A Second Runway for Gatwick

Appendix

A31

Waste

YOUR LONDON AIRPORT
Gatwick

Gatwick R2 - Updated Scheme Design for Airports Commission

Waste

May 2014

Executive Summary

The Airport Commission's Appraisal Framework (10. Place) seeks information on how promoters propose to manage and dispose of waste during the construction and operational phases of a further runway development including how any contaminated elements will be removed and disposed of. The Airport Commission's Appraisal Framework includes a requirement for a Construction Waste Management Plan to be provided.

The minimisation, reuse and recycling of waste, and the diversion of waste from landfill during both the construction and operational phases of the development would be a key driver for GAL - actively contributing to long term social, economic and environmental goals.

In its Updated Scheme Design GAL is making provision and plans for a range of leading edge initiatives to manage and mitigate waste during construction and operation as part of a sustainable resource management strategy. These will build on the current initiatives in GAL's 'Decade of Change' Strategy, Construction Waste Strategy and Action Plan, and Sustainable Materials Strategy. The overall objectives are to:

- reduce construction and operational waste through design
- maximise the reuse and recycling of construction and operational waste,
- minimise waste to landfill; and
- seek the best environmental option for all waste streams.

Based on GAL's current performance of recycling 96% of construction, demolition, and excavation waste from its projects and the findings of the geo environmental report and contamination assessment (Appendix to GAL's submission), which concludes that the R2 development site is likely to be generally free of contamination, GAL expects that this level of performance can be maintained and exceeded for the R2 scheme.

The increased additional operational waste volumes would create economies of scale to promote the development of further initiatives and support greater recycling at the airport.

This report and the accompanying Construction Waste Management Plan, sets out some of the main initiatives and plans that GAL proposes to put in place to achieve the objectives set out above. These can be summarised as follows:

The construction waste initiatives:

- Provide a Construction Consolidation Centre (CCC) to optimise construction deliveries onto site, reduce wastage through 'Just-in-Time' deliveries, and backhaul waste from site to the CCC.
- Creation of an onsite Waste Consolidation Centre for construction waste to be sorted or bulked for reuse or recycling on or off-site.

- Provide crushing plant to ensure that construction and demolition waste is reused and recycled on site wherever possible and to minimise the need for off-site transportation issues
- Provide on-site silt & sediment tanker facility to treat site drainage waters, dewatering and road sweeping waste. This facility will also manage sewerage collections from site compounds via tanker. An onsite sewage discharge point to the treatment works would avoid off-site transportation.
- Utilising the airport's existing onsite waste processing facilities at the 'Gatwick Care Centre' to manage office and welfare waste from construction.
- Development of a waste food processing plant and biomass boiler to generate hot water during the construction phase for use in site compounds and pre-conditioning concrete batching plant waters. This facility will also reduce off-site transportation movements.

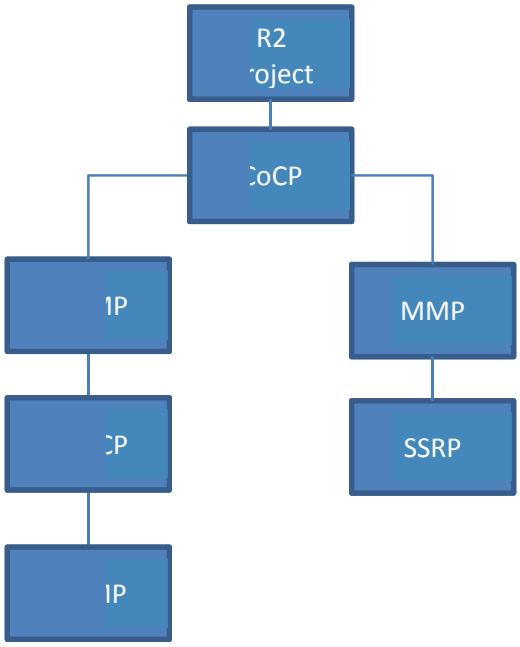
The operational waste initiatives:

- A sustainable resource management strategy integrating management of waste with the R2 energy and water strategies
- A self-sufficient concept to waste management with a joined up approach and collaboration with the airport community
- The development of an Anaerobic Digestion facility to generate biogas to the airport Energy Centre that incorporates waste from the sewerage systems, runway de-icer and community waste streams
- A 'Biogas to Vehicle Fuel' facility for the airport bus and vehicle fleets
- An increase in airport recycling through the investment in equipment to sort materials at the airport's 'Care Centre' – through an enhanced Integrated Waste Management Facility

<u>R2 Project document structure – Construction Waste Management:</u>

Glossary;

CoCP – Code of Construction Practice
CWMP – Construction Waste Management Plan
WMCP – Waste Management Control Plan
SWMP – Site Waste Management Plan
MMP – Materials Management Plan
SSRP – Site Specific Remediation Plan



1. Introduction

1.1. The AC's Appraisal Framework recognises that the construction phase and the inherent expansion of the operational phase of an airport scheme are likely to generate substantial quantities of waste materials. The Framework requires scheme promoter's Updated Scheme Designs (USD) to prepare a waste management plan, including details of a contamination assessment and how any contaminated elements and other waste will be managed and disposed.

1.2. This report sets out GAL's proposals for managing and controlling construction and operational waste that would arise from GAL's proposals for a second runway and associated development (R2).

1.3. In relation to construction, the Geo-environmental report forms a separate Appendix to GAL's submission and provides the findings that the R2 development site is likely to be generally free of contamination, with the exception of some relatively small amounts of hazardous wastes.

1.4. The report is structured as follows:

1.4.1. Section 2 drawing on the Geo-environmental report provides an overview of the likely construction and operational waste impacts of R2

1.4.2. Section 3 provides the Regulatory and policy context of the scheme

1.4.3. Section 4 provides an overview of current construction and operational waste generation and current management practice, including the very high level of recycling already achieved at Gatwick

1.4.4. Section 5 looks at the predictions of construction waste that would arise from the R2 proposals. It then identifies the measures proposed within the Construction Waste Management Plan for how waste will be managed

1.4.5. Section 6 considers operational waste that is expected to arise and how GAL is considering mitigation measures to limit the airport's impact

1.4.6. Section 7 draws conclusions

1.5. The Construction Waste Management Plan is provided as one of a number of appendices.

2. Aspects of the construction and operation of the R2 development that will impact waste

Construction Waste

2.1. The R2 site is located south of the existing airfield and is predominantly Greenfield, with some existing commercial and industrial facilities, agricultural and residential properties. Also present are some infrastructure facilities such as sub-stations as well as several small waste management facilities that require removal. Following the demolition of these properties and amenities, materials will be segregated and processed onsite to allow their reuse within the proposal. This will involve the segregation of bulk earthworks and excavations for reuse within the scheme designs and landscaping to limit the removal of waste from the site.

2.2. The geo-environmental conditions for the R2 site have been assessed by GAL through a desk based assessment (Appendix to GAL's USD submission). This has established that the R2 scheme is expected to encounter only a very limited volume of contaminated soils and groundwater, mainly associated with historical airport maintenance uses, a petrol station, some areas of minor industrial/commercial activity and a small number of licensed and unlicensed waste recycling and management activities. There are no landfills on the development area, nor are there any heavy industrial land uses such as gasworks or chemical plants. Those sites that have been identified to be potentially contaminated can be readily remediated within the proposals. Additionally, the application of a hierarchy of systematic mitigation measures is expected to greatly reduce the impacts to acceptable levels and the final site will have a much improved land quality from a chemical contamination perspective. Whilst the development of R2 would lead to the production of large quantities of construction waste arisings from demolition and enabling works, As a result of the limited amount of contamination and the proposed Construction Waste Management Plan, it is fully expected that the majority (at least 96%) of the waste from the R2 scheme will be able to be reused or recycled.

Operational Waste

2.3. As a result of the increased passenger throughput and capacity of the R2 development, the existing waste handling processes, practices and procedures would need to be reviewed to allow for the projected increase in waste volumes.

2.4. The existing Integrated Waste Management facility known as 'The Care Centre' and its incumbent waste contractor could be expanded in their capabilities to accept the predicted increased volume of R2 waste streams. This expansion could be achieved through capital investment to mechanise and automate some waste activities and improve the current throughputs of the facility. This could also lead to a greater recycling rate for the airport and help deliver continuous improvements on the 2020 target of 70% recycling of operational waste, agreed in the 'Decade of Change'.

3. Regulatory Context

3.1. There are a number of Regulations and policies that influence the way waste would be managed during the construction and operation of R2.

3.2. The Planning Regime is considered the primary regulatory framework, although it should be noted that implicit within this is the requirement that the R2 scheme should comply with the requirements of the Environmental Protection Act 1990. The Duty of Care for Waste under the Environment Protection Act 1990 applies to all those involved with the management of waste including the waste producers. The basic premise of the Duty of Care is that waste is managed correctly from when it arises to its ultimate recovery or disposal point. In practical terms waste must only be transported by those registered to carry waste (Registered Carriers). Sites where waste is transported to or undertakers that keep, treat or dispose of waste, must be appropriately licensed/permitted or registered as being exempt from the need to hold a licence.

3.3. Other regulatory requirements include:

- Environmental Permitting (England and Wales)(Amendment) Regulations 2014
- The Waste (England and Wales) Regulations 2011
- DERA Waste Strategy for England 2011
- Waste Framework Directive - The revised Waste Framework Directive requires Member States to establish waste prevention programmes not later than 12 December 2013
- Animal By-Product Regulations
- Industrial Pollution Prevention and Control
- Hazardous Waste Regulations
- WEEE
- Landfill Directive
- Batteries Directive

3.4. The regulations outlined above and the embraced EU targets agreed by the UK are focussing action in specific areas. These include:

- EU Landfill Directive targets on the diversion of biodegradable municipal waste from landfill in 2013 and 2020;
- Waste Framework Directive target to recovery of at least 70% of construction and demolition waste by 2020;
- A range of minimum producer responsibility targets covering packaging, Waste Electronic and Electrical Equipment (WEEE), End of Life Vehicles (ELV) and batteries
- There will be a greater focus on waste reduction at the earlier, design stages of construction projects as this is where the largest environmental and financial savings can be made.

4. Current Construction and Operational Waste Practice and Generation at Gatwick

GAL Policies and Initiatives

4.1. GAL has a range of policies and initiatives to minimise and manage waste from construction and operation. These derive from GAL's environmental and sustainability strategy - 'Decade of Change – Moving towards a sustainable Gatwick', and GAL's 'Construction Waste Strategy and Action Plan'.

Decade of Change and Construction Waste Strategy and Action Plan

4.2. The 'Decade of Change' sets out key activities that GAL is legally obliged to undertake as it continues to develop Gatwick sustainably by 2020. At the core of the journey towards a sustainable Gatwick, GAL has created a 10 point sustainability plan with 10 issues and 10 years to achieve them. Waste is one of the 10 points identified:

4.3. In relation to waste generated from the airport's operations, the key objectives are:

- Generate no waste to landfill (2020)
- 70% of Gatwick waste recycled
- Work with airlines, partners and stakeholders to deliver a joint approach to waste management
- Embrace innovation to drive improvements to waste management practices

Construction Waste Strategy and Action Plan

4.4. The Gatwick 'Construction Waste Strategy and Action Plan' was developed to provide guidance to the construction teams and ensure the most cost effective and environmentally sustainable management of construction waste on the airport was achieved. The document takes account of national and Gatwick's policy trends in the waste management industry and the projected financial impacts of waste management legislation. It was developed to meet and, in parts, exceed the aspirations set out by DERA in the Waste Strategy for England 2011. The Plan also adopts and follows the waste hierarchy which prioritises the most environmentally sustainable approaches to waste and resource management. The targets set out in this plan to recover 90% of construction waste were envisaged to be a minimum, with aspirations that they will be improved on. This ambition has in fact been realised and exceeded in current waste management practices at the airport and has been reflected in the R2 Construction Waste Management Plan with a reuse and recycling target proposed of 96%.

Other GAL Policies

4.5. The Gatwick 'Sustainable Materials Strategy' aims to enable contractors and designers to identify, source and use construction materials with a low embodied environmental impact across their manufacture, use and disposal. The Strategy is applicable to those teams,

individuals and suppliers who are responsible for the design of construction projects, and the specification and procurement of construction materials or components at Gatwick Airport.

4.6. The Construction Waste Storage and Recycling plan refers to construction waste arisings only produced from within the Gatwick Airport boundary. This policy addresses the treatment requirements under the Waste Recycling Action Programme WRAP) Quality Protocol of recovered materials from inert waste.

4.7. Policies relating to operational waste are detailed in the following documents:

Airport Waste and Recycling Management - The purpose of this document is to advise all companies operating at Gatwick Airport of the waste and recycling facilities available on airport, the correct use of the facilities and the restrictions on their use.

Airport Catering and Cabin Waste - The purpose of this document is to specify to Airlines, Cleaners and Catering companies operating at Gatwick to both maximise recycling and to ensure full compliance with the Animal Health and Veterinary Laboratories Agency (AHVLA) instructions.

<u>Construction Waste</u>

4.8. GAL requires that all construction projects provide their own compliant waste facilities and recycling/disposal routes. Monthly returns are provided to GAL by the contractors demonstrating the tonnages of materials that were reused/recycled in that period. Examples of current projects and their achievements are:

- GAL projects overall exceeded the targets set in 2012 for recycling 95% of excavation waste, 95% of demolition waste and 90% of general construction waste which have been reused or recycled onsite.
- The Pier 5 project used the Environment Agency licenced, on airport concrete recycling facility. The project processed, crushed and reused over 4,000 tonnes of concrete removed from the apron slab as part of the new construction, reducing the amount of virgin aggregate required.
- A project working to upgrade the balancing ponds which deal with Gatwick's surface water run-off have reused materials under the 'CL:AIRE'1 guidance. Over 800m^3 of silt excavated from one of the ponds has been treated on site and then reused. In excess of 1,000m^3 of excavated materials from a pond refurbishment programme have been re-used in the construction of a new lagoon reducing the use of virgin materials and lorry movements onto the campus.

4.9. GAL's managed storage and processing area for airport related construction waste arisings is key to the reuse of materials onsite and has operated since the late 1990's. Prior to the crushing activity taking place, GAL ensures that the crushing operator provides the relevant information to demonstrate full compliance with the WRAP Quality Protocol. Any material

which fails to comply with the WRAP Quality Protocol will be disposed of in accordance with legal requirements and reported to GAL.

4.10. The table below provides the most recent data on construction waste quantities and recycling rates against GAL's targets. The overall targets for recycling demolition, excavation and construction waste at Gatwick Airport have been exceeded during 2012 and 2013.

4.10.1. Table: Total Construction Waste (Demolition, Excavation, & Construction)

Year	Target % Recycle	Actual % Recycle	Total Tonnage
2012	90	99.22	115,229
2013	90	96.75	326,149

4.10.1.1. Table: Construction Waste (sub-total)

Year	Target % Recycle	Actual % Recycle	Total Tonnage
2012	90	98.62	18,435
2013	90	88.85	4,260

4.10.1.2. Table: Demolition Waste (sub-total)

Year	Target % Recycle	Actual % Recycle	Total Tonnage
2012	95	98.65	8,745
2013	95	99.43	12,972

4.10.1.3. Table: Excavated Waste (sub-total)

Year	Target % Recycle	Actual % Recycle	Total Tonnage
2012	95	99.48	84,652
2013	95	97.27	307,225

Operational Waste

4.11. Gatwick's operational waste is currently processed on site at the Gatwick Airport Integrated Waste Management facility known as 'The Care Centre'. This facility operates as a Transfer Station that allows the sorting, bulking and temporary storage of waste from the airport prior to reuse/recycling or further treatment off site.

4.12. The current waste volumes produced at Gatwick are approximately 9,300 tonnes per annum. This equates to 0.29kg per passenger per annum.

4.13. GAL provides segregated waste and recycling facilities across the Airport and expects that all authorised users ensure that the waste streams collected match the recycling facilities offered by the airport e.g. Mixed Dry Recyclables; General Waste; Food; Glass; Cardboard; Aircraft Cabin Waste (Cat1). GAL requires that every company producing or handling waste on the airport adheres to the waste hierarchy (reduce, preparing for reuse, recycle, recover and responsibly dispose) and that waste is securely contained to minimise the risk of litter, Foreign Object Debris (FOD) and spillages.

4.14. The majority of waste that is not recycled at Gatwick goes to an Energy from Waste facility. As a result of that process, 14% of material is recycled, 71% is recovered as energy and 15% of the ash is landfilled.

