Oriel

Circular Economy Statement

October 2020

File: ORL-INF-XX-XX-RP-PL-180-Circular Economy Statement

Oriel
Creating the centre for advancing eye health

Moorfields Eye Hospital NHS Foundation Trust

NHS

Moorfields Eye Charity

UCL INSTITUTE OF OPHTHALMOLOGY

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Creating the centre for advancing eye health

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Oriel
Circular Economy Statement

Prepared for:

Moorfields Eye Hospital NHS Foundation

Moorfields Eye Hospital NHS Foundation Trust
UCL Institute of Ophthalmology
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Executive Summary

This Detailed Circular Economy Statement has been prepared in accompany the detailed planning application for the construction of a new facility that would allow the existing Moorfields Eye Hospital (MEH) and University College London (UCL) Institute of Ophthalmology (IoO) services to relocate into a single building at the existing St. Pancras Hospital site (hereafter referred to as the 'Proposed Development').

This document sets out the proposed Circular Economy Strategy which has been developed to meet the relevant planning policy (Ref. 1) within the context of the constraints applicable to the Proposed Development.

The high level strategic opportunities that were identified to maximise the residual value of the Proposed Development are the following:

- Minimising the used material for the substructure and structure;
- Exploring the possibilities of creating an adaptable building structure;
- Creation of Scenario Modelling, indicating how the Proposed Development could accommodate in the future different functions;
- Investigating possibilities for offsite pre-manufacture to avoid waste;
- Eliminating the need for a full basement by raising the level of the ground floor; and
- Segregation of six key materials and hazardous waste.

1 Introduction

1.1 Background

1.1.1 AECOM's Sustainable Development Group has been commissioned by Moorfields Eye Hospital NHS Foundation Trust, on behalf of Oriel[1], to prepare a Circular Economy Statement, to accompany a detailed planning application for the construction of a new facility that would allow the existing Moorfields Eye Hospital (Moorfields at City Road) and University College London (UCL) Institute of Ophthalmology (IoO) services at Bath Street to relocate into a single building at the existing St. Pancras Hospital Site (hereafter referred to as the 'Proposed Development').

1.1.2 The site of the Proposed Development comprises part of the existing St. Pancras Hospital and is located between St Pancras Way and Granary Street in the London Borough of Camden (LBC), hereafter referred to as the 'Site'.

1.1.3 This document sets out the proposed Circular Economy Strategy which has been developed to meet the relevant planning policy (Ref. 1) within the context of the constraints applicable to the Proposed Development and its location. As the document supports the detailed planning application, it is called a "*Detailed Circular Economy Statement*" in accordance to the Greater London Authority (GLA)'s Circular Economy Statement Guidance Pre-Consultation Draft (Ref. 2).

1.2 Description of the Proposed Development

1.2.1 The Proposed Development comprises a single building, between seven and ten storeys in height including Ground Level and Lower Ground Level, as well as plant at Roof Level, as well as provision of public realm at ground level, blue badge parking, and vehicular drop off points along St Pancras Way. The building is arranged around a central atrium and connection space. There is also a roof terrace on the Sixth Floor Level on the south-western corners of the building.

1.2.2 The height of the Proposed Development will be up to 69.15 metres (m) Above Ordnance Datum (AOD) and will have a gross external area (GEA) of approximately 48,851 square metres (sq m) and a gross internal area (GIA) of approximately 46,468 sq m.

1.2.3 The Proposed Development will comprise a mix of uses including clinical, research and education purposes, including accident and emergency (A&E) department, outpatients, operating theatres, research areas, education space, café and retail areas, facilities management, office space and plant space.

1.2.4 Table 1-1 provides an overview of the gross external area (GEA), gross internal area (GIA) and how the areas are apportioned across the key uses within the building.

[1] Oriel is a joint venture between Moorfields Eye Hospital NHS Foundation Trust, UCL Institute of Ophthalmology and Moorfields Eye Charity

Table 1-1 Overview of the gross external and internal area of the building and the area per function.

