8 CONSTRUCTION WASTE

8.1 INTRODUCTION

8.1.1 This chapter has been prepared by Arup and considers waste management issues associated with proposals within the Heyford Park masterplan. The principal activities that would be expected to produce waste would be the demolition of existing buildings together with construction activities associated with the new facilities. These facilities are described in full within the planning application for the site.

8.2 ASSESSMENT APPROACH

Terms of Reference

- **8.2.1** This chapter provides an assessment of issues arising as a consequence of the generation and management of construction waste associated with the proposed scheme. In so doing, it seeks to assess the impact of the following:
 - Undertaking of necessary mitigation and remediation of contaminated and polluted sites;
 - Demolition and disposal of below ground and above surface engineering structures and buildings;
 and.
 - Waste created during construction of new facilities, infrastructure and buildings.

Methodology

- 8.2.2 The impact of construction waste resulting from the proposed development has been based on desk study (including information from the ground conditions assessment) and a review of the scheme proposals. Given that contractors to undertake the proposed works are yet to be engaged and construction method statements would be reliant on their approach to development, detailed assessments of construction and demolition waste have not been possible. Nevertheless, this Chapter provides a discussion of the national, regional and local planning and policy setting surrounding the issue of construction waste management. Based on the main activities to be expected as a result of the development, the primary waste generating activities are described with specific attention to the opportunity for waste recovery from these.
- **8.2.3** Finally, based on the discussion of the drivers and options to minimise, re-use and recycle demolition and construction waste, mitigation opportunities are discussed, focusing both on general principles of waste management, and on waste management schemes which may be adopted by the scheme.

Limitations, Constraints and Assumptions

8.2.4 At the time of completion, no detailed information was available relating to quantities of material expected from demolition, quantities of waste from contaminated ground remediation, or detailed estimates of new build/refurbishment mix to be provided by the masterplan. Furthermore, in the absence of a detailed construction method statement, scheme specific proposals/commitments for management of demolition and construction have not yet been developed. Quantification of estimates of waste streams and an assessment of

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- the significance of potential environmental effect reflects the data available at this time. It has not been considered appropriate to make a 'value' judgement in significance terms as to waste management activities associated with the proposed development. No specific significance criteria have been adopted to describe the measures associated with waste management.
- **8.2.5** This assessment does not seek to discuss the issue of waste management licensing. It is assumed that all waste storage, transfer and ultimate disposal of waste would be undertaken under the appropriate waste management regulations and Duty of Care.

8.3 PLANNING POLICY FRAMEWORK

8.3.1 The following section discusses the principal national, regional and local planning policies and legislative drivers, as they relate to waste.

National Policy

8.3.2 A range of national planning policies relate to treatment of waste, the most relevant of which are described as follows:

UK Waste Strategy

- **8.3.3** The Government set out its vision for sustainable waste management in 'Waste Strategy 2000'; the national waste strategy'. Responsibility for the waste management strategy is devolved to the administrations in Wales, Scotland and Northern Ireland, within the context of the overall national policy.
- **8.3.4** The UK waste management strategy principles are essentially based on a reduction in the total amount of waste society produces. It takes account of safe disposal priorities, minimisation of the risk of immediate and future pollution and harm to human health, and increasing the proportion of waste managed by the options towards the top of the waste management hierarchy, that is, reduction and re-use.
- **8.3.5** The strategy sets demanding targets to:
 - Reduce the amount of industrial and commercial waste landfilled to 85% of 1998 levels by 2005;
 - Reduce the landfill of biodegradable municipal waste to 35% of the 1995 level by 2020;
 - Recover value from 40% of municipal waste by 2005, 45% by 2010 and 66% by 2015; and,
 - Recycle or compost at least 17% of household waste by 2003, rising to 25% by 2005, 30% by 2010 and 33% by 2015.

The Environmental Protection Act 1990

8.3.6 Section 34 of the Environmental Protection Act 1990 requires that all those who produce or handle wastes from demolition, earthworks and construction activities have legal responsibilities – the Duty of Care – for its safe keeping, transport and subsequent recovery or disposal. Failure to comply can result in an unlimited fine or imprisonment.