4.15. GAL is committed to achieving its 'Decade of Change' target of 70% recycling by2020 and has undertaken a study in February 2014 to further understand the nature of the waste and what the profile of the waste stream is. This study will be used to identify where future opportunities are, to increase the recycling rate, and to attain the 70% recycling target. This will be achieved through a programme of capital investment, process change, stakeholder engagement, and training and awareness sessions across the airport. These initiatives will help GAL meet the 2020 target and position Gatwick Airport to handle the additional capacity provided by R2 and deliver year on year improvements towards 2050.

5. R2 Construction Waste Predictions and Strategy

Construction Waste Predictions

5.1. Drawing on information from provisional desktop studies, current best practices on site, a provisional schedule of buildings for demolition, and waste composition data, the volume of waste that would be produced at the airport during the construction phase of R2 has been estimated (Table 5.1.1). This covers the estimated level of waste generated from the demolition and deconstruction of existing buildings on the development site and, in relation to the proposed development, industry benchmarks for construction activities, and waste generation rates. The assumptions underlying these estimates are provided in Appendix 8.5 - Assumptions.

5.1.1. Table: R2 Construction Waste Predictions

Project Phase	Tonnes of Waste
Demolition	295,000
Earthworks	524,000
Construction	835,000
Total	*1,654,000*

5.2. Measures to reduce the quantity of waste being produced in the first instance will be employed as a business as usual approach across all aspects of the construction phases through design for deconstruction principles, offsite prefabrication and modular design.

5.3. Any contamination found within the development area will be remediated and re-used in an appropriate way in conjunction with a site remediation strategy and a Materials Management Plan (see Geo-environmental report – Appendix to GAL's USD submission). Material reuse and the cleaning up of contaminated materials through bioremediation or soil washing techniques will be used wherever possible to minimise off-site disposal, treatment and to reduce off-site transportation movements.

5.4. Based on current performance and current industry benchmarks of Good Practice and Best Practice as set out in Table 5.4.1, Waste Recycling levels have been set for R2. However, a figure of 95% is aspirational for the R2 Project based on tonnages submitted to a reuse or recycling process. The recycling targets for demolition (97%) and earthworks (98%) have been based on past experience at the airport and a high level data gathering assessment from around the airport. These estimates will be subject to review following detailed onsite investigations and it is anticipated that the figures could rise.

5.4.1.Table: Construction Industry 'Good and Best Practice' recycling rates by material

Material Type	Good Practice %	Best Practice %
Timber	90	95
Metals	100	100
Plasterboard	90	95
Packaging	85	95
Ceramics	85	100
Concrete	95	100
Inert	95	100
Plastics	80	95

Miscellaneous – Hazardous, furniture, insulation, canteen, etc	50	75
Electrical	70	95
Cement	75	95
Liquids and Oils	100	100
Average %	***84.5***	***95.4***

5.5. Based on the assumptions detailed above and GAL's current performance and aspirations, Table 5.5.1 provides estimates of the total tonnes of demolition, earthworks and construction waste to be recycled from the R2 development.

5.5.1.Table: Total tonnes of waste to be recycled from R2

Project Phase	**Tonnes of Waste Estimated**	**% Recycled / Reused**	**Tonnes Recycled**	**Tonnes EfW / Incineration /Landfill**
Demolition	295,000	97	286,150	8,850
Earthworks	524,000	98	513,520	10,480
Construction	835,000	95	793,250	41,750
Total	***1,654,000***	***96***	***1,592,920***	***61,080***

5.6. Based on a preliminary desktop assessment, estimates on the age of buildings required to be demolished, and known waste management activities in the proposed development area, it is considered that some 4,000 tonnes of demolition material arisings may be hazardous and sent to an appropriately licensed facility and/or landfill. The demolition materials sent to landfill would include asbestos bearing products which are expected to be found in some buildings to be demolished. All other hazardous materials would be sent to appropriately licensed facilities including energy from waste (EfW) or high temperature incineration.

5.7. Based on geo-environmental data, the quantity of excavated contaminated material from earthworks is assumed to be negligible as a result of the soil remediation strategy outlined in the geo-environmental report. However, for the purpose of this assessment, a small proportion of the total volume has been assumed not to be suitable for remediation on site until further detailed site investigations have been undertaken.

5.8. The volume of construction material that would be sent to landfill after treatment is estimated at 6,000 tonnes. However, a proportion of this waste would be sent for energy recovery as a hierarchical preference where practical.

R2 Construction Waste Management Strategy

5.9. GAL has prepared a Construction Waste Management Plan in accordance with the requirements of the Updated Airport Commission Appraisal Framework. The Construction Waste Management Plan (see Appendix 8.1 – Construction Waste Management Plan) sets out the strategy and actions which GAL would bring forward for waste management during the construction of R2 in accordance with objectives to:

- reduce construction waste through design

- maximise the reuse and recycling of construction waste,
- minimise waste to landfill; and
- seek the best environmental option for all waste streams.

5.10. The Construction Waste Management Plan includes the following initiatives.

5.10.1. Table: Construction Waste Management Plan Initiatives

Waste minimisation and designing out waste	• Justification reports on how waste has been minimised in association with delivery systems, standardisation and modular design concepts • Contractual obligation to adopt the Construction Waste Management Plan
Concrete Crushing Plant	• Direct processing of materials on site e.g. concrete; asphalt; brick; timber; etc • Reduced transportation movements on site • Direct reuse of materials on site under the WRAP Quality Protocol
Waste Consolidation Centre	• Source segregation onsite to prevent double handling of materials • Temporary storage of materials on site awaiting processing e.g. baling, compaction, etc • Bulk segregated loads sent direct to a recycling process off site • Optimise recycling rates and rebates • Reduced transportation movements on site • Hazardous waste storage and segregation • Skip deliveries managed on site
Site Tanker / Dewatering Facility	• Septic tank collection service from site compounds (where no connections to sewer are available), welfare accommodation, etc • Silt and sediment treatment facility for site drainage facilities, dewatering activities, oil interceptors, bunds and road-sweeping • Dedicated discharge point and meter to sewer on site to reduce transportation movements off site • Reuse of solid phase through blending on site • Prevention of surface water contamination
Construction Consolidation Centre	• Optimise construction deliveries onto site • Reduce waste through the process of Just-in-Time deliveries • Environmental benefits of reducing construction traffic i.e. a reduction in congestion, noise, pollution and carbon emissions • Utilisation of reverse logistics i.e. return of unused material, packaging and pallets • Efficiencies - waste reduction, reduced freight traffic, productivity improvements and improved programme certainty • Deconstruct the building for use in the airport

	operation phase and retail deliveries • Locate facility with multimodal transport network i.e. road and railhead
Biomass Boiler	• Food waste used to produce hot water for use in the welfare accommodation or concrete batching plant. • Reduce vehicle movements away from the site • Reuse the plant during airport operation
Care Centre Integrated Waste Management Facility	• Welfare and Office accommodation waste would be treated through the onsite Materials Recycling Facility to optimise recycling rates • Reduced transportation movements on site
Remediation Centre	• Onsite and insitu remediation strategies to ensure the maximum reuse and recycling of contaminated materials on site

Overall Implications of Construction Waste

5.11. The construction of the R2 development would significantly increase the quantity of construction materials generated over the development of the airport. However, with the adoption of the Construction Waste Management Plan, use of the onsite crushing facilities, and the development of a Waste Consolidation Centre onsite, segregated materials will be reused within the R2 development. The recyclables will be transported directly to re-processors for recycling or reuse off-site. The Construction Consolidation Centre will also minimise waste being produced in the first place through Just-in-Time delivery principles.

5.12. The remaining 4% of construction, demolition and earthworks waste will be sent for further treatment at a Materials Recycling Facility or incinerated with energy recovery offsite. It has been assumed that over the lifetime of the R2 construction phase, the available processing capacity in the region will not be exceeded. As a result of the environmental design and mitigation measures proposed, the environmental effects of the R2 construction waste are assessed as being negligible.

6. R2 Operational Waste Predictions and Strategy

Operational Waste Predictions

6.1. Drawing on information from current practices on site and the 'Decade of Change' initiatives to attain the 70% recycling by 2020, the predicted waste volumes during operation have been estimated in table 6.2.1.

6.2. Using the projected passenger numbers anticipated by 2050 (95Mppa) and allowing for an improved waste value of 0.25Kg/passenger per annum (ppa) – a slight improvement on the current 0.29Kg/passenger per annum - the projected annual waste tonnage would be 23,750 tonnes per annum by 2050.

6.2.1.Table: Waste tonnages with R2

Year	Target % Recycle	Passengers Mppa	Total Tonnage	Kg/passenger per year
2030	75	65	16,250	0.25
2050	80	95	23,750	0.25

6.3. The increase in recycling rates above is based around continuous improvement and waste minimisation initiatives across the airport. The 0.25Kg/passenger per annum value takes account of potential legislation changes, improved training and awareness, and waste minimisation initiatives at the airport.

6.4. The percentage of waste not recycled from the airport operations would be sent to a recovery operation or Energy from Waste plant with zero waste direct to landfill.

R2 Operational Waste Management Strategy

6.5. GAL have outlined below how the R2 scheme integrates into the wider picture during the operational phase of the airport up to 2050 and the mitigation measures that would be considered to limit the impact that the airport has during the operational phase.

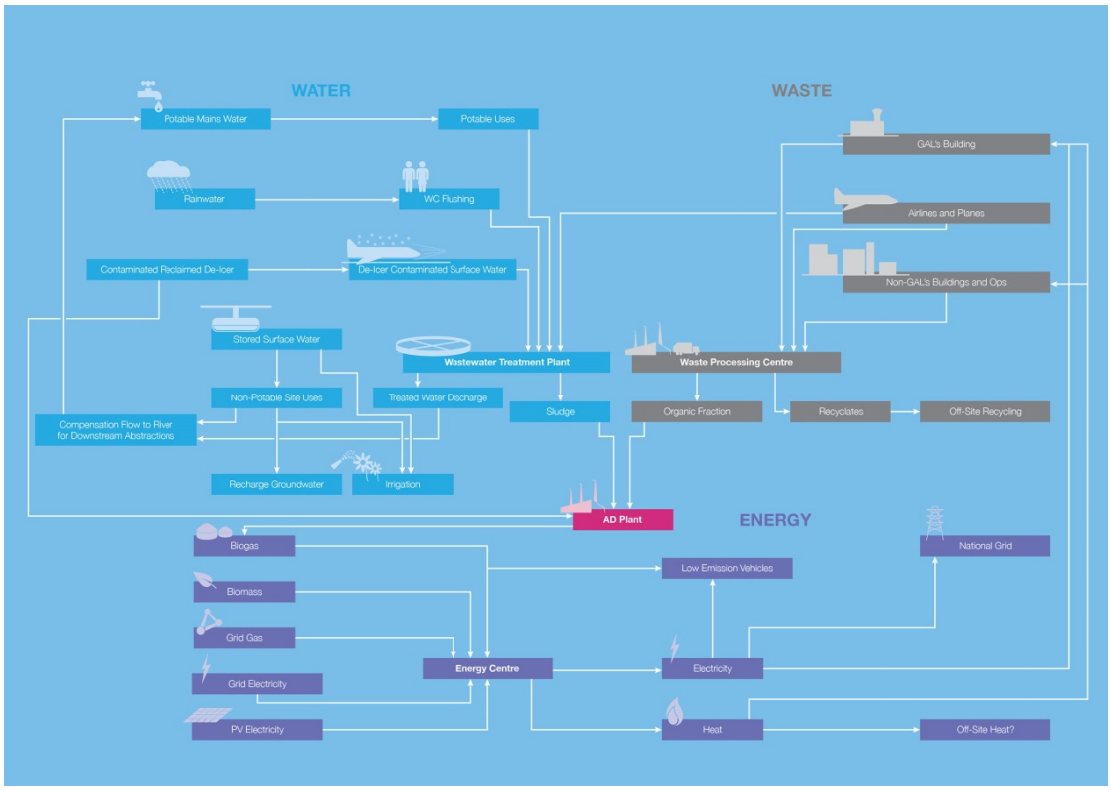
6.6. As a result of the increased passenger capacity at the airport through the R2 development, GAL is committed to putting in place a range of proposals to manage and handle the additional waste volumes produced at the airport, increase the operational recycling rates, and reduce transportation movements and impacts on the environment.

6.6.1.Table of waste initiatives to reduce the impact of the R2 scheme in operation.

Joint approach to waste management	• Continuation of the 'Decade of Change' initiatives and on-going collaboration with the airport to manage their waste more effectively • Continuous improvements that take forward the 'Decade of Change 2020' initiatives and targets • Self-sufficient concept to waste management that includes Category 1 waste • Waste minimisation initiatives with suppliers and the expansion of the Retail Logistics Centre
Energy from Waste	• Gatwick Airport Energy Centre has provision for alternative fuels e.g. biomass; biogas; etc • Consideration of an Anaerobic Digestion facility to

	process organic waste from the Airport Community
'Care Centre' – Integrated Waste Management Facility	• Expansion of the existing waste processing facility at Gatwick to increase throughput • Consideration of new technologies to treat International Catering Waste/Cat1 • Increase recycling volumes through the investment in separation equipment to increase the 70% recycling by 2020 target
Airport Terminal design	• Provision of adequate space and equipment to facilitate the storage and handling of waste from retailers, passengers and airport support staff • Consideration of vacuum waste collection systems to optimise waste recycling, minimise space take and reduce labour in the handling of waste • BREEAM Excellent/Outstanding standard
Anaerobic Digestion Plant	• Consideration of the development of a 'Biogas to Vehicle Fuel' facility to utilise biogas in the airport bus or support fleet • Liquid digestate used to fertilise the airport grassed areas as a substitute for carbon based products

A graphical depiction showing how operational waste generated at the airport will form part of the sustainable resource management strategy



7. Conclusions

7.1. Waste minimisation, recycling and resource efficiency are an important aspect of GAL's proposals for incorporation at all stages of the R2 development. The diversion of waste from landfill during the construction phase and throughout the operational life of the airport is a key driver for GAL.

7.2. GAL have already achieved 96% recycling of construction, demolition, and excavation waste from its projects and expects that this can be maintained and exceeded for the R2 scheme.

7.3. Through the use of GAL's onsite crushing plant, the proposed Waste Consolidation Centre, site tanker and dewatering facility, and the use of site-specific remediation measures for any locally impacted sites, it is expected that the majority of construction waste will be able to be reused or recycled on site.

7.4. The Construction Waste Management Plan forms the basis for detailed project procedures and requirements for waste management which will form part of any contractual obligations for Suppliers and Contractors to the R2 Project. The requirements will include the working practices to minimise the production of waste as a result of design and procurement, accidental damage, deliberate wastage, over ordering and abortive works. The proposed waste collection system will reduce the amount of sorting and handling required as well as preventing the cross-contamination of relatively clean/inert waste for re-use, recycling, or disposal.

7.5. Contamination levels are expected to be limited, but the residual impacts from contaminated land are anticipated to be small, as the remediation works will effectively eliminate any areas of land which are currently contaminated and deliver a site which is fully suitable for use. There are no landfills on the development area, nor any heavy industrial land uses such as gasworks or chemical plants.

7.6. The R2 development presents significant opportunities to enhance the management of the increased operational waste streams that would arise from R2. The increased operational waste could create economies of scale to support the development of further airport recycling initiatives. The interactions and symbiosis between the energy, waste and water systems in a sustainable resource management strategy demonstrates GAL's commitment to managing resources efficiently.

7.7. Self-sufficiency to waste management with a joined up approach and collaboration with the airport community could improve recycling rates and enable the development of an Anaerobic Digestion facility that provides biogas to the airport Energy Centre, which is also enhanced with waste from sewerage systems, runway de-icer and the community waste streams. A 'Biogas to Vehicle Fuel' facility could provide power to the airport bus fleet to minimise CO_2 impacts.

7.8. These schemes are integral to delivering a sustainable airport and would be safeguarded through the proposed collaborative approach, the environmental benefits and socio-economic advantages of scale anticipated through R2.

