it should be emphasised that the types and make-up of commercial and industrial wastes can be very diverse, and in the operational phase will be dependent on the final occupancies of the buildings.

18.5.15 To convert the volume of waste from volume to mass, a conversion factor of 0.27 has been applied to the volume of operational waste. Table 18.8 shows the anticipated weekly waste arisings, annual waste arising and tonnage of waste per annum from the operational phase.

Table 18.8 Operational waste categorised by land use				
Land use	Formula	Weekly waste arising (litres)	m ³ annum (*52/1000)	Tonnage of waste per annum
Arena	Volume per m2 of floor area [5l] x floor area [40,894]	204,470	10,632.4	2,870.8
Hotel	Volume per bedroom [250l] x number of bedrooms [182]	45,500	2,366	638.8
Shopping centre	Volume arising per m2 of sales area [10l] x square meterage [16,175]	161,750	8,411	2,270
Residential	Number of dwellings [1,050] x {(volume arising per bedroom [70l] x average	171150	8,899.8	2,403.1

	number of bedrooms [1.9] + 30}			
Office	Volume arising per employee [50] x number of employees	3,493.8	181.7	49
Food and beverages	Volume per number of covers [75] x covers [2002]	150,150	7,807.8	2,108.1
4* hotel	Volume per bedroom [350] x number of bedrooms	52,500	2,730	737.1
Apartment-Hotel	Volume per bedroom [250] x number of bedrooms [298]	74,500	3,874	1,045
Museums	Volume per m2 of floor area [10] x floor area [8,400]	84,000	4,368	1,179.36
Leisure	Volume per m2 of floor area [100] x floor area [6,200]	620,000	32,240	8,704.8
Total¹		1,567,513.8	81,510.7	22,006.06
[#] The waste arisings from the food and beverages have been calculated using the assumptions of 15ft ² per seat, and that 60% of the allocated 4,650m ² floor plan is for service areas.				

18.5.16 Using the BS 5905:2005, the total tonnage of operational waste per annum is 81,510.7m³ or **22,006.06 tonnes**. This represents 3.52% of available local infrastructure. It is worth noting that the Arena, hotel and Red Dragon Centre will replace existing facilities, so the increase to waste arising from these facilities should be considered against these reductions.

18.5.17 The generation of operational waste forecast from the Proposed Development **does not constitute a significant effect**, see Table 18.9.

Nature of Impact	Receptor Sensitivity	Magnitude of Change	Significance of Effect	Confidence Level
Generation of waste for treatment or disposal using local infrastructure	Low	Medium	Minor adverse	High

18.6 Mitigation

Construction phase

- 18.6.1 In order to minimise the generation of waste, a detailed Site Waste Management Plan (SWMP) will be prepared. The SWMP will be prepared in advance of Site clearance and other preparatory works, and prior to any construction work. The SWMP may form part of the overall Construction Environmental Management Plan (CEMP) and will be prepared in consultation with the appointed Contractor(s). However, due to the scale of the Proposed Development, it would be preferable to prepare and operate the SWMP as a separate system, with links to the CEMP where appropriate. This would ensure waste management and the reduction of waste during the construction phase is dealt with in a rigorous and focused manner and is not diluted by being an addendum to the CEMP.
- 18.6.2 The CEMP is a means by which recommended environmental mitigation measures can be implemented at the Site from the start of preparatory enabling works, through to the completion of the development. The CEMP will be agreed with Cardiff Council and other appropriate authorities, prior to commencement of works at the Site. The Contractors will be obliged to comply with all the requirements of the CEMP. CEMPS will come forward as different phases of the development progress to reflect different stages of the development and construction process.
- 18.6.3 Compliance with the SWMP will ensure that general Site waste will be re-used or recycled wherever possible, either on-site or off-site. The generation of waste, and its segregation, storage, disposal, and treatment will be controlled and monitored by means of the SWMP and also by the implementation of an over-arching CEMP.
- 18.6.4 Although the masterplan area is large, the area of the site for the Arena and Hotel is constrained in terms of space and this is where works will be first taking place. The site needs to accommodate for crushing and waste sorting facilities to treat and recycle waste e.g., convert stone into aggregates; and sort, store and recycle plastic / wood and packaging material etc., in accordance with a SWMP.

Operational phase

- 18.6.5 In order that current and predicted national and regional recycling targets can be achieved, the buildings will be designed to encourage segregation and recycling of wastes. Design features for the buildings will ensure end-users have access to waste management and recycling facilities. This must be carried out in order that the

properties meet local policies with regard to waste management. These features will allow waste to be collected easily through collection schemes.