Total (sq m)		Use (Gross Departmental Area) (sq m)					
GEA	GIA	Health	Research	Education	Commercial	Public areas	Other
48851	46468	19820	7925	1939	303	1528	14953

1.3 Policy

1.3.1 The London Plan is the statutory Spatial Development Strategy for Greater London prepared by the Mayor of London ("the Mayor"). The current 2016 Plan (The London Plan consolidated with alterations since 2011) (Ref. 3) is the adopted Development Plan, but the new draft London Plan (Intend to Publish version, December 2019) (Ref. 1), whilst not yet adopted, is at an advanced stage and is a material consideration in planning decisions.

1.3.2 The new draft London Plan (Ref. 1) introduces new policies in relation to the Circular Economy.

Policy SI 7 Reducing waste and supporting the circular economy

"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:*
   - *i) Construction and demolition – 95 per cent*
   - *ii) 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.*

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.*

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 D3 Optimising site capacity through the design-led approach

1.3.3 The Circular Economy Design Principles are also referenced in the "Policy D3 Optimising site capacity through the design-led approach" (Ref. 1).

Camden Local Plan Policy CC5 Waste

1.3.4 The Camden Local Plan (Ref. 4) is the key strategic document in Camden's development plan, containing policies for guiding planning decisions. The Local Plan was adopted on 3 July 2017 and It is the basis for planning decisions and future development in Camden.

"To make sure that residents and businesses can properly store and sort their waste and to make household recycling as easy as possible, the Council will require developments to provide adequate facilities for recycling and the storage and disposal of waste. Facilities for home composting will be encouraged in appropriate development schemes. We will also seek to secure the reuse of construction waste on development sites to reduce resource use and the need to transport materials."

"To ensure an integrated approach to waste management and the highest possible reuse and recycling rates, the Council will encourage the submission of a site waste management plan prior to construction."

1.3.5 This Circular Economy Statement is based on the GLA's Circular Economy Statement Guidance Pre-Consultation Draft (Ref. 2) which interprets the policies in the new draft London Plan set out above and describes the information that should be included in Circular Economy Statements.

1.4 Circular Economy aspirations

1.4.1 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 Pre-Consultation Draft (Ref. 2). This Circular Economy Statement sets out the aspirations and intentions concerning the responsible sourcing and environmental impact of construction products. Waste management will establish a whole-lifecycle approach from consideration of reuse opportunities of existing materials on site, to designing out waste arising from the Proposed Development at the end-of-life stage, through to the principles of disassembly and adaptability.

1.4.2 A BREEAM 'Excellent' rating, under BREEAM New Construction (NC) 2018 (Ref. 5), which represents high standards in environmental, social and economic sustainability performance, is being targeted for the Proposed Development. Through pursuit of the BREEAM criteria, the design of the Proposed Development 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 the construction products, including the implementation of a Sustainable Procurement Plan to guide specification (in response to Mat 01 and Mat 03 credits). Also, a Pre-Demolition Audit will be undertaken, with a view to designing out waste arising from the Proposed Development at the end-of-life stage, through principles of disassembly and adaptability (in response to Wst 01 and Wst 06 credits).

1.5 Method statement

1.5.1 In order to ensure that Circular Economy measures are integrated into the design of the Proposed Development, a cross-disciplinary meeting was held on 19th August 2020. Attendees included representation across the parties and teams involved with the project; architecture (lead designer AECOM and lead architect Penoyre Prasad), cost management (Gardiner & Theobald), structural engineer (AECOM), Mechanical, Electrical, and Plumbing (MEP) engineer (AECOM) and sustainability (AECOM).

