
15 Construction Waste

- 15.1.1 This chapter considers wastes arising during the excavation, demolition and construction required to develop the IBA Facility. It seeks to quantify the amount of waste arising where practicable as well as identify the different types of materials and how they will be managed. The assessment also seeks to assess the potential environmental impacts associated with the handling and disposal of the waste arising and where appropriate propose mitigation measures for avoiding and minimising any negative effects.
- 15.1.2 For the purposes of this assessment, 'waste' is defined as: *"any substance or object which the holder discards or intends or is required to discard"*, as specified by Section 75 (2) of the Environmental Protection Act 1990 and comprises the following distinct elements:
- Excavation – produced from earth moving activities;
 - Demolition – produced from demolition of existing buildings/structures; and
 - Construction – produced from construction of new buildings/structures.
- 15.1.3 Vast amounts of waste produced in the UK each year end up in landfill. Better use of inert waste materials, particularly construction and demolition waste, to substitute primary materials is identified as one of the key elements in the reduction of waste nationally. The Government's strategy for managing waste and resources is based on the waste hierarchy – prevention, minimisation, re-use, recycling, energy recovery and disposal.

15.2 Relevant Legislation and Policy

- 15.2.1 **Site Waste Management Plan Regulations 2008** (Ref 15-1) - The Site Waste Management Plans Regulations came into force on 6 April 2008 making Site Waste Management Plans (SWMP) compulsory for all construction projects in England costing over £300,000. A SWMP records the amount and type of waste produced on a construction site and how it will be reused, recycled or disposed of.
- 15.2.2 **Waste Strategy for England 2007** (Ref 15.2) – The Waste Strategy for England aims to break the link between economic growth and waste growth and put more emphasis on waste prevention and re-use. It also aims to meet and exceed the landfill diversion targets including for non-municipal waste. The strategy also seeks to reduce greenhouse gas emissions from waste management and to achieve an annual net reduction of at least 9.3 million tonnes of carbon dioxide equivalent per year compared to 2006.

- 15.2.3 To stimulate diversion of construction and demolition waste from landfill, the Government is considering, in conjunction with the construction industry, a possible new target of halving the amount of waste going to landfill by 2012 as a result of waste reduction, re-use and recycling.
- 15.2.4 **PPS10: Planning for Sustainable Waste Management** (Ref 15.3) – PPS10 sets the overall planning framework for waste and seeks to drive waste management up the waste hierarchy, addressing waste as a resource and only disposing of it as a last resort. PPS10 encourages implementation of Site Waste Management Plans for all proposed new developments to help in identifying the type of material to be demolished and/or excavated, opportunities for the re-use and recovery of materials and to demonstrate how off-site disposal of waste will be minimised and managed.

15.3 Assessment Methodology

General Approach

- 15.3.1 As noted in the introduction, this assessment seeks to characterise the nature and likely amount of waste generated during the construction phase of the proposed development. It also assesses the potential environmental impacts associated with the management of these wastes.
- 15.3.2 The various waste materials from excavation, demolition and construction will be assessed to determine whether they should be prioritised for either waste minimisation or recycling/re-use. Factors influencing prioritisation include the potential hazard the material may pose to the environment, the benefits of its re-use or minimisation, its annual waste volume (where quantities are provided) and whether any potential or ready markets exist for its recovery.

Demolition and Excavation

- 15.3.3 Demolition waste is defined as “*waste materials, which arise from the construction or demolition of buildings and/or civil engineering infrastructure, including hard construction, demolition and excavation waste, whether segregated or mixed*” (Hurley *et al*, 2001 Ref 15.6). It is further broken down into three categories as follows:
- Hard construction demolition waste – either segregated or mixed unprocessed/uncrushed materials (particularly concrete, masonry, bricks, tiles, etc);
 - Excavation waste – naturally occurring soil, stone, rock and similar materials (whether clean or contaminated) which have been excavated as a result of site preparation activities; and

- Mixed hard construction and demolition waste – a physical mixture of the above.

15.3.4 Assessment of demolition waste will focus on the waste types likely to be produced and how they should be managed.

Construction

15.3.5 As there is no recognised methodology for estimating construction waste arisings, one has been developed to estimate volumes of arisings based on Environmental Performance Indicators (EPIs) developed by BRE using data from the SMARTStart System (Ref 15.7). Table 15.1 sets out the most up to date EPIs. These data were updated on 31st August 2010 and are continuously being revised as more developers and contractors enter waste data for their projects into the SMARTStart system.