Appendixes

Appendix 1 **Construction Waste Management Plan**

Appendix 2 **Code of Construction Practice - Waste**

Appendix 3 **Construction Waste Strategy and Action Plan**

Appendix 4 **Sustainable Materials Strategy**

Appendix 5 **Assumptions**

Appendix 1 – Construction Waste Management Plan

Gatwick R2
Construction Waste Management Plan
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Nathan Gray

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Approvals:
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Appendix 2 – Code of Construction Practice

Gatwick R2
Code of Construction Practice - Waste
Ref: Ver 1.2

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Name	Title	Date	Version

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Appendix 3 – Construction Waste Strategy and Action Plan

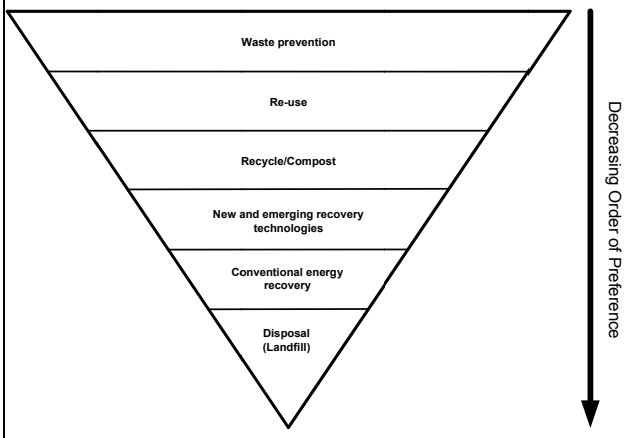
Gatwick

Gatwick Airport
Construction Team

Construction Waste Strategy & Action Plan

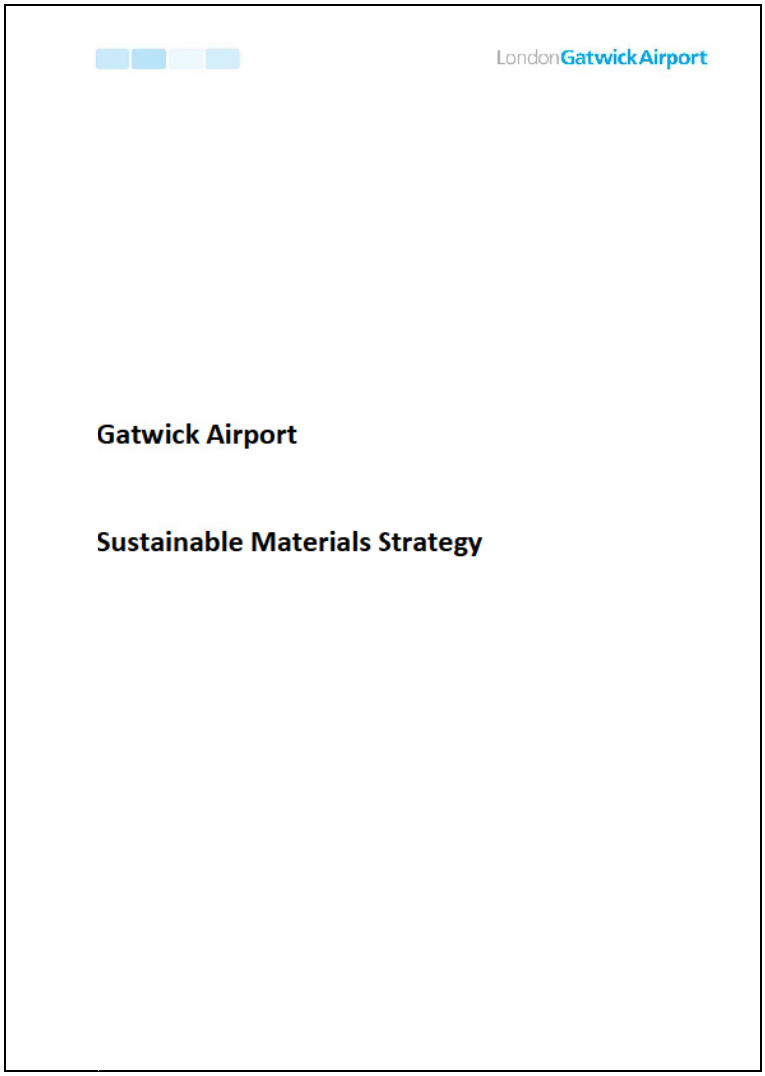
Introduction

The Gatwick Airport construction waste strategy is designed to provide a direction to ensure the most cost effective and environmentally sustainable management of construction waste flows on the airport sites. As such, it takes account of national and Gatwick policy, trends in the waste management industry and the projected financial impacts of waste management legislation. It is designed to meet and, in parts exceed the aspirations set out by DEFRA in the Waste Strategy for England 2007 including the targets for commercial and industrial waste. It supports the WRAP 'Halving Waste to Landfill' construction commitment by meeting or exceeding the WRAP suggested waste requirements. It also adopts and follows the waste hierarchy which prioritises the most environmentally sustainable approaches to waste and resource management (see below).



It is therefore essential to Gatwick Airport that it minimises its dependence on landfill, while maximising waste minimisation, re-use and recycling activities and finding long term secure disposal routes for the residual wastes.

Appendix 4 – Sustainable Materials Strategy



Appendix 5 - Assumptions

It is assumed that the construction waste generated by the R2 scheme will be removed off-site and handled by a licensed waste management contractor and processed through the proposed Waste Consolidation Centre onsite or a construction waste treatment facility capable of recovering 96% of the construction waste.

Construction waste generated during the construction of new infrastructure and buildings in the course of the R2 development would be at a rate in line with BRE benchmark rates (outlined below). This is a reasonable assumption as the BRE guidance provides published generation rates based on large-scale projects.

BRE Benchmark Rates:

Demolition waste

- Residential – 620Kg/m2
- Non- Residential – 757kg/m2

Construction Waste

- Commercial Retail 13.02m3/100m2
- Runway, Taxi way, Apron – 22.18m3/100m2
- Hotel – 17.70m3/100m2
- Workers Accommodation – 0.345/person/yr
- 4000 Labourers
- Office Accommodation – 0.416/person/yr
- 1000 Office based staff
- 5 Year Construction Programme

It is assumed that there will be a limited need to dispose of contaminated soils off-site. The bulk of the excavation works would take place in predominantly Greenfield space and therefore is expected that contamination levels will be very low. This is a reasonable assumption based on the geo-environmental conditions for the R2 site that have been assessed by GAL through a desk based assessment (Appendix to GAL's USD submission).

Gatwick R2
Construction Waste Management Plan
Ref: Version 1.1

Document History:

Document Owner:

Nathan Gray

Revision History:

Version	Date	Reason for change	Author

Approvals:

This document requires the following approvals.

Name	Signature	Title	Date	Version

Distribution:

This document has been formally distributed to:

Name	Title	Date	Version

Table of Contents

1. Introduction

1.1 Gatwick R2 Project Waste Management

This Construction Waste Management Plan (CWMP) identifies, in accordance with the AC's Appraisal Framework (Section 10. Place, paragraph 10.22), the procedures and measures GAL would intend to put in place to manage waste generated during the construction phase of the R2 project, including how any contaminated elements will be removed and disposed. A Materials Management Plan (MMP) will be produced (see the geo-environmental report and contamination assessment – Appendix 2.13 of GAL's submission) and chemical re-use criteria developed to allow the movement of impacted soils to areas of the R2 site that are suitable for reuse. This will greatly reduce if not eliminate the requirement for offsite disposal of contaminated soils.

The CWMP would form one of a wider suite of Construction related documents to manage the construction impacts of R2. These sit beneath an over-arching Code of Construction Practice (CoCP) which sets out the management measures that GAL would require of its contractors, as well as a series of objectives and measures to be applied throughout the construction of R2.

The CWMP will ensure all waste arising from the construction works are managed in a sustainable manner, maximising the opportunities to reduce, reuse and recycle waste materials. The CWMP will also detail the compliance and assurance requirements to be maintained on site during all phases of construction. The Construction Waste Management Plan will contain:

- Classification of all waste including hazardous waste according to current legislative provisions;
- Performance measurement and target setting against estimated waste forecasts
- Reporting of project performance on quantities and options utilised
- Measures to minimise waste generation through the management of contracts with designers and contractors;
- Maximise opportunities for re-use or recycling via the Waste Consolidation Centre;
- Provision for the segregation of waste streams on site that are clearly labelled;
- Recording of proposed carriers and the terms of their respective licences;
- Licensing requirements for treatment or disposal sites;
- An appropriate audit trail encompassing waste disposal activities and waste consignment notes;
- Measures to avoid fly tipping by others on lands being used for construction.
- Returns policies for unwanted materials; and
- Provision of training and awareness through the use of toolbox talks

A Waste Management Control Plan (WMCP) would be produced in conjunction with the appointed Waste Management Contractor for the specific requirements of the waste management practices on the site and the CWMP. The WMCP could contain (list not exhaustive):

- Site set up process for the Waste Consolidation Centre
- Skip ordering and identification process
- Waste collection procedure

- Waste storage procedure
- Document control procedures
- Due-diligence procedures
- Hazardous waste procedures
- Liquid waste procedures
- Reporting process
- Inventory control
- Equipment schedule
- Method Statements and Risk Assessments

The intention of this CWMP is that waste produced during construction activities will be minimised, re-used or recycled, wherever practical, feasible, economic and consistent with other environmental and management aspects of the R2 scheme.

During the preparation of this document, consideration has been given to the following documentation:

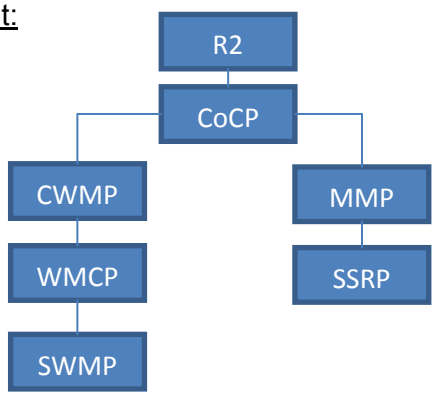
- EPA 1990
- GAL – Code of Construction Practice
- GAL – 'Decade of Change'
- GAL – Construction Waste Strategy and Action Plan
- GAL – Sustainable Materials Strategy
- Geo-environmental report and Contamination Assessment (Appendix 2.13 GAL's AC submission)

The CWMP is structured as follows:

- Section 2 reviews the context of the Gatwick Waste Strategy and Action Plan
- Section 3 looks at the waste hierarchy and an overview of the methods that GAL aim to use in minimising waste
- Section 4 presents the principles of the waste system to optimise reuse and recycling and encourage source segregation
- Section 5 looks at the monitoring and development of the CWMP
- Section 6 provides the regulatory context of the scheme
- Section 7 provides the reporting structure of the scheme

<u>R2 Project document structure – Construction Waste Management:</u>

Glossary;
CoCP – Code of Construction Practice
CWMP – Construction Waste Management Plan
WMCP – Waste Management Control Plan
SWMP – Site Waste Management Plan
MMP – Materials Management Plan
SSRP – Site Specific Remediation Plan



2. Context

2.1 GAL – Construction Waste Strategy and Action Plan

2.1.1 Design Objective

.1 It is essential to Gatwick Airport Limited that it minimises its dependence on landfill, while maximising waste minimisation, re-use and recycling activities and finding long term secure disposal routes for the residual wastes.

.2 The Gatwick Airport Limited construction waste strategy is designed to provide a direction to ensure the most cost effective and environmentally sustainable management of construction waste flows on the airport sites. As such, it takes account of national and Gatwick policy, trends in the waste management industry and the projected financial impacts of waste management legislation. It is designed to meet and, in parts exceed the aspirations set out by DEFRA in the Waste Strategy for England 2011 including the targets for commercial and industrial waste. It supports the Waste Recycling and Action Programme (WRAP) 'Halving Waste to Landfill' construction commitment by meeting or exceeding the WRAP suggested waste requirements. It also adopts and follows the waste hierarchy which prioritises the most environmentally sustainable approaches to waste and resource management:

- Eliminate
- Reduce
- Reuse
- Recycle
- Recover; and
- Dispose of waste

.3 At least 97 per cent, by weight, of the material from demolition works will be reused or recycled on site. Waste minimisation and management begins with design.

.4 GAL is seeking to design out, as far as practical, the production of waste during construction and operation of the facilities.

.5 The approach to designing for the future will require significant market innovation, which it is hoped will benefit the management and design of future facilities. The topographical modelling and design of the Gatwick R2 scheme seeks to minimise the export of material and minimise the import of clean material or secondary aggregate. It has allowed for a design which aims to balance cut and fill, so that only the most contaminated or hazardous material needs to be removed from site. Contaminated materials that can be remediated will be used or incorporated into the scheme.

When designing facilities, materials selection and structure will be kept under review to help minimise waste. Resource efficiency will be a key objective, alongside maximising the use of secondary materials. This can be through designing around standard sizes to avoid cutting down and creating waste, and also by avoiding details which create waste material without enhancing the design. GAL will also work with the supply chain to ensure, wherever practical, that pre-manufactured materials are made available to suit the design, rather than having to cut down and create waste on site. The choice of materials themselves can also have an implication on waste at the construction stage, particularly the use of materials that can be manufactured off site. The design of sites and infrastructure will consider robustness and protection to minimise wear and damage. Sites and surrounding area designs will allow space for the effective segregation and management of waste during construction and operation. Good design will encourage positive behaviour by users of the facilities who will be encouraged to segregate waste and employ good housekeeping principles.

2.1.2 Enabling and construction works

.1 The natural ground will, as far as possible, be used as fill material as part of the Gatwick R2 scheme, including for surface treatment and engineering structures.

.2 A Materials Management Plan will be in place for the demolition of onsite buildings and site clearance. This plan will set out the hierarchy of actions for demolition and site clearance materials, i.e. the priority to reclaim, reuse, and recycle wherever possible. Pre-demolition surveys will identify the types and volumes of materials. From these surveys, specific Site Waste Management Plans will be developed, including specific targets for the reuse and recycling of materials, which form contractual commitments, as well as plans for the effective management of any contaminated waste. A steering group will be established to maximise reuse and recycling on site. The scheme designers will be key participants in this steering group to assist in identifying the opportunities for reuse of material.

.3 A small element of contamination is known to exist on site and minimisation of waste is central to the strategy for its remediation and reuse on site.

.4 The GAL Construction Waste Strategy and Action Plan and Site Waste Management Plans for the construction phase will be based on source segregation and the proximity principle. All materials will be classified on site. Maximum practicable reuse, recovery and recycling of materials will be achieved through on site processing and utilisation of the proposed Waste Consolidation Centre.

.5 GAL will work with its supply chain to reduce the waste packaging associated with construction materials. This will work in tandem with the approach to logistics and the Construction Consolidation Centre, which will explore more opportunities for returning packaging to the sender.

3. Waste Hierarchy

The waste hierarchy is essential to Gatwick Airport Limited so that it minimises its dependence on landfill, while maximising waste minimisation, re-use and recycling activities throughout construction. The procedures and principles outlined below are presented to assist all contractors engaged on the R2 scheme.

3.1 Waste prevention

This construction waste management plan shall be integrated through all levels of the Programme and its procedures and systems, including its managers, designers, suppliers and contractors.

This plan will form the basis of detailed project procedures and requirements for waste management which are part of the contractual obligations for Suppliers and Contractors to the Project. The requirements will include the working practices to minimise the production of waste as a result of design and procurement, accidental damage, deliberate wastage, application losses, over ordering and abortive works.

It is the responsibility of the Project Contractors to provide a Site Specific Waste Management Plan (see GAL Construction Waste Strategy and Action Plan) that details how this Construction Waste Management Plan will be implemented in each area in conjunction with the appointed Waste Management Contractor and their Waste Management Control Plan. A SWMP is a documented record of total wastes anticipated (developed during the design phase of a project by the Prime Designer) and total wastes actually produced (during the construction and delivery phase, updated by the Prime Contractor), including 'Duty of Care' information showing how waste is disposed of, whether that is by reclamation on-site, off-site re-use, recycling, refuse derived fuel (RDF), or disposal to landfill.

3.2 Waste minimisation

Measures to minimise waste will include the following:

3.2.1 Design

Contractors or Suppliers should demonstrate how their designers have designed out waste. This may include;

- design of delivery systems to protect products e.g. reusable totes, protective layers, etc.
- evidence of prefabrication, standardisation and modular design concepts.

A 'Justification Report' will be produced by each supplier and form a part of their Site Waste Management Plan. For example:

- a report on how they have minimised waste associated with products and packaging is to be supplied to the Gatwick R2 Project. Supporting evidence is required to back up the quantities (kg/tonne) of materials saved or minimised as a total of products supplied; or
- a statement acknowledging how the designs have been adapted to standard material sizes to limit the production of waste.

3.2.2 Packing material

Contractors and Subcontractors shall provide written confirmation e.g. a 'Justification Report', detailing how their Suppliers have reduced packing material to the minimum whilst maintaining adequate protection to the goods. For example:

- a system where packing material e.g. cable drums, pallets, totes, etc, is identifiable from each supplier and is returned to the supplier on the next delivery truck, and a system put in place to manage this operation. This system should be agreed between the Supplier, Contractor and Logistics organisation prior to deliveries commencing.
- reusable packaging shall be used such as drums, pallets etc.
- confirmation of the volumes/quantities returned against those supplied should be provided as evidence on a monthly basis by the Contractor.
- where materials cannot be minimised, a statement regarding the justification shall be provided by the Contractor.