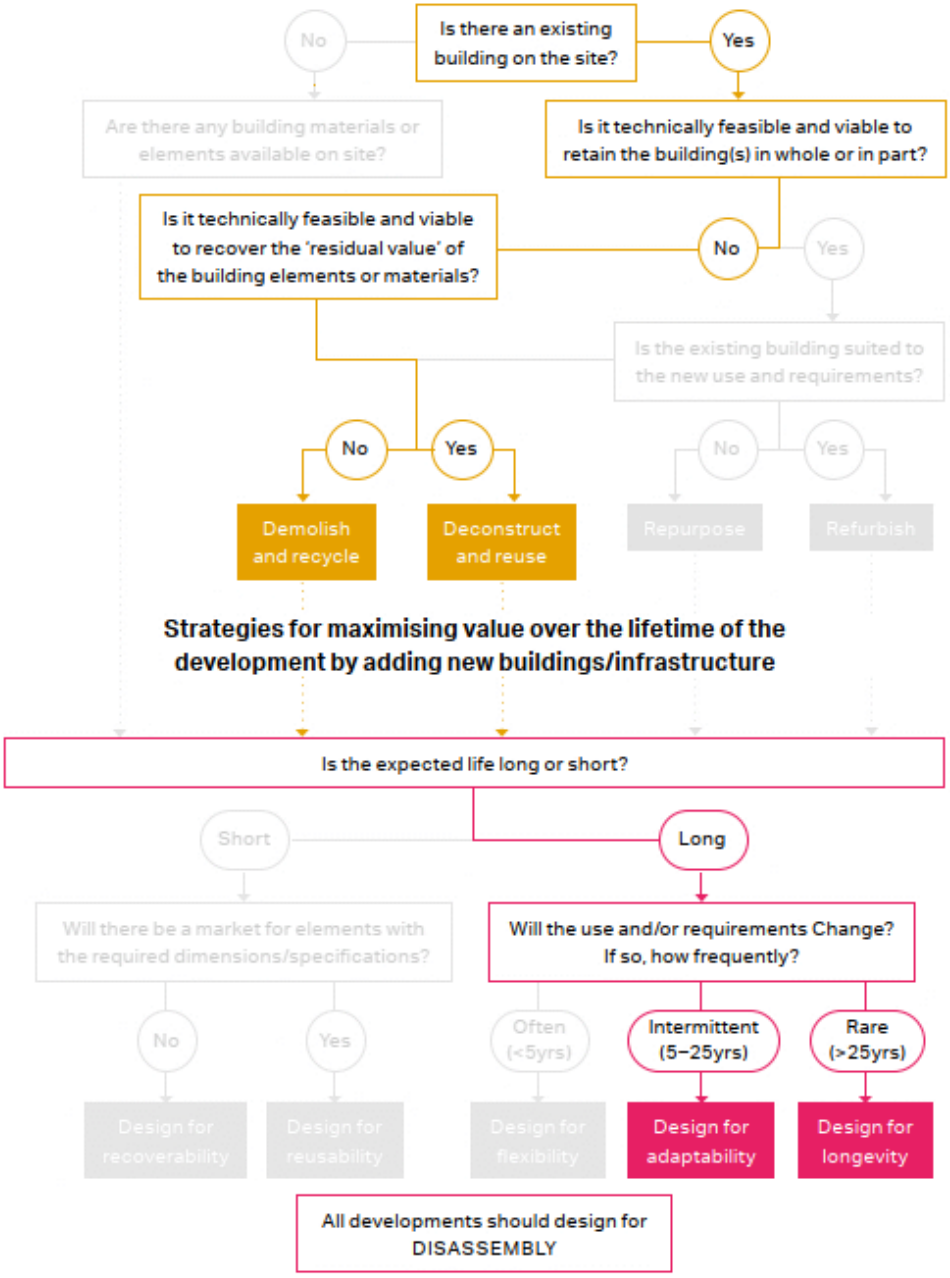
1.5.2 The workshop structure provided all attendees with an overview of the Circular Economy principles, allowing them to agree on a strategic approach and identify opportunities and key actions. Information provided and agreed during the workshop has been used to populate Tables 2 and 3 and the reporting forms presented in Section 3 of the GLA's Circular Economy Statement Guidance Pre-Consultation Draft (Ref. 2). Key actions for the structural and architectural design were provided to the design team following the workshop.

