Circular Economy Statement

The Hillingdon Hospital Redevelopment

The Hillingdon Hospitals NHS Foundation Trust

April 2022

Delivering a better world

Quality information

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1. Executive Summary

Overview

This Circular Economy Statement has been prepared by AECOM Ltd. on behalf of The Hillingdon Hospitals NHS Foundation Trust ('the Client') in support of the hybrid planning application to the London Borough of Hillingdon (LBH). The proposal comprises of a full application for the new Hillingdon Hospital and multi-storey car park (hereafter referred to as the 'Hospital Redevelopment') and an outline application for a mixed-use development with a residential primary function (hereafter referred to as the 'Masterplan Development').

This document sets out the proposed Circular Economy Strategy for the Hospital Redevelopment and Masterplan Development (hereafter referred to as the 'Proposed Development') to meet the relevant planning policy within the context of the constraints applicable at the Site.

Brief description of the development

Hillingdon Hospital is located to the south of Pield Heath Road, bound by Royal Lane to the west, and Colham Green Road to the east. The site is located within the Brunel Ward. The site comprises a ten-storey block built in the 1960s and a mix of other hospital buildings scattered across the site. Many of the acute beds are in single storey wards built in the 1940s, which are in very poor condition. The remainder of the site consists mainly of surface level car parking, interspersed with pockets of landscaping.

The Applicant intends to seek planning permission for the following:

- **The 'Hospital Redevelopment':** Full application seeking planning permission for demolition of existing buildings and redevelopment of the site to provide the new Hillingdon Hospital, multi-storey car park and mobility hub, vehicle access, highways works, associated plant, generators, substation, new internal roads, landscaping and public open space, utilities, servicing area, surface car park/ expansion space, and other works incidental to the proposed development.
- **The 'Masterplan Development':** Outline planning application (all matters reserved, except for access) for the demolition of buildings and structures on the remaining site (excluding the Grade II Furze and Tudor Centre) for a mixed-use development comprising residential (Class C3) and supporting Commercial, Business and Service uses (Class E), new pedestrian and vehicular access; public realm, amenity space, car and cycling parking.

Engaged organisations

Some of the key organisations that were involved in the development, design and delivery of the Proposed Development include:

- AECOM (Project Manager, Mechanical, Electrical, Plumbing, Structural and Civil Engineers, Energy and Whole Life-Cycle Carbon ('Multidisciplinary Engineering'));
- IBI Group (Architects, Healthcare Planning, Landscape Architects);
- Prior and Partners (Masterplanners);
- Savills (Planning);
- Ridge (BREEAM and Quantity Surveyors) and;
- Mott MacDonald (Engineering services)

A full list of all of the organisations that were engaged in the design and development of the Proposed Development is provided in Table 1.

Strategic approaches

The Site is currently occupied by a number of existing buildings, as illustrated in Figure 1, including The Furze, Grade II Listed building, the eleven storeys Tower Block, Existing accommodation and ward buildings.

Mott MacDonald have been appointed by The Hillingdon Hospitals NHS Foundation Trust to provide engineering services to develop a Strategic Outline Case (SOC) for the Proposed Development. The SOC report outlined the below key constraints relating to the "do-minimum scenario" (redevelopment and refurbishment of the existing hospital buildings and minor new construction works as required):

> *"This option carries a high risk from a MEP standpoint due to the aging nature of the infrastructure and the extensive support needed to maintain their operation. Some parts of the existing infrastructure are not afforded the level of resilience that would be expected and extensive upgrades, some of which are underway, will be required. The ability to improve construction of the new buildings over the existing whilst maintain business as usual will be challenging and the constrained nature of the works will increase this difficulty. The current public transport offering is robust with numerous bus services, but it has poor permeability and the means of patient transfer and public access to the site are restricted."*

Therefore, the strategic approaches for the Proposed Development have been set out as follows:

- To maximise opportunities to retain the value of existing materials on the Site through reuse, reclaim and recycling;
- Ensure beneficial reuse of any loose fill material remaining on site for soil remediation, pile matting or landscaping sub-base;
- Adopt lean design principles to minimise the material intensity of the Proposed Development. Minimise construction waste arising through use of pre-cast or prefabricated elements where feasible. Ensure materials are sustainably sourced and specified, with a preference toward use of certified materials throughout; and
- Adequate storage provision and separation of municipal and healthcare waste streams for the new development to allow maximisation of recycling opportunities.

Changes in use for the Proposed Development are expected to be infrequent. The Proposed Development will therefore be designed for longevity. The blocks consisting of tenanted areas will adopt principles of longevity for its structure and skin whilst supporting adaptability through its internal configuration to facilitate changes in spatial requirements of varied tenancies throughout the building's lifetime.

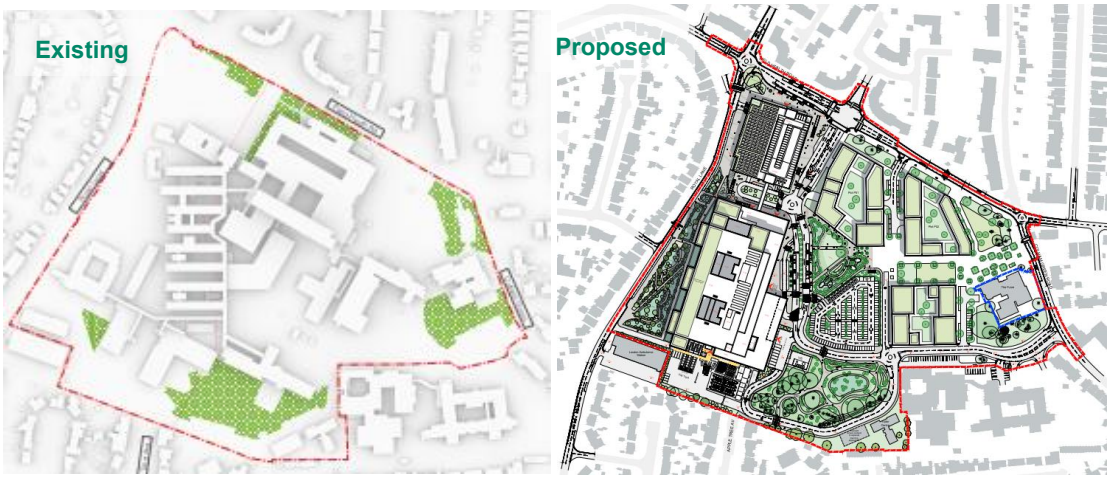

Figure 1. Existing vs Proposed Development Site *(Source: DAS- THHR_01-IBI-ZZ-ZZ-RP-A-250010)*

Specific commitments

The key commitments of the Applicant are:

- To divert a minimum of 95% of non-hazardous demolition waste from landfill for reuse, recycling or recovery;
- To divert a minimum of 95% excavation waste from landfill for beneficial reuse;
- To divert a minimum of 95% of construction waste from landfill for reuse, recycling or recovery;

- To specify products and materials to achieve a minimum of 20% of the total value of the selected elements to be comprised of recycled or reused content; and
- To facilitate the achievement of a minimum recycling rate for municipal waste by 2030 of 65% for the Proposed Development.

Overall implementation approach

The specific plans for short- and medium-term targets are the following:

- Ensure that the contractor tender package includes all Circular Economy Statement commitments and targets.
- Review the potential to source materials as per commitments.
- Set up a tracker for all the commitments and targets made in the Circular Economy statement and review the progress on a monthly basis.

The programme / method for longer-term targets are as follows:

- The Demolition Contractor and Lead Contractor to provide evidence that all commitments are addressed in the As-Built building.
- The Demolition Contractor and Lead Contractor to report against all waste management targets.
- The Demolition Contractor and Lead Contractor to provide written confirmation that the final destination landfills have sufficient space.
- The Client to provide a Post Completion Report to the Greater London Authority.

2. Introduction

Background

AECOM's Sustainable Development Group has been commissioned by The Hillingdon Hospitals NHS Foundation Trust (hereafter referred to as the 'Client') to prepare a Circular Economy Statement, to accompany a hybrid planning application for the for Hillingdon Hospital Redevelopment Scheme comprising of 102,637.6 m^2 Gross Internal Area (GIA) (detailed planning application), referred to as the 'Hospital Redevelopment', and 40,464 m^2 GIA (outline planning application), referred to as the 'Masterplan Development'. The combined Hospital Redevelopment and Masterplan Development are hereafter referred to as the 'Proposed Development'.

The document sets out the proposed Circular Economy Strategy which has been developed to meet the relevant planning policy (Greater London Authority, 2021) within the context of the constraints applicable to the Proposed Development and its location.

London Plan

The London Plan is the statutory Spatial Development Strategy for Greater London prepared by the Mayor of London ("the Mayor"). The new London Plan 2021 has now been adopted as the current version (Greater London Authority, 2021), introducing a range of topic areas to policy including the following in relation to the Circular Economy.

Policy SI 7 Reducing waste and supporting the circular economy

2.1 *"A. Resource conservation, waste reduction, increases in material re-use and recycling, and reductions in waste going for disposal will be achieved by the Mayor, waste planning authorities and industry working in collaboration to:*

1) *Promote a more circular economy that improves resource efficiency and innovation to keep products and materials at their highest use for as long as possible;*
2) *Encourage waste minimisation and waste prevention through the reuse of materials and using fewer resources in the production and distribution of products;*
3) *Ensure that there is zero biodegradable or recyclable waste to landfill by 2026;*
4) *Meet or exceed the municipal waste recycling target of 65 per cent by 2030;*
5) *Meet or exceed the targets for each of the following waste and material streams:*
    a) *Construction and demolition – 95 per cent reuse/recycling/recovery;*
    b) *Excavation – 95 per cent beneficial use;*
6) *Design developments with adequate, flexible, and easily accessible storage space and collection systems that support, as a minimum, the separate collection of dry recyclables (at least card, paper, mixed plastics, metals, glass) and food.*

2.2 *B. Referable applications should promote circular economy outcomes and aim to be net zero-waste. A Circular Economy Statement should be submitted, to demonstrate:*

1) *How all materials arising from demolition and remediation works will be re-used and/or recycled;*
2) *How the proposal's design and construction will reduce material demands and enable building materials, components and products to be disassembled and re-used at the end of their useful life;*
3) *Opportunities for managing as much waste as possible on site;*
4) *Adequate and easily accessible storage space and collection systems to support recycling and re-use;*
5) *How much waste the proposal is expected to generate, and how and where the waste will be managed in accordance with the waste hierarchy;*
6) *How performance will be monitored and reported.*

2.3 *C. Development Plans that apply circular economy principles and set local lower thresholds for the application of Circular Economy Statements for development proposals are supported."*

Policy D 3 Optimising site capacity through the design-led approach

2.4 *The Circular Economy Design Principles are also referenced in the "Policy D3 Optimising site capacity through the design-led approach"* (Greater London Authority, 2021).

London Borough of Hillingdon

London Borough of Hillingdon Local Plan

The London Borough of Hillingdon Local Plan sets out the overall level and broad locations of growth up to 2026. It comprises a spatial vision and strategy, strategic objectives, core policies and a monitoring and implementation framework with clear objectives for achieving delivery, with specific policies focused on waste minimisation:

Policy EM1: Climate Change Adaptation and Mitigation

"…7. Encouraging sustainable techniques to land remediation to reduce the need to transport waste to landfill. In particular developers should consider bioremediation as part of their proposals…"

Policy EM11: Sustainable Waste Management

"The Council will aim to reduce the amount of waste produced in the Borough and work in conjunction with its partners in West London, to identify and allocate suitable new sites for waste management facilities within the West London Waste Plan to provide sufficient capacity to meet the apportionment requirements of the London Plan which is 382 thousand tonnes per annum for Hillingdon by 2026…"

Description of the development

The Proposed Development is for:

- **The 'Hospital Redevelopment':** Full application seeking planning permission for demolition of existing buildings and redevelopment of the site to provide the new Hillingdon Hospital, multi-storey car park and mobility hub, vehicle access, highways works, associated plant, generators, substation, new internal roads, landscaping and public open space, utilities, servicing area, surface car park/ expansion space, and other works incidental to the proposed development.
- **The 'Masterplan Development':** Outline planning application (all matters reserved, except for access) for the demolition of buildings and structures on the remaining site (excluding the Grade II Furze and Tudor Centre) for a mixed-use development comprising residential (Class C3) and supporting Commercial, Business and Service uses (Class E), new pedestrian and vehicular access; public realm, amenity space, car and cycling parking.

Hospital Redevelopment

Full planning permission will be sought for:

- Replacement hospital building (79,603.6 sqm GIA) of basement, ground plus seven storeys on the western extent of the site incorporating a linked mobility hub and multi storey car park (MSCP) for 781 car spaces;
- High quality landscaping buffer fronting Royal Lane;
- New bus stop arrangements and improved connections to the hospital on Pield Heath Road;
- Large central green open space for use by the hospital and wider community;
- 161 surface level car parking spaces with the ability to cater for up to 14,000 sqm of expansion space for future hospital expansion (if required).

Masterplan Development

Outline planning permission will be sought for the wider masterplan comprising the following proposals:

- Up to 33,870 sqm of residential, comprising 327 dwellings;
- Plots – P01, P02, P04 (mixed use blocks with supporting provision of 800sqm of town centre uses (Use Class E) at ground floor level).
- Up to 302 car parking spaces, and 515 cycle parking spaces.
- Improved permeability and public access routes through the site;
- High quality public realm and landscaped gardens throughout the site.

The Proposed Development site (commonly referred to as the 'Site') is 9.6 hectares in size and is located at Pield Heath Rd, Uxbridge UB8 3NN. The Site comprises of the following existing buildings: The Furze, Grade II Listed building, the eleven storeys Tower Block, Existing accommodation and ward buildings. The Proposed Development, including Hospital Redevelopment and Masterplan Development, is presented in Figure 2.

Please note: this figure is not drawn to scale

Figure 2. Proposed Masterplan *(Source: DAS- THHR_01-IBI-ZZ-ZZ-RP-A-250010)*

Engaged organisations

Some of the key organisations that were involved in the development, design and delivery of the Proposed Development include AECOM (Project Manager, Multidisciplinary Engineering), IBI Group (Architects, Healthcare Planning, Landscape Architects), Ridge (BREEAM and Quantity Surveyors) and Savills (Planning). A full list with all of the organisations that were engaged in the design and development of the Proposed Development is provided in Table 1.

Table 1. Overview of the organisations that were engaged in the development, design, and delivery of the Proposed Development

Role	Organisation
Client / Building Users	The Hillingdon Hospitals NHS Foundation Trust
Architects	IBI Group
Healthcare Planners	
Landscape Architects	
Project Manager	AECOM
Structural & Civil Engineers	
Mechanical, Electrical and Public Health Engineers	
Waste Management Consultants	
Masterplanners	Prior and Partners
Planning	Savills
BREEAM and Quantity Surveyors	Ridge
Transport Engineers	Mott MacDonald

Method statement

Two workshops about the principles of circular economy have been held. The first virtual workshop, focused on the Hospital Redevelopment was held on 16/06/2021, and the second workshop, focused on the Masterplan Development was held on 14/07/2021 (Appendix A). The workshops included representatives across the disciplines engaged with the development to ensure that circular economy measures are integrated into the design of the Proposed Development. Attendees included representation across the parties and teams involved with the project; AECOM (Project Manager, Multidisciplinary Engineering), IBI Group (Architects, Healthcare Planning, Landscape Architects), Prior and Partners (Masterplanners), Ridge (BREEAM and Quantity Surveyors) and Savills (Planning).