Packaging materials should be fully and easily recyclable after use or damage.

3.2.3 Work methods

Project Construction Management, Supervision and the Workforce shall be made aware of the Construction Waste Management Plan and associated documentation. The aim to minimise wastage at source and the importance to limit landfill must be made clear as well as the detailed procedures for waste collection, etc. This should form part of the site induction process and a regular programme of toolbox talks.

The provision of purpose built lay down and appropriate storage areas shall be provided in each construction zone/area to help minimise wastage of unused building products, as well as demonstrating good housekeeping, material management through Just-in-Time delivery principles and segregation of products/waste.

Contractors will provide a ‘Justification Report’ detailing the proportion of goods/materials delivered, compared to that installed on site at completion of each work package. This will be reported as a percentage of purchased goods to that installed, with a start and completion date for the package.

3.2.4 Contractual arrangements

Where applicable, the Suppliers and Contractors Agreements shall include, as a contractual obligation, the Construction Waste Management Plan. This obligation should be cascaded to all the different Tiers of Suppliers and Sub-Contractors.

3.2.5 Recycled content

Where applicable, the Suppliers and Contractors Agreements shall include, as a contractual obligation outlined in the Works Information and Gatwick’s ‘Sustainable Materials Strategy’, the requirement to report the percentage of recycled content of the products supplied. The recycled content should be expressed by:

- Value (£); and
- Weight (kg)

3.2.6 Training and awareness

Where applicable, the Suppliers and Contractors shall include, as a contractual obligation, the requirement to train and make aware the implications and requirements of this plan. Training records shall be maintained and provided to the GAL Project Manager as a central record with details of number of inductions, tool-box talks, etc in line with the Programme requirements for reporting.

3.3 On site reuse

The following will facilitate reuse on the R2 scheme:

3.3.1 Waste segregation facilities

A waste segregation area will be set up in each construction zone or compound by the Contractor, with suitable waste collection vehicular access provided at all times. The segregation area will be suitably sized (16m x 12m x 0.15m) and fenced (e.g. Herras fence) to facilitate a number of skips.

An experienced Waste Representative within each area will be employed by the Contractor or supplier to manage and police the segregation facility within their control and will liaise with the Waste Management Contractor to provide further suggestions and processes on how to improve the waste situation within each area.

The Contractual relationship is to provide for maximum reuse and recycling, and minimise landfill use (<4%).

The waste area shall, as a part of the process, allow the redistribution to the R2 project teams or Construction Consolidation Centre; materials that are suitable for reuse i.e. pallets, totes, concrete to the crushing plant, etc.

3.3.2 Concrete mixing water

Where contaminated process water is produced it should be returned to the batching plant or silt recycling facility to minimise environmental pollution and the contamination of surface waters.

3.3.3 Metal Off cuts and surplus

Metal off-cut bins will be provided by the Waste Management Contractor for bulking at the Waste Consolidation Centre.

3.3.4 Small tools and electrical equipment.

A workshop may be set up by the small tool supplier to inspect, certify and check in & out the small tools. The workshop will maintain and salvage small tool parts from beyond economic repair items for maintenance on others. Before an electrical item is deemed waste, it should be sent through this workshop for assessment.

IT equipment should be reused if no take-back service has been established at the outset. The potential for including these items in the Materials Exchange system should be explored. All waste will be disposed of correctly under the Waste Electrical and Electronic Equipment Regulations (WEEE).

3.4 On site recycling

The following will facilitate recycling on the R2 scheme:

3.4.1 Waste Consolidation Centre

The Waste Consolidation Centre contractor shall, as a part of the process, re-distribute material that is deemed suitable for recycling on site or that could be used for alternative purposes on site.

3.4.2 Excess / scrap concrete

The excess, out of tolerance and unused concrete shall be taken back to the concrete supplier's designated area. Formwork or a designated area shall be set up by the concrete supplier ready to take delivery from these items as excess. The concrete supplier will be responsible for the breaking up of the cured excess concrete. The appointed Waste Management Contractor could then remove this for onwards recycling at the site crushing plant. The cost recovery associated with this could be chargeable to the initiating Contractor i.e. the person who returned the excess concrete as a means of preventing over ordering.

3.4.3 Bituminous waste

Black-top road planning's derived from decommissioning and resurfacing of roads shall be stored and re-used, wherever practicable, in the construction of new roads on or around the site by the appointed Highway/Road Contractor.

3.4.4 Road Sweepers, Oil Interceptors & Silt Busters

Site generated slurry, liquids and road sweepings contaminated with silt/sediment or oil shall be dewatered on site via the onsite treatment facility to minimise off-site disposal. The solids may be incorporated within the site earthworks in accordance with a site specific remediation plan, and the liquids will be assessed for non-potable uses or disposal. Hazardous oils will be removed separately from interceptors and bulked up prior to removal from site to an onward recycling facility.

The Project Highway Contractor is responsible for cleaning and maintaining all common user roads and the Contractors are responsible for their individual Principal Contractor areas.

3.4.5 Food Waste

Facilities for the segregation of food waste will be provided by each Supplier or Contractor and collected by the appointed Waste Management Contractor for processing. The processed material may be used on site in a biomas boiler if it is deemed suitable for use and has been approved by the Regulator. The biomas boiler could be used to heat water in welfare accommodation or batching plant equipment.

3.5 Offsite reuse

The following will facilitate reuse away from the R2 scheme:

3.5.1 Waste Consolidation Centre

The Waste Consolidation Centre shall, as part of the process, distribute to authorised external locations, materials that are not suitable for reuse on site but are suitable for reuse off site. These materials will be bulked prior to removal to optimise transportation movements and maximise rebates.

3.6 Offsite recycling

The following will facilitate recycling away from the R2 scheme:

3.6.1 Waste Consolidation Centre

The waste consolidation centre shall as part of the process, distribute to an authorised external location, material that is suitable for recycling off site. This may include hazardous waste.

Where sufficient volumes of materials for offsite recycling are identified in one area outside of the waste consolidation centre, direct disposal via the Waste Management Contractor's system may be arranged with agreement from the GAL Project Manager, Contractor and the Waste Management Contractor.

3.6.2 Office/ Welfare waste - Bottles, paper, newspaper & cans

Arrangements shall be made for used drinks containers and recyclable products to be collected by the appointed Waste Management Contractor. Office accommodation, welfare accommodation and canteens should be provided with a twin bin collection system (Drinks containers and Recyclables) for recycling by the Contractor. Food waste will be collected separately from the welfare catering facilities.

Awareness raising initiatives should be promoted in all welfare areas by Facility Managers to assist in maximising recycling efforts and to allow for recycling at an onward destination.

3.7 Composting or Incineration with energy recovery

The following will facilitate recovery from the R2 scheme through composting, or use in an energy from waste plant that has heat recovery:

3.7.1 Site Shredding and Composting facility

A site processing facility will be established within the R2 site to treat site generated wood waste during construction, and vegetation that has arisen from the site clearance activities. The shredding and composting activity will comply with current legislation and obtain all relevant approvals.

3.7.2 Scrap timber, hazardous waste, etc

The Waste Management Contractor will transport wood waste to the site shredding and composting area to allow scrap timber to be recycled as chipboard, pulping, fuel pellets or other uses such as energy recovery and incineration or composting.

It must be noted that some timbers and other materials may not be suitable for some purposes as the material is affected by the treatment it has received for preservation, fire retarding, etc.

Hazardous waste should be incinerated with energy recovery where environmentally and economically viable.

3.7.3 Scrub or shrub clearance

Any vegetation clearance undertaken as a part of the initial site clearance works will be taken to the site shredding and composting facility for use on site. A site investigation will be undertaken by the Contractor prior to any clearance activities to prevent the inclusion of prohibited or invasive plant species into the composting facility e.g. Japanese Knotweed.

3.8 Contaminated land

Contaminated material will either be treated to improve soil quality or used in a location where it is suitable for use without further treatment. A Material Management Plan (MMP) will be produced and chemical re-use criteria developed to allow the movement of impacted soils to areas of the site that are seen to be suitable for reuse. This will greatly reduce if not eliminate the requirement for off-site disposal. The waste manager, as monitored by the working party (see Section 5 Monitoring and Development), shall be responsible to promote the reduction in volume of waste sent to landfill and reused on site.

3.9 Landfill / disposal

Only after the above options have been exhausted as a hierarchical preference should waste be sent to landfill or disposal. This may include foul waste or hazardous waste that meets with the appropriate Waste Acceptance Criteria (WAC) of the particular landfill. The waste manager, as monitored by the working party (see Section 5 Monitoring and Development), shall be responsible to promote the reduction in volume of waste sent to landfill. Sufficient incentive should be provided to motivate such a target through the involvement of the Waste Management Contractor and GAL Project Manager.

A comparison across sites will be made on a monthly basis, reporting on the percentage of segregation achieved in each area. The target rate for segregation will be 100%, to be agreed between the Contractors and the appointed Waste Management Contractor, and used as a means to achieve the optimum amount of reuse or recovery on or off site and to limit the volume of waste ultimately sent to landfill or disposed of by incineration.

4. R2 Waste Principles and Processes

4.1 Principles

The waste collection process shall be designed to reduce the amount of sorting required as well as preventing the cross-contamination of relatively clean/inert waste for re-use, recycling, or disposal.

Waste storage for segregation shall be provided within each sub-project area or as deemed necessary and agreed between the Contractor and Waste Management Contractor.

Collection of construction related waste from these facilities shall be carried out by the appointed Waste Management Contractor and in direct liaison with the Contractor for scheduling purposes.

Foul or liquid wastes will be disposed of via a direct connection to the mains sewer from all accommodation and welfare blocks on site where possible. All connections to the foul sewer network on site will be made by the Contractor under the control of a Discharge Consent (e.g. Thames Water Utilities Ltd). Where a connection is not possible, the site tanker collection service for foul waste will be provided by the Waste Management Contractor and waste disposed via an authorised disposal facility on site.

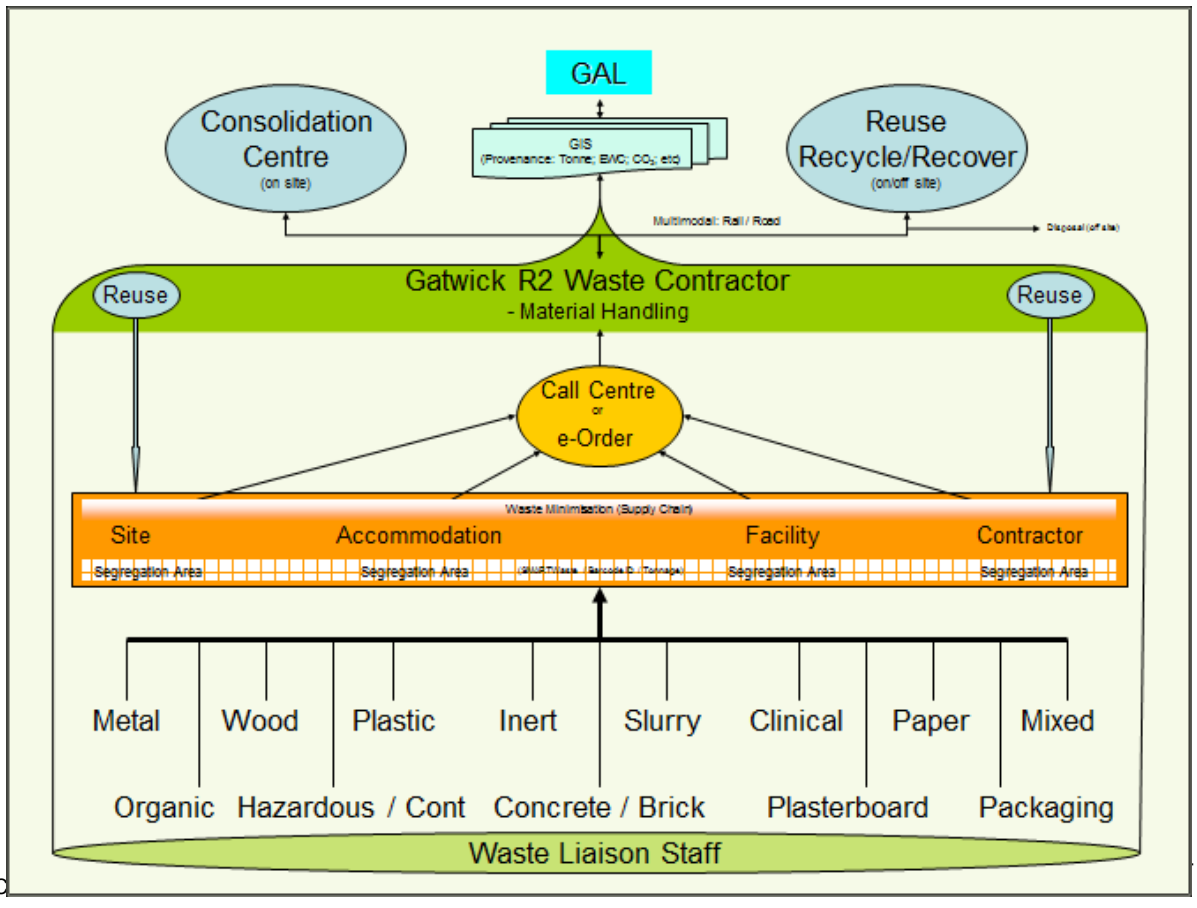
The Waste Consolidation Centre shall be within the boundary fence of the Project site to prevent the requirement for a Waste Management Licensing or Permit.

The Waste Consolidation Centre shall carry out the bulking of segregated loads, compacting, shredding, bagging, etc of materials generated on site and shall co-ordinate the disposal of the waste whether to internal or external recycling, for on or off site re-use, or removal to an offsite treatment facility.

4.2 Waste Process

The waste process below identifies the linkages between the R2 Construction Teams, the appointed Waste Management Contractor and the materials flows on and off site. The Waste Management Contractor is pivotal in managing and recording the material flows and volumes collected, transported and removed from the R2 scheme.

Figure - The Gatwick R2 Project Waste Process:



4.3 Roles and Responsibilities

Clear roles and responsibilities will be set out for:

4.3.1 GAL

.1 Waste Manager

.2 Project Manager

4.3.2 Waste Management Contractor

.1 Contract Manager

4.3.3 Site Contractor

.1 Principal Contractor

.2 Waste Representative / Liaison Staff

4.4 General Housekeeping

Sound housekeeping practices across the R2 project will enable site staff to minimise the generation of unnecessary waste from the project by preventing, amongst other things, accidental damage, vandalism, vermin and litter. It is also useful to encourage staff to appreciate the value of the materials being "wasted", by referring to waste as "offcuts" or a resource. This helps to enforce the importance of waste minimisation.

Raw materials should be appropriately stored in such a manner that equipment, weather or vandals do not damage them. In addition, the storage area should be somewhere where the materials can be kept until needed – repeated relocation of raw materials increases the likelihood of damage and wastage. The principles of Just-in-Time Delivery are crucial to preventing over-ordering and maintaining a supply of sufficient materials until the next programmed delivery is made.

Waste materials should also be stored securely, with appropriate measures being taken to ensure it remains contained as per 'Duty of Care' EPA 1990. Where waste is being stored, care should be taken to prevent:

- Corrosion or wearing out of the containers
- Accidental spillages and leaks
- Container breakages through misuse, bad weather, or accidents
- Scavenging by vandals, vermin and other animals
- Loose waste blowing away (FOD), falling out of skips, bays, etc.

It is envisaged that all waste will be collected locally from the sites in the first instance. A consolidation centre will be provided to "bulk-up" waste volumes prior to their removal off-site or redistribution on site. The appointed Waste Management Contractor will bulk segregated waste or compact wastes within this area before removing them from the site. It will be the responsibility of the waste management contractor to "shuttle" waste from the local site collection points to the consolidation area, as well as removing it from the site or redistributing within the site boundary. All waste movements will be recorded in the central system (e.g. SmartWaste) and a weight associated with each load.

4.5 Best Practice Principles

4.5.1 Segregation

The site contractor(s) is required to demonstrate their compliance with this plan and to put in place adequate training and awareness provisions to enable their workforce to segregate materials generated within their area.

A waste segregation facility will be set up in each construction zone by the Contractor, with suitable waste collection vehicular access provided at all times. The segregation area will be suitably sized (16m x 12m x 0.15m) and fenced (e.g. Herras fence) to facilitate a number of skips.