2 Strategic approach

2.1 Overview

2.1.1 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 central London context. Throughout this process the "decision tree" provided in the GLA's Circular Economy Statement Guidance Pre-Consultation Draft (Ref. 2) was used (see Figure 2-1).

Figure 2-1 Circular Economy Decision Tree for the Proposed Development



2.1.2 The existing buildings on Site have a mixture of uses and structures and are not compatible with the scale of the Proposed Development. They are of low-quality building material and the fabric has deteriorated. In addition, there is high likelihood that the buildings are contaminated with asbestos which needs to be removed prior to the demolition (Ref. 6). The Site has been specifically chosen due to the buildings being at the end of their life. There is, for example, a 150-year-old boiler house (see Figure 2-2 below) which it would not be economical or practicable to refurbish to meet the requirements of the Proposed Development. Therefore, it is not feasible to repurpose or refurbish them. However, a Pre-Demolition Audit of the existing buildings will be undertaken and opportunities to reclaim or recycle components and materials will be taken, wherever possible.

Figure 2-2 Existing Boiler House on St Pancras Hospital Site

2.1.3 Key strategic Circular Economy principles for the Proposed Development which are explored throughout this document include the aspects set out in Table 2-1.

Table 2-1 Circular Economy Strategic Approach

Aspect	Phase / Building/ Area	Steering approach	Explanation	Supporting Analysis
Circular Economy approach for the new development	Sub-structure	Optimisation of the grid	Minimise the used material and explore the possibilities of creating an adaptable building structure	05B Structural Grid
	Superstructure	Optimisation of the grid		
	Space	Adaptability / Flexibility	Scenario Modelling	Stage 2 Report Appendix A- Supporting Documents
	Construction waste	Minimise construction waste	Investigating possibilities for offsite pre-manufacture to avoid waste	Stage 2 Report Appendix A- Supporting Documents
	Excavation waste	Minimise excavation waste	Eliminating the need for a full-basement and raise of the level of the ground floor	Derived from cost plan
Circular Economy approach for municipal waste during operation	All areas	Effective segregation of materials	Segregation of six key materials (plastic, metal, cardboard, paper, glass, food) and hazardous waste (Infectious, pharmaceutical, sharps)	Operational Recycling and Waste Management Strategy

2.1.4 The following sections of this report outline the Circular Economy opportunities available within the constraints of the Site and identify the activities and design features that may be developed in line with this strategic approach for the Proposed Development.

3 Circular Economy opportunities

3.1 Addressing the nine Circular Economy principles

3.1.1 The following sections detail the Circular Economy opportunities identified for the Proposed Development, as explored through the application of the following nine Circular Economy principles:

- Minimising the quantities of materials used;
- Minimising the quantities of other resources used;
- Specifying and sourcing materials 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.

3.1.2 Table 3-1 summarises the proposed Circular Economy response to each of the nine Circular Economy principles (arranged by row) and considers each layer of the building (arranged by column) to which these apply. More details about the information contained in Table 3-1 is summarised in the following sections.

Minimise the quantities of materials used

3.1.3 A Pre-Demolition Audit of the existing buildings will be undertaken as part of the BREEAM Assessment, to identify the opportunities to reclaim and recycle components and materials. The Pre-Demolition audit will be undertaken as soon as access to the Site can be arranged; this is complex due to the nature of the site as a working hospital and access constraints associated with the Covid-19 pandemic. An initial desk-based analysis of the potential opportunities for reclamation has been undertaken and it is noted that there are some Victorian buildings with London Stock bricks set in lime mortar and roof slates that could be reclaimed. As part of the Pre-Demolition Audit, it will be considered whether there is adequate space on Site for the storage of the salvaged material or if not, a plan for taking the material off Site will be determined. Architectural salvaging will be considered for high value items such as old radiators that can be removed and resold without downcycling.