Circular Economy aspirations

The intention is that the design of the Proposed Development will address the circular economy principles, as defined in the GLA's Circular Economy Statement Guidance (GLA,2022). This Circular Economy Statement sets out the aspirations and intentions of the design team in response to these principles and the key measures and interventions which are expected to be adopted to support these within the Proposed Development and its associated programme.

BREEAM

BREEAM certification, under BREEAM New Construction (NC) 2018, which represents high standards in environmental, social and economic sustainability performance, is being sought for the Hillingdon Hospital building. The BREEAM pre-assessment documented in the Sustainability Statement submitted as part of this planning application (Ridge) indicates that a BREEAM 'Excellent' rating is being sought for the Hospital Redevelopment.

Through pursuit of the BREEAM criteria, the design of the new Hillingdon Hospital, the new multi-storey car park (MSCP) and the hard landscaping for the Hospital Redevelopment, will broadly address the principles of the circular economy, particularly those relating to adaptability, materials and waste. In line with BREEAM requirements, consideration will be given to the responsible sourcing and environmental impact of construction productions, in accordance with the development's Sustainable Procurement Plan, and the production of a Whole Life-Cycle Carbon Assessment (in response to Mat 01 and Mat 03 credits).

The following credits have been identified as setting out best practice in response to circular economy principles:

- *Man 03 Responsible Construction Practices;*
- *Ene 01 Reduction of Energy Use and Carbon Emissions;*

- *Ene 02 Energy Monitoring;*
- *Wat 01 Water Consumption;*
- *Wat 02 Water Monitoring;*
- *Wat 03 Water Leak Detection;*
- *Wat 04 Water Efficient Equipment;*
- *Mat 01 Environmental Impacts from Construction Products – Building Life Cycle Assessment (LCA);*
- *Mat 02 Environmental Impacts from Construction Products – Environmental Product Declarations (EPDs);*
- *Mat 03 Responsible Sourcing of Construction Products;*
- *Mat 05 Designing for Durability and Resilience;*
- *Mat 06 Material Efficiency;*
- *Wst 01 Construction Waste Management;*
- *Wst 03 Operational Waste;*
- *Wst 06 Design for Disassembly and Adaptability;* and
- *LE 01 Site Selection.*

3. Strategic Approach

Overview

Initially, high level strategic opportunities were identified in order to maximise the residual value of the Proposed Development. The strategic approach for the implementation of Circular Economy principles in the Proposed Development accounts for several key factors which are unique to the Site and its wider London context. Throughout this process the “decision tree” provided in the GLA’s Circular Economy Statement Guidance (GLA, 2022) was used, as shown in Figure 3.

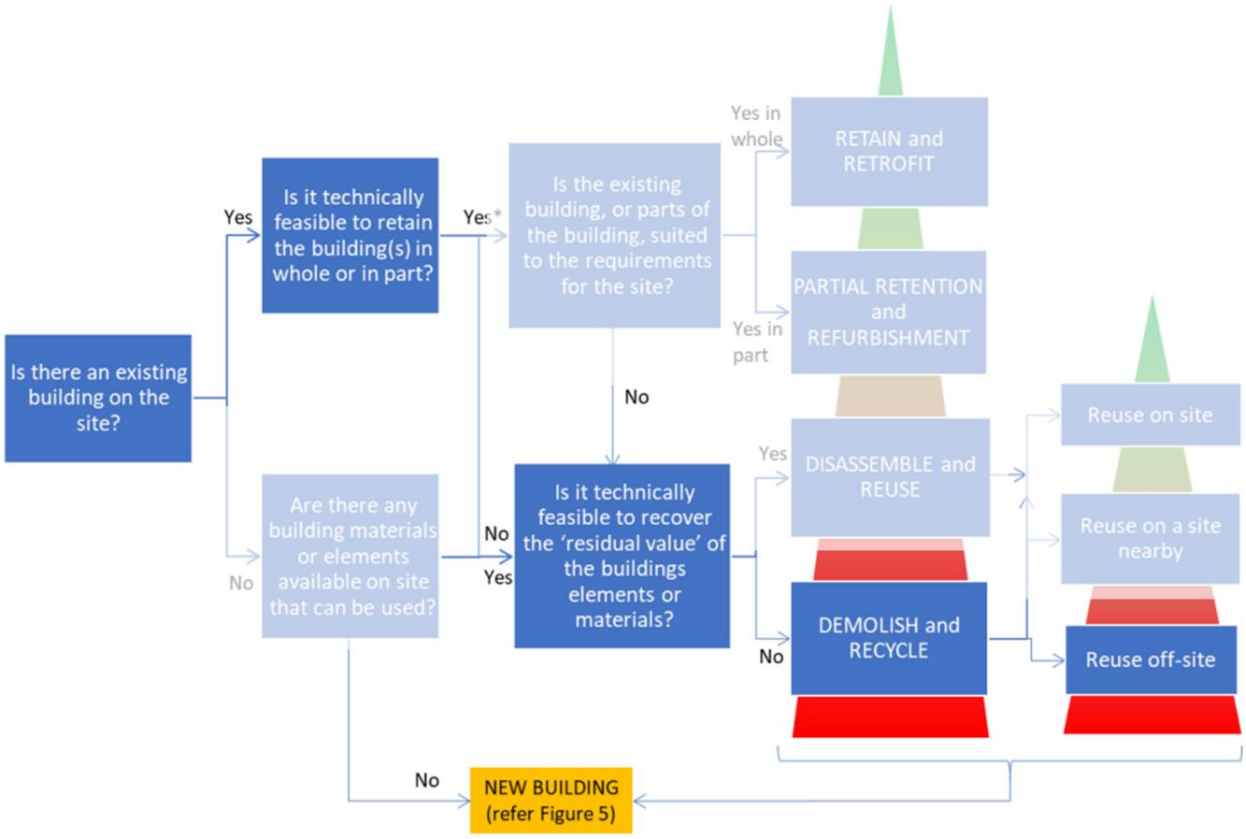

Figure 3. Circular Economy Decision Tree for the Proposed Development

The total Site area represents approximately 9.6 hectares.

The Site is currently occupied by a number of existing buildings, as illustrated in Figure 4, including The Furze, Grade II Listed building, the eleven storeys Tower Block, Existing accommodation and ward buildings. The planning application includes the demolition of all buildings and structures on the Site excluding the Grade II Furze and Tudor Centre.

Figure 4. Location of Existing Buildings On-Site (Source: *DAS- THHR_01-IBI-ZZ-ZZ-RP-A-250010*)

Mott MacDonald have been appointed by The Hillingdon Hospitals NHS Foundation Trust to provide engineering services to develop a Strategic Outline Case (SOC) for the Proposed Development. The SOC report outlined the below key constraints relating to the "do-minimum scenario" (redevelopment and refurbishment of the existing hospital buildings and minor new construction works as required):

> *"This option carries a high risk from a MEP standpoint due to the aging nature of the infrastructure and the extensive support needed to maintain their operation. Some parts of the existing infrastructure are not afforded the level of resilience that would be expected and extensive upgrades, some of which are underway, will be required. The ability to improve construction of the new buildings over the existing whilst maintain business as usual will be challenging and the constrained nature of the works will increase this difficulty. The current public transport offering is robust with numerous bus services, but it has poor permeability and the means of patient transfer and public access to the site are restricted."*

Also, as per Section 2.7 "Estate Condition and Surveys" of the Design and Access Statement (DAS) (IBI Group, 2022), much of the Hillingdon Hospital site is currently not fit for purpose. A 'six facet survey' was undertaken by Oakleaf for the estate in 2017. The 'six facet survey' considers physical condition ('facet 1'), statutory compliance ('facet 2'), space utilisation audit ('facet 3'), functional suitability review ('facet 4'), quality audit ('facet 5') and environmental management ('facet 6'). Each building that is part of the estates is assessed against the six facets and provided with an overall grade: A (Good), B (Satisfactory), C (Poor) or D (Bad). The majority of the Estate is rated at Condition C (Poor) or D (Bad) as shown in the below Figure 5.

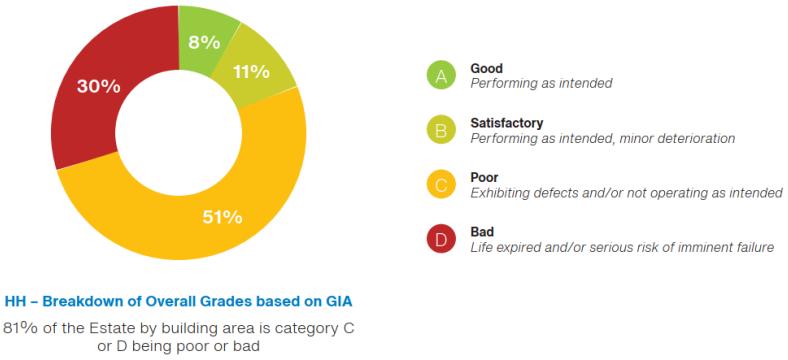

Figure 5. Condition Grades of Existing Buildings On-Site (Source: *DAS- THHR_01-IBI-ZZ-ZZ-RP-A-250010*)

Section 2.7 of the DAS states:

> *"Much of the Hillingdon Hospital site is currently not fit for purpose. Services are scattered across the site, many in old and inappropriate facilities. The tower and podium accommodate the main critical care service departments. The tower block wards are sub optimal in terms of ward size and configuration and although they provide single-sex facilities, the style and lack of bed space compromises patient dignity and privacy.*
>
> *A number of acute wards are significantly below current requirements. The sickest medical patients are still accommodated in temporary 1940s prefabricated wards at times of maximum demand. Investment is required to bring the site to current standards both of clinical care and building performance with operational buildings being safe, fit for purpose, and compliant with statutory legislation."*

Section 2.7 of the DAS also identifies a number of key issues for the existing hospital:

- *"Failure of ventilation systems to theatres, ITU and A&E resuscitation.*
- *Water leaks in patient areas.*
- *Inability to maintain a habitable environmental especially in the winter.*
- *Sewerage overflows.*
- *Lifts failing.*
- *Water contamination including a growth of Legionella and Pseudomonas bacteria necessitating urgent action.*
- *Asbestos contamination mainly within engineering plant areas and ducts.*
- *Means of warning and escape.*
- *Internal fire spread including compartmentation.*
- *External fire spread.*
- *Temporary building built in 1941 are still in use.*
- *Incremental development has led to fragmented services across the site."*

Further details on the redevelopment approach are provided in section 3 of the Planning Statement (Savills).

Pre- Demolition Audit

A Pre-Demolition Audit (AECOM, 2022) has been undertaken which sets out the opportunities for reuse, recycling and recovery of existing materials on the site. Implementation of the outcomes from the Pre-Demolition Audit will ensure that waste arising from the existing site will be managed in line with the waste hierarchy, maximising opportunities for reuse (either onsite or offsite) before considering recycling. For much of the material on the site,

recycling off-site will be more likely (e.g. concrete, ceramics, metals, textiles, glass, plasterboard, plastics). There are some elements like bricks, timber and suspended mineral ceiling tiles, which subject to testing, demand, programme and cost implications can be reused offsite (Appendix B).

Since the majority of buildings are currently in active use as part of the operational hospital and due to the current risk of Covid-19 it has not been possible to obtain access to the majority of buildings on site in order to carry out site surveys at this stage. This Pre-Demolition Audit has therefore been carried out as a desk-based exercise, using drawings provided by the Applicant and a review of existing visual imagery of the exterior of the buildings.

The key strategic Circular Economy principles for the outline and detailed part of the Proposed Development which are explored throughout this Circular Economy Statement are set out in Table 2 and Table 3.

New Development

Changes in use of the Proposed Development are expected to be infrequent therefore the Proposed Development will be designed for longevity. The Hospital Redevelopment and Masterplan Development will adopt principles of longevity for its structure and skin, whilst supporting adaptability through the internal configuration of the buildings, to facilitate changes in spatial requirements of varied tenancies throughout the lifetime of the buildings.

Table 2. Circular Economy Strategic Approach (Hospital Redevelopment)

Aspect	Phase/Building/Area	Steering Approach	Explanation	Target	Supporting Analysis
Circular economy approach for the existing Site	Site	Maximise reuse and recycling	A Pre-Demolition Audit has been undertaken to identify opportunities for reuse, recovery and recycling.	95% diversion of demolition waste from landfill	Pre-Demolition Audit (Appendix B) (AECOM, 2022)
Circular economy approach for the new development	Superstructure	Recycled materials Functional adaptability	Use of recycled concrete. Configuration of a structure which allows for areas of the floorplate to be 'broken out' and risers to be extended at a later stage. Expansion strategy to expand the building with link block at north (car park) or east (remaining part of masterplan).	95% diversion of excavation and construction waste from landfill Minimum 20% reused or recycled content by value of materials	Whole Life-Cycle Carbon Assessment (AECOM, 2022)
	Façade	Functional adaptability	The façade panels will be offsite manufactured and designed to facilitate the elemental replacement of individual modules.		Functional Adaptability & Disassembly report (Ridge, 2021) Design and Access Statement (IBI Group, 2022)
	Shell	Use of pre-fabrication methods	Minimising construction waste through the use of pre-cast or prefabricated elements where feasible.		
	Space/ Services	Functional adaptability	Be a "Long Life, Loose Fit" design Standardize room sizes and dimension across a number of room uses to allow interoperability. Repeated wards.		
	Services/Stuff		Internal Systems - Modular bed head, Modular theatres, Modular HVAC		
	All areas	Sustainable specification	Sustainable Procurement Plan. Targets for 80% responsible sourcing for concrete and CARES for rebar. Steel and concrete are all BES 6001 and British Gypsum BES6001		Whole Life-Cycle Carbon Assessment (AECOM, 2022)
Circular economy approach for municipal and healthcare waste during operation	All areas/uses	Operational waste management	Adequate storage provision and separation of waste streams to allow maximisation of recycling opportunities. Hospital waste will be segregated in accordance with the guidance set out in publication HTM 07-01 (Management of Healthcare Waste. Waste receptacles of a suitable type and correctly colour-coded will be used for internal collection of all waste streams.	Minimum diversion from landfill by 2030 of 65% for the whole development	Sustainable Waste Management Plan (AECOM, 2022)

Table 3. Circular Economy Strategic Approach (Masterplan Development)

Aspect	Phase / Building / Area	Steering Approach	Explanation	Target	Supporting Analysis
Circular economy approach for the existing Site	Site	Maximise reuse and recycling	A Pre-Demolition Audit has been undertaken to identify opportunities for reuse, recovery and recycling.	95% diversion of demolition waste from landfill	Pre-Demolition Audit (Appendix B) (AECOM, 2022)
Circular economy approach for the new development	Substructure and Superstructure	Lean Design	Optimise the structure to minimise the quantities of concrete required and lower the embodied carbon associated with the Proposed Development	95% diversion of excavation and construction waste from landfill Minimum 20% reused or recycled content by value of materials	Whole Life-Cycle Carbon Assessment (AECOM, 2022)
	All areas / uses	Resource Efficiency	Minimise the quantities of resources used whilst specifying materials sustainably with high recycled content where possible		
		Design for longevity	Infrequent use changes are expected to the residential element. The structure and skin will use durable and robust materials.		
Circular economy approach for the municipal waste during operation	All areas / uses	Operational Waste Management	Adequate storage provision and separation of waste streams to allow maximisation of recycling opportunities Separate provision will be made for residential and commercial bin storage.	Minimum diversion from landfill by 2030 of 65% for the whole development	Sustainable Waste Management Plan (AECOM, 2022)

4. Circular Economy Commitments

Key Circular Economy commitments

Table 4 and 5 summarise the key commitments.