- 18.6.6 As the masterplan for the Proposed Development is illustrative, the type of commercial activities cannot be specified in detail for each of the building plots, and therefore the exact specifications for the number and type of waste receptacles cannot be defined. However, contracts drawn up between the final occupiers and waste contractors will ensure that waste is properly managed, according to best practice and guidance.
- 18.6.7 The provision of waste storage and segregation facilities for commercial properties will depend on the size and use of the building. / Use.
- 18.6.8 Commercial property users will be provided with facilities to assist in the safe storage and segregation of recyclables, prior to collection. The design of storage areas will be in accordance with appropriate best practice guidelines, and internal and external design features for waste segregation and storage will be considered. For commercial buildings, this is linked to greener buildings guidance and Energy Performance Certificates which have been mandatory for all commercial buildings since 2008.
- 18.6.9 The plots e.g., vehicle parking areas will also be provided with litter bins for use by people working at and visiting the Site. The number of waste receptacles and litter bins is currently not known and will be refined at the final design stage. It is expected that any waste receptacles and litter bins provided at the Site will be emptied regularly under procured contracts, the waste being properly disposed of or treated in licensed facilities. This will include commercial collection services for all commercial activities on site, and public sector collections from the residential properties.
- 18.6.10 Provision will be made for the storage of the necessary waste containers as described above, which may include temporary storage of green waste. It is anticipated that all green waste produced during the operational phase of the development will be composted off-site.

18.7 Residual Effects

Operational Phase

- 18.7.1 The mitigation will include design aspects for the provision of waste receptacles that are appropriate and accord with business best practice for the mixed uses that are accommodated within the Site. Litter will be prevented by the provision of litter bins

with management contracts for litter removal, thereby preventing litter being a wind-blown problem at nearby receptors including residential properties.

18.7.2 There will be an increase in commercial waste above the baseline situation, but this will be a small increase in terms of the waste totals that are currently managed within the Cardiff area.

18.7.3 The overall impact and effect of the Proposed Development in terms of waste issues during the operational phase is highlighted in Table 18.10. The overall significance of effect is expected to be **not significant**.

Table 18.10: Residual Significance of Effect - Operation Phase						
Nature of Impact	Receptor Sensitivity	Environmental Impact	Significance of Effect	Confidence Level	Mitigation	Residual Significance of Effect
Increase in commercial waste above baseline	Low	Low / Medium	Negligible / Minor adverse	High	Good design features for encouraging recycling. Contracts between end users and Waste Management contractors to ensure proper waste management is addressed. Provision of waste storage facilities.	Not significant

18.8 Assessment of Cumulative Effects

18.8.1 Cumulative impacts with regards to waste and material management may occur when two or more major developments are under construction or are operational within the same catchment at the same time. Potential cumulative impacts include excessive increases in waste generation over a short timescale, or cumulatively over time during the operational phase. These have the potential to exceed available local capacity and

will necessitate an increase in distance to disposal or treatment options, or the treatment of waste being forced down the waste hierarchy.

18.8.2 Eighteen major developments have been identified within proximity of the Site, details of which are included within Chapter 5 (Approach to Environmental Impact Assessment).

18.8.3 It is expected that any increase in demand for waste management infrastructure resulting from these developments when in construction will remain negligible. It is expected that construction will be undertaken in line with industry best practice, and the implementation of a CEMP where appropriate.

18.8.4 It is expected that any increase in demand for waste management infrastructure resulting from these developments when fully operational will cumulatively be comparable to that expected from the Proposed development.

18.8.5 It is assumed that any other committed development will adhere to industry best practice and relevant legislation during construction and operation, utilising permitted waste disposal and treatment facilities. As such, it is believed that the other committed developments, in combination with the Proposed Development, will not result in any significant inter-cumulative or intra-cumulative effects.

18.9 Conclusion

18.9.1 This Chapter assessed the significance of effect of the Proposed Development on the potential receptors and impacts in relation to Recoverable Materials and Waste.

18.9.2 There are numerous waste treatment and disposal facilities within 10km of the Site, and therefore it is well-served in terms of minimising transportation requirements for the removal and treatment of waste.

18.9.3 There are three phases that will take place during the development of the Site, relevant to waste management practices:

- demolition (of existing buildings).
- construction (of buildings and associated infrastructure); and
- Operation (of the Proposed Development).

18.9.4 In line with the waste hierarchy, it is expected that the vast majority of material from the demolition of the buildings will be recycled or recovered for another purpose. The impact on local recycling, recovery for reclamation, and inert landfill outlets for these

waste streams is considered to be of minor adverse significance. Overall, the demolition of the buildings will not cause significant impacts on the environment.

18.9.5 Given the high priority accorded to reduction of site waste, general waste arisings during the construction phase will be minimised. With the implementation of an SWMP it is expected that adverse environment affects will not occur from the storage, handling, and transportation of general Site waste. The need to dispose of this off-site is considered to be a negligible during this phase of development, and therefore would not constitute a significant impact on the environment.

18.9.6 For the Operational Phase, the assessment has concluded there will be an increase in commercial waste above the baseline situation, but this will be a small increase in terms of the waste totals that are currently managed within the Cardiff area. With mitigation, the overall significance of effect is expected to be negligible to minor adverse. The assessment of additive or cumulative impact of other developments in the vicinity has concluded that under a worst-case scenario, there would be a minor adverse impact over the long term. With mitigation this could be reduced, as detailed in Section 18.6.