3.1.4 The total floor area of the proposed building has been reduced by 20% through rationalisation of the spatial requirements in the Brief, based on discussions with the future occupants including MEH and UCL IoO. For example, the area of a typical consulting room which is usually 16 sq m was

reduced to 5.5 sq m. The gross allowance per functional unit has reduced from 50 sq m to less than 40 sq m.

3.1.5 Off-site prefabrication of different elements is being considered in order to minimise the waste arising during the construction and therefore minimise the quantities of the material used. The elements that are being considered for prefabrication include: demountable / relocatable partition walls, plant rooms and plant skids, toilet pods, stairs and the walkways in the atrium.

3.1.6 A study was carried out to identify the optimal structural grid to minimise the amount of material required, while still following the principles of an adaptable building. In this exercise, various grid spans and columns sections were explored. The selected structural grid (7.2m x 7.5m) was chosen due to the reduction of the required material and the flexibility it provides in the planning of different departments.

Minimise the quantities of other resources used

3.1.7 A greater efficiency of land use will be achieved over the existing buildings, maximising the available spatial opportunities on Site and helping to optimise the use of London's limited available land. The internal and external environment will be enhanced to provide views out, good daylighting levels, an attractive streetscape and access to common areas. All these features should support the Proposed Development's appeal to the future occupiers (visitors, patients and staff) and promote its longevity.

3.1.8 Water-efficient sanitary fittings will be used, which include low flush toilets, showers and wash hand basins, as required by BREEAM. In addition, water meters will be proposed to help prevent water wastage. The water meters will be connected to the Building Management System (BMS) to provide visibility of the consumption in order to make changes to minimise usage. Additionally, water leak detection and flow control devices will be provided, which will shut off the supply to the WCs when they are not in use and provide a monitoring system to alert if there is a major leak to further reduce water wastage.

3.1.9 The Proposed Development will also be designed to address efficient use of energy. Operational energy demands will be minimised in line with the new draft London Plan requirements (Ref. 1), through the use of efficient fabric and services, the use of ground source heat pumps and photovoltaic panels.

Specify and source materials and other resources responsibly and sustainably

3.1.10 The design of the Proposed Development aims to utilise ground granulated blast-furnace slag (GGBS) cement replacements to reduce the embodied carbon of concrete elements. A minimum of 35% GGBS for in-situ concrete will be used and the possibilities of higher percentages of GGBS will be investigated as part of the design development process. Opportunities to use recycled aggregates either from the demolition or from off-site sources will also be considered.

3.1.11 The design team will check on the sustainability characteristics of materials being specified throughout the detailed design stage. As set out in the

Sustainable Procurement Plan, that has been prepared as part of the BREEAM pre-assessment, the main targets for the responsible sourcing of materials are as follows:

- Prioritising materials from suppliers that have responsible sourcing credentials such as BES 6001 and ISO 14001;
- Prioritising the specification of products with either of the following responsible certification schemes:
  - BES 6001;
  - Sustainable Constructional Steel Scheme (CARES);
  - Concrete Sustainability Council (CSC);
  - Eco Reinforcement Responsible Sourcing Standard, Steel Products for the Reinforcement of Concrete,
- All timber and timber-based products to be legally harvested and traded timber as per the UK Government's Timber Procurement Policy (TPP);
- At least 80% of the timber used on Site to be procured from FSC or PEFC certified sources;
- Prioritising the specification of reused or recycled materials;
- Prioritise the specification of products with environmental product declarations (EPDs);
- Use of UCL Carbon Management Plan (Ref. 7Ref. 7) to lower carbon emissions;
- Source major materials from local suppliers especially for bricks, concrete and aggregate use;
- The Principal Contractor will employ a local workforce and provide apprenticeships as part of the project.

3.1.12 The design team will review the sustainability characteristics of materials being specified during the project.

Design for longevity, adaptability or flexibility and reusability or recoverability

3.1.13 Scenario modelling is a useful way to test whether the design of the Proposed Development can be used to service different functions. Figure 3-1 illustrates the scenario modelling that has been undertaken to explore the division of the floor plate for additional functions (residential, hotel, office). This system provides a robust approach to allow spatial usage for either open plan office layouts or cellularisation.