Regional Policy

8.3.7 Regional Planning Guidance is covered by 'Regional Planning Guidance for the South East (RPG9). Chapter 10 and Chapter 11 are dedicated to Waste and Minerals respectively and afford discussion of construction waste through Policy W2:

"Policy W2: Sustainable Design, Construction and Demolition

Development Plan Documents should ensure development design, construction and demolition which minimises waste production and associated impacts through:

- the re-use of construction and demolition materials;, and
- the promotion of layouts and designs that provide adequate space to facilitate storage, re-use, recycling and composting.

In particular, development in the Region's strategic growth areas should demonstrate and employ best practice in design and construction for waste minimisation and recycling".

Local Planning Policy

8.3.8 On 5 March 2007, Cherwell District Council's Executive adopted the RAF Upper Heyford Revised Comprehensive Planning Brief 2007 as a Supplementary Planning Document (SPD). In addition to describing the principles for development, together with describing specific requirements for aspects such as transport, conservation and security, the SPD includes, within section 4.11.8, provision for recycling demolition arisings as follows:

"4.11.8 Recycling of demolition arisings

A STRATEGY FOR THE DISPOSAL OF DEMOLITION ARISINGS WILL BE SOUGHT THAT MAXIMISES SALVAGE, MAXIMISES ON SITE RE-USE AND MINIMISES DISPOSAL TO LAND FILL.

A Disposal Strategy will be sought that aims to:

- i. maximise the salvage of materials;
- ii. maximise the opportunity for on site re-use;
- iii. minimise the need to transport material off site."
- **8.3.9** The Disposal Strategy further recommends use of plant including temporary concrete crushing plant to provide inert and uncontaminated secondary aggregate for construction, together with temporary concrete batching plant to assist with the production of concrete and pre-cast products from crushed concrete arisings.
- **8.3.10** Other materials such as glass, plastics and timber should also be recycled. However, on site burning of timber would be discouraged and on site stockpiling of arisings would need to be inert and uncontaminated so as not

to have an adverse impact on the water environment. Visual impact and nuisance to properties as a result of management of demolition arisings would also need to be assessed.

8.4 BASELINE CONDITIONS

- **8.4.1** In EIA terms, baseline conditions are those identified from desk and/or field based investigations which are present without the proposed scheme.
- 8.4.2 The area occupied by Heyford Park is designated as a Windfall site for residential development by the Non-Statutory Cherwell Local Plan 2011. Under Policy H1b, the site is earmarked for residential development between 1996 and 2011. As a consequence of this aspiration for residential development, it would be expected that, even in the absence of this scheme, demolition of a significant proportion of the current structures would be required. Nevertheless, given that no other proposals for development at the site have a planning basis i.e. no planning related material has been formally submitted, there is no evidence to support this as the baseline scenario. Therefore, in the absence of the proposed scheme, there may be no development at the site. The current buildings and structures would remain in place and no construction would be undertaken. The direct consequence of this would be that no construction and demolition waste would be created under the baseline scenario.

8.5 ASSESSMENT OF WASTE ARISING

8.5.1 The key environmental impact of construction waste would be realised through the need to dispose of generated waste which may not be re-used on site. Commonly, construction and demolition waste is disposed to landfill. It is expected that waste would be generated from the following broad categories of activity:

Demolition and Disposal of Buildings and Above Surface Structures

Implementation of the Heyford Park masterplan would require demolition of a number of current buildings from the site as shown in Table C.01. An approximate schedule of the proposed demolitions along with an estimate of the overall floor space of demolished buildings is provided below. These have been based on the data available at the time of producing this chapter. Buildings marked for demolition are listed below and shown in Demolitions Drawing Figure 03, Chapter 1.

Table C.01: Buildings for Demolition			
Previous Use	Approximate Floorspace of		
	Buildings	building (m2)	
Hardened Aircraft Shelter	П	10,250	
Offices and Workshops	15	12,000	
Industrial Sheds	8	10,250	
Stores	4	2,750	

Table C.01: Buildings for Demolition				
Previous Use	Approximate Number of Approximate Floorsp			
	Buildings	building (m2)		
Residential accommodation	246 (semi-detached buildings/	28,300*		
	bungalows)			
Barracks / Former School	To be confirmed	To be confirmed		
Unknown	2	To be confirmed		

^{*} Based on average floor space of existing semi-detached buildings/bungalow of 115m2

- **8.5.2** It is not currently possible to fully quantify the amount or specific types of waste materials that will be generated by the demolition of the buildings, as a demolition contractor has not yet been appointed. It is at that stage that a contractor would review building plans, quantify the amounts of materials in them and determine any opportunities for recycling of materials.
- **8.5.3** In the absence of detailed estimates the nature and quantities of demolition waste, the material types outlined in Table C.02 are expected to be the main materials encountered.