Table 4. Key Circular Economy Commitments (Hospital Redevelopment)

	Site	Substructure	Super-structure	Shell/Skin	Services	Space	Stuff	Construction Stuff	Summary	Challenges	Counter-Actions + Who + When	Plan to prove and quantify
SECTION A: CONSERVE RESOURCES												
Minimising the quantities of materials used	• Reclaimed materials and reused crushed concrete for the landscape elements	• Rationalised structural frame to reduce structural material required • 7.5x7.5 grid as more efficient compared with 9x9 • Modern Methods of Construction		• Modular façade design will be considered					Optimisation of the design and investigating material efficiency within the scheme	Cost implications and subject to feasibility	Investigate further at next design stage	Resolve at next design stage
Minimising the quantities of other resources used (energy, water, land)	• Proposed Development to be delivered on previously developed land			• Energy efficient fabric	• Net Zero Carbon targets for Hillingdon Hospital as per NHS priorities • BREEAM targeted credit Ene01, Wat01 • Water-efficient sanitary fittings			• BREEAM targeted credit Man03 • Monitoring of water and energy use in construction	Land and water efficiency, and Energy Strategy	No challenges	Include construction monitoring requirement at tender	Energy and Sustainability Statements and reporting in construction
Specifying and sourcing materials responsibly and sustainably	• Employers Requirements to support sustainable specification and sourcing • Use of 30 % GGBS content proposed for concrete elements where feasible (i.e. basement, columns, core walls) • 80% responsible sourcing for concrete and CARES for rebar are being considered • Steel and Concrete are all BES 6001 and British Gypsum BES6001 • Blockwork with high recycled content for plant on lower ground and ground floor considered • Opportunities for use of reclaimed materials to be explored in relation to landscaping • EPDs and Sustainable Procurement Plan to be explored in line with BREEAM Credits								Explore potential to use materials with recycled content	Cost implications and subject to feasibility	Investigate further at next design stage	Resolve at next design stage
SECTION B: DESIGN TO ELIMINATE WASTE (AND FOR EASE OF MAINTENANCE)												
Design for reusability / recoverability / longevity / adaptability / flexibility		• Flexibility within the structural grids • Flow and stacked diagrams used during the design process to complement the evolving clinical briefs/operational policies.		• Concrete cladding typically requires little maintenance. • Brick that is reusable and recyclable and requires no maintenance • Seals to be replaced instead of the whole façade panel	• Services replacement strategy to be developed during design Stage 3	• Future conversion or extension could be possible		• Use of screws and bolts rather than welded connections	Build for longevity, adaptability and disassembly	No challenges	Explore production of a ‘Building Adaptability and Disassembly Guide’	Resolve through detailed design
Design out construction, demolition, excavation and municipal waste arising				• Prefabricated elements to be assessed • Ultra-High-Performance Fibre Reinforced Concrete (UHPFRC) panels with brick slips to be offsite manufactured and craned in	• Use of prefabricated risers and horizontal distributions to be explored • Bathroom pods, pre-fab risers, horizontal distribution on			• SWMP has been prepared for the Proposed Development • Coordination of programme to minimise excess	Use of offsite construction for some elements	Cost implications and subject to feasibility	Investigate further at next design stage	Resolve through detailed design

	Site	Substructure	Super-structure	Shell/Skin	Services	Space	Stuff	Construction Stuff	Summary	Challenges	Counter-Actions + Who + When	Plan to prove and quantify
				• Consider preparing a deconstruction manual	main corridors, all AHU with integrated pipework, louvres at high and low level could be pre-fab, bedrooms can be standardised, all the services within the ceiling void could be standardized offsite, include medical gases in the MMC • Consider preparing a deconstruction manual			cutting and jointing				
SECTION C: MANAGE WASTE												
Demolition waste (how waste from demolition of the layers will be managed)	• Pre-Demolition Audit has been undertaken to identify opportunities for reuse, recycling and recovery • Target diversion of 95% of demolition waste from landfill								Implement recommendations of pre-demolition audit	Subject to testing, demand, programme and cost implications	To be explored with contractor	Pre-Demolition Audit
Excavation waste (how waste from excavation will be managed)	• Manage excavation waste responsibly to allow reuse • Target 95% beneficial reuse of excavation waste								Implementation of responsible construction management methods	Potential contamination	To be explored with contractor	Cut and fill calculations
Construction waste (how waste arising from construction of the layers will be reused or recycled)	• Implementation of the Sustainable Waste Management Plan with regular monitoring • Target diversion of 95% of construction waste from landfill								Implementation of responsible construction management methods	Ensure best practice is met	To be explored with contractor	Construction monitoring
Municipal and Healthcare waste (how the building will be designed to support operational waste management)	• Separation of municipal waste streams with sufficient allowance for storage • 65% by 2030 (for the non-hazardous waste of the Hospital Redevelopment)								Separation of operational waste streams	No challenges	-	Refuse storage implementation

Table 5. Key Circular Economy Commitments (Masterplan Development)

	Site	Substructure	Super-structure	Shell/Skin	Services	Space	Stuff	Construction Stuff	Summary	Challenges	Counter-Actions + Who + When	Plan to prove and quantify
SECTION A: CONSERVE RESOURCES												
Minimising the quantities of materials used	• Reclaimed materials and reused crushed concrete for the landscape elements	• Rationalised structural frame to reduce structural material required • Modern Methods of Construction	• Modular façade design will be considered						Optimisation of the design and investigating material efficiency within the scheme	Cost implications and subject to feasibility	Investigate further at next design stage	Resolve at next design stage
Minimising the quantities of other resources used (energy, water, land)	• Proposed Development to be delivered on previously developed land	• Measures from Energy Strategy and Sustainability Statement to be incorporated	• Energy efficient fabric						Land and water efficiency, and Energy Strategy	No challenges	Include construction monitoring requirement at tender	Energy and Sustainability Statements and reporting in construction
Specifying and sourcing materials responsibly and sustainably	• Employers Requirements to support sustainable specification and sourcing • High recycled content blockwork to be explored • Explore specification of materials with EPDs to support end-of-life scenarios • GGBS to concrete elements to be considered								Explore potential to use materials with recycled content	Cost implications and subject to feasibility	Investigate further at next design stage	Resolve at next design stage
SECTION B: DESIGN TO ELIMINATE WASTE (AND FOR EASE OF MAINTENANCE)												
Design for reusability / recoverability / longevity / adaptability / flexibility		• Columns within party walls where possible to allow flexible living	• Brick that is reusable and recyclable and requires no maintenance	• Services replacement strategy to be developed during design Stage 3	The space will have generous floor to ceiling heights and support reconfiguration .			• Use of screws and bolts rather than welded connections	Build for longevity, adaptability and disassembly	No challenges	Explore production of a ‘Building Adaptability and Disassembly Guide’	Resolve through detailed design
Design out construction, demolition, excavation and municipal waste arising			• Prefabricated elements to be assessed • Consider preparing a deconstruction manual	• Standardisation within the design				• SWMP has been prepared for the Proposed Development • Coordination of programme to minimise excess cutting and jointing	Use of offsite construction for some elements	Cost implications and subject to feasibility	Investigate further at next design stage	Resolve through detailed design
SECTION C: MANAGE WASTE												
Demolition waste (how waste from demolition of the layers will be managed)	• Pre-Demolition Audit has been undertaken to identify opportunities for reuse, recycling and recovery • Target diversion of 95% of demolition waste from landfill								Implement recommendations of pre-demolition audit	Subject to testing, demand, programme and cost implications	To be explored with contractor	Pre-Demolition Audit
Excavation waste (how waste from excavation will be managed)	• Manage excavation waste responsibly to allow reuse • Target 95% beneficial reuse of excavation waste								Implementation of responsible construction management methods	Potential contamination	To be explored with contractor	Cut and fill calculations

	Site	Substructure	Super-structure	Shell/Skin	Services	Space	Stuff	Construction Stuff	Summary	Challenges	Counter-Actions + Who + When	Plan to prove and quantify
Construction waste (how waste arising from construction of the layers will be reused or recycled)	• Implementation of the Sustainable Waste Management Plan with regular monitoring • Target diversion of 95% of construction waste from landfill								Implementation of responsible construction management methods	Ensure best practice is met	To be explored with contractor	Construction monitoring
Municipal waste (how the building will be designed to support operational waste management)	• Separation of municipal waste streams with sufficient allowance for storage • Minimum of 65% diversion of municipal waste from landfill by 2030								Separation of operational waste streams	No challenges	-	Refuse storage implementation

Reporting Forms

Bill of Materials

Please refer to the ‘THHR_Redevelopment_gla_circular_economy_statements_template’ and the ‘THHR_Masterplan_gla_circular_economy_statements_template’ issued alongside this report for the Bill of Materials information.

Recycling and Waste

Table 6 shows the Recycling and Waste reporting metrics based on the current design stage information.

Table 6. Recycling and Waste Reporting (Proposed Development)

CATEGORY	TOTAL ESTIMATE	OF WHICH…			SOURCE OF INFORMATION
	t/m² GIA	% reused or recycled onsite	% reused or recycled offsite	% to landfill / not reused or recycled	
Excavation waste	0.585 (Hospital Redevelopment) 0.77 (Masterplan Development)	95%		5%	• Sustainable Waste Management Plan (AECOM, 2022) ○ 60,000 tonnes of excavation waste (Hospital Redevelopment) • GLA Guidance benchmarks (Masterplan Development)
Demolition waste	0.184 (Hospital Redevelopment and Masterplan Development)	95%		5%	• Pre-Demolition Audit (Appendix B) (AECOM, 2022) • Sustainable Waste Management Plan (AECOM, 2022) ○ 26,386 tonnes of demolition waste (Hospital Redevelopment and Masterplan Development)
Construction waste	0.205 (Hospital Redevelopment) 0.113 (Masterplan Development)	95%		5%	• Sustainable Waste Management Plan (AECOM, 2022) ○ 21,095 tonnes of construction waste (Hospital Redevelopment) • GLA Guidance benchmarks (Masterplan Development)
	t/annum	% reused, recycled or composted, on or off site		% to landfill / not reused or recycled	
Municipal and Healthcare waste	1,043 (non-hazardous) +534 (hazardous) (Hospital Redevelopment) 483 (Masterplan Development)	65% by 2030 (for the non-hazardous waste of the Hospital Redevelopment and the Masterplan Development)		Max. 35% and no recyclable or compostable waste	• Sustainable Waste Management Plan (AECOM, 2022) ○ 1,043 (non-hazardous) +534 (hazardous) tonnes /annum (Masterplan Development) ○ 56,920 L/week = 355 tonnes /annum (from households) (outline application) ○ 15,250 L/week = 128 tonnes /annum (from commercial uses) (Masterplan Development)

The total area for the Hospital Redevelopment is 102,637.6 m² (GIA) and for the Masterplan Development 40,464 m² (GIA).

The GLA guidance asks for written evidence that the destination landfill(s) have the capacity to receive waste. The demolition contractor and lead contractor will provide this information once final waste quantities are confirmed.

Circular Economy Narrative

The following sections detail the Circular Economy opportunities identified for the Proposed Development:

- Minimise the quantities of materials used;
- Minimise the quantities of other resources used;
- Specify and source materials and other resources responsibly and sustainably;
- Design for longevity, adaptability or flexibility and reusability or recoverability;
- Design out construction, demolition, excavation and municipal waste arising;
- Manage demolition waste;
- Manage excavation waste;
- Manage construction waste; and
- Manage municipal waste.

Minimise the quantities of materials used

The Hospital Redevelopment and the Masterplan Development will adopt lean design principles in order to minimise the quantity of materials associated with the structure. The structural frame will be rationalised to reduce the quantity of material and weight of the superstructure and subsequently allows for a reduction in the foundation.

For the Hospital Redevelopment the floorplate has been designed to be open and uniform throughout the height of the building. Structural solutions have been considered to optimise material use, in particular:

- 7.5m x7.5m grid is more efficient compared with 9mx9m.
- Benefits and various types of structural Modern Methods of Construction which assist in the delivery of a more efficient structural frame have been explored and their performance was measured against design drivers which are appropriate to hospital facilities.
- An options appraisal for the structures has been conducted for both the substructure and superstructure which assessed the below options and concluded to the optimum ones against sustainability and embodied carbon, programme, structural depth and future flexibility.

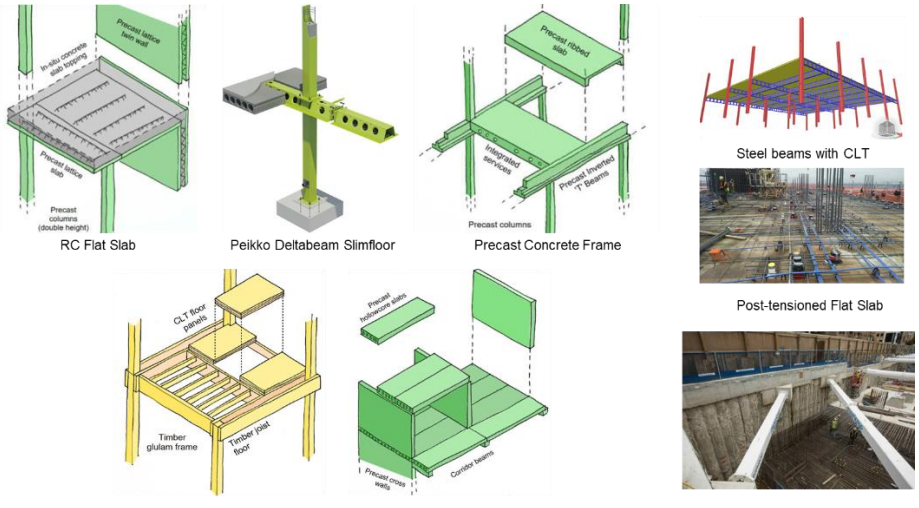

Figure 6 Structural Options Appraisal (Source: THHR-ACM-ZZ-XX-PP-S-299003 (P01))

Minimise the quantities of other resources used

The Hospital Redevelopment and the Masterplan Development will deliver high efficiencies of land use, maximising the available spatial opportunities on Site and helping to optimise the use of London's limited available land. Current designs also propose a landscaped area for the public increasing the amenity space available to residents and hospital visitors.