Figure 3-1 Scenario Modelling, Oriel to Hotel (left) and Office (right)

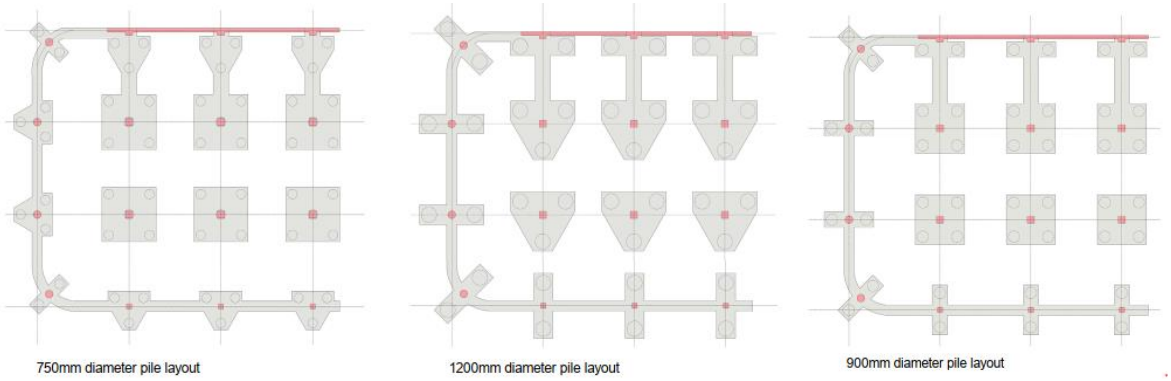
3.1.14 There is the intention to implement a modular demountable / relocatable partitioning system for approximately 20% of the floorplate of the proposed building. This would provide the option of partitions that can be repositioned or extended without creating construction dust or material waste.

3.1.15 The design team has conducted an exercise to explore a range of different grid sizes to ascertain which grid dimension is optimal for the variety of uses within the Proposed Development, both now and in the future.

3.1.16 One of the principles of the façade design is that the solid and transparent elements are interchangeable, so the façade could flex depending on the use in the space. For example, louvres for on-floor plant rooms could be exchanged for glazed elements if the space becomes an occupied area.

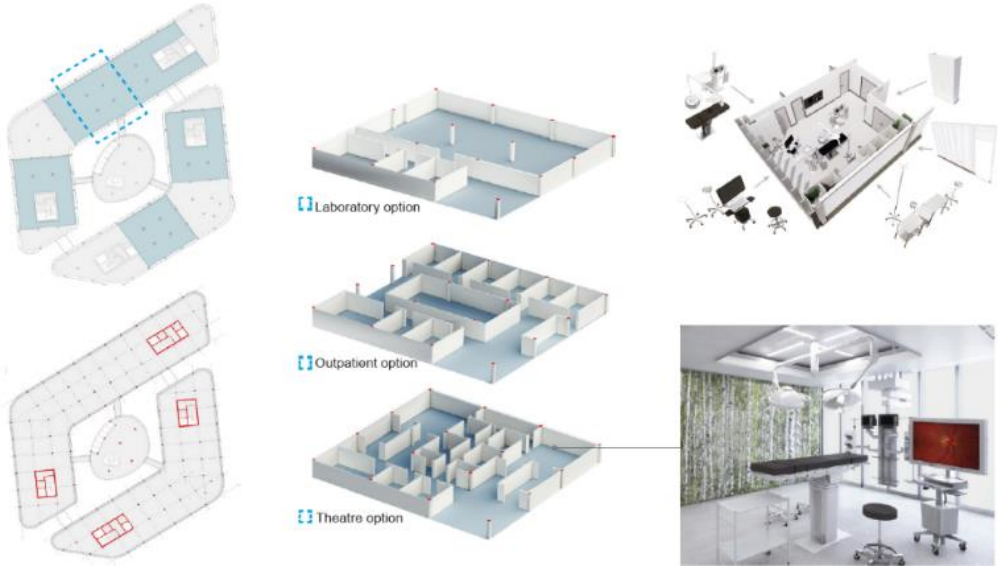
3.1.17 The study included the investigation of different substructure systems with a range of retaining walls and piles layout (Figure 3-2), different structural grid spans (6.6m x 7.5m, 7.2m x 7.5m, 9.9m x 7.5m) and columns section shape and dimensioning.