Table C.02: Opportunities for Waste Recovery				
Material	Disposal	Recovery Opportunities		
Concrete	Landfill	Recycled as 'Recycled Concrete		
		Aggregate' (RCA)		
Non-concrete masonry (used in	Landfill	Use in 'Recycled Aggregate' (RA)		
Recycled Aggregate);				
Non ferrous metals (sold for scrap	Landfill	Sold for scrap and recycling		
and recycling);				
Wood (may be reclaimed or	Landfill	Reclaimed or shredding		
shredded);				
Glass (collected for recycling);	Landfill	Collection for Recycling		
Architectural features (reclaimed	Landfill	Reclaim or re-use		
for re-use); and,				
Hazardous / Potentially	Landfill	On-site treatment		
contaminated materials		Off-site management (landfill)		

8.5.4 The construction programme and detailed discussions between the main site contractor, project manager and demolition contractor will seek to ensure that waste generated by demolitions will be assessed having regard

to the potential for recycling and re-use; on or off site. This will be the primary focus for waste disposal from the site with landfill as a final option.

Removal and Scarification of Runways

8.5.5 In addition to the buildings scheduled for demolition, sections of the existing runway will be removed or scarified. Beyond the eastern boundaries of the historic core, the focus of the development is on the environmental enhancement of the existing County Wildlife Site (CWS). Removing or scarifying sections of the existing runway will enable the improvement of the limestone grassland in the area. For the areas of runway identified there are two types of surface; tarmac and concrete. Where the surface is tarmac it will be taken up and removed. Concrete areas would be scarified.

Remediation of Contaminated Land and Pollution

- **8.5.6** As outlined in Chapter 12, 'Geology, Soils and Contamination', a number of potential contamination sources were identified at the site. These included:
 - Petrol, Oil and Lubrication (POL) Fuel Storage and Pipeline System and filling station;
 - Former Fire Practice Areas, and Fireworks and Weapon Storage Area;
 - Boilers, Incinerators, Electrical Sub-stations;
 - Airfield Facilities, Buildings and Houses, Workshops and former Launderette;
 - Car Storage Areas and Car Wash Facility;
 - Sewage Works;
 - Landfill Sites and Waste Disposal Pits;
 - Former Hospital.
- 8.5.7 Based on currently available information, it is considered that the main contamination sources are the POL storage tanks and associated pipework at the site as well as other airbase facilities and workshops.
 Hydrocarbons are considered to be the main contaminants arising from these sources.
- **8.5.8** A Code of Construction Practice (CoCP) will be developed and will include a method statement for investigation, testing or excavating contamination encountered on the site. It is likely that, depending on the contaminants encountered, material will need to be remediated on site or transported off site for further treatment and or disposal. Waste and contaminated material requiring treatment and disposal has the potential to include:
 - Hydrocarbons, acidic compounds, heavy metals high soluble sulphate in soil;
 - Sewage and waste;
 - Asbestos:
 - Contaminated soil from fireworks and weapon storage areas, potentially containing explosive compounds.

Construction Waste

8.5.9 The development associated with the proposed masterplan for Heyford Park is detailed in Table C.03. Some of these buildings will be new build and some will involve the refurbishment of existing buildings. The predominant activity (new build or refurbishment) is indicated in Table C.03.