The Proposed Development is targeting a BREEAM rating of 'Excellent' for the Hospital Redevelopment. The credits relevant to waste and the Circular Economy which are being targeted for the development are listed in the BREEAM Section of this report, and specific references throughout where applicable.

The operational energy demand of the Proposed Development will be minimised in line with London Plan and BREEAM Credit Ene 01 requirements through the specification of efficient fabric and services. The 'Be Seen' spreadsheet will be completed, post submission, in line with the London Plan Policy SI 2 'Minimising greenhouse gas emissions', including the required contextual information on the scheme, predicted building energy use, renewable energy, and expected carbon emissions.

The Hospital Redevelopment will aim to minimise internal potable water consumption in-line with BREEAM Credit Wat 01. Water-efficient sanitary fittings will be used, which may include low flush toilets, showers, and hand wash basins, in line with BREEAM Credit Wat 01. The Hospital Redevelopment will also be fitted with water meters to encourage reduction of water consumption by allowing metering, managing and monitoring of water usage.

In order to minimise the quantities of resources used the Lead Contractor will be required to set targets to facilitate monitoring and reporting in line with BREEAM Credit Man 03 for the Hospital Redevelopment. This will include monitoring of energy consumption, carbon dioxide emissions and potable water consumption.

An Energy Strategy (AECOM, 2022) has been developed for the Proposed Development in line with the GLA Energy Hierarchy, reducing energy demand and targeting site-wide carbon emissions savings for the 'Be Green' stage of 31% compared to the baseline for the Hospital Redevelopment and 60% compared to the baseline for the Masterplan Development.

The energy strategy for the Hospital Redevelopment is:

1. Energy efficient fabric and buildings services design.
2. A Ground Source Heat Pump (GSHP) system to provide base load heating and cooling.
3. An Air Source Heat Pump (ASHP) system to meet remaining heating, cooling and hot water demands.
4. An ambient loop system to act as a thermal store and maximise system efficiency.
5. A photovoltaic (PV) array on the roof of the hospital building and MSCP.

The energy strategy for the Masterplan Development is:

1. Energy efficient fabric and buildings services design;
2. Heat pumps to meet remaining heating, cooling and hot water demands;
3. A Photovoltaic (PV) array on the roof of the buildings.

Specify and source materials and other resources responsibly and sustainably

Where possible materials will be specified with a preference toward certified materials or those with an Environmental Product Declaration (EPD). The Proposed Development will also avoid toxic finishes where possible.

An embodied carbon assessment has been undertaken as part of the Whole Life-Cycle Carbon Assessment (AECOM, 2022) for the Proposed Development, which responds to latest London Plan policy and covers principles of BREEAM Credit Mat 01.

In general, recycled/reclaimed materials are being considered. Targets for 80% responsible sourcing for concrete and CARES for rebar are being considered.

A minimum of 30% GGBS content is currently proposed for specific concrete elements. For the hospital building basement, foundations, lowest floor, upper floors, roof, columns and core walls in situ concrete has a 30% cement replacement target, similar to the MSCP where foundations, lowest floor, columns and core walls and double T sections have the same 30% target.

A minimum 20% of the total value of the selected products and materials will include recycled and reused content in line with London Plan, Policy SI 7 ‘Reducing waste and supporting the circular economy’.

Design for longevity, adaptability or flexibility and reusability or recoverability

Between Strategic Outline Case (SOC) stage and Outline Business Case (OBC) various clinical priorities informed the design development; most notably the configuration and size of the emergency floor, which needed to be co-located on a single level, had the biggest impact on the design arrangement. During this process the stacking of the clinical departments evolved to ensure better flows and greater efficiency in floor layouts. Additionally, the plant rooms were re-shaped to achieve more efficient arrangements and allow better daylight to the ground floor. This re-organisation helped to reduce the height of the building by one floor and realise a direct link from the multi storey car park into the first floor ambulatory zone; thus enabling the ground floor to be a dedicated emergency floor with the first floor providing all of the ambulatory and outpatient services.

The stacking diagrams shown below in Figure 7 illustrate the organisation of the hospital departments along with the main lift cores that divide key flows for visitors (with direct access into each 28-bed ward cluster), patient transfers and FM services either side of the main hospital street. These diagrams have been developed to complement the evolving clinical briefs/operational policies.

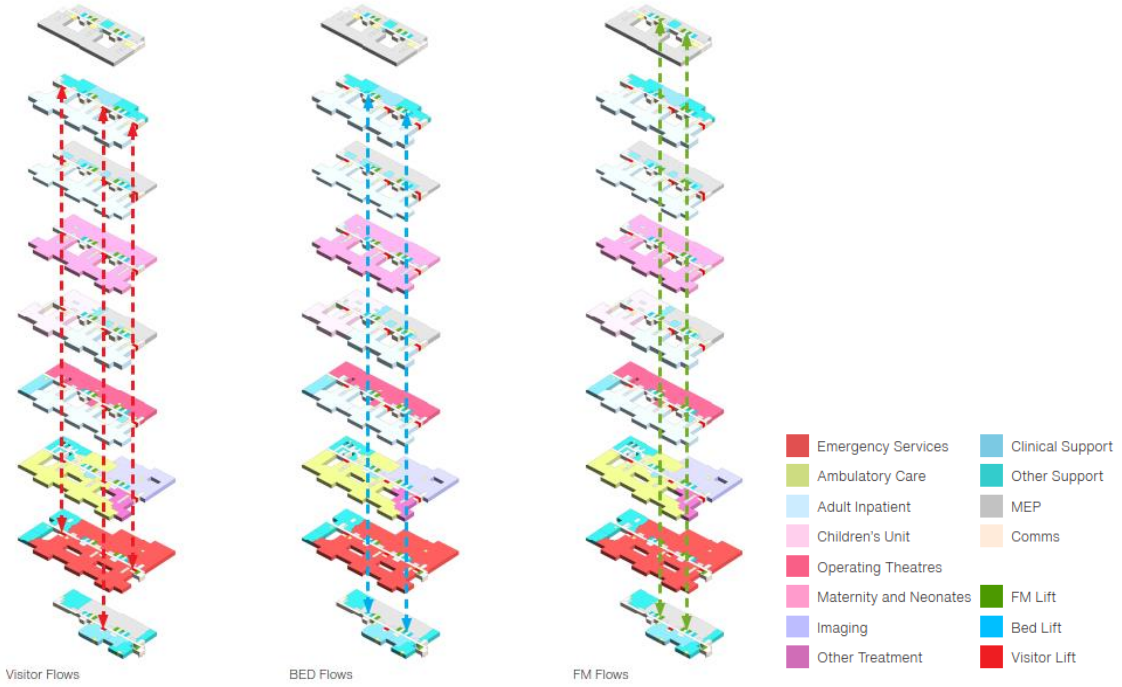

Figure 7. Hospital flows and stacking diagrams

Flexible solutions that can be adapted to meet potential changes in use or internal layout throughout the life of the building, are constrained by healthcare guidance and requirements. However, the structural grid is deliberately regular so allows for reconfiguration (removable partitions etc.). Some spaces are less flexible due to use in space e.g. operating theatre however this has been limited to where necessary maximising flexibility. Adequate floor to floor heights are included to allow for servicing flexibility and increase the viability of natural ventilation to deep plan spaces.

Recoverability has been considered in the design for example in the façade system. The façade is being designed so that one module can be taken out and individual glazing panels can be removed and replaced.

Concrete cladding is proposed, which typically requires little maintenance compared to other lighter-weight cladding solutions, providing life-cycle cost benefits. Also, the proposed brick façade parts are reusable (through the use of lime mortar) and recyclable and require no maintenance.

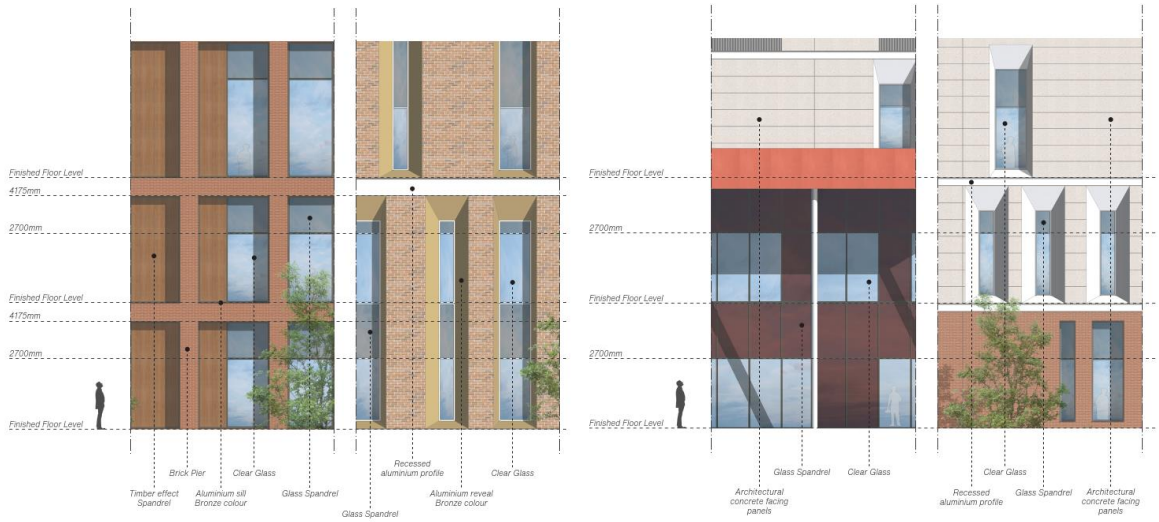

Figure 8. Hospital Redevelopment (hospital building) façade material palette

Design out construction, demolition, excavation and municipal waste arising

The contractor will provide input from RIBA Stage 3 and a Sustainable Waste Management Plan has been prepared. Having early contractor engagement will enable engagement with the supply chain and influence efficiency. The Sustainable Waste Management Plan highlights techniques which are to be implemented on Site during construction to help prevent the generation of unnecessary waste.

Also, the use of precasting, prefabrication and other offsite manufacture will reduce the quantities of construction waste arising. The modular façade has the benefit of allowing for elemental replacement reducing demolition waste in operation.

Manage demolition waste

A Pre-Demolition Audit (AECOM, 2022) has been undertaken which sets out the opportunities for reuse, recycling and recovery of existing materials on the site. Implementation of the outcomes from the Pre-Demolition Audit will ensure that waste arising from the existing site will be managed in line with the waste hierarchy, maximising opportunities for reuse (either onsite or offsite) before considering recycling. For much of the material on the site, recycling off-site will be more likely (e.g. concrete, ceramics, metals, textiles, glass, plasterboard, plastics). There are some elements like bricks, timber and suspended mineral ceiling tiles, which subject to testing, demand, programme and cost implications can be reused offsite (Appendix B).

The estimated demolition waste arising from the Proposed Development (both the Hospital Redevelopment and the Masterplan Development) as set out by the Pre-Demolition Audit totals 26,386 tonnes, equating 0.184 t/m^2 GIA as set out in Table 6. Recycling and Waste Reporting.

A minimum of 95% of non-hazardous demolition waste generated by the Proposed Development will be diverted from landfill for reuse, recycling or recovery in line with London Plan Policy SI 7 ‘Reducing waste and supporting the circular economy.’

Manage excavation waste

A minimum of 95% of excavation waste generated from the Proposed Development will be diverted from landfill for beneficial use in line with London Plan Policy SI 7 ‘Reducing waste and supporting the circular economy.’

Manage construction waste

Off-site construction methods, which increase resource efficiency, will be considered as part of the later design stages. The following are the current suggestions for the Hospital redevelopment for the prefabricated or constructed elements off-site: bathroom pods, risers, horizontal distribution on main corridors, all AHU with integrated pipework, louvres at high and low level could be prefabricated, bedrooms can be standardised, all the services within the ceiling void could be standardized offsite.

A Sustainable Waste Management Plan (AECOM, 2022) has been prepared which identifies techniques to be implemented on Site during the construction phase to help prevent unnecessary waste being generated. A copy of the SWMP will be kept in the site office at all time and then post construction will be held at the company's head office for a period of two years. All waste that leaves the site will be recorded by the site 'Checker' using the Waste Transfer Notes (WTN) which includes relevant SIC codes or Consignment Note (CSN) for hazardous waste.

A minimum of 95% of construction waste generated by the Proposed Development will be diverted from landfill for reuse, recycling or recovery in line with London Plan Policy SI 7 'Reducing waste and supporting the circular economy.'

Manage municipal and healthcare waste

A Sustainable Waste Management Plan (AECOM, 2022) has been prepared for the Proposed Development which sets out the waste storage and management proposals in line with relevant policy and guidance.

During operation, waste from the Hospital Redevelopment (hospital building) will be segregated in accordance with the guidance set out in publication HTM 07-01 (Management of Healthcare Waste). Waste receptacles of a suitable type and correctly colour-coded (e.g. rigid containers for sharps.) will be used for internal collection of all waste streams.

Separate provision will be made for residential and commercial bin storage.

The estimated municipal and healthcare waste arising from the Proposed Development totals 1,577 tonnes/annum for the Hospital Redevelopment and 483 tonnes/annum for the Masterplan Development as set out in Table 6. Recycling and Waste Reporting.

A minimum of 65% municipal waste generated by the Hospital Redevelopment and a minimum of 65% municipal waste generated by the Masterplan Development will be diverted from landfill for reuse, recycling or recovery by 2030 in line with London Plan Policy SI 7 'Reducing waste and supporting the circular economy.'

Plans for implementation

In line with Circular Economy principles, the main priority is to extend the lifetime of the building through careful design and specification through the measures listed above.

Specific plans for short- and medium-term targets

- Lead Contractor to implement the Sustainable Waste Management Plan, to be reported on monthly.
- Ensure that the Lead Contractor is contractually required to meet the targets for of at least 95% diversion of the excavation and construction waste from landfill for reuse, recycling or recovery.
- Ensure that a minimum of 20% of the total value of the selected products and materials will include recycled and/or reused content.
- Establish the final destination landfills and ensure that they have sufficient capacity.
- Review the potential to source materials as per commitments and targets set out in the section “3.3.3 Specify and source materials and other resources responsibly and sustainably”.
- Set up a tracker for all the commitments and targets made in the Circular Economy statement and review the progress on a regular basis.