An experienced Waste Representative within each area will be employed by the Contractor or supplier to manage and police the segregation facility within their control and to liaise with the appointed Waste Management Contractor to provide further suggestions and processes on how to improve the waste situation within each area.

The Contractor will provide appropriate signage for the storage of waste materials as agreed between the Waste Management Contractor. Primary processing may be undertaken within the segregation area to enable the reuse of materials on site or to allow for loads to be easily transported to the waste consolidation centre.

The prevention of cross-contamination of materials is essential to allow the maximum amount of recovery with the minimum amount of processing to be undertaken on site. It is the responsibility of the Contractor to manage this function on site, and will be monitored by the waste management contractor as a percentage of segregation from each area. A weight (e.g. tonne or kg) will be associated with each type of waste removed from each area to allow the central reporting of waste statistics as a project performance indicator.

4.5.2 Materials Wastage

Waste management of construction materials will be specific according to each stage of construction during which waste is generated. The main construction phases are: Civils, Shell and Core, Cladding and Fit-out.

Estimates for the Gatwick R2 Project waste volumes are outlined below as an indication of how much waste will be produced over the entire scheme. When the project mobilisation programme is available and a relevant labour distribution over time is known, a more accurate waste profile for the programme will be produced.

Table: R2 development waste forecast.

Project Phase	Tonnes of Waste	Tonnes Recycled	Tonnes EfW / Incineration /Landfill	% Recycled / Reused
Demolition	295,000	286,150	8,850	97
Earthworks	524,000	513,520	10,480	98
Construction	835,000	793,250	41,750	95
Total	***1,654,000***	***1,592,920***	***61,080***	***96***

The table shows an estimated volume of the total waste within the Gatwick R2 Project during demolition, enabling works, and construction. Estimates for each phase will be produced prior to commencement. The intention is to reuse or recycle 96% of the total waste either on site or off site during construction and minimise the use of landfill wherever possible.

4.5.3 Spoil

Spoil materials excavated through foundation works; utilities installations or general ground works; must be stored and segregated appropriately by the Contractor in accordance with the type, nature, and classification (EWC Code) of the spoil. Where materials have been previously identified and analysed through a detailed site investigation (see relevant Site Specific Remediation Strategy) and are classified as contaminated, these must be managed accordingly.

4.5.4 Multimodal transport

The transportation of waste away from the Gatwick R2 Project could be achieved through sustainable means where practical. The Gatwick R2 Project has a potential to utilise the rail network if a railhead were to be considered at the existing Crawley Aggregates Industry Depot. The use of the local road network cannot be discounted for use, but will be limited to reduce impacts on the local communities through the consolidation of loads leaving the site and the optimisation of reverse logistics.

The proposed Construction Consolidation Centre and Waste Consolidation Centre within the Gatwick R2 Project will allow waste to move internally around the site and then be bulked for off-site disposal via the road or rail networks.

5. Monitoring & Development

A working party will be set up with representatives from the project teams and chaired by the Waste Manager (appointed by the Waste Management Contractor) to monitor and develop the Construction Waste Management Plan and the Waste Management Control Plans during the progress of the R2 scheme. The identification of opportunities for continuous improvement and the compliance with the waste targets will be key outputs from this group.

6. Legal

6.1 Waste Management Licence or Permit

Any relevant applications for a WML or an exemption from WML, which is made by a Contractor, should be provided to the GAL permit, licence and consents Manager. These will be audited by the Waste Manager to ensure legal compliance through random checks and audits.

6.2 Duty of Care

The Duty of Care for Waste under the Environment Protection Act 1990 applies to all those involved with the management of waste including the waste producers. The basic premise of the Duty of Care is that waste is managed correctly from when it arises to its ultimate recovery or disposal point.

In practical terms waste must only be transported by those registered to carry waste (Registered Carriers) and sites where waste is transported to or from undertaking keeping, treating or the disposal of waste must be appropriately licensed/permitted or registered as being exempt from the need to hold a licence.

At each stage paperwork must accompany the waste being transported and include the required information so that the nature and characterisation of the waste (European Waste Catalogue Codes), the origin, destination and haulier are recorded.

All waste materials will be fully traceable and auditable within the R2 scheme as well as any that leave the site. BRE's SmartWaste will allow all aspects of the Duty of Care to be recorded electronically for incorporation into the GAL central reporting system.

A record of all carriers and licensed facilities used in association with the Gatwick R2 project will be maintained within the GAL central reporting system.

6.3 Hazardous Waste

All producers of hazardous waste must register and pre-notify the Environment Agency to obtain a relevant site reference number under the Hazardous Waste Regulations 2005. The intention is that the appointed Waste Management Contractor will make a single application for the site on behalf of GAL, so that all producers will be covered by a single reference for the site, and record all hazardous waste movements from the site (see Waste Management Control Plan).

All appropriate methods of storage and handling should be undertaken prior to hazardous waste being removed from the R2 scheme by authorised persons. The correct classification and EWC code shall be used on all hazardous waste documentation, with full traceability and auditability provided for all loads.

6.4 Clean Neighbourhood and Environment Act 2005

A Site Waste Management Plan (SWMP) is no longer a legal requirement as of December 2013 under the Clean Neighbourhood and Environment Act 2005.

However, GAL still wish to use the SWMP principle and structure to ensure that details of the amount and type of waste that will be produced on a construction site, how it will be reused, recycled or disposed of is transparent and documented before work commences. The plan will then be updated during the construction process to record how the waste is managed and to confirm the disposal of any materials that cannot be reused or recycled on site are sent to a legitimate site.

SWMPs aim to improve resource efficiency within the construction industry in order to reduce the amount of waste produced and recover as much as possible of the remainder. This will be achieved in two ways: firstly, by requiring those responsible for projects to forecast how much of each type of waste they will produce and to record how much will be reused or recycled; and secondly, by building on the savings in material and disposal costs already secured, to promote the opportunities of preventing or minimising waste at source, i.e. through resource efficient design and construction methods.

Through the implementation of the CWMP, the R2 project will achieve its sustainable development commitments and resource efficiencies.

6.5 Liquid - Consents, Permits and Licences

Any discharges of liquids to ground, a water body or sewer should be agreed with and submitted to the GAL permits, licence and consents Manager prior to an application being made to the relevant authority (EA / TWUL).

Any dewatering operations will be assessed as to the method of disposal of the waters and the requirements for the monitoring, treatment and storage of those liquids prior to discharge. This may be through a series of settlement tanks, cut-off trenches, on site tanker treatment processes, or removed from site in a tanker to a licensed facility, only after treatment as required by the Landfill Directive.

6.6 Flytipping

The prevention of flytipped material will be managed through the security measures and phasing of road closures around the R2 project. Agreements with Local Authorities to remove any flytipped material on a public highway or footpath within their control will be put in place.

6.7 Planning

6.7.1 Nuisance

As part of any Planning process associated with the construction of the R2 scheme, GAL are committed to minimise noise generated by the construction activities on site.
Specialised equipment e.g. balers, compactors, crushers, etc will be used for handling waste. In addition, GAL will include in the contracts of all companies involved with the construction of the R2 requirements associated with noise to comply with any Section 61 agreements. The Waste Management Contractor will therefore be expected to comply with these requirements assisted by site Contractors where appropriate.

Additionally, the Waste Management Contractor must sheet all loads that may give rise to dust emissions during transit on or off the site. In exposed areas, water sprays must be used as necessary to prevent dust emissions from stored materials to prevent a dust nuisance to local amenities or the airport.

6.7.2 Traffic Movements

The Waste Management Contractor will liaise closely with the GAL Transport Manager in order to ensure that procedures for controlling the transportation of loads, engine idling, emission standards, and other procedures deemed necessary, are met.

The routing of construction traffic is a key commitment as a part of the development process for the R2 scheme. The Waste Management Contractor will adhere to the specified routes and will organise their work such that the routes are only utilised during the hours agreed, but may also need to be mindful of any specific conditions placed on the destination treatment sites for access or approach routes. Alternative routes may be used via the multimodal transport system developed for the R2 scheme as a means of limiting road haulage and traffic congestion.

6.8 Waste audits – Off site movements

All waste destinations shall be checked and audited by the appointed Waste Management Contractor (as a minimum) once a year against the Duty of Care, and for compliance with specific requirements of each Waste Management Licence/Permit and its associated conditions.

A schedule of audits shall be prepared along with a record of each audit, the outcome and actions from that audit, and evidence that the actions from that audit have been closed out in a timely manner. Any breaches or areas of concern will be reported to GAL.

The Waste Manager or his representative will be informed of all audits and will have the opportunity to accompany the appointed Waste Management Contractor on all audits.
Reporting

6.9 KPI

- Percentage of waste disposed to landfill (<4%)

6.10 Monthly reporting

Reporting may contain:

- Audits undertaken
- Performance
- Non-conformances

Gatwick R2
Code of Construction Practice - Waste
Ref: Ver 1.2

Document History:

Document Owner:

Nathan Gray

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Approvals:

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Table of Contents

1. Introduction

1.1 Code of Construction Practice

The Code of Construction Practice (CoCP) supports the proposals for site preparation works and infrastructure works proposed for the Gatwick R2 scheme. It sets out the management measures which GAL will require of its contractors to adopt and implement for any construction on the R2 Project and related offsite activities.

The term “Construction” in the Code of Construction Practice includes all site preparation, demolition, material delivery, excavated material disposal, waste removal and all related engineering and construction activities that form a part of the scheme.

The Code of Construction Practice sets out a series of objectives and measures to be applied throughout the R2 Scheme and phases of construction activity. These will maintain satisfactory levels of environmental protection and limit disturbance from construction activities as far as reasonably practicable.

The term “Project” means such projects forming part of the R2 Scheme.

The purpose of the CoCP is to provide the framework for any future preparation of an Environmental Management Plan for the R2 Project.

1.2 Scope of the CoCP

Elements not included in this Waste (Management and Recycling) section, but would be expanded on to be included in the future are:

- General Site Operations: Working Hours, Layout and Site Appearance.
- Transport Management
- Noise and Vibration
- Air Quality
- Contaminated Land
- Protection of Surface and Groundwater Resources
- Ecology
- Archaeology and Heritage
- Pollution Incident Control

2. CoCP - Waste (Management and Recycling)

2.1 Objective

Excavated materials, demolition, and construction waste generated at sites will be managed, so far as reasonably practicable, in accordance with all applicable waste management legislation and in accordance with the following waste hierarchy:

- Minimise the generation of waste;
- Excavated material and waste will be re-used and / or recycled in environmentally beneficial uses within the site development

- Excavated material and waste will be re-used and / or recycled in environmentally beneficial uses at sites outside of the Site;
- Unsuitable material will be disposed at appropriately licensed facilities e.g. Energy from Waste, or landfill sites.

2.2 General Provisions

The minimisation, re-use, and recycling of waste generated during site enabling works will be managed in accordance with a Materials Management Plan for the Site.

A Construction Waste Management Plan will be produced and implemented to manage waste generated during construction works and provide the framework for contractor's Site Waste Management Plans.

The statutory requirements of the Environment Agency will be complied with at all times. Contaminated land and demolition materials requiring treatment will be regulated under a waste management licence/permit or mobile treatment licence where required. Any necessary exemptions from waste management licensing in respect of the movement and storage of waste materials will be obtained. The Site is to be considered as one site for the purposes of waste management licensing and regulatory controls. Where unsuitable material and other wastes have to be transported off site, the Contractor will use registered waste carriers and appropriately licensed sites.

2.3 Materials Management Plan

A Materials Management Plan will be produced prior to work commencing on site. The Plan will require contractors to undertake a pre-demolition and site clearance survey to identify the type of waste material on site, estimate quantities of each material and its recovery potential (the percentage that can be reclaimed or recycled). Following the pre-demolition and site clearance survey, the contractor will set targets for reclamation and recycling. Targets will be based on industry best practice, the contractor's estimates of the materials recovery potential (identified in the pre-demolition and site clearance surveys), and the expected capacity of the site wide design and capacity of the waste and/or construction/aggregates industry to reuse or recycle the demolition material.

2.4 Construction Waste Management Plan

A Construction Waste Management Plan (CWMP) will be produced to manage construction waste across the site during the construction of the R2 scheme. The Plan will ensure all waste arising from the construction works are managed in a sustainable manner, maximising the opportunities to reduce, reuse and recycle waste materials. The CWMP will also detail the compliance and assurance requirements to be maintained on site during all phases of construction. The Construction Waste Management Plan will contain:

- Classification of all waste including hazardous waste according to current legislative provisions;
- Performance measurement and target setting against estimated waste forecasts
- Reporting of project performance on quantities and options utilised

- Measures to minimise waste generation through the management of contracts with designers and contractors;
- Maximise opportunities for re-use or recycling via the Waste Consolidation Centre;
- Provision for the segregation of waste streams on site that are clearly labelled;
- Recording of proposed carriers and the terms of their respective licences;
- Licensing requirements for treatment or disposal sites;
- An appropriate audit trail encompassing waste disposal activities and waste consignment notes;
- Measures to avoid fly tipping by others on lands being used for construction.
- Returns policies for unwanted materials; and
- Provision of training and awareness through the use of toolbox talks

Contractors will be required to produce Site Waste Management Plans in accordance with the CWMP and Site Waste Management Plan (SWMP) – GAL's Construction Waste Strategy and Action Plan details the process to be followed, and with reference to any appropriate industry practice.

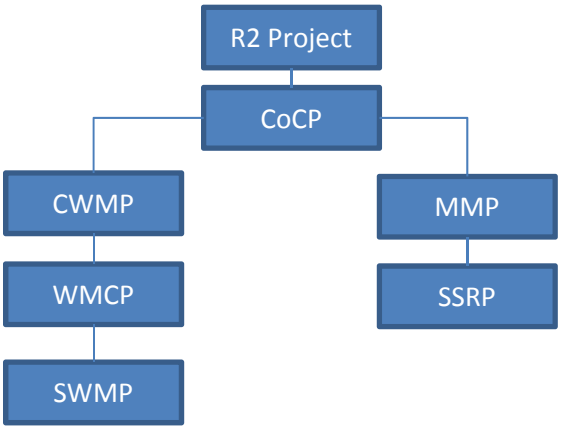
2.5 Handling and Disposal of Waste

In addition to the relevant statutory provisions, the approved guidance and procedures in the identification, handling, transport, storage, recovery and disposal of waste will be complied with.

In the case of odour, suitable containment will be used so as to avoid the perception of odour at the site boundary. In the case of particulates dust control measures will be adopted as set out in the GAL Air Quality strategy.

<u>R2 Project document structure – Construction Waste Management:</u>

Glossary;
CoCP – Code of Construction Practice
CWMP – Construction Waste Management Plan
WMCP – Waste Management Control Plan
SWMP – Site Waste Management Plan
MMP – Materials Management Plan
SSRP – Site Specific Remediation Plan



3. Appendices - Health, Safety & Environmental Legislation & Guidance

Legislation and guidance considered within the production of this Code of Construction Practice includes, but is not limited to details included within the following Appendices:

Appendix A Relevant Acts of Parliament
Appendix B Regulations
Appendix C Approved Codes of Practice
Appendix D HSE Guidance Notes/Codes of Practice
Appendix E British Standards
Appendix F Industry Codes of Practice

3.1 Appendix A: Relevant Acts of Parliament:

- The Environmental Protection Act 1990
- The Environment Act 1995
- The Control of Pollution Act 1974
- Pollution Prevention and Control Act 1999
- The Land Drainage Act 1991
- Clean Neighbourhoods and Environment Act 2005
- The Health and Safety at Work Etc. Act 1974

3.2 Appendix B: Relevant Regulations:

- The Construction (Lifting Operations) Regulations 1961
- The Construction (Head Protection) Regulations 1989
- The Management of Health and Safety at Work Regulations 1999
- The Construction (Design and Management) Regulations 2007
- The Construction (Health, Safety and Welfare) Regulations 1996
- Hazardous Waste (England and Wales) Regulations 2005
- The Waste Management Licensing Regulations 1994 (as amended)
- The Controlled Waste Regulations 1992
- The Controlled Waste (Registrations of Carriers and Seizure of Vehicles) Regulations 1991 (as amended)
- Pollution Prevention and Control (England and Wales) Regulations 2000 (as amended)
- Environmental Protection (Duty of Care) Regulations 1991
- The Provision and Use of Work Equipment Regulations 1998
- The Environmental Protection (Prescribed Processes and Substances) Regulations 1991
- The Conservation (Natural Habitats, etc.) Regulations 1994 (as amended)
- The Control of Pollution (Oil Storage) (England) Regulations 2001
- Hedgerows Regualtions 1997

- Contaminated Land (England) Regulations 2006 and Circular 02/2006
- .