Figure 3-2 Comparative study for different substructure systems



3.1.18 The 7.2m x 7.5m grid was selected due to the flexibility that it provides in planning the surgical department and the outpatients' department as well as the creation of more waiting space. This flexibility was demonstrated with a range of different test-to-fit layouts during early Stage 2. Additionally, it enables two sets of theatres to be accommodated on either side of the corridor. Figure 3-3 illustrates the outputs from the study that was undertaken to determine how the grids and floor plates can be adapted to different uses.

Figure 3-3 Scenario modelling for different uses (Laboratory, Outpatient option, Theatre option)



3.1.19 The model may further support the adaptable aspirations of the Proposed Development through flexibility of specification; with redevelopment of the 'soft core' of the building less constrained. The design team has considered the potential for the building to be extended in the future. The proposed extension strategies considered are as follows:

- The potential to accommodate a vertical extension for different building uses (i.e. residential) that have less plant-room requirements.
- Parts of the atrium could be infilled if required at a future time, with additional floors added at various level.

Design out construction, demolition, excavation and municipal waste arising

3.1.20 As noted above, the use of Design for Manufacture and Assembly (DfMA) is being fully explored as part of the design to reduce waste in the production and construction of the building. Modular elements will be prioritised such as the central core which could be pre-fabricated and assembled on Site on a floor-by-floor basis.

3.1.21 Prefabricated demountable partitioning walls with integrated pre-pressurised services will be considered. These systems will reduce the volume of waste associated with on-site installation and can also be repositioned or extended without creating waste. Other prefabricated elements that are being considered are the plant rooms and plant skids, which can include boiler room, chilled water pump room, domestic water services plant rooms, packaged generator, etc. (Figure 3-4). Additionally, there is the intention to use prefabricated toilet pods and modular risers. The opportunity to use off-site construction for the steel walkways in the atrium will be explored with the Principal Contractor when they are appointed.

Figure 3-4 Prefabricated plant rooms

Manage demolition waste

3.1.22 As previously detailed, a Pre-Demolition Audit will be produced to identify opportunities for reuse, recycling and recovery materials and components from the existing buildings. The recycling targets are shown in the Recycling and Waste reporting form (Table 3-3). In practice this will aim to maximise materials recovery, in particularly high value materials including London Stock bricks set in lime mortar, roof slates, and old radiators.

3.1.23 Elements such as concrete and cement mortar brick could be crushed and used for the substructure or temporary works either on or off Site. As a first step adequate space on site for the storage of the salvaged material needs to be identified, otherwise a plan for taking the material off site should be determined. There is also the potential to remove and resell the old radiators without downcycling. However, there may be not much opportunity to reclaim components or materials from the existing buildings due to the presence of asbestos in many elements of the existing buildings.

3.1.24 In collaboration with the demolition contractors, it is intended that, in line with the new draft London Plan (Ref. 1) policy, 95% of non-hazardous waste is diverted from landfill.

Manage excavation waste

3.1.25 The excavation works associated with the proposed building have been significantly reduced by eliminating the need for a full basement beneath the building with only a semi-basement required and by slightly raising the level of the building, through making use of the Site topography.

3.1.26 A minimum of 95% of excavation waste generated from the Proposed Development will be diverted from landfill for beneficial use in line with the draft new London Plan (Ref. 1), Policy SI 7 ‘Reducing waste and supporting the circular economy’.

Manage construction waste

3.1.27 As outlined above, the aim would be to reduce construction waste arising through off-site construction and good site management practices.