Programme / method for longer-term targets

- Lead Contractor to provide evidence that all commitments are addressed in as-Built building.
- Demolition Contractor and Lead Contractor to provide written confirmation that the final destination landfills had sufficient capacity.
- Provide evidence that a minimum of 20% of the total value of the selected products and materials will include recycled and/or reused content.
- Lead Contractor to provide evidence that materials have been procured in line with the requirements set out in the Sustainable Procurement Strategy.
- Ensure that the operators are aware of the overall waste management strategy and the targets for diversion of municipal waste from landfill for reuse, recycling or recovery by 2030 at a minimum rate of 65%.
- Explore production of a ‘Building Adaptability and Disassembly Guide’ and End-of-Life-Strategy.
- Provide a Post Completion Report to the GLA which includes lessons learned that can be fed into future projects.

End-of-life strategy

In line with Circular Economy principles, the main priority is to extend the lifetime of the building through careful design and specification through the measures listed above. The production of a ‘Building Adaptability and Disassembly Guide’ will be explored in conjunction with BREEAM Wst 06 requirements. It is anticipated that the document will explore elements of the façade and building services plant to provide guidance on which materials, elements or components can be reused, recycled or composted; and how to disassemble the building to minimise wastage and facilitate reuse, recycling or composting.

The lifetime of different building elements and components will vary so the guide may also consider the process for maintenance, upgrade and replacement of the demountable or modular elements of construction. The key opportunity areas to explore within the guide may include:

- Communicate the end-of-life strategies of elements as envisioned by the original design team;
- Illustration of the removal and replacement of glazing units;
- Illustration of the removal and replacement of building services systems.

Post Completion Report

According to the Circular Economy Statement Guidance(GLA, 2022) an update to the Circular Economy Statement should be filled out post-completion, to set out the targets and actual outcomes achieved:

"As a minimum, applicants must produce a Post-completion Report setting out the predicted and actual performance against all numerical targets, and provide updated versions of Tables 1 and 2, the Recycling and Waste Reporting Form and Bill of Materials.

In order to inform and improve the Circular Economy Statement process, structure and contents, the Applicant commits to describe the important lessons learned and summarise these in the Post-completion Report. These will be captured at each stage of design and construction.

The Applicant commits to submit the Post- Completion Report to the local authority and the GLA at ce&wastestatement@london.gov.uk.

5. Conclusion

Circular Economy commitments for the Proposed Development have been developed through a collaborative, cross-disciplinary approach. The interventions proposed aim to embed sustainable practice, waste reduction and circular economy principles within the scheme and address new London Plan policy requirements.

This Circular Economy Statement covers a wide range of interventions in developing a design approach that prioritises Circular Economy principles and will help to reduce the material impact and waste generated by the built environment through the lifecycle of the Proposed Development.

The main principles that have been implemented are summarised as follows:

Land Use: The Proposed Development will deliver high efficiencies of land use, maximising the available spatial opportunities on Site and helping to optimise the use of London's limited available land.

Lean Design: The principles of lean design have been adopted to minimise material intensity of the Proposed Development. This is to be achieved by rationalising the structural frame to reduce structural material required and using Modern Methods of Construction.

Sustainable Procurement: A Sustainable Procurement Plan will be implemented for the Proposed Development, setting out the standards and requirements for responsible sourcing of construction products by suppliers and traders. The Proposed Development will target a minimum of 20% recycled or reused content by value for selected products in line with London Plan, Policy SI 7.

Pre-Fabrication Methods: Construction waste arising from the Proposed Development will be minimised through adoption of pre-fabrication methods where possible. For example, bathroom pods, prefabricated risers and horizontal distributions are proposed to be used.

Waste Minimisation and Management: The scheme will seek to design out demolition and construction waste to meet London Plan Policy SI 7 targets through the implementation of a SWMP. The Proposed Development will provide adequate storage provision and separation of municipal and healthcare waste streams to allow maximisation of recycling opportunities.

The document sets out the proposed Circular Economy Strategy which has been developed to meet the relevant planning policy SI 7 'Reducing waste and supporting the circular economy' of the London Plan (Greater London Authority, 2020), meeting the requirements and complying with the relevant policies.

6. References

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Appendix A

A.1 Workshop Meeting Notes (Hospital Redevelopment)

Meeting Notes

Meeting name
CE Workshop

Meeting date
16/06/2021

Time
09:00-11:00

Location
Microsoft Teams

Project name
The Hillingdon Hospital Redevelopment

Prepared by
Aspa Skorletou

Attendees

DC	AECOM Sustainability
AS	AECOM Sustainability
AM	AECOM MEP lead
BP	AECOM Structures
TK	Savills Planning
VFS	Prior and Partners
AB	
JH	IBI Group Architect
MJ	AECOM Structures
BT	AECOM Structures
NS	AECOM Structures
DB	AECOM Sustainability
SW	AECOM Façades
SJ	AECOM PM
KW	AECOM PM
ASP	AECOM PM
PS	Ridge QS
	AECOM MEP

Presentation slides
The presentation slides from the workshop have been made available alongside these notes, Hillingdon Hospital CES Workshop V3.3 - 160621.pptx

Ref	Note	Action
Summary of Actions		
01	BP to share total estimates in t/m^2 GIA for excavation waste, required for Table 4: Recycling and Waste Reporting of the CES.	**AECOM Structures (BP)**
02	DC to raise that a pre-demolition audit is required for the planning submission stage via email or as an early warning.	**AECOM Sustainability (DC, AS)**
03	KW to circulate programme updates.	**AECOM PM (KW)**
04	JH to share details on Low (level 5 and upwards) and High-Tech structural options.	**AECOM Structures (JH)**
05	DB to share recycled content figures for glass. **Post meeting note:** DB shared the declaration of the recycled content of glass from a glass supplier (9.1% external recycled glass content, 29.9% external + internal recycled glass content).	**AECOM Facades (DB)**

Ref	Note	Action
06	DB to review potential to replace the seals instead of replacing the whole façade panel.	**AECOM Facades (DB)**
07	DB to share details and discuss brick options with architects.	**AECOM Facades (DB)**
08	Landscape elements to be picked up in the next masterplan workshop on 30th June 2021.	**AECOM Sustainability (DC, AS)**
09	JH to engage with supply chain to determine the maximum GGBS percentages.	**AECOM Structures (JH)**
10	DC to check with JH and the BREEAM team what is currently considered under the responsible sourcing credits and also involve DB with the BREEAM team regarding the façade responsible sourcing materials.	**AECOM (DC, AS, JH, DB)**
11	AB to confirm partitions alternative options if applicable (e.g. Breathaplasta, Biocomposite)	**IBI Group (AB)**
12	DC to confirm with BREEAM team adaptability and disassembly credits.	**AECOM Sustainability (DC, AS)**
13	AM to share services replacement strategy diagram.	**AECOM MEP (AM)**
14	Discuss feasibility of scenario modelling with different uses of the building. This action will also support the BREEAM credits.	**AECOM PM (KW)**
15	DC to write an Early warning for the post completion report for the CE statement	**AECOM Sustainability (DC, AS)**

Introduction to Circular Economy Principles

16 DC introduced the Circular Economy principles and presented the below points:

- Linear Economy (take-make-dispose)
- Circular Economy (CE) model: Waste as a resource
- CE Principles: Retain, Refit, Refurbish and then Reclaim, Remanufacture, Recycle
- Building in layers
  - Site, Structure, Skin, Services, Space plan, Stuff have different lifecycles
  - "Peel" different materials without compromising other elements
- Design for adaptability
  - Clear floor plates and generous floor to ceiling heights
  - Scenario modelling- floors to be reconfigured for different functions (e.g. Moorfields Hospital)
- Design for disassembly
  - Allow for reclamation in façade design
  - Lime mortar benefits over Portland cement
  - Dry laid tiles- no adhesives benefits over porcelain tiles
- Selecting Materials
  - Cradle to cradle certified products (no toxins and other gases)
  - Paint360- waste paint used as raw material for new one, job creation
  - Biological materials, mass timber

Note

Circular Economy Statement

17 DC presented the CE planning requirements based on London Plan (Mar 21) and draft CES Guidance (Oct 20):

- All referable projects have to prepare a Circular Economy Statement (CES)

Note

Ref	Note	Action
Required Commitments		
18	DC presented the 4 key CE required Commitments: 1. **Excavation:** 95% beneficial use (picked up from contractors) 2. **Construction and demolition:** 95% reuse / recycling / recovery (picked up from contractors) 3. **Municipal/ operational waste:** 65% recycling by 2030 (picked up from waste team) 4. **Reused or recycled content:** at least 20% by value of materials (easy to achieve as more industry materials start to achieve this target)	**Note**
Required Information		
19	DC presented the required information that needs to be provided in the CES as per below:	**Note**
20	**Table 1: Strategic Approach**- decision tree to be completed by AECOM Sustainability team.	**Note**
21	**Table 2: Key Commitments**- requires input from design team regarding the 9 Commitments for each building structure layer).	**All**
22	**Table 3: Bill of Materials**- weight (kg) cross reference to WLC Assessment.	**Note**
23	**Table 4: Recycling and Waste Reporting**- BP to share total estimates in t/m^2 GIA for excavation waste, total estimates for demolition/construction and municipal waste to be sourced from pre-demolition audit/ site-municipal-operational waste management plan.	**AECOM Structures (BP)**
24	**Written evidence that the destination landfill(s) have the capacity to receive waste**- to be secured as planning condition as information will not be available at this stage.	**Note**
25	**Pre-Demolition Audit (independent)-** DC to request that from the team. It was noted that the majority of the buildings are currently occupied and there are maybe access issues due to Covid-19 measures.	**AECOM Sustainability (DC)**
26	**End-of-life strategy**	**Note**
27	**Plans for Implementation**	**Note**
28	**Post Completion Report**	**Note**
Workshop Session		
Pre-Demolition Audit		
29	DC raised that an independent pre-demolition audit needs to be requested from the client for the planning application stage and requested the planning application date.	**Note**
30	ASP raised that due to Covid-19 risk a pre-demolition audit is not feasible at the moment, as the buildings are currently occupied.	**Note**
31	DC to raise the issue via email or as an early warning.	**AECOM Sustainability (DC)**
Mobility Hub		
32	TK confirmed mobility hub includes car park spaces, cycle spaces and retail.	**Note**
33	DC suggested that due to future mobility trends, change of use (e.g. residential) and dismantling options should be considered. DC presented project example (built with higher ceilings, a central atrium space, and an adaptable structure, the new parkade will have the ability to convert into office space or condominiums).	**Note**
34	MJ confirmed that as per future project plans car park needs to be reserved as possible hospital expansion space.	**Note**
35	KW raised that car park has a low-cost budget.	**Note**
36	MJ raised that car park loading is lower than what is required for residential use.	**Note**
37	JH raised that car park grid is different from what is required for residential use.	**Note**
38	DC concluded that although adaptability approach is not suitable for the car park, the disassembly approach should be considered by the design team.	**Note**

Ref	Note	Action
Structure		
39	JH confirmed that Option 1- Hybrid RC Flat Slab (Low and High Tech) is the preferred one at the moment. JH to share details on Low (level 5 and upwards) and High Tech.	**AECOM Structures (JH)**
40	JH confirmed that for basement both options are still on (open cut and secant pile).	**Note**
41	JH mentioned that there is an updated options appraisal graph in TG4 report for basement, and reduced impacts are feasible through engagement with the supply chain.	**Note**
42	JH pointed out that 7.5x7.5 grid is more efficient compared with 9x9	**Note**
43	MJ explored the DfMA solution but that is not feasible	**Note**
Facades		
44	DB confirmed that Ultra High-Performance Fibre Reinforced Concrete (UHPFRC) panels with brick slips are considered for the facades with 7.5 m span from column to column and GWP 86.5kgCO_2/m^2 for stages A1-A4 and 155kgCO_2/m^2 for stages A5-D. The panel build up will be 50mm brick slip, 50mm UHPFRC, 250mm thermal insulation and dry lining. DB also added that the panels will be offsite manufactured the supplier currently considered is "Precast".	**Note**
45	DB confirmed that the unitized façade, considered for the terracotta and architectural concrete parts, will be aluminium framed, offsite manufactured and craned in.	**Note**
46	DB to share recycled content figures for glass. **Post meeting note:** DB shared the declaration of the recycled content of glass from a glass supplier (9.1% external recycled glass content, 29.9% external + internal recycled glass content).	**AECOM Facades (DB)**
47	DC suggested the below materials/ techniques to be considered for the façade elements: • MOSA Ceramic Façade, Natureplus and Cradle to Cradle as those cover all the environmental criteria • Post-consumer waste recycled aluminium • StoneCycling and k-briq (unfired brick), Mortarless bricks • Reused bricks	**Note**
48	DB mentioned that the brick options need to be confirmed with the architects. DB confirmed that mortarless brick is maybe not applicable to this project and that due to planning requirements vertical panel might not be acceptable. DB to share details of brick options with architects.	**AECOM Facades (DB)**
49	DB also raised that as lime mortar can take a long time to achieve its full strength, this will be a potential issue for the traditional construction on site that is currently considered.	**Note**
Landscape		
50	DC suggested reclaimed materials and reused crushed concrete for the landscape elements.	**Note**
51	BP stated that crushed of existing concrete for landscape use could be fine, but landscape architect will need to specify the materials first.	**Note**
52	KW confirmed that Carl from the IBI Group is the landscape architect.	**Note**
53	It was agreed that the landscape elements should be picked up in the next masterplan workshop	**All**
Modern Methods of Construction (MMC)- Key Commitments: Principle 1		
54	AM confirmed regarding MMC considered: bathroom pods, pre-fab risers, horizontal distribution on main corridors, all AHU with integrated pipework, louvres at high and low level could be pre-fab, bedrooms can be standardised, all the services within the ceiling void could be standardized offsite, include medical gases in the MMC.	**Note**
Key Commitments: Principle 2		
55	DC mentioned that information on this commitment will be derived from the energy and sustainability statements	**Note**
Recycled content- Key Commitments: Principle 3		
56	JH confirmed that GGBS is currently considered to be maximised – Percentage will depend on ground conditions. JH to engage with supply chain to determine the maximum percentages.	**AECOM Structures (JH)**