Table C.03: Breakdown of Proposed Development by Use			
Use type	New build (NB) or Refurbishment (R)	No. of dwellings	
Residential	NB (some R)	1,075	
Use Type		Approximate Floorspace (m ²)	
Office (class B1 and B2)	NB & R	15,650	
Office (Class B2)	NB & R	18,000	
Storage (class B8)	R	86,100	
Heritage Centre	R	4,200	
Conference Centre	NB & R	4,150	
Retail	NB & R	750	
Church	R	700	
Community Centre	R	600	
Bar/restaurant	R	350	
Nursery	NB & R	200	
Primary School	NB	To be confirmed	
TOTAL		130,700	

NB = New Build, R = Refurbishment

8.5.10 Activities associated with construction of the various components of the Heyford Park masterplan have the potential to result in the generation of waste. The average amount of waste produced in construction of residential developments has been estimated at 19.2 m³ waste per 100 m² floor area¹. This is estimated to be comprised of the sources described in Table C.04:

Table C.04: Composition of Waste from Residential Development			
Waste Group	Waste Produced per 100 m ² floor area		
	Volume (m³)	Weight (Tonnes)	
Timber	1.3	0.39	

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Table C.04: Composition of Waste from Residential Development			
Waste Group	Waste Produced per 100 m ² floor area		
	Volume (m³)	Weight (Tonnes)	
Concrete	2.5	2.78	
Inert	1.1	1.43	
Ceramic	2.8	2.18	
Insulation	1.0	016	
Plastic	0.6	0.13	
Packaging	2.9	1.59	
Metal	1.3	1.04	
Plaster and Cement	3.2	1.28	
Miscellaneous	2.5	1.00	
Total	19.2	12.00	

Source: BRE, 2006

8.5.11 Based on an average² semi-detached residential property with a floorspace of 80m², the floorspace for the proposed development of 1,075 dwellings would be in the order of 86,000m². Approximately 70 existing dwellings are to be retained and refurbished, however due to uncertainty around the extent of refurbishment and the likely waste generated as a result, for the purposes of this calculation a worst case has been assumed that all 1,075 residential dwellings are new build.

It can be estimated that, in the absence of a specific strategy to minimise waste generation during construction, approximately 16,500m³ (10,320 tonnes) of waste could arise from the construction of the residential properties.

8.5.12 The Building Research Establishment (BRE) has calculated the average amount of waste produced in construction of other development types³ across the UK. The results are shown in Table C.05.

Table C.05: Composition of Waste from Development					
	Health Care (G, M, S, P,	Residential (G, M, S, P,	Office (G, M, S, P, F)	Education (G, M, S, P,	Industrial (G, M, S, P,
	F)	F)		F)	F)
m3 / 100m2 of	11.7	19.2	14.1	22.2	30.2
floor area					

Source: Adapted from BRE, 2006, G = groundworks, M = mainframe, S = Services, P = partitions, F = fitout

8.5.13 Based on the figures outlined in Table C.05, and assuming no waste minimisation activities are undertaken, the proposed masterplan development is likely to result in generation of approximately 25,200 m³ of waste as shown in Table C.06.

Table C.06: Waste arising from Development			
Use Type	Floorspace (m²)	Development Type	Approximate
		(as shown in Table	Waste Arising
		C5)	(m³) ⁴
Residential	Approx. 86,000	Residential	16,500
Office (class B1)	15,650	Office	2,200
Office (class B2)	18,000	Industrial	5,450
Storage (class B8)	86,100	Refurbishment	Not calculated
Heritage Centre	4,200	Refurbishment	Not calculated
Conference Centre	4,150	Education	900
Retail	750	None specified (office)	100
Church	700	Refurbishment	Not calculated
Community Centre	600	Refurbishment	Not calculated
Bar/restaurant	350	Refurbishment	Not calculated
Nursery	200	Education	50
Primary School	To be confirmed		To be confirmed
TOTAL	130,679		25,200

8.5.14 Due to data limitations and the ongoing development of the designs, it is not possible to identify at this stage what proportion of each use type will be refurbishment (where refurbishment has been identified as an option). As a result, where a mix of new build and refurbishment is proposed, figures in Table C.06 assume a 'worst case' scenario of 100% new build. Further, where the development has been identified as predominantly refurbishment, no waste arising has been calculated. The quantity of waste likely to be generated is largely dependant on the scale and scope of the refurbishment and is not possible to meaningfully calculate at this masterplanning stage of design development.