3.3 Appendix C: Relevant Codes of Practice:

- Management of Health and Safety at Work ACOP to The Management of Health and Safety at Work Regulations 1999
- Workplace Health, Safety and Welfare ACOP to The Workplace (Health, Safety and Welfare) Regulations 1992
- Managing for Health and Safety in Construction ACOP to The Construction (Design and Management) Regulations 2007
- Health and Safety Commission ACOP for Work with Materials Containing Asbestos
-

3.4 Appendix D: Relevant HSE Guidance Notes:

- HS13 Asbestos 1988
- HSE Guidance Note EH 40/96 - Occupational Exposure Limits 1996
- HSE Guidance Note EH 44/91 - Dust General Principles of Protection
- EH10 Asbestos - exposure limits and measurement of airborne dust concentrations, 1990
- EH35 Probable asbestos dust concentration at construction processes, 1989
- EH36 Working with asbestos cement 1990
- EH37 Work with asbestos insulating board, 1989
- EH50 Training operatives & supervisors for work with asbestos insulation & coating, 1988
- EH51 Enclosures provided for work with asbestos insulation, coating & insulation board, 1989
- EH52 Removal techniques and associated waste handling for asbestos insulation coating and insulating board, 1989
- HSE Guidance MDHS100: Surveying, sampling and assessment of asbestos containing materials
- HSE Practice of workers and the general public during the development of contaminated land 1991
-

3.5 Appendix E: Relevant British Standards:

- BS 6031: 1981 - Code of Practice for Earthworks
- BS 6164: 1990 - Code of practice for safety in tunnelling in the construction industry
- BS 6472: 1992 - Guide to Evaluation of Human Exposure to Vibration in Buildings (1Hz to 80Hz)

3.6 Appendix E: relevant Codes of Practice:

- The Environmental Protection Act 1990
- Fire Prevention on Construction Sites
- The Joint Code of Practice on the Protection from Fire of Construction Sites and Buildings Undergoing Renovation
- Code of Practice, British Archaeologists and Developers Liaison Group 1986. English Heritage London Region - Guidance Papers
- LFCDA Fire Safety Guidance Note Number 29: Access for Fire Appliances
- Institute of Field Archaeologists Cod of Practice, 2000.
- British Archaeologists & Developments Liaison Group Code of Practice 1991.
- CBI - Archaeological Investigations, CoCP for minerals operators 1991
- DoE - Reports 1-5 produced by Contaminated Land Research (CLR), 1994/5
- DoE - A Guide to Risk Assessment and Risk Management for Environmental Protection (1995)
- DoE - Waste Management Papers
- DoE - Planning Policy Guidance on Biodiversity & Geological Conservation:
    - PPG 9 (1994)
    - DoE - Planning Policy Guidance on Planning and the Historic Environment. PPG 15.
    - DoE - Planning Policy Guidance Note on Archaeology and Planning. PPG 16.
    - EA - Pollution Prevention Guidance Notes
    - EA - Piling into Contaminated Sites
    - DoE - Circular 11/94 Environmental Protection Act 1990
    - ICE - Site Investigation Steering Group: Site Investigation in Construction Sites, 1993, Vol 4”Guidelines on Safe Investigation by drilling of landfills and contaminated land”.
    - ICE - “Design Practice Guide on Contaminated Land” 1994
    - CIRIA - “Remedial treatment of contaminated land” Series: SP101 to SP111 (1995)
    - CIRIA – “Control of pollution from construction sites: Guidance for consultants and contractors” (C532).
    - CIRIA/EA - Concrete Bunds for Oil Storage Tanks
    - CIRIA/EA - Masonry Bunds for Oil Storage Tanks
- BSI DD 175 - Code of Practice for the identification of potentially contaminated land and its investigation.
- PG3/1(95) - Process Guidance Note (as amended)
- PPS 23 - Planning and Pollution Control (DoE 1994)

Gatwick Airport

Sustainable Materials Strategy

Document Tracking

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Table of Contents

1.0 Introduction

The aim of this Sustainable Materials Strategy is to enable relevant teams to identify, source and use construction materials with a low embodied environmental impact across their manufacture, use and disposal. The Strategy is applicable to those teams, individuals and suppliers who are responsible for the design of construction projects, and the specification and procurement of construction materials or components at Gatwick Airport. In doing so Gatwick Airport will realise its aspiration to minimise the embodied environmental impact associated with its capital project activities.

This Strategy is delivered through a three stage approach to materials selection (figure 1). Each stage compliments the others and where applicable, all stages should be completed.

Stage 1	Incorporates the BRE Green Guide to Specification (BRE GGS), to optimise the embodied environmental impact during specification selection for building elements. Presently there is no equivalent to the BRE GGS for civil engineering specifications; therefore Stage 1 only applies to building infrastructure.
Stage 2	Incorporates the Materials Red List, which identifies specific requirements for key materials to minimise the environmental impact associated with materials selection. Stage 2 is applicable to all civil engineering and building infrastructure.
Stage 3	Incorporates the Principles of Design for Deconstruction to aid deconstruction and optimise the embodied energy of existing materials through reuse or recycling, whilst minimising waste. Stage 3 is applicable to all civil engineering and building infrastructure.

Figure 1: The three stages of sustainable materials selection

A series of targets support this Strategy (Appendix 1) and assess compliance against the Materials Red List, use of the BRE GGS and principles of Design for Deconstruction. The targets encourage best practice and innovation and help to measure success in terms of delivering the overall objective.

2.0 The Process

The process chart in Appendix 2 illustrates the Strategy delivery process and how the three stages interlink.

2.1 The BRE Green Guide to Specification

The BRE GGS uses life cycle assessment (LCA) methodology to assess the embodied environmental impact of construction materials from cradle to grave. It allows direct comparison of the environmental impacts of functionally equivalent products and building specifications across 13 impact categories (climate change, water extraction, mineral resource extraction, stratospheric ozone depletion, human toxicity, ecotoxicity, nuclear waste, waste disposal, fossil fuel depletion,

eutrophication, photochemical ozone creation and acidification). It also addresses replacement intervals over a 60 year lifespan, embodied CO2, recycled content and recyclability of the building component; and provides a level playing field for comparison. The size of the resulting 'Ecopoint' score relates directly to its impact - a high score equals high impact.

Presently there is no equivalent to the BRE GGS for civil engineering projects and therefore its use is only relevant for the 12 main building elements covered by the guide.

In developing the guide, several hundred industry specifications were assessed, giving rise to a spread of Ecopoint scores and final rating A+ to E for each building element group.

For each element, summary ratings are displayed by building type (e.g. flat roofs: warm deck) against each detailed specification (see figure 2), with a breakdown of its scores across the 13 impact areas and 5 criteria. A specification with a summary rating of A+ provides the optimal embodied environmental impact and hence is the preferred option.

Flat roofs: warm deck Commercial, Education & Industrial	Summary rating	Climate change	Water extraction	Human toxicity	etc
Profiled metal deep decking with in situ concrete:					
Vapour control layer, insulation, EPDM single ply roofing membrane	B	B	B	A+	
Vapour control layer, insulation, felt isolating layer, mastic, asphalt roofing	C	C	B	A	
Vapour control layer, insulation, PVC* single ply roofing membrane	B	B	B	A+	
Vapour control layer, insulation, TPO single ply roofing membrane	B	B	B	A+	

Figure 2: Extract from BRE Green Guide showing example of specifications and summary rating

*Note: Gatwick Airport aims to eliminate PVC in all its construction components and requires that PVC-free alternatives are selected by design. To meet this requirement BRE GGS specifications containing PVC should NOT be considered.

Additional specification assessments have been undertaken since the BRE GGS (4th edition) was published in 2009. These are available on the free online version of the BRE GGS at www.bre.co.uk/greenguide which should be used by teams in preference to the hard copy. Assessment of any non-listed specifications may be sought from BRE through the web site. The use of the BRE GGS is **mandatory** for all designers and specifiers of those main building elements listed in figure 3 below. All specifications are expected to achieve a minimum of 'C' rating, with a longer term target to achieve A/A+ for a proportion of building elements (see targets in Appendix 1).

Roof
External wall
Surfacing for lightly trafficked areas
Surfacing for heavily trafficked areas

*Figure 3: Building elements for which the use of the Green Guide to Specification is **mandatory***

The Ecopoint range for these four building elements is particularly wide ranging, with those specifications scoring less than 'C' having a relatively high Ecopoint score and associated embodied impact. For this reason Gatwick Airport has identified the manadatory use of the BRE GGS when specifying for these potentially higher risk building elements.

As the BRE GGS is straightforward to use, it is recommended that it is used to assist in specification selection of all remaining commercial and industrial main building elements (figure 4), to optimise the embodied environmental impact:

Ground floor	Windows	Surfacing to pedestrian areas
Upper floor	Internal wall	Boundary protection
Separating floor	Insulation	

*Figure 4: Building elements for which the use of the Green Guide to Specification is **recommended***

2.2 The Materials Red List

Emissions to air, land or water, waste generation, use of finite natural resources, release of carbon dioxide, energy consumption, loss of biodiversity, displacement of communities and health and safety of labour may all be improved or amplified depending on materials selection.

The Gatwick Airport Materials Red List (figure 5) identifies those materials that should be avoided or selected in preference to others.

The Materials Red List applies to **all construction materials** for both **temporary** and **permanent** works; extending the scope beyond main building elements as for the BRE GGS. It adds clarity to the BRE GGS whilst allowing Gatwick Airport to prioritise specific components with particular environmental qualities or impacts over others, for all construction works. For example where timber forms part of the infrastructure, it must be FSC or PEFC certified; components must be PVC-free, thus eliminating any BRE GGS specification containing PVC; and Ready Mixed Concrete (RMC) must be certified as responsibly sourced under BES 6001 global standard. Where there is conflict between Stage 1 and Stage 2 selection mechanisms, the Materials Red List takes priority.

Material	Summary Requirement (see targets for detail)
Timber	FSC or PEFC certified. Formaldehyde-free composite boards.
Concrete	Maximise use of cement replacement products. RMC certified to BES 6001.
Natural Resources	Maximise use of recycled materials.
Mined and Quarried Products	Source mined and quarried products from a local and responsible source. Minimise use of virgin aggregates, metal ores and minerals.
PVC	Select PVC-free alternatives.
HCFC/HFCs	Eliminate HCFC use in line with legislation and minimise HFC use where possible. Eliminate HCFC/HFC in insulation products. Review HCFC/HFC use in existing and proposed HVAC systems and explore alternatives.
VOCs	Source low-VOC products.
Hazardous Chemicals	Achieve REACH compliance. Reduce use of Substances of Very High Concern (SVHCs).

Figure 5: The Materials Red List

The Materials Red List helps teams to understand the often hidden impacts of materials in daily use, enabling them to make responsible choices. Red List materials commonly occur in construction materials, components and modular units, and non-compliant materials should not be used unless no practicable alternative can be found (see Concessions). Further detail on the environmental impacts associated with the use of Red List materials is provided in Appendix B.

Compliance with the Materials Red List may require changes to be made to a proposed design; the sourcing of products with a longer lead time; or the procurement of products through a new supplier. It is imperative that design teams and construction planners consult the Materials Red List at the earliest opportunity so as to embed it within the design and ensure that resourcing and procurement plans take account of the requirements. Compliance with this Strategy will be monitored through audit and review (see Reporting, Audit and Review)

HCFCs/HFCs

This Strategy aims to eliminate the use of HCFCs and minimise the use of HFCs. The reduction in use of HCFC/HFCs for air cooling and chilling at Gatwick Airport will be achieved through the ongoing review of existing and proposed assets as part of the Gatwick Airport HCFC/HFC Phase Out Strategy

(see extract in Appendix 6). The checklist outlined in the Phase Out Strategy should be followed where HCFC/HFC use is proposed. A concession will be required prior to the installation of new equipment containing HFCs.

2.3 Design for Deconstruction

The final stage in optimising the embodied environmental impact of construction projects is to employ good practice principles in construction design so as to facilitate their **economic** and **effective** deconstruction for reuse and recycling.

When making design choices the design team should proactively consider the deconstruction of each design element to facilitate reuse or recycling. For example, the removal of components from a building through easy and safe access to the building element and fixings; use of fixing methods that allow parallel disassembly and rapid deconstruction; avoidance of non-recyclable materials such as composite materials or secondary finishes that complicate reprocessing; and the avoidance of toxic materials.

To aid designers a checklist of design principles for deconstruction is provided in figure 6.

Economic Viability

At the start of each project the design team needs to ascertain whether designing for deconstruction is economically viable and in doing so should pose the question **"why are we designing for deconstruction?"** The answer may be to reduce the embodied environmental impact of a project; to maximise the value of a temporary building, to reduce quantities and certain types of materials going to landfill, to reduce future landfill tax liabilities or financial penalties etc. These reasons will help to evaluate the costs and benefits of designing for deconstruction and the cost and value to each beneficiary, which will in turn inform the decision as to whether to proceed.

In the majority of cases temporary structures should incorporate the principles of design for deconstruction to maximise opportunities for reuse of materials and building components. Design complexity and use of materials should be minimised and particular attention should be given to the method of fixing and to modular build. A deconstruction statement (see below) should accompany all temporary structures.

Desired Outcome

Assuming the business case is favourable the next question to pose is **"are we designing for component reuse or materials recycling?"** and if so **"what type of reuse and recycling are we designing for?"**

If the design is to facilitate reuse then what type of reuse? The removal of a whole or part of a building for refurbishment; the removal of a component or element for reconditioning (e.g. metal railings or cladding), or salvaging elements for subsequent reconditioning.

If the design is for recycling then what type of recycling? Down-cycling, on site reprocessing and reuse, or the separation of materials for off site reprocessing and recycling should be considered in terms of the desired outcome.

Due to the different techniques applied to the process of reconditioning for reuse and reprocessing for recycling, the answer to these last two questions will determine the overall design. As shown in figure 6, certain decisions taken at the design stage will achieve more effective reuse whilst others may achieve more effective materials recycling. Design teams should reflect the design principles below, to aid design for deconstruction for either reuse or recycling where it is considered beneficial to do so. A complete design checklist is provided in Appendix 4.

Design Principle √ = very important × = less important	**Desired outcome**	
	Component reuse	Material recycling
Provide identification of materials and components	√	√
Provide guidance for deconstruction	√	√
Design for simultaneous, parallel disassembly and deconstruction	√	×
Design for deconstruction using common tools and equipment rather than bespoke tools	√	×
Minimise the number of different types of components	√	×
Mechanical in preference to chemical connections	√	×
Consider using modular construction	√	×
Provide good access for deconstruction especially connections	√	×
Design components sized to suit appropriate means of handling	√	×
Provide adequate tolerances for assembly and deconstruction	√	×
Design connectors, fixings and components for repeated use	√	×
Consider using standard grids	√	×
Use the minimum number of different types of connectors	√	×
Consider the use of prefabrication	√	×
Minimise the number of different types of material	×	√
Use alternatives to toxic and hazardous materials	×	√
Make inseparable sub-assemblies from the same material	×	√
Eliminate the use of secondary finishes to materials	×	√

Figure 6: Suitability of different design principles for reuse and recycling end of life events (from CIRIA Design for Deconstruction, 2003)

Deconstruction Statement

The most useful aid for the reuse or recycling team when planning full or partial deconstruction or a building or piece of infrastructure, will be a complete record of all the materials and components used. It will also be useful to know the original intentions and assumptions made by the design team (e.g. designing for reuse or recycling; targeted materials) and to have access to the information produced at the design stage (e.g. cost-benefit evaluation, designed access to and types of fixings). This information should be collated in a deconstruction statement or file and provided to the Facilities Manager at building handover.

2.4 BREEAM and CEEQUAL

Use of the BRE GGS, Materials Red List and Principles of Design for Deconstruction positively contribute to the BRE Environmental Assessment Method (BREEAM) for building projects, and the Civil Engineering Environmental Quality Assessment and Awards Scheme (CEEQUAL), for civil engineering projects.

BREEAM is the leading and most widely used environmental assessment method for buildings. It promotes and sets the standard for best practice in sustainable design, addressing wide-ranging environmental and sustainability issues; enabling developers and designers to measure the environmental performance of a building.

CEEQUAL promotes environmental and social best practice and measures social and environmental performance in civil engineering projects. It aims to achieve economic, social and environmental success by assessing the effect of the project on a wide range of social and environmental issues, such as the effect on community relations and biodiversity; and also indirect economic issues through the consideration of energy, materials and waste.