Ref	Note	Action
57	JH confirmed that targets for 80% responsible sourcing for concrete and CARES for rebar are being considered.	**Note**
58	DC confirmed with team that steel and concrete are all BES 6001 and British Gypsum BES6001.	**Note**
59	DC to check with JH and the BREEAM team what is currently considered under the responsible sourcing credits and also involve DB with the BREEAM team regarding the façade responsible sourcing materials.	**AECOM (DC, JH, DB)**
Ceilings- Key Commitments: Principle 3		
60	DC suggested that Certified cradle to cradle systems exist for ceilings (e.g. Armstrong)	**Note**
61	AB mentioned that ceilings are not currently investigated at this stage.	**Note**
Partitions- Key Commitments: Principle 3		
62	DC raised that gypsum is not a good option from an end of life perspective. DC suggested alternative options: • Breathaplasta- ultra-breathable lime plaster • Biocomposite board (Ecor)	
63	AB to confirm partitions alternative options if applicable (e.g. Breathaplasta, Biocomposite).	**IBI Group (AB)**
Insulation- Key Commitments: Principle 3		
64	DC suggested Biohm, mycelium insulation as an alternative option, it is naturally self-extinguishing, sequesters carbon, but in small scale production at the moment.	**Note**
65	DC to confirm with BREEAM team adaptability and disassembly credits.	**AECOM Sustainability (DC)**
Key Commitments: Principle 4		
66	DB confirmed that the seals in the glazing modules have to be replaced every 20-25 years. DB to review potential to replace the seals instead of replacing the whole façade panel.	**AECOM Facades (DB)**
67	DB also mentioned that as different panels are connected with spigots, few panels need to be removed before replacing one.	**Note**
68	AM confirmed that there will be a services replacement strategy. AM to share relevant diagram to be included in the CES.	**AECOM MEP (AM)**
69	DC suggested blockwork with high recycled content for plant on lower ground and ground floor.	**Note**
70	DC suggested the design team to prepare scenario modelling with different uses of the building and provided examples from similar healthcare project. This action will also support the BREEAM credits.	**Note**
71	KW to discuss feasibility of scenario modelling with different uses of the building. This action will also support the BREEAM credits.	**AECOM PM (KW)**
Key Commitments: Principle 5		
72	DC suggested the design team to progress with preparing a deconstruction manual for facades and building services.	**Note**
Key Commitments: Principle 6		
73	DC to progress action on the pre-demolition audit as previously mentioned.	**Note**
Key Commitments: Principle 7		
74	DC raised requirement for Excavation Waste (clean) is 95% beneficial use.	**Note**
Key Commitments: Principle 8		
75	DC raised requirement for Construction Waste is 95% reuse, recycling, recovery.	**Note**
Key Commitments: Principle 9		
76	DC raised requirement for Municipal Waste is 65% recycling by 2030.	**Note**

Post Completion Report

Ref	Note	Action
77	DC to write an Early warning for the post completion report required for the CE statement (update based on the “as build” information similar to the WLC and Energy GLA requirements).	**AECOM Sustainability (DC)**
Next Steps		
78	Meeting Minutes and slides to be circulated.	**AECOM Sustainability (AS)**
79	Circular Economy Statement to be prepared, reviewed and circulated for comments.	**AECOM Sustainability (DC, AS)**

A.2 Workshop Meeting Notes (Masterplan Development)

Meeting Notes

Meeting name
THHR: Masterplan Whole Life Carbon and Circular Economy Workshop

Meeting date
14/07/2021

Time
10:00-11:00

Location
Microsoft Teams

Project name
The Hillingdon Hospital Redevelopment

Prepared by
Aspa Skorletou

Attendees

DC	AECOM Sustainability
AS	AECOM Sustainability
BC	AECOM Sustainability
BP	AECOM Structures
TK	Savills Planning
VFS	Prior and Partners
JH	
SW	AECOM Structures
SJ	AECOM PM
KW	AECOM PM
ASP	AECOM PM
PS	Ridge QS
HE	AECOM MEP
LP	AECOM MEP
CH	Ridge QS
	IBI Group

Presentation slides
The presentation slides from the workshop have been made available alongside these notes, Hillingdon WLC and CES workshop v3.6 - 140721.pptx

Ref	Note	Action
Summary of Actions		
80	AECOM to review the Draft Design Codes. The draft version will be ready w/c 19th July 2021.	**AECOM Sustainability**

Ref	Note	Action
81	BC to send RFI document to VFS for masterplan required high level quantities/ assumptions.	**AECOM Sustainability (BC)**
82	AECOM Sustainability to obtain schedule for residential units.	**AECOM Sustainability**
83	KW to provide wording from SOC stage reports to provide the rationale for demolishing the existing buildings.	**AECOM PM (KW)**
84	BC to request energy assumption from RB.	**AECOM Sustainability (BC)**
Introduction to the WLC Principles		
85	BC introduced the WLC principles and presented the below points: • What is Embodied Carbon and the Lifecycle Stages (from extraction, manufacture and transport to demolition and recycling). • How is embodied carbon calculated (material quantities X embodied carbon conversion factor). • What can be done to reduce embodied carbon (i.e. Design out basements, cement replacements, reuse of materials, low carbon materials as timber, lean design). • GLA benchmarks for modules A1-A5 and B-C (comparison is required and explanation for differences to those).	**Note**
86	BC mention that in order to complete the WLC assessment of the outline part of the application material quantities are required even at a high level.	**Note**
Introduction to the CE Principles		
87	DC introduced the CE principles and presented the below points: • CE Hierarchy • Design Principles (i.e. Design for disassembly – Buildings as "material banks") • London Plan, CE Guidance and Contents (as this is a hybrid application the CES will cover the Draft CE requirements for the Masterplan and the Detailed CE requirements for the Hospital) • 4 required targets (i.e. 95% reuse/ recycle / recovery for excavation, construction and demolition, 65% recycling for municipal waste, 20% by value of materials recycled content) • Strategic approach part 1 (existing buildings- yes, feasible to retain the buildings-no, feasible and viable to recover the residual value of the building elements/materials- yes/no- pre demo audits will indicate this approach) • Strategic approach part 2 (expected life-Long, longevity, adaptability, disassembly)	**Note**
88	DC mentioned that there is a pre demolition audit for one of the existing buildings that showed it is not feasible to keep the existing elements, but we need to proceed with pre-demolition audits for the other buildings. This will be included in risk items schedule.	**Note**
Workshop session		
89	BC mentioned that high level quantities (i.e. grid size, ground conditions) will be included in AECOM's in- house tool ScopeX to produce high level carbon output and reduction options	**Note**
90	JH mentioned that masterplan is out of AECOM Structures scope of works	**Note**
91	BC to send RFI document to VFS for masterplan required high level quantities/ assumptions	**AECOM Sustainability (BC)**
92	VFS currently drafting the Design Codes document and DAS	**Note**
93	AECOM to review the Draft Design Codes. The draft version will be ready w/c 19th July 2021.	**AECOM Sustainability**

Ref	Note	Action
94	BC mentioned that the WLC assessment will be based on the RICS guidance and include comparisons with different 'realistic' options.	**Note**
95	The below recommendations were discussed for inclusion in the Design Codes: • Avoid transfer structures (i.e. Podium Parking) where possible to reduce embodied carbon impacts • Avoiding basements • Optimising the structural grid • Maximising cement replacements / low carbon concrete • Avoid complex-built forms • Use of SUDS (e.g. permeable paving, swales and ditches) instead of hard attenuation	**Note**
96	For façade, VFS suggested to assume palette of colours, reflecting the existing residential and the hospital, materials.	**Note**
97	Roofs should be assumed as flat.	**Note**
98	For external works, VFS suggested to assume that portions of the materials can be reclaimed, and that Type 1 can be reclaimed – crushed and used for sub-base.	**Note**
99	BC to request energy assumptions from RB (AECOM's energy consultant).	**AECOM Sustainability (BC)**
100	DC questioned why the buildings are being demolished and what was the rationale.	**Note**
101	VFS confirmed that from previous stages of the masterplan, due to poor quality and dimensions it is not feasible to retain the existing buildings.	**Note**
102	KW to provide wording from SOC stage reports to provide the rationale for demolishing the existing buildings.	**AECOM PM (KW)**
103	DC presented the Pre-Demolition Audit, for bldg 15/17	**Note**
104	Pre- demolition audit probably raised as a commitment at this stage providing there is a good reason why the building cannot be accessed to undertake a pre-demolition audit.	**Note**
105	VFS mentioned that due to cost and current targets, basement is not considered as a solution	**Note**
Next Steps		
106	Meeting Minutes and slides to be circulated.	**AECOM Sustainability (AS)**
107	AECOM to provide RFI's	**AECOM Sustainability (BC)**
108	WLCA and CES to be prepared, reviewed and circulated for comments.	**AECOM Sustainability (DC, AS, BC)**

Appendix B

B.1 Pre- demolition audit

BREEAM Pre-Demolition Audit Report

Hillingdon Hospital
London Borough of Hillingdon

The Hillingdon Hospitals NHS Foundation Trust

THHR_01-ACM-ZZ-XX-RP-7-000028

March 2022

Delivering a better world

Quality information

Prepared by	Checked by	Verified by	Approved by
Josh Wilks Graduate Environmental Engineer	Lucy Hill, Principal Waste and Resources Specialist	Mike Bains, Technical Director	Mike Bains, Technical Director

Revision History

Revision	Revision date	Details	Authorized	Name	Position
0	11-Mar-22	Issue 1	MJB	M Bains	Technical Director

Prepared for:

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Introduction

AECOM Limited (hereafter referred to as 'AECOM') has been appointed by The Hillingdon Hospitals NHS Foundation Trust (hereafter referred to as the 'Client' / 'Applicant') to prepare this Building Research Establishment Environmental Assessment Method (BREEAM) Pre-Demolition Audit Report (hereafter referred to as the 'Report'). This Report has been prepared by AECOM to accompany hybrid planning application being submitted by the Applicant to the London Borough of Hillingdon.

The proposal comprises hybrid planning application for:

1. FULL application seeking planning permission for demolition of existing buildings and redevelopment of the site to provide the new Hillingdon Hospital, multi-storey car park and mobility hub, vehicle access, highways works, associated plant, generators, substation, new internal roads, landscaping and public open space, utilities, servicing area, surface car park/ expansion space, and other works incidental to the proposed development.
2. OUTLINE planning application (all matters reserved, except for access) for the demolition of buildings and structures on the remaining site (excluding the Grade II Furze and Tudor Centre) for a mixed-use development comprising residential (Class C3) and supporting Commercial, Business and Service uses (Class E), new pedestrian and vehicular access; public realm, amenity space, car and cycling parking.

As per the BREEAM New Construction 2018 (UK)[1], a total of 5 credits can be obtained for the Wst 01 Construction Waste Management criteria.

- One Credit – Pre-Demolition Audit:
    1. Complete a pre-demolition audit of any existing buildings, structures or hard surfaces being considered for demolition. This audit will:
        a) Be carried out at Concept Design stage by a competent person prior to strip-out or demolition works
        b) Guide the design, consider materials for reuse and set targets for waste management
        c) Engage all contractors in the process of maximising high-grade reuse and recycling opportunities
    2. Refer to the audit in the Resource Management Plan (RMP)
    3. Compare actual waste arisings and waste management routes used with those forecasts and investigate significant deviations from planned targets
- Three Credits – Construction resource efficiency: preparing a compliant RMP with the aim of minimising and monitoring waste.
- One Credit –Diversion from landfill.

This Report will support the Client towards obtaining one credit (Pre-Demolition Audit) for the BREEAM Wst 01 Construction Waste Management criteria.

Site Context

The total application boundary covers an area of 9.6hectares.

Hillingdon Hospital is located to the south of Pield Heath Road, bound by Royal Lane to the west, and Colham Green Road to the east. The site is located within the Brunel Ward. The site comprises a ten storey block built in the 1960s and a mix of other hospital buildings scattered across the site. Many of the acute beds are in single storey wards built in the 1940s, which are in very poor condition.

[1] BREEAM UK New Construction Non-domestic Buildings (All UK) Technical Manual SD5078: BREEAM New Construction 2018 3.0

The remainder of the site consists mainly of surface level car parking, interspersed with pockets of landscaping. Hillingdon Hospital is located within the urban area of Hillingdon and is not subject to any designations such as Green Belt or site allocations. It is not within a conservation area.

Proposed Development

Detailed planning permission will be sought for:

- Replacement hospital building (79,603.6 sqm GIA) of basement, ground plus seven storeys on the western extent of the site incorporating a linked mobility hub and multi storey car park (MSCP) for 781 car spaces;
- High quality landscaping buffer fronting Royal Lane;
- New bus stop arrangements and improved connections to the hospital on Pield Heath Road;
- Large central green open space for use by the hospital and wider community;
- 161 surface level car parking spaces with the ability to cater for up to 14,000 sqm of expansion space for future hospital expansion (if required).

Outline planning permission will be sought for the wider masterplan comprising the following proposals:

- Up to 33,870 sqm of residential, comprising 327 dwellings;
- Plots – P01, P02, P04 (mixed use blocks with supporting provision of 800sqm of town centre uses (Use Class E) at ground floor level).
- Up to 302 car parking spaces, and 515 cycle parking spaces.
- Improved permeability and public access routes through the site;
- High quality public realm and landscaped gardens throughout the site.

Aims and Objectives

The main aim of the Report is to identify and quantify the materials that might be generated on Site during the demolition phase. This information will assist the Client to maximise the recovery of material for subsequent high grade or value applications.

The objectives of this Report are to:

- Identify the types and quantities of key materials present in the existing buildings, structures and hard surfaces;
- Identify potential applications and any related issues for the reuse and recycling of the key waste/materials in accordance with the waste hierarchy;
- Identify opportunities for reuse and recycling within the same development;
- Identify local reprocessors or recyclers for recycling of materials;
- Identify overall recycling targets where appropriate;
- Identify reuse targets where appropriate; and
- Identity overall landfill diversion rate for all key materials.

Key Waste Principals

The Waste Hierarchy

Clause 12 of The Waste (England and Wales) Regulations 2011[2] requires that anyone involved in the import, generation, collection, transferring, recovery, or disposal of waste must take all such measures available to apply the waste hierarchy.

This Report considers the waste hierarchy and encourages materials identified on-Site to be reused before they are sent for recycling, recovery, or disposal. The main principles of the waste hierarchy are summarised in Figure 1.

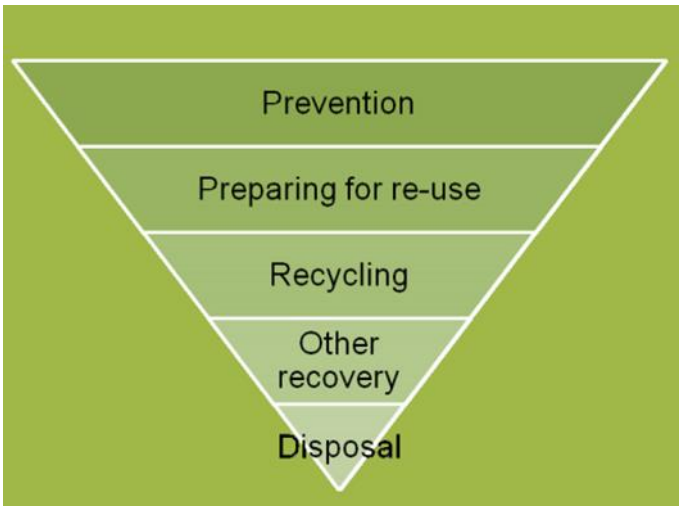

Figure 1 Waste Hierarchy[3]

The Circular Economy

A Circular Economy is a systematic approach to economic development designed to benefit businesses, society, and the environment. In contrast to the '*take make waste*' linear model, a Circular Economy is regenerative by design and aims to gradually decouple growth from the consumption of finite resources. The Circular Economy activity focuses on design that is regenerative and restorative. This is based on three principals:

- Design out waste and pollution;
- Keep products and materials in use; and
- Regenerate natural systems[4].