8.6 MITIGATION

- **8.6.1** The fundamental opportunities for reducing the impacts of construction waste on the environment are described by the waste hierarchy, which seeks to provide the opportunity to limit ultimate disposal to waste management facilities such as landfill or energy from waste plants. The waste hierarchy provides the following opportunities to reduce quantities of waste:
 - Eliminate: Avoid producing waste in the first place;
 - Reduce: Minimise the amount of waste produced;

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- Re-use: Use items as many times as possible;
- Recycle: Recycle what is left after it has been re-used;
- Dispose: Dispose in a responsible manner.
- **8.6.2** While the quantity of material to be generated from buildings earmarked for demolition may be considered to be fixed by the overall masterplan requirements, the impacts of this in terms of generation of construction waste would be limited by the ability to re-use and recycle material for incorporation, either within the scheme, or for use in the recycling industry. Opportunities for reducing the impact of waste resulting only from construction related activities are considered to be available at all levels of the waste hierarchy above.

General Approaches

8.6.3 Reduction of waste ultimately disposed to waste management facilities may be achieved through adoption of a range of mitigation measures:

Elimination: Specification, Stock Control and Sub-contract Management

8.6.4 Strict control of procurement systems relating both to quantities of materials ordered and stored, together with specifying requirements for packaging waste and its responsibility for disposal may contribute to minimising the quantities of waste taken to site.

Re-use and Recycling: Waste Segregation

- **8.6.5** Provision of waste segregation and recycling facilities at the site would maximise the potential of aggregation of discrete waste streams in order to make recycling or reprocessing a viable management option. Segregation of waste in areas of hardstanding to allow discrete collation of waste streams for the following materials may be provided:
 - Timber;
 - Plastics:
 - Light active (plaster bags, cement bags, packaging etc);
 - Plaster / Gypsum products;
 - Spoil;
 - Rubble.
- **8.6.6** Removal to landfill should be used as a last resort, and wherever possible, all inert material should be used on site for making up levels and backfilling.

Re-use and Recycling: Treatment of Waste Materials On and Off Site

- **8.6.7** Regard would be had to relevant statutory guidelines for dealing with waste production, storage, transfer and disposal including the following:
 - Segregating of wastes into inactive, active and special and hazardous wastes;
 - Storage via segregation, clear marking of containers, using suitable containers of a suitable quality, providing suitable bunds and covers and ensuring waste does not blow away;
 - Transfer using a licensed company with checks to ensure that relevant licences are in place and retaining records; and
 - Disposal ensuring that landfill sites, recycling facilities and transfer stations hold relevant licenses or exemption from licence and retaining records.

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- **8.6.8** A Code of Construction practice will be developed by the Contractor and will contain commitment to the following principles of waste elimination, re-use and recycling:
 - The generation of all waste across the construction site will be minimised through the active education of all construction site workers;
 - Technical teams and buying teams should work together to ensure that the appropriate quantities and specification of material are ordered, packaging is minimised;
 - Storage of materials on site should be undertaken in away that minimises wastage;
 - Waste will be appropriately segregated and stored on site to facilitate and maximise recycling and re-use opportunities;
 - Opportunities shall be explored for the re-use of inert materials as fill to slabs or crushed for aggregate use depending on site requirements.

Waste Management Systems

8.6.9 A range of systems may be adopted by organisations directly involved in demolition and construction at the Heyford Park site in order to provide frameworks for reducing the quantity of waste that would ultimately be sent to landfill or other waste disposal facilities. Commitment by participating organisations to the following, supported with appropriate management targets and monitoring mechanisms, may contribute to reducing the total quantities of material sent to landfill.

Site Waste Management Plans

- **8.6.10** Originally developed as a Department for Trade and Industry (DTI)⁶ Voluntary Code of Practice, Site Waste Management Plans (SWMP) provide a tool for construction companies to improve their environmental performance, meet regulatory controls and reduce the rising costs of disposing of waste. It is not essential for there to be a separate SWMP document for each site; the details can be included in a waste management section of an overall Site Environmental Management Plan.
- **8.6.11** Adopting a site management approach based around an effective SWMP can bring about benefits including:
 - Better control of risks relating to the materials and waste on the site;
 - A tool to help deal with any queries from the regulator;
 - A mechanism to demonstrate to clients how waste is managed and minimise costs and risks to them:
 - A tool to help fulfill the requirements of quality and environmental management systems;
 - Compliance with likely future contractual requirements from public and private sector clients;
 - A system to help make cost savings by better management of materials supply, materials storage and handling, and better management of waste for recovery or disposal.
- **8.6.12** SWMP would usually be expected to do the following:
 - Identify the different types of waste that will be produced by the project, and note any changes in the design and materials specification that seek to minimise this waste;
 - Consider how to re-use, recycle or recover the different wastes produced by the project;
 - Require the construction company to demonstrate that it is complying with the duty of care regime; and,
 - Record the quantities of waste produced.
- **8.6.13** Use of SWMPs for any construction project of over £250,000 may be a legal requirement by April 2008.