Table 15.1 Environmental Performance Indicator: volumes of construction waste arising

Project Type	m ³ waste / 100 m ² floor area	m ³ waste / £100K project value
Residential	17.3	12.8
Commercial Offices	19.9	9.6
Commercial Other	12.5	9.3
Commercial Retail	20.8	17.3
Education	21.3	10.5
Healthcare	15.8	9.6
Industrial Buildings	17.2	11.9
Leisure	15.8	9.0
Public Buildings	24.6	12.8

Source: BRE SMARTStart Summer 2010 EPIs Ref 15.7

- 15.3.6 To estimate waste arisings, floor area is multiplied by the appropriate EPI (for industrial buildings) given in Table 15.1 above. The likely composition of construction waste is based on a regularly cited source on construction waste composition (Hurley *et al*, 2001 Ref 15.6).

Determination of Significance

- 15.3.7 There are no nationally agreed criteria for assessing the magnitude of impacts or significance of effects arising from waste management. Each project is evaluated according to its individual characteristics. Overall, the fundamental purpose of a waste management assessment is to characterise waste types and arisings and to identify the existing and potential methods employed for their management.
- 15.3.8 The significance of the effect (whether beneficial or adverse) is largely conditioned by the type, location and capacity of local and regional waste management facilities and their ability to manage waste in an environmentally responsible way. However, an assessment of the likely effects that arise at the waste management facilities is outside the scope of this assessment and it is assumed that waste carriers and waste management companies will adhere to any conditions imposed upon them as a result of planning or environmental regulations.
- 15.3.9 The significance of effects for the purposes of this study will be determined largely by professional judgement, taking account of the predicted waste arising and local waste management strategies and policies. The significance of effect will be rated according to the following scale:

- **Major** – an effect which in isolation could have a material influence on planning decision making process – this would be considered significant;
- **Moderate** – an effect which on its own could influence decision making, particularly if combined with other similar effects – likely to be significant, judgement to be applied;
- **Minor** – an effect which on its own is likely to have negligible influence on planning decision making when combined with other effects could have a more material influence – less likely to be considered significant, a judgement needs to be applied; and
- **Negligible** – no effects, not significant.

15.4 Assessment of Materials and Waste Management Methods

Demolition and Excavation Waste

- 15.4.1 **Demolition** - Currently, the site is mostly vacant with temporary portacabins and mobile plant. No other buildings are found on site and so demolition activities will be limited to the excavation of the outcrop of dolerite rock.
- 15.4.2 **Excavation** - It is expected that there will be excavated materials arising as a result of rock blasting and earth moving activities associated with the construction of the proposed IBA and MRF facilities. Assuming that the excavated materials will be suitable for re-use on an industrial site, it is planned that the cut and fill quantities will be balanced on site to avoid any off-site disposal. Dolerite will be stored until the market enables the re-sale of this mineral resource.
- 15.4.3 **Contaminated materials** - The site is classed as a green-field site. It is underlain by bedrock. Historic ground investigations indicate that there is very limited potential for contamination from the items previously stored on site. Further details on contaminated materials and proposed methods of management are presented in Chapter 10.
- 15.4.4 In terms of waste management methods used, it is anticipated that:
- 15.4.5 **Re-use** – Excavated material (soils) will be retained on site for re-use as backfill while hard rubble will be crushed and re-used on site. Where the product can be sold on as a viable resource it will be stored until market conditions improve. Unsuitable material for engineering fill will be used for landscaping. Drainage arisings will be used in engineering fill/and or landscaping. Top soil will be limited.

15.4.6 **Recycling** – It is expected that some concrete and tarmac will arise from the re-working of the access road. In addition there will be inert materials from the MRF facility. This material can be treated to produce high quality recycled aggregates either by using crushing and/or screening processes off site or on site. Once treated the recycled concrete aggregate will be used as hardcore or back fill in excavated areas to substitute virgin aggregates. Concrete can be used as hardcore and back fill where high strength and aesthetics are not of importance.

15.4.7 **Disposal** – Waste that cannot be re-used or recycled is likely to end up in landfill. Any hazardous waste arisings will be dealt with by a licensed operator and disposed of at a secure site.