This Report can help encourage a Circular Economy by:

- Influencing the wider design team to consider reclamation and reuse of waste/materials found on-Site to be incorporated in the Proposed Development, avoiding disposal of valuable materials, and
- Identifying reuse and reprocessors companies for materials found on-Site, extending the products useful life before being remanufactured.

Figure 2 demonstrates the key stages and principles used when applying the Circular Economy to the built environment.

[2] The Waste (England and Wales) Regulations 2011 (as amended)
[3] Defra Guidance on applying the Waste Hierarchy
[4] Ellan MacArthur Foundation [The Circular Economy In Detail (ellenmacarthurfoundation.org)]

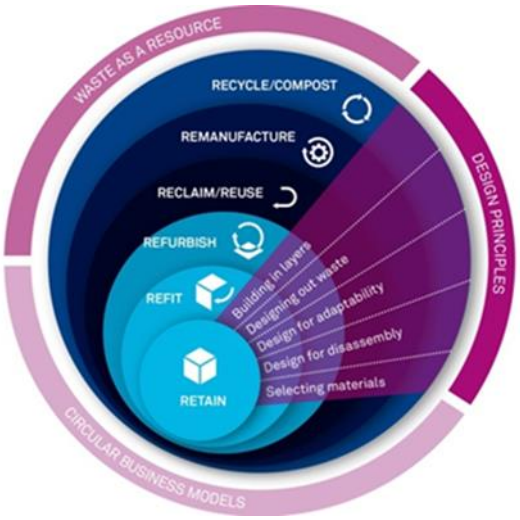

Figure 2 Applying Circular Economy Principles to Building Design[5]

[5] Building Revolutions, David Cheshire, AECOM, RIBA Publications, 2016

Methodology

In line with BREEAM requirements, the Site Audit was carried out by competent persons: '*… who has appropriate knowledge of buildings, waste and options for reuse and recycling of different waste streams*'.

Since the majority of buildings are currently in active use as part of the hospital and having regard to COVID requirements, it has not been feasible to carry out site surveys at this stage. This Site Audit has therefore been carried out as a desk-based exercise, using drawings provided by the Applicant and a review of existing visual imagery of the exterior of the buildings.

Exclusions and Assumptions

The following exclusions, assumptions and caveats apply to this Report:

- For the following buildings, the audit has been undertaken without the survey team having attended and has been based on high-level information and photos provided by Quinn London Contractors for the following facilities:
  - Link Corridor (Partial Demo)
  - Canteen (Partial Demo)
  - Adult Audiology
  - Substation
  - Alderbourne
  - Pinewood Ward
- Where clear line of sight/access was not available to attain measurements e.g. thicknesses, best judgement and assumptions have been made with reference to the DoWT-B spreadsheet.
- For the following buildings, the audit has been undertaken without the survey team having attended and based solely on provided floor plans:
  - Geriatic Day Hospital
  - Beaconsfield
  - Quebec ward
  - Osterley ward
  - Churchill ward
  - Middlesex ward
  - Lister ward
  - Pagett ward
  - Diabetic care
  - High voltage plant
  - Podium
  - Greenacres
  - Education & Training
- Best judgement and assumptions have been made with reference to the DoWT-B spreadsheet.
- For all buildings, no structural drawings were provided, only floor/layout plans. As such, the construction and materials for the buildings have been calculated based on best judgement and construction knowledge in terms of composition, thickness and methodology.
  - Carparks C1, C2 & C3 - All quantities and compositions were collated based on what could be identified using desktop methods such as Google Earth and Bing Maps.
  - 10% of concrete volume was given as steel reinforcement for the Podium.

  - Doors and windows have been included at a standard size across the estate.
  - It is assumed that all tenant installed furniture, equipment and miscellaneous non-fixed items will be removed by the tenant upon vacating the premise, and as such has not been taken into account for this assessment.
  - The areas of glazing are not excluded from the mass of walls.
  - It is assumed that all tenant installed furniture and equipment will be removed by the tenant upon vacating the premise, and as such will not be taken into account for this assessment.
  - Assumed under portakabins that a 150mm slab foundation is in place.
  - Assumed that all partitions are formed of timber studwork and not metal.
  - Floor finishes decided on based on building useage.
- Exclusions:
  - Busy Bees Nursey BB - No information was made available for Busy Bees nursery and hence no allowance have been made for this building.
  - Old Creche 53 - no allowance has been made for this building.
  - Small power, data and large/specialist plant has not been included within the calculations (including but not limited to internal wiring, copper pipes, boilers, HVAC etc).
  - No excavations have been taken into account for this audit.
  - Allowances have been made for foundations of each building, but not basements.
  - No biomass has been included in the calculations. Only inert materials have been allowed for.
  - The residential boundary fencing is not included in this audit (masonry and timber).
  - The temporary fencing is not included in this audit (timber and metal).

Key Materials Identified

The following section describes the key materials identified, their location and the estimated quantities obtained during the audit. Based on the condition of the materials and the likely availability of recovery routes, a circularity rating for the materials has been provided to determine whether they can be reused, recycled, sent for recovery or disposed to a landfill as a last resort. The circularity rating describes how likely the materials is to be reused on/off site and has been based on professional judgement.

The circularity rating is based on the following key, shown in Table 1. The ratings and related descriptions are recommendations for the management route of the materials identified; the exact routes for the materials will be determined by the appointed demolition contractor.

Table 1 Circularity Rating

Indicator	Description
	Good condition and reuse of this material is possible.
	Wear and tear – this material is likely to be recycled. Alternatively, this indicator may be used if the material is in a good condition but there is no market for reuse and therefore it has to be recycled.
	Poor condition/not reusable or non-recyclable material, this may be due to a number of reasons such as there being no end market for the material to be recycled (e.g. composite materials) or due to the small quantity of the material present, which therefore makes it unviable to recycle separately. This material is likely to be sent to landfill or energy recovery.

Concrete

Locations and Quantities

Table 2 presents the quantities of concrete in each building where it is assessed as being present.

Table 2 Concrete Location and Quantities

Building Number	Building Name	Approximate Quantity (m^3)
1	Alderbourne Unit	576
2	Geriatric Day Hospital	336
3	Beaconsfield	729.7
5	Quebec Ward	203.1
6	Pinewood Ward	203.1
7	Osterley Ward	389.2
8	Churchill Ward	
9	Middlesex Ward	359.6
10	Lister Ward	
11	Pagett Ward	484.5
12	Diabetic Care Unit	
18	Annex Corridor	311
21	High Voltage Switch Gear and Plant Room	93.6
23	Catering / Main Restaurant	18.5
24	Podium / Sewage Pump / CHP	515.2
72	Greenacres	165
73	Adult Audiology	55.6
77	Education and Training	379.1
S4	Substation 4	0.9
n.a.	External Hardstandings	3003.6
		150.18

Recommendation

For all concrete elements, concrete can be sent to a local reprocessor and crushed off-site for use as recycled aggregate. Depending on space and programme constraints, concrete may also be crushed on-site may be used as a construction material for the Proposed Development.

Bricks

Locations and Quantities

Table 3 presents the quantities of bricks / blocks in each building where they are assessed as being present.

Table 3 Bricks/ Blocks Location and Quantities

Building Number	Building Name	Approximate Quantity (m^3)
1	Alderbourne Unit	185
2	Geriatric Day Hospital	147
3	Beaconsfield	125.6
5	Quebec Ward	93.1
6	Pinewood Ward	54.3
7	Osterley Ward	141.1
8	Churchill Ward	
9	Middlesex Ward	106.5
10	Lister Ward	
11	Pagett Ward	241.3
12	Diabetic Care Unit	
18	Annex Corridor	55.4
21	High Voltage Switch Gear and Plant Room	59
77	Education and Training	346

Recommendation

It is assumed that any bricks which are in good condition will not meet the requirements of the Proposed Development and therefore would not be suitable for re-use on-site. However, these bricks may be sent off-site for re-use or recycling.

Tiles

Locations and Quantities

Table 4 presents the quantities of roof tiles in each building where they are assessed as being present. Due to access constraints, it is not possible at this stage to estimate the quantities of ceramics in internal fixtures and fittings (e.g. WCs and basins).

Table 4 Roof Tiles Location and Quantities

Building Number	Building Name	Approximate Quantity (tonnes)
1	Alderbourne Unit	53.2
2	Geriatric Day Hospital	30.4
3	Beaconsfield	71.4
11	Pagett Ward	3.6
12	Diabetic Care Unit	
18	Annex Corridor	0.7
21	High Voltage Switch Gear and Plant Room	
77	Education and Training	37.8

Recommendation

Due to the adhesive binding the tiles and the time required to carefully remove them without breakage, it is recommended that these materials are segregated, so that they can be crushed and recycled off-site. Internal fixtures (e.g. WCs and basins) can be removed and taken off-site where they may be prepared for re-use or crushed and recycled.

Metals

Locations and Quantities

Table 5 presents the quantities of metals in each building where they are assessed as being present.

Table 5 Metals Location and Quantities

Building Number	Building Name	Approximate Quantity (kg)	
		Iron and steel	Aluminium
1	Alderbourne Unit	25853	5261
2	Geriatric Day Hospital	18425	n/a
3	Beaconsfield	40408	n/a
5	Quebec Ward	2240	n/a
6	Pinewood Ward	2240	n/a
7	Osterley Ward	4880	n/a
8	Churchill Ward		
9	Middlesex Ward	4880	n/a
10	Lister Ward		
11	Pagett Ward	4880	n/a
12	Diabetic Care Unit		
18	Annex Corridor	13372	n/a
21	High Voltage Switch Gear and Plant Room	10435	n/a
23	Catering / Main Restaurant	1872	n/a
24	Podium / Sewage Pump / CHP	75.6	n/a
72	Greenacres	8790	n/a
73	Adult Audiology	3114	n/a
77	Education and Training	26478	n/a

Recommendation

- For all metal found on Site, it is recommended that it is taken off-site to be recycled.

Suspended Grid Mineral Ceiling Tiles

Locations and Quantities

Table 6 presents the quantities of suspended grid mineral ceiling tiles in each building where they are assessed as being present.

Table 6 Suspended Grid Mineral Ceiling Tiles Location and Quantities

Building Number	Building Name	Approximate Quantity (m^2)
1	Alderbourne Unit	432
2	Geriatric Day Hospital	90
3	Beaconsfield	218
5	Quebec Ward	430
6	Pinewood Ward	431
7	Osterley Ward	836
8	Churchill Ward	
9	Middlesex Ward	730
10	Lister Ward	
11	Pagett Ward	1109
12	Diabetic Care Unit	
23	Catering / Main Restaurant	90
77	Education and Training	929

Recommendation

Majority of the mineral ceiling tiles will be appropriate for reuse off-site. Where it is not possible for mineral ceiling tiles to be reused, it is recommended that they are recycled via a ceiling recycling programme.

Plastics (Including Vinyl Sheets)

Locations and Quantities

Table 7 presents the quantities of plastics in each building where they are assessed as being present.

Table 7 Plastics Location and Quantities

Building Number	Building Name	Approximate Quantity (m^2)
1	Alderbourne Unit	922
5	Quebec Ward	430
6	Pinewood Ward	431
7	Osterley Ward	836
8	Churchill Ward	
9	Middlesex Ward	730
10	Lister Ward	
11	Pagett Ward	1109
12	Diabetic Care Unit	
18	Annex Corridor	920
23	Catering / Main Restaurant	90
72	Greenacres	51
73	Adult Audiology	12
77	Education and Training	172

Recommendation

- It is recommended that plastics are taken off-site to be recycled.

Textiles

Locations and Quantities

Table 8 presents the quantities of textiles in each building where they are assessed as being present. In the majority of cases, it was not possible to determine the presence of textiles due to the desk-based nature of the audit: those buildings listed below are only those where information was provided to confirm the presence of carpets.

Table 8 Textiles Location and Quantities

Building Number	Building Name	Approximate Quantity (m^2)
1	Alderbourne Unit	330
72	Greenacres	430
73	Adult Audiology	166
77	Education and Training	516

Recommendation

Where the carpets are found on Site to be of good quality and in good condition, it can be reused off-site. However, where the condition of carpet is poor quality and/or condition, then off-site recycling is recommended.

Timber and Timber Products

Locations and Quantities

Table 9 presents the quantities of timber and timber products in each building where they are assessed as being present.

Table 9 Timber and Timber Products Location and Quantities

Building Number	Building Name	Approximate Quantity		
		Timber (m^3)	Timber – Untreated Doors (m^2)	Fibreboard (kg)
1	Alderbourne Unit	69.4	164.96	n/a
2	Geriatric Day Hospital	42.7	110.58	n/a
3	Beaconsfield	83.8	143.21	n/a
5	Quebec Ward	14.82	68.89	2500
6	Pinewood Ward	15.96	65.26	2500
7	Osterley Ward	29.82	105.14	5000
8	Churchill Ward			
9	Middlesex Ward	27.8	123.27	4440
10	Lister Ward			
11	Pagett Ward	26.46	175.84	4754
12	Diabetic Care Unit			
18	Annex Corridor	36.8	n/a	n/a
24	Podium / Sewage Pump / CHP	2.2	n/a	n/a
72	Greenacres	46.6	59.82	n/a
73	Adult Audiology	18	43.51	n/a
77	Education and Training	14.5	81.58	n/a
S4	Substation 4	18.2	n/a	n/a

Recommendation

Where possible, it is recommended that high quality timber such as good quality doors in good condition are taken off-site and reused.

Where high quality solid timber cannot be reclaimed, it is recommended that it is taken off-site for recycling.

Where reuse outlets cannot be secured, or recycling is not possible (due to the finish on the doors or the composite nature of other timber products, e.g. fibreboard), it is recommended that the timber is sent for energy recovery.

Glass

Locations and Quantities

Table 10 presents the quantities of glass in each building where it is assessed as being present.

Table 10 Glass Location and Quantities

Building Number	Building Name	Approximate Quantity (m^2)
1	Alderbourne Unit	86.4
2	Geriatric Day Hospital	97.9
3	Beaconsfield	113.56
5	Quebec Ward	51.84
6	Pinewood Ward	77.56
7	Osterley Ward	122.2
8	Churchill Ward	
9	Middlesex Ward	93.4
10	Lister Ward	
11	Pagett Ward	93.6
12	Diabetic Care Unit	
18	Annex Corridor	859.2
23	Catering / Main Restaurant	90
72	Greenacres	72
73	Adult Audiology	40.32
77	Education and Training	79.68

Recommendation

- It is recommended that glass is sent off-site, to be crushed and recycled.

Plasterboard (Other Gypsum Material)

Locations and Quantities

Table 11 presents the quantities of plasterboard in each building where it is assessed as being present.