8.6.14 During the construction phase, a SWMP will be developed and a waste management contractor will be appointed to manage the off-site recycling of plasterboard, timber, plastics and inert materials. The waste management contractor shall report back to the principal contractor on key waste management indicators.

The Institute of Civil Engineers' Demolition Protocol

- **8.6.15** Demolition and construction, in line with the framework defined by the Institute of Civil Engineers' Demolition Protocol would be expected to provide a framework to allow best practice of demolition and construction waste. The ICE Demolition Protocol provides methods to assess and recover demolition material as well as specify recovered (recycled & reclaimed) material in the new build.
- 8.6.16 The production of demolition material can be linked to its specification and procurement as a high value material in new builds. Currently much recycled material is produced through crushing demolition and construction waste and is then subsequently 'lost' on-site or used as a fill in low value applications. The Protocol describes how the demolition and design processes can be managed to ensure that resource efficiency is achieved by minimising waste and maximising the displacement of primary materials where viable.

Waste Benchmarking and Auditing

- 8.6.17 Use of Waste Benchmarking and Auditing schemes may contribute to waste reduction through identifying waste management performance levels and introducing systems to audit performance against targets and aims. One such benchmarking scheme is the SMARTStart scheme, which is a waste auditing tool, developed by the Building Research Establishment (BRE), to facilitate the process of evaluating waste management across sites, aiding in the application of the sustainable waste management concept. It is a benchmarking and monitoring tool that allows each site to enter data regarding the materials that leave their site as waste. As containers leave the site they are visually assessed and the percentage volume of 12 waste groups are recorded.
- **8.6.18** Where appropriate, the SMARTStart scheme will be employed to manage the segregation of waste and reporting on waste management indicators on the site.

8.7 CONCLUSION

- **8.7.1** Re-development of the Heyford Park site has the potential to generate a range of solid waste materials as a result of the ground remediation with further material resulting from the required demolition and subsequent activities. A conventional approach to waste management would favour determining the Waste Acceptance Classification of wastes and, based on the degree of contamination, either disposal to landfill or specific treatment and remediation.
- 8.7.2 A more strategic waste management approach would afford due attention to consideration of the waste hierarchy and favour waste elimination ahead of re-use, recycling with disposal to landfill as a final option. Methods to facilitate a hierarchical approach to waste management that may be employed on a construction programme include control of procurement, ordering and packaging, provision of segregated recycling

facilities, re-use of waste material within the scheme, and transport of specific waste streams to appropriate recycling facilities.

8.7.3 A range of construction industry waste management systems are available which provide the opportunity to formalise waste management procedures within the broader scope of the construction programme.
Commitment to a Site Waste Management Plan, a Demolition Protocol or a Waste Auditing Scheme (or similar) would all contribute to reducing the ultimate volume of waste disposal to landfill by providing systems to contribute to management of demolition and construction waste according to a hierarchical waste management strategy.

NOTES

- Developing a Strategic Approach to Construction Waste: 20 Year Strategy Draft for Comment, Building Research Establishment, Watford, 2006
- Developing a Strategic Approach to Construction Waste: 20 Year Strategy Draft for Comment, Building Research Establishment, Watford, 2006
- 3 BRE (2006), SMARTWaste Benchmarking. Available at: http://www.smartwaste.co.uk/benchmarking.jsp
- 4 Excluding waste generated through excavation and refurbishment.
- In the absence of industry benchmarking figures for retail establishments, an assumption has been made to use the figure for waste arising from office developments.
- 6 Now Department for Business Enterprise and Regulatory Reform (DBERR)