Both environmental assessment schemes aim to encourage the use of materials with a lower environmental impact, taking account of their full life cycle. The schemes awards credits for the use of specifications and materials that minimise environmental impact.

Gatwick Airport is beginning to consider both BREEAM and CEEQUAL during the design and construction of new buildings and civil engineering works; and during the refurbishment of existing infrastructure. The implementation of this Strategy will significantly contribute towards an improved overall score and reduced environmental impact.

3.0 Targets

A series of targets support this Strategy (Appendix 1). The targets help to assess compliance against the Materials Red List, use of the BRE GGS and principles of Design for Deconstruction; encourage best practice and innovation; and help to measure success in terms of delivery of the overall objective. The targets compliment the Gatwick Airport Environmental Strategy Indicative Targets and High Level Actions.

The Strategy has sought to meet best practice where industry benchmarks exist for Red List materials; for example in the use of PFA. Where there is no benchmark, targets aim to minimise or

maximise use and Project teams should collate information to support their success in achieving the target. The elimination of components through design to achieve compliance may be counted towards the targets. For example, the removal through design of a HFC chiller unit by non-HFC substitution or the connection into a central chilling network should be recorded as target compliance so as to recognise and reward the good environmental practice of eliminating need.

4.0 Concessions

All Project teams, functions and suppliers to Gatwick Airport must comply with this Strategy. Where a material or specification is required which is contrary to these objectives, then a Concession request form (Appendix 5) must be submitted to the Best Practice Manager in the Development Team for approval prior to acquisition. Each case will be assessed on an individual basis against availability, practicality, performance and cost of alternatives.

All tender submissions are required to accommodate the Materials Red List , BRE GGS mandatory components and the principles of Design for Deconstruction, in terms of design, cost, programme, quality, health and safety and labour implications. Any changes to specification or installation requirements associated with compliance in these areas must be identified by the supplier during the tender stage.

Failure to seek approval for a Concession may result in the non-compliant material or product being removed, disposed of and replaced, with the full cost borne by the Project team or supplier. Retrospective approval will only be considered in exceptional circumstances.

5.0 Reporting, Audit and Review

All project teams are required to collate information to enable them to report their performance annually against the targets outlined in this Strategy, to the Best Practice Manager in the Development Team. Supporting information to provide an adequate audit trail of compliance should also be retained by the team.

The Best Practice Manager will audit project compliance against the requirements of this Strategy in line with the wider Gatwick Airport audit and review process. Project teams will be audited throughout the Project process from project conception to completion of construction.

6.0 Conclusion

Incorporating the principals outlined in this Strategy into the design, construction and flexible use of the infrastructure at Gatwick Airport will provide a portfolio with an optimal embodied environmental impact that will reflect the environmental credentials of Gatwick Airport for years to come.

7.0 Appendices

Appendix 1 - Sustainable Materials Strategy Targets 2010 - 2015

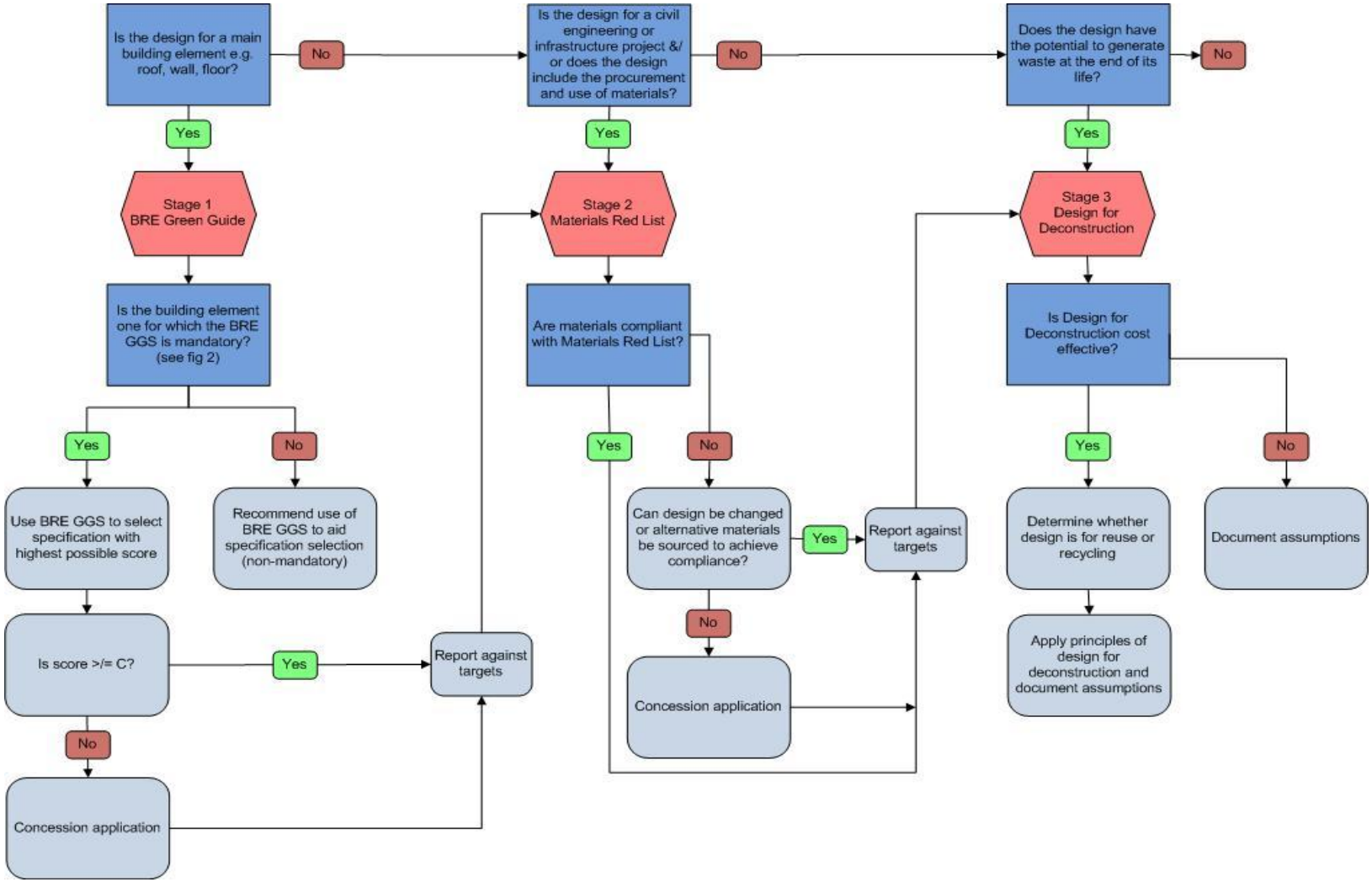
Material	Objective	Target 2010	Target 2011	Target 2012	Target 2013	Target 2014	Target 2015	*Notes*
Timber (1)	**Use FSC or PEFC certified timber and timber products**	Collect data from framework suppliers on timber sources and certification		80% of construction timber to be FSC or PEFC certified with remaining 20% from known legal sources	Review success of government FLEGT licensing scheme. Include/exclude as appropriate	98% of construction timber to be FSC or PEFC certified with remaining 2% from known legal sources	Maximise recycled content of timber products, with any remaining proportion FSC or PEFC certified	
Timber (2)	**Use formaldehyde-free (FSC/PEFC) timber composite boards. Alternatively use 100% recycled plastic for formwork and hoardings**			Obtain 65% formaldehyde-free timber composite boards with remaining 35% low formaldehyde content			Obtain 95% formaldehyde-free timber composite boards with residual 5% low formaldehyde content	
Concrete (1)	**Maximise the use of sustainable concrete**		Maximise the use of cement replacement products (PFA or GGBS) in ready mixed concrete for: - Normal Construction (IIB-V 21%-35% PFA or IIIA 36%-65% GGBS); - Foundations (IVB-V 36%-55% FA or IIIB 66%-80% GGBS); & - Pavement Quality Concrete (30% maximum PFA)	All ready-mix and precast concrete products certified to BES 6001 BRE Standard for Responsibly Sourced Products	Review 2011 target against Industry Best Practice for use of cement replacement products			

Material	Objective	Target 2010	Target 2011	Target 2012	Target 2013	Target 2014	Target 2015	*Notes*
Concrete (2)	**Incorporate innovative lower carbon products and better construction solutions in concrete design**		Trial the use of innovative low carbon concrete products and/or better construction solutions, record savings as case study and promote		Research and continue to trial the use of innovative low carbon concrete products and/or better construction solutions, record savings as case study and promote			
Natural resources	**Promote the use of recycled materials**		Maximise opportunities to use recycled materials in temporary/permanent works (e.g. metal ores, hardcore, bituminous materials/planings, rubber, glass). Document and promote to other project teams			90% of airport demolition/deconstruction materials to be reused or recycled* (by weight)		** priority to on-site recycling where storage capacity, supply & demand constraints permit*
Mined and quarried products	**Source mined and quarried products from a responsible source. Minimise use of virgin aggregates, metal ores and minerals**		Source 25% of high grade aggregate requirements from recycled material (by weight) . Note: excludes PQ concrete mixes	Source 90% of virgin mined and quarried products from a certified responsibly source and local* or EU origin				** local sourcing is preferable to EU.*

Material	Objective	Target 2010	Target 2011	Target 2012	Target 2013	Target 2014	Target 2015	*Notes*
PVC	**Select PVC-free alternatives by design in all applications**	Explore opportunities to recycle any PVC waste arising from work on airport, in preference to disposal.		All new components used in construction to achieve PVC-free, including membranes and components which interface with existing PVC structures				*Targets apply to all temporary and permanent works.*
HCFC/HFCs	**Eliminate HCFC use in line with UK legislation and minimise HFC use where possible**	Review all existing, new or replacement HVAC requirements against the HCFC/HFC Phase Out Strategy and consider the use of alternatives where possible	Eliminate use of HCFC/HFC expanded foam insulation and replace with HCFC/HFC-free products (e.g. rigid phenolic/urethane foam). Where space permits select maximum thickness sheep wool insulation			Eliminate HCFC use in HVAC systems across Gatwick Airport		
VOCs	**Reduce environmental impact associated with high-VOC products (paints, sealants, adhesives, varnishes, printing inks, furnishings, carpets etc.)**		Source low-VOC products (EMICODE EC1 or Blue Angel Eco-label for product type, or equivalent), for 50% applications		Source low-VOC products (EMICODE EC1 or Blue Angel Eco-label for product type, or equivalent), for 60% applications		Source low-VOC products (EMICODE EC1 or Blue Angel Eco-label for product type, or equivalent), for 90% applications	

Material	Objective	Target 2010	Target 2011	Target 2012	Target 2013	Target 2014	Target 2015	*Notes*
Hazardous Chemicals	**Reduce environmental impact associated with chemical use**	Use only items, substances or preparations so as to achieve full compliance with REACH Regulations	Request all framework suppliers provide information on any SVHC (subst. of very high concern) present in items, substances or preparations that they supply and/or use at Gatwick Airport	25% reduction in use of SVHCs based on 2011 data		50% reduction in use of SVHCs based on 2011 data		
BRE Green Guide to Specification	**Specify building components that deliver a low embodied environmental impact**			40% 'mandatory' building component specifications to achieve optimal BRE Green Guide rating (A/A+)			80% 'mandatory' building component specifications to achieve optimal BRE Green Guide rating (A/A+)	*based on BRE 2008 Green Guide ratings A+ to E*
Design for Deconstruction	**Apply Principles of Design for Deconstruction to all construction works**			Design for Deconstruction considered in 50% of building and infrastructure projects initiated this year.		Deconstruction Statement prepared for every project.		
Sustainable Materials Strategy	**Ensure Strategy on track to deliver overall aim**			Review objectives and progress against targets.				

Appendix 2 - The Materials Selection Process



Appendix 3 - Materials Red List Summary of Environmental Issues

Material	Summary Requirement	Common Use	Key Impacts
Timber	FSC and PEFC certified Formaldehyde-free composite boards	Timber and timber products incl. formwork, chipboard, plywood, doors, pipe supports, packaging Fire retardant and adhesive in composite boards	Deforestation and associated impacts of non-sustainable or illegal timber felling practices Known animal carcinogen and suspected human carcinogen. Occupational exposure linked to respiratory disease and sick building syndrome
Concrete	Maximise use of cement replacement products RMC certified to BES 6001	Concrete in structural, foundations, airfield pavement works. Pre cast structures and drainage.	Depletion of natural resources, global warming impact associated with cement manufacture, environmental impacts associated with limestone quarrying.
Natural Resources	Maximise use of recycled materials	Recycled materials can be used extensively in concrete as recycled and secondary aggregates (RSA) to form all or part of the coarse and fine aggregates. Non-aggregate recycled materials such as glass ,rubber, plastic can be used in road construction, rubber asphalt, hoardings and formwork, interior fixtures and fittings e.g. balustrades, suspended ceilings etc.	Depletion of finite natural resources
Mined and Quarried Products	Source mined and quarried products from a local and responsible source. Minimise use of virgin aggregates, metal ores and minerals.	Concrete mixes, foundations and sub-base layers, embankments Virgin aggregates, metal ores and minerals , cement	Global warming impact, noise, air emissions and fossil fuel depletion associated with transport. Environmental and social impact associated with mining and quarrying e.g. emissions to air and water courses, loss of biodiversity, health impacts . Natural resource use.
PVC	Select PVC-free alternatives	Piping, cladding, subsurface drainage, plumbing wares, electrical wire insulation, trunking, ducting, smooth floor coverings, roofing membranes, windows, stair rails, formwork, tensile fabric roofing or structures, internal wall coverings, signage , illuminated screens and beacons.	In manufacture and disposal: Environmental impacts during manufacture associated with the release of heavy metals e.g. mercury and cadmium (foetal abnormalities) and the release of dioxin (bioaccumulator & adverse effects on immune system, reproduction and foetal development, carcinogen and hormone disruptor) during, manufacture, incineration and accidental fire. Vinyl chloride & ethyl chloride used in manufacture are carcinogens & powerful irritants. Many PVC components are SVHCs (see HazChems) In use: Phthalates used as plasticizers (softening agents) in PVC are carcinogens and endocrine disrupters (linked to infertility and foetal abnormalities). During use off-gassing of VOCs continues (see VOCs). During accidental fire hydrochloric acid, toxic dioxins, carbon monoxide and dense black smoke is released which hinders evacuation and incurs elevated cleanup costs.