Construction Waste

15.4.8 The likely amount of waste arising from the construction of the proposed facility has been calculated in accordance with the methodology set out in section 15.3. To arrive at estimated arisings, floor area is multiplied by the appropriate EPI (17.2 for industrial buildings) as shown in Table 15.3 below.

15.4.9 Just over 335 cubic metres of waste are anticipated to be generated during construction. It should be noted that this figure is indicative and the actual amounts will be established through preparation and implementation of the Site Waste Management Plan (see Appendix 15.1 for an outline) once construction activities commence.

Table 15.3 Estimated Volumes of Construction Waste

Element of Proposed Development	Estimated Floor Area (sq metres)	Cubic metres of waste / 100 sq metres floor area*	Estimated Volume of Construction Waste (cubic metres)
Main IBA building ⁽¹⁾	700	47	335
Main MRF plant	360	0	10
Total	1060	47	345

Note 1: This value relates to the total waste from construction of IBA processing yard and IBA building.

15.4.10 In the absence of a material schedule for the types of materials to be used to construct the proposed facilities, a regularly cited source on construction waste composition by Hurley *et al.* 2001 (Ref 15.6) has been used. The range and mean averages from the study are shown below in Table 15.4. These data give an indication of the composition of construction waste likely to be generated at the development.

15.4.11 Any scrap metal likely to arise from the MRF facility will be sent for recycling off site. Good practice is to segregate metals on site by type.

Table 15.4 Construction Waste Streams

Waste Group	Average % by mass	Range (6 projects) % by mass
Timber	19.3	11-33
Concrete	5.9	0.5-18
Inert – bricks, masonry, rubble, hardcore, asphalt, sand and stone	11.1	0.5-27
Ceramic	3.0	3-11
Insulation	2.5	1-11
Plastic	13.0	1-11
Packaging	25.7	8-37
Metal	2.6	0.5-8
Plastic and cement	3.1	0.5-12
Miscellaneous	13.8	7-9
Total	100.0	N/A

Source: Hurley et al. 2001 (Ref 15.6)

15.4.12 It is anticipated that the following management methods will be used to deal with the construction waste arising:

15.4.13 **Re-use-** Cardboard can be re-used on site provided it is kept clean and dry. Plastic sheeting can also be re-used as weather protection; pallets can be re-used on site in moving materials around and polypropylene bags can be used for storing waste. Left over paints can be mixed together and re-used as undercoat. Insulation materials may have potential for re-use but safe storage is required to avoid damage.

15.4.14 **Recycling** – There is potential to recycle plastics if they are properly segregated to avoid contamination. Cardboards can also be recycled as well as timber/wood which can be shredded and used for the manufacture of fibre and chip boards. However, wood for these processes

should be uncontaminated. Empty tins can also be recycled depending on the type of metal they are made from.

- 15.4.15 **Disposal** – Residual waste that cannot be re-used/recycled or that is hazardous is likely to be sent to landfill.

15.5 Mitigation

- 15.5.1 The proposed mitigation measures focus on promoting sustainable waste management in line with the waste hierarchy. They also focus on integrating good site management practices to ensure resource efficiency and reduce potential for any other negative environmental effects like odour and litter.
- 15.5.2 In order to minimise the volume of waste generated during the construction of the MRF and IBA Facility, the contractor will prepare a Site Waste Management Plan. An outline SWMP has been prepared and is presented in Appendix 15.1. The SWMP should cover the following elements, where applicable to each phase:

General Practices

- An approved person will be nominated to be responsible for good site practice. Their responsibilities should include arranging collection and effective disposal to an appropriate facility (including efficient recording of transfer notes) of all waste generated at the site;
- A system for recording and monitoring the amount of waste generated, recycled and disposed of (including the disposal site location) will be established; and
- Training will be implemented for relevant site personnel in proper waste management handling procedures.

Reduction of Waste

- Site practices will be in place to minimise the potential for damage or contamination of construction materials (for example designated areas for storage);
- Work activities will be planned effectively in order to minimise over-ordering of construction materials;

- Prefabricated panels will be used in construction, where feasible, in order to reduce waste generation on site and associated transportation impacts; and
- Purchasing power will be used to minimise materials packaging and ensure that packaging is recyclable where feasible.