Table 11 Plasterboard (Other Gypsum Material) Location and Quantities

Building Number	Building Name	Approximate Quantity (m^3)
1	Alderbourne Unit	37
2	Geriatric Day Hospital	26.2
3	Beaconsfield	53.8
5	Quebec Ward	6.18
6	Pinewood Ward	8.68
7	Osterley Ward	12.4
8	Churchill Ward	
9	Middlesex Ward	12.4
10	Lister Ward	
11	Pagett Ward	8.31
12	Diabetic Care Unit	
18	Annex Corridor	3.8
72	Greenacres	18.6
73	Adult Audiology	7.8
77	Education and Training	4.3

Recommendation

- Gypsum-based waste, including plasterboard, must be segregated on-site. Once segregated, this waste can be sent off-site with a specialist contractor to be recycled.

Bituminous Material (Asphalt)

Locations and Quantities

Table 12 presents the quantities of bituminous material in each building where it is assessed as being present.

Table 12 Bituminous Material (Asphalt) Location and Quantities

Building Number	Building Name	Approximate Quantity (m^3)
1	Alderbourne Unit	4.8
2	Geriatric Day Hospital	2.95
3	Beaconsfield	4.2
5	Quebec Ward	1.2
6	Pinewood Ward	1.2
7	Osterley Ward	2.3
8	Churchill Ward	
9	Middlesex Ward	1.82
10	Lister Ward	
11	Pagett Ward	1.93
12	Diabetic Care Unit	
18	Annex Corridor	5.7
21	High Voltage Switch Gear and Plant Room	1.38
23	Catering / Main Restaurant	0.5
24	Podium / Sewage Pump / CHP	4.36
73	Adult Audiology	
77	Education and Training	1.94

Recommendation

● Subject to the acceptance criteria and whether the bituminous material is classified as hazardous waste, it is recommended it is sent for either energy from waste, or for disposal at landfill as a last resort.

Lighting

Locations and Quantities

Lighting (including fluorescent tubes and Light Emitting Diodes (LED)) will be present, however, at present it is not possible to quantify this because of the lack of internal access.

Recommendation

The reuse of lightbulbs and their fixtures is likely impractical; it is therefore likely that fluorescent and LED lighting would be taken off-site and recycled, whereas older incandescent lightbulbs would be sent for energy recovery.

Insulation

Locations and Quantities

Table 12 presents the quantities of bituminous material in each building where it is assessed as being present.

Table 13: Insulation Location and Quantities

Building Number	Building Name	Other construction materials containing asbestos (kg)	Fibreglass (m3)	Polystyrene - m3
1	Alderbourne Unit		210	
2	Geriatic Day Hospital		115	
3	Beaconsfield		227	
5	Quebec ward	2760	65	12.2
6	Pinewood ward	2760	65	12.2
7 & 8	Osterley ward & Churchill ward	5520	142.5	24.4
9 & 10	Middlesex ward & Lister ward	5520	110	24.4
11 & 12	Pagett ward & Diabetic care unit	5520	142.5	24.4
18	Annex corridor (partial)			
21	Switch gear and plant room			279
72	Greenacres		131	
73	Adult audiology		48	
77	Education & Training		103	

Recommendation

The off-site recycling of polystyrene is potentially feasible. Asbestos will need to be safely removed and disposed of to landfill. It is likely that fibreglass would also require landfill disposal.

Identified Materials and Estimated Quantities

Estimated quantities of the materials anticipated to be generated during the demolition process are provided in Table 14. The estimated volumes are based on the audit and do not consider the actual skip volumes that may result from the Site (i.e., does not account for bulking and the inevitable voids within the skip during disposal).

Table 14. Estimate Quantities of Materials / Waste

Material	European Waste Catalogue Code	Weight[6] (Tonnes)	% of Total Material	Material Recovery Potential (%) (Best Practice)[7]	Material Recovery Potential (Tonnes)	Disposal to Landfill/Energy From Waste (Tonnes)
Other insulation materials	17-06-04	25	0%	50%	13	13
Other construction materials containing asbestos	17-06-05*	22	0%	0%	-	22
Concrete	17-01-01	19,653	74%	100%	19,653	0
Bricks	17-01-02	1,711	6%	100%	1,711	0
Wood - untreated	17-02-01	1,180	4%	95%	1,121	59
Glass - uncontaminated	17-02-02	113	0%	100%	113	0
Treated wood, glass, plastic (alone or in mixtures) containing hazardous substances	17-02-04*	50	0%	0%	-	50
Textiles	20-01-11	64	0%	100%	64	0
Other bituminous mixtures	17-03-02	28	0%	0%	-	28
Aluminium	17-04-02	5	0%	100%	5	0
Iron and steel	17-04-05	167	1%	100%	167	0
Other soil and stones	17-05-04	3,248	12%	100%	3,248	0
Other gypsum materials	17-08-02	120	0%	95%	114	6
Total		26,386			26,208	178

Note: Numbers may not add up, due to rounding. The material recovery potential (%) is sourced from Waste and Resources Action Programme Best Practice (WRAP: Achieving good practice Waste Minimisation and Management (Guidance for construction clients, design teams and contractors). Where information in relation to material recovery potential is not available for specific materials, professional judgement has been used.

[6] Following densities were used to convert m^3 to tonnes – Concrete: 2.7 – 2.8 t/m^3, Masonry (Bricks): 1.4 t/m^3, Timber – 0.5 -0.75 t/m^3, Glass – 2.6 t/m^3, Textiles – 1.5 t/m^3, Grid Tiles – 3 t/m^3, Plastics – 1.1 t/m3, Metals – 0.03 – 7.85 t/m^3, Plasterboard – 0.6 t/m^3

[7] WRAP – Achieving good practice Waste Minimisation and Management (Guidance for construction clients, design teams and contractors)

Waste Management Opportunities

The key shown in Table 15 has been adopted to show the benefits of each waste/material opportunity.

Table 15 Material Opportunities Benefits Key

Key	Description of Benefit
	Reduction in landfill costs.
	Reduced environmental impact.
	Less carbon/energy intensive.
	Preserve natural resources.
	Corporate social responsibility.

Potential opportunities for reusing and recycling the materials/waste generated on Site as well as the benefits of such initiatives have been identified in Table 16 of this Report.

There are several opportunities to apply the waste hierarchy and circular economy to the areas within the Site to be demolished, and examples of local reprocessing and recycling facilities have been identified where appropriate in this Report. However, this assessment is not intended to present an exhaustive list of these facilities. The final choices of the recommendations made within this Report will need to be determined by the contractor, based on the costs and benefits of the options presented. There are clear benefits to implementing waste minimisation initiatives, these include:

- Reducing costs associated with disposal;
- Realising financial benefits by diverting waste from landfill; and
- Environmental and social benefits of implementing the waste hierarchy and circular economy.

Table 16. Materials / Waste Management Opportunities

Key Materials	Circularity Rating	Suggestion	Benefits	Constraints	Example reuse / reprocessors / recyclers
Concrete		Off-site recycling		Additional space to keep materials segregated.	Table 17 provides a list of recycling companies which may be able to collect / process waste concrete.
Bricks and Masonry		Based on the condition and quality (subject to testing) - Reuse and Recycling		Additional space to keep materials segregated to then transport off-site for crushing. Additional time in the demolition programme will have to be allowed and it is likely to incur increased demolition costs, however, there will be a resale value for the bricks and it would considerably reduce the amount of material that is downcycled for secondary aggregates.	Globe Chain is a reuse marketplace that connects companies with charities, SMEs and individuals to redistribute unneeded construction material while collating social, environmental and economic data. GlobeChain: https://www.globechain.co.uk Salvage opportunities for bricks: https://www.salvoweb.com
Tiles and Ceramics		Off-site Recycling		Additional space to keep materials segregated.	GlobeChain: https://www.globechain.co.uk
Metals		Off-site Recycling		Additional space to keep materials segregated.	European Metal Recycling (EMR) is a company which specialises in the collection of, and recycling of scrap metal waste streams. EMR: https://uk.emrgroup.com/
Suspended Grid Mineral Ceiling Tile		Subject to demand and quality, reused off-site or recycled.		Additional space required to keep material segregated.	Armstrong Ceiling Solutions have a recycling service for acoustic ceiling tiles. Armstrong: https://www.armstrongceilings.com/commercial/en/performance/sustainable-building-design/ceiling-recycling-program.html GlobeChain: https://www.globechain.co.uk
Plastics (including vinyl sheets)		Plastics (polycarbonate skylights) found on site can be recycled into other products such as dashboards, battery boxes.		Additional space to keep materials segregated.	Recovinyl offers a takeback scheme for vinyl flooring via Axion Group. Recovinyl: https://axiongroup.co.uk/services/specialist-collection-schemes/recovinyl/

Key Materials	Circularity Rating	Suggestion	Benefits	Constraints	Example reuse / reprocessors / recyclers
		Smooth uplifted vinyl may be recycled into secondary products.			
Textiles		Off-site Recycling.		Additional space to keep materials segregated.	Interface offers a take back scheme which allows used carpet tiles to get reused by charies, local businesses and others. Interface: https://www.interface.com/EU/en-GB/products/carpet-tile/reentry-en_GB Envirocycle London provdes a carpet tile re-use programme. Envirocycle: https://envirocyclelondon.com/recycle-office-carpet-tiles/
Timber and Timber Products		Off-site Reuse and Recycling.		Additional space to keep materials segregated.	GlobeChain: https://www.globechain.co.uk Community Wood Recycling are able to reclaim wood for re-use. Community Wood Recycling: https://communitywoodrecycling.org.uk/
Glass		Off-site Recycling.		Additional space to keep materials segregated.	The following are providers of glass recycling services, UK wide. May Glass Recycling: https://www.mayglassrecycling.co.uk/services Nationwide Waste Services: https://www.nationwidewasteservices.co.uk/recycling/ Guardian Glass: https://www.guardianglass.com/gb/en
Plasterboard (Other gypsum materials)		Off-site Recycling.		Additional space to keep materials segregated. .	Junk Removals London provide a plasterboard collection and recycling service, which is suitable for old, used plasterboard. Junk Removals London: https://junkremovalslondon.com/plasterboard-collection/
Bituminous Material		Off-site disposal or energy recovery.		Additional space to keep materials segregated.	
Lighting (low energy light bulbs or fluorescent light tubes)		Only low energy light bulbs and fluorescent light tubes are recyclable. Incandescent (old-fashioned) light bulbs cannot be recycled.		Additional disposal costs.	Recolight provide a collection and recycling service for WEEE lighting and electricals. Recolight: https://www.recolight.co.uk/ GlobeChain: https://www.globechain.co.uk Salvage opportunities for lighting: https://www.salvoweb.com

Waste contractors in the area that collect multiple construction streams (segregated) are shown in Table 17. This list is not intended to be comprehensive, and waste generators will need to meet their legal duty of care by making sure that any waste produced is managed responsibly and only given to businesses authorised to take it. The presence of a company on the list below does not remove the requirement for waste generators to carry out their own duty of care checks.

Table 17. London Waste Companies which collect multiple Construction, Demolition and Excavation (CD&E) Waste Streams

Waste Company	Website Hyperlink
Capital Waste	https://capwaste.co.uk/
London Waste Removal Service	www.Londonwasteremovalservice.co.uk/demolition
O'Donovan Waste Disposal	https://www.odonovan.co.uk/
Junk Bird Limited	https://junkbunk.co.uk/
Swift Waste Management	https://swiftwaste.co.uk/
Powerday	https://powerday.co.uk/
Bywaters	https://www.bywaters.co.uk/

General Practical Guidance for Demolition Materials and Waste

This pre-demolition audit has been conducted to allow material and waste management to be considered in the early stage of the project. The Client, Architect and Demolition Contractor should be involved in the material and waste management process from the offset. This will allow for effective planning to realise the value of materials on-Site and their subsequent management (i.e., consideration of the waste hierarchy).

The reuse of material on-Site or on a nearby similar project is the ideal option from an environmental and economic perspective. The Client and Architect are best positioned to consider these options and enable these initiatives. Doing so also often results in reduced transportation, reducing embodied CO2 emissions and costs associated with material management on the project. To maximise this opportunity, it is advised that the following are considered:

- Opportunities for reuse on-Site;
- Safe storage of these items on-Site, in a separate storage area if feasible;
- Opportunities for reuse by the Client on other projects;
- Opportunities for reuse on local/similar projects;
- Advertisement of specific items on websites (e.g., www.salvo.co.uk);
- Contacting local architectural salvage merchants about specific items; and
- Selling or gifting items locally.

Waste arisings during demolition works should be continually monitored to provide a thorough understanding of the types and amounts of waste coming from the Site. This data collection will help with the continual improvement of material and waste management on-Site. Data collection can also be used to help set more demanding waste segregation targets for future demolition and refurbishment projects.

Recommendations and Next Steps

The type and quantities of material present on-Site have been identified, and opportunities to apply the principles of waste hierarchy and Circular Economy applied to different material types, with local reprocessing and recycling facilities identified. Ahead of demolition works taking place, the following recommendations and next steps are suggested:

- Lifecycle analysis of new construction materials for the Proposed Development, in conjunction with the reuse/recycling of materials as identified in this Report.
- Embed the recommendations within this Report in the design process at pre-tender stage so the measures in relation to reuse and recycling targets are included in the awarded demolition contract.
- Engagement with construction material suppliers to explore opportunities for takeback schemes.
- Where takeback schemes with suppliers are not possible, it is recommended that early engagement with reprocessing and recycling companies take place, in order to best capture recyclable materials and avoid downcycling.
- It is recommended that the materials identified within this Report are incorporated into a Site Waste Management Plan (SWMP)/Construction Resource Management Plan (CRMP) for effective management of waste. This is considered good practice on all construction projects and is a key step in facilitating diversion from landfill.
- Identify storage areas on-Site as appropriate for the types and quantities of waste anticipated to be produced during demolition. These areas should allow for the successful segregation of waste, as appropriate to avoid contamination of the different waste and material streams.

- All staff should have appropriate levels of training to enable the segregation of waste is achieved. Waste management information should be included within the Site induction for all personnel. It is recommended that a Reporting procedure SWMP/CRMP is put in place to catalogue the materials/waste produced, which is regularly updated. This will allow for the appropriate organisation of the transport for materials/waste on-Site and prevent stock piling.
- Further to this, it is recommended that a Waste Champion is nominated by the Principal contractor to facilitate management of the SWMP/CRMP. This role would also aim to allow that the waste hierarchy is considered at all times, with the emphasis being on reducing, reusing, and recycling before landfill disposal is considered.

Once the Demolition Contractor is commissioned to undertake the demolition, the following should be considered:

- The Demolition Contractor should engage all contractors in the process of maximising high-grade re-use and recycling opportunities, and
- The Demolition Contactor should refer to the Pre-Demolition Audit Report in the SWMP/CRMP.

Further Information

In addition to the resources detailed in Table 16 of this Report, further information pertaining to the sustainable waste management for construction projects can be found through the following sources:

- Bioregional, Reclaimed Buildings Product Guide: https://www.bioregional.com/resources/reclaimed-building-products-guide
- SmartWaste: Provides waste measurement, Site Waste Management Planning and benchmarking tools: http://www.smartwaste.co.uk/

aecom.com

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