Material	Summary Requirement	Common Use	Key Impacts
			Reputation: Greenpeace, WWF and FoE continue to campaign to phase out PVC. Corporate leadership to achieve PVC-free is demonstrated by Mattel, Disney, M&S, Nike, VW, Honda.
HCFC/HFCs	Eliminate HCFC use in line with legislation and minimise HFC use where possible. Eliminate HCFC/HFC in insulation products Review HCFC/HFC use in existing and proposed HVAC systems and explore alternatives.	Foaming gap fillers, insulation foam. Air cooling, chilling (cold stores, catering fridges), fire suppressant systems.	High global warming impact. Intended as a temporary solution to replace ozone depleting CFCs. Manufacture of some HCFCs banned from 2010, with phase-out programme in place. Ongoing use of HFCs conflicts with Kyoto and UK Climate Change targets with likely ban by 2030. Hydrochlorofluorocarbon (HCFC) compounds are used to replace chlorofluorocarbons (CFCs). As they contain chlorine they deplete stratospheric ozone (have ozone depletion potential (ODP)), but to a lesser extent than CFCs. Those with higher ODP such as R11 are being phased out first from 2010, with others to follow. Hydrofluorocarbon (HFC) compounds are also used to replace CFCs. As they do not contain chlorine they do not have any ODP. However all HCFCs and HFCs have a high Global Warming Potential (GWP), ranging from 90 to 12,000 times that of CO2. It is due to their GWP that their use is to be avoided where design opportunities and technology permits.
VOCs	Source low-VOC products	Fire retardants (often formaldehyde in many products e.g. timber boards, carpets, upholstery); form release agents, adhesives, epoxy resins, paints & coatings	VOCs are an important air pollutant and significant contributor to global warming via their role in creating low level ozone and in prolonging the life of methane (a greenhouse gas) in the atmosphere. Aromatic VOCs such as benzene, toluene and xylene are suspected carcinogens. VOCs may also react with nitrogen oxides in air in the presence of sunlight, to form low level ozone which contributes to respiratory problems and can also damage crops and buildings. Internal sources of VOCs such as paints, solvents, adhesives, formaldehyde and wood preservatives contribute to sick building syndrome
Hazardous Chemicals	Achieve REACH compliance Reduce use of SVHCs	Most chemical compounds such as wood preservatives, paints, solvents, adhesives, additives cleaning fluids etc. Also components such as plasticisers in flexible PVC, preservatives in fence posts, flame retardants in polystyrene etc.	Many impacts incl. carcinogenic, toxic to humans and aquatic systems, damage to nervous system, endocrine inhibitor, irritant

Appendix 4 - Design for Deconstruction Checklist

Activity	√ when considered	
Q - Why are we designing for deconstruction?		
Evaluate costs and benefits and identify beneficiaries of designing for deconstruction. If favourable outcome continue.		
Q - Are we designing for component reuse or materials recycling?		
Q - What type of reuse and recycling are we designing for?		
Consider design principles below, as determined by desired outcome		
Design Principle √ = very important × = less important	**Desired outcome**	
	Component reuse	Material recycling
Provide identification of materials and components	√	√
Provide guidance for deconstruction	√	√
Design for simultaneous, parallel disassembly and deconstruction	√	×
Design for deconstruction using common tools and equipment rather than bespoke tools	√	×
Minimise the number of different types of components	√	×
Mechanical in preference to chemical connections	√	×
Consider using modular construction	√	×
Provide good access for deconstruction especially connections	√	×
Design components sized to suit appropriate means of handling	√	×
Provide adequate tolerances for assembly and deconstruction	√	×
Design connectors, fixings and components for repeated use	√	×
Consider using standard grids	√	×
Use the minimum number of different types of connectors	√	×
Consider the use of prefabrication	√	×
Minimise the number of different types of material	×	√
Use alternatives to toxic and hazardous materials	×	√
Make inseparable sub-assemblies from the same material	×	√
Eliminate the use of secondary finishes to materials	×	√
Collate file of information on all building materials and components and record of design assumptions		

Appendix 5 - Concession Request Form

Concession Request

1. Request

Project Details:	**Supplier:**
Location / Work Area:	**Supplier's Ref No:**
System:	**Document No:**

Description of issue:

Proposal to deviate from Gatwick Airport Standards or Technical Brief :
(include justification for acceptance)

Ref. Attachments (e.g.: report, technical paper etc.)

Name	Signature	Position & Organisation	Date

2. Decision

Standard Owner / Technical Leader response:

CONCESSION AGREED? Yes ☐ **No** ☐ **(**If Yes, Acceptance signature of Standard Owner or Technical Leader is required)

Standard Owner/ Technical Leader Name	Signature	Position	Date

Circulation :

Appendix 6 - HCFC Refrigerant Phase-Out Strategy (extract)

Checklist to determine destiny of HCFC asset

In 2010 the manufacture of HCFCs was banned, making HCFC based equipment harder and more expensive to maintain. By the end of 2014 the use of HCFC refrigerants will become illegal for virtually all applications.

At the start of 2009 across Gatwick Airport there were 187 pieces of equipment containing a total of more than 1.4 tonnes of HCFC R22 refrigerant, providing cooled air across various parts of the site. A replacement programme for pieces of large equipment exists and plans are being developed to replace all HCFCs across the Gatwick campus. As part of this, HCFC based assets need to be analysed to determine what should be done with them. A site HCFC register is available and holds details of all HCFC assets.

The checklist below aims to guide whether an asset should be replaced, disposed of or regassed and how this might occur. When considering the use of any chilled system, first consider this checklist to ascertain whether alternative cooling may be incorporated into the design; to achieve compliance with the Gatwick Airport Sustainable Materials Strategy. Installation of HCFC/HFC chilling will require a Concession.

1	Does the asset serve an area which is currently or is soon to become redundant? If so tick **dispose of unit** option
2	Does the usage level of the area in terms of how many people use it and for how long justify the need for air cooling? If not tick **dispose of unit** option
3	Can the amount of equipment generating heat (such as PCs, monitors, printers, photocopiers, fridges, microwaves, etc.) be reduced such that the area no longer requires cooling? If so tick **dispose of unit** option
4	Would natural ventilation either by ducting or vents provide enough heat build up removal to make the asset's additional cooling unnecessary? If so tick **dispose of unit** option.
5	If applicable for the asset in question is there a supply of chilled water available from a non-HCFC based chiller which could be used instead of the current asset? If so tick **attach to a main chilled water service** option.
6	Is there a ducted system with sufficient capacity available which could be extended to the area currently served by the asset? If so tick **replace unit with an HVAC service from another system** option.
7	Is the unit in very good condition with a realistic projected asset life which goes significantly beyond 2014? If so tick **re-gas with HFC refrigerant** option
8	Is the current asset oversized in terms of capacity against the area it is serving? If so consider reducing the capacity of any replacement.
9	Has a risk assessment for using a natural refrigerant replacement unit been performed? A statement of key risks associated with each natural refrigerant is available from your technical leader in the Development Team. See 11 & 12 below.
10	Does the area generate a reasonable based heat load throughout the year? Examples would include an IT server room or a conventional lift motor area. If so is there an option to use air source heat pump or VRF system to transfer the heat to another area which would normally require heating in the winter months? If this is the case then tick the **use as heat source** option
11	If the risk assessment doesn't preclude the use of a natural refrigerant and a natural refrigerant replacement is less than 30% more expensive than an HFC based replacement then tick **replace with a natural refrigerant unit** option.
12	If the risk assessment does preclude the use of natural refrigerants or the natural refrigerant option is more than 30% more expensive then tick **replace with an HFC refrigerant unit** option

Tick the option below which the checklist above has directed you to:

Dispose of unit	Re-gas unit with HFC refrigerant	Replace with a natural refrigerant unit	Replace with an HFC refrigerant unit	Attach to a main chilled water service	Replace unit with an HVAC service from another system	Use as heat source
☐	☐	☐	☐	☐	☐	☐

Appendix 7 - Glossary of Terms

BRE Green Guide to Specification	BRE (formally Building Research Establishment) publication providing designers and specifiers with easy-to-use guidance on how to make the best environmental choices when selecting construction materials and components for building projects.
BREEAM	BRE Environmental Assessment Method used to measure the environmental performance of a building.
Building element	Used in this document to describe a main building structure such as ground floor, internal wall, insulation, roof etc.
CEEQUAL	Civil Engineering Environmental Quality Assessment and Awards Scheme (CEEQUAL), for civil engineering projects. Promotes environmental and social best practice and measures environmental and social performance for civil engineering projects.
Deconstruction	The process of carefully taking apart components of structures, possibly with some damage, with the intention of either reusing some of the components or recycling the materials. It may be undertaken during refurbishment, when adapting a building or infrastructure for new use, or at its end of life.
Downcycling	The reuse or recycling of a product, component or material for a purpose with a lower performance requirement than it originally provided.
Ecopoint	An Ecopoint is a single score environmental assessment. Developed by the BRE as a standardised means of comparing the environmental impacts of individual products. This enables different products to be comparatively assessed using a simple single score rating. Ecopoints are calculated by 'normalising' the data of a products whole of life environmental impact, using a weighting system developed on a range of sustainability issues. Ecopoint scores class products with an A+ to E rating - 'A+' being the most environmentally preferable
Environmental aspect	Any feature of an organisation's activities, products, or services that can 'interact' with (or impact on) the environment
Environmental Impact	The effect of a substance or activity on the environment. It may be positive or negative, direct or indirect.
FSC	The Forest Stewardship Council (FSC) is an international, non-governmental organisation promoting responsible management of the world's forests. The FSC runs a global forest certification system with two key components: Forest Management and Chain of Custody certification. This system allows consumers to identify, purchase and use timber and forest products produced from well-managed forests.
Functional unit	Provides essential information about the general attributes of each specification used in the BRE GGS, including unit of comparison and its performance characteristics.
LCA (Life Cycle Analysis or Assessment)	A method of evaluating the environmental impacts of a system taking into account its full life cycle through the compilation and evaluation of the inputs, outputs and

	the potential environmental impacts. Often referred to as cradle to grave.
Materials Red List	A list of materials selected by Gatwick Airport which are to be avoided or minimised, or where specific requirements are to be achieved in preference to other materials.
PEFC	Programme for the Endorsement of Forest Certification (PEFC) is an international non-profit, non-governmental organisation promoting sustainable forest management. Provides a certification system for well managed forests.
Recycling	The process by which materials that would otherwise become solid waste are collected, separated or processed and returned to the economic mainstream to be reused in the form of raw materials or finished goods.
Reprocessing	The operation of reforming reclaimed materials into new products
Summary Rating	Average performance rating (A+ to E) across all 18 assessment criteria used in the BRE GGS

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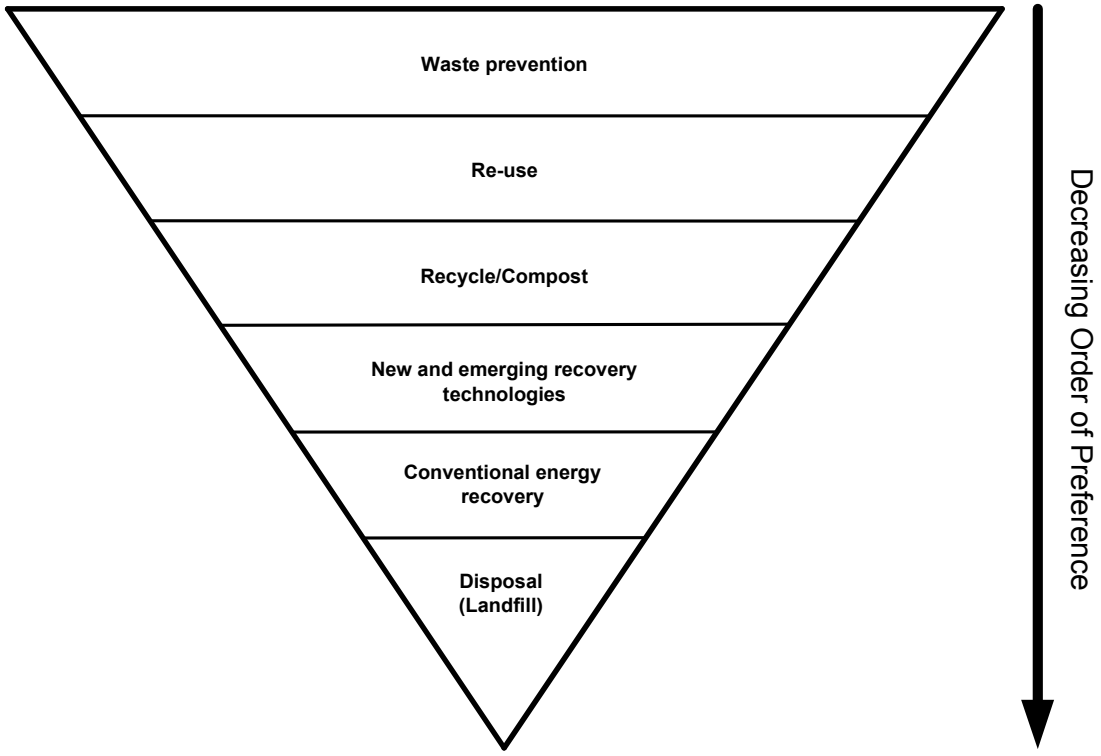
Gatwick Airport
Construction Team

Construction Waste Strategy & Action Plan

Introduction

The Gatwick Airport construction waste strategy is designed to provide a direction to ensure the most cost effective and environmentally sustainable management of construction waste flows on the airport sites. As such, it takes account of national and Gatwick policy, trends in the waste management industry and the projected financial impacts of waste management legislation. It is designed to meet and, in parts exceed the aspirations set out by DEFRA in the Waste Strategy for England 2007 including the targets for commercial and industrial waste. It supports the WRAP 'Halving Waste to Landfill' construction commitment by meeting or exceeding the WRAP suggested waste requirements. It also adopts and follows the waste hierarchy which prioritises the most environmentally sustainable approaches to waste and resource management (see below).



It is therefore essential to Gatwick Airport that it minimises its dependence on landfill, while maximising waste minimisation, re-use and recycling activities and finding long term secure disposal routes for the residual wastes.

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Overall Waste Targets

To drive improvements in performance Gatwick Airport has developed and adopted the following long term targets for the various types of construction waste.

Long Term Target to 31st December 2020		
1.	**Construction Waste**	Minimum of 75% recovery or reuse of construction materials, aiming to exceed 90% recovery
2.	**Demolition Waste**	Recovery of at least 95% of demolition and strip out waste
3.	**Excavated Material**	Recovery of at least 95% of soil and aggregate
4.	**Hazardous Waste**	Full compliance with legislative requirements for the treatment and disposal of Hazardous waste
5	**Waste to Landfill**	No untreated waste to landfill

Currently these targets would be considered best practice as recommended by WRAP, but Gatwick Airport would like to exceed them where space and facilities on projects allow. However, it is likely that during the life of this strategy the targets will become the minimum requirement to comply with UK and EU legislation.

Construction Waste Action Plan

To reach these targets Gatwick aims to set annual targets progressing towards the overall 2020 target.
The plan for reaching the overall 2020 target would be;

Year	Description	Targets
2010	Introduce collection and reporting of construction waste data	85% recycling of all mixed construction waste
2011	Introduce reporting separately on individual waste streams in line with WRAP recommendations	75% recycling Construction waste 85% recycling Demolition waste 85% recycling Excavation waste
2012	Increase required recycling rates	85% recycling Construction waste 95% recycling Demolition waste 95% recycling Excavation waste
2013	Develop and introduce waste reduction targets by project type & value	TBA
2015	Introduce a target of 'No untreated waste to landfill'	'No untreated waste to landfill'

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Management of Waste on Site

Waste from construction, demolition and maintenance activities, including those related to retail fit-outs and strip-outs, should be managed separately from all other waste, as it follows a different pattern of waste management. Construction waste tends to be produced more sporadically and sometimes in much larger individual consignments. The requirements for separate treatment of hazardous waste are equally applicable to construction waste.

From April 2008, a legal obligation on all project teams was introduced to produce a Site Waste Management Plan (SWMP) where the capital value of the project exceeds £300,000 excluding VAT. However it is best practice for all project teams to apply this approach assisting in correctly estimating costs for waste removal & treatment.

A SWMP is a documented record of total wastes anticipated (developed during the design phase of a project by the Prime Designer) and total wastes actually produced (during the construction and delivery phase, updated by the Prime Contractor), including 'Duty of Care' information (see later) showing how waste is disposed of, whether that is by reclamation on-site, off-site re-use, recycling, refuse derived fuel (RDF), disposal to landfill etc.

The SWMP will be prepared early in design phase for all new projects, and updated as required. It will be provided to the EPC Manager before start on site, forecasting quantities and on completion of the project, reporting actual performance.

Information on Site Waste Management plans can be found using the following address;

http://www.netregs.gov.uk/commondata/acrobat/swmp_simpleguide_1697918.pdf

There may be opportunities to reclaim waste materials produced during construction and demolition, thus minimising the quantity that leaves the airport site for disposal.

However the storage and processing of waste materials for reuse, reclamation or recycling may require a waste management licence, depending on the materials, quantities and intended uses involved. The Environment Agency can issue exemptions from the need for a waste management licence, but there is an onus on the project team to register for their exemption.

If a project is intending to carry out such activities, then this should be recorded in the Site Waste Management Plan (SWMP) and should be checked with the Gatwick EHS Assurance Team on any additional requirements for waste management licensing or exemptions.

Gatwick has an agreement with the Environment Agency to store clean concrete on site for crushing and re-use on other projects. Project teams can make use of this facility by following the Construction Waste Storage & Recycling Procedure 20000-XX-QU-XXX-000095.

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Contractual Arrangements

The construction waste removal contracts will generally be placed directly by the Prime Contractors. Contracts will not normally be placed directly between Gatwick Airport and a Waste Management Contractor for construction waste.

Construction waste management services are available at Gatwick Airport through the incumbent Waste Management supplier. Other waste management suppliers can be used by Prime Contractors but the Materials Recycling Facilities (MRF) must be inspected as part of the 'Duty Of Care' requirements before any waste is dispatched from site.

Prime Contractors are required to send to the Best Practice Manager, before the 4th day of each month, the previous months records of waste, the quantity of waste produced and the quantity of waste sent to landfill, in the format requested by the Best Practice Manager, giving a breakdown of:

- construction, demolition and excavation waste (each reported separately)
- hazardous and non-hazardous waste
- the % recycled of each waste stream

As the requirements of the action plan targets become more challenging, additional reporting will be required, including the amounts of 'Waste to Energy' plus quantities of treated and untreated waste to landfill.

Doug Waters
Best Practice Manager
September 2012
version 9