Re-use / Recycling

- Cut and fill management will be employed during construction, in order to maximise re-use of the inert demolition materials on-site;
- Waste will be monitored, sorted and stored in as many categories as appropriate to enhance re-use or recycling of materials (avoid cross contamination) and ensure their proper disposal;
- On-site concrete crushing and screening of materials will be used to generate secondary aggregate for the development. This material can be used in various elements of the construction including as a sub-base for minor roads and pathways;
- Where structural and durability issues are not compromised, materials will be specified from recycled sources; and
- Where inert demolition and construction materials cannot be re-used on site, potential off-site users should be identified and the plan developed for delivery of materials. Where materials cannot be re-used or re-cycled they will be taken to the EfW facility. Most waste has a calorific value and can be processed in the EfW plant.

Disposal

- General site waste will be stored in enclosed bins or compaction units separate from demolition and construction waste. A reputable collector will be employed by the contractor to remove general refuse from the site, separately from the demolition and construction wastes, to minimise potential odour and litter impacts;
- Any excavated soils removed from site for disposal to a landfill will undergo Waste Acceptance Criteria (WAC) testing in order to correctly classify the material in terms of waste disposal. The results of the WAC testing will be supplied to the chosen waste acceptor at an early stage of the development in order to locate a suitable landfill site;
- Any materials that are hazardous will be removed and managed by appropriately licensed contractors; and

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- Where construction and demolition waste cannot be re-used or recycled on or off site a reputable collector will be employed by the contractor to remove this waste to landfill.

15.6 Assessment of Effects and Significance

- 15.6.1 The direct effects of the waste arising from demolition and construction on the environment are judged to be negligible (see definitions in paragraph 15.3.9), on the basis that a Site Waste Management Plan is implemented. This is because the expected type of waste arising is largely inert and is expected to be re-used.
- 15.6.2 The effects of any hazardous/contaminated materials are discussed in Chapter 9 of this ES. Previous ground investigations at the site have not encountered significant concentrations of contaminated soils. If contamination is encountered during site works it should be reported to the Local Authority and may require remediation and/or collection by a specialised hazardous waste operator and subsequent disposal at a licensed facility.

Table 15.5 Impacts and Significance

Impact	Comments	Nature of Impact	Anticipated Effect Significance	Mitigation	Residual Effect
Demolition waste arisings	Demolition waste is expected to arise from demolition Dolerite outcrop	Temporary	Minor to negligible	Implementing a SWMP to ensure the minimisation of waste and maximise the amount reused on site. Hazardous waste will be handled and disposed of in an appropriate manner.	Negligible
Excavation waste arisings	Excavation materials will be generated from quarrying activities	Temporary	Minor to negligible		Negligible
Construction waste arisings	Approximately 335 cubic metres of waste are anticipated to be generated as a result of construction	Temporary	Minor to negligible		Negligible

15.7 Conclusion

- 15.7.1 The proposed development will require quarrying of the Dolerite outcrop, excavation of materials during earth moving activities, construction of new buildings to house the proposed MRF and IBA Facility, and infrastructure, and landscaping. This assessment has focused on the likely quantities and types of materials arising from these activities and how they should be managed.
- 15.7.2 It is expected that the majority of the waste arising will be re-used on site and only small quantities are likely to be sent for re-use, recycling, recovery or disposal off site. Waste that is not suitable for re-use, recycling or recovery will be disposed of to a licensed facility. Any hazardous waste arising will be dealt with by a specialised hazardous waste operator.
- 15.7.3 No significant environmental effects are envisaged.

15.8 References

- 15.1 Site Waste Management Plan Regulations.
- 15.2 Waste Strategy for England (DEFRA 2007).
- 15.3 Planning Policy Statement 10 (PPS10): Planning for Sustainable Waste Management (ODPM, 2005).
- 15.4 Plymouth Core Strategy 2006-2021 (Plymouth City Council, Adopted 2007).
- 15.5 Plymouth Waste Development Plan Document 2006-2021 (Plymouth City Council, Adopted 2008).
- 15.6 Hurley, J.W., McGrath, C., Fletcher, S.L. and Bowes, H.M (2001). Deconstruction and re-use of construction materials. BR418. CRC Ltd., London. Cited in WRAP 2003 A Strategy for construction, demolition and excavation waste as recycled aggregates. Banbury: WRAP.
- 15.7 BRE (2010) Measuring and benchmarking construction refurbishment and demolition waste. <http://www.smartwaste.co.uk/benchmarking.jsp>