3.1.28 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 the draft new London Plan, Policy SI 7 ‘Reducing waste and supporting the circular economy.’

Manage municipal waste

3.1.29 An Operational Recycling & Waste Management Strategy has been prepared for the Proposed Development and is submitted with the planning application. The estimated recycling and waste arisings are based on Moorfields Eye Hospital and UCL IoO’s existing waste production output and current and predicted occupancy numbers, which include the accommodation of commercial/café uses. The arisings for the weekly, twice weekly and daily collection of recycling and waste are provided in the Operational Recycling & Waste Management Strategy. The recycling levels will exceed the municipal waste recycling target of 65% by 2030, in line with the draft new London Plan (Ref. 1), Policy SI 7 ‘Reducing waste and supporting the circular economy’.

3.1.30 Refer to the Operational Recycling & Waste Management Strategy for further details.

Key Circular Economy Commitments

3.1.31 Table 3-1 shows the key Circular Economy commitments.

Table 3-1 Key Circular Economy Commitments

	Site	Substructure	Super-structure	Shell/Skin	Services	Space	Stuff	Construction Stuff	Summary	Challenges	Counter-Actions + Who + When	Plan to prove and quantify
CONSERVE RESOURCES												
Minimising the quantities of materials used	• Pre-demolition audit to be produced; • Potential to reclaim resources, such as bricks, roof slates.		• Optimising grid and frame to reduce overall weight	• Unitised façade system	• Offsite prefabrication of building services	• Offsite manufacture of walkways; • Pre-fabricated, modular, partition wall systems; • Reduction of the areas that require suspended ceilings.		-	Investigation into off-site Construction of certain elements	Relative cost, availability and access for installing off-site, modular components to be considered	Investigate further at next design stage	Resolve at next design stage
		• The total floor area of the building has been reduced by 20% by rationalising the brief										
Minimising the quantities of other resources used (energy, water, land)		• Design provides efficient use of land and space available on site • Energy strategy reduces operational energy use			• water-efficient sanitary fittings; • water meters; • Water leak detection; • Use of solar photovoltaics.		-		Water and Energy strategy Efficiency	No challenges	No counteractions required	Energy and Sustainability Statement
Specifying and sourcing materials responsibly and sustainably	• Sustainable Procurement Plan to be implemented	• Consideration of using aggregates either from the demolition or from off-site	• use of at least 35% GGBS as cement replacement				-	-	Investigation of recycled aggregates and cement replacement		Investigate further at next design stage	Resolve at next design stage
DESIGN TO ELIMINATE WASTE (AND FOR EASE OF MAINTENANCE)												
Design for reusability / recoverability / longevity / adaptability / flexibility			• Scenario modelling to demonstrate adaptability of design (e.g. hotel or office)	• Adaptable cladding system with interchangeable solid and transparent elements		• Flexible floorplates to allow different uses; • Consideration of using demountable / relocatable partitioning.			Adaptable grid, scenario modelling, demountable partitions	Cost implications of relocatable partitions	Investigate further at next design stage	Resolve at next design stage

Oriel
Circular Economy Statement

	Site	Substructure	Super-structure	Shell/Skin	Services	Space	Stuff	Construction Stuff	Summary	Challenges	Counter-Actions + Who + When	Plan to prove and quantify
Design out construction, demolition, excavation and municipal waste arising		Reduced basement areas and building level raised to reduce excavation waste	Optimising grid and frame to reduce overall weight	• Modular, offsite manufacture of facade	• Pre-fabricated plant rooms and plant skids • Offsite prefabrication of bathroom pods	• Consideration of using prefabricated demountable partitioning			Investigation into offsite construction for elements of the building	Relative cost, availability and access for installing off-site, modular components to be considered	Investigate further at next design stage	Resolve at next design stage
MANAGE WASTE												
Demolition waste (how waste from demolition of the layers will be managed)	• Pre-demolition audit to be produced	N/A						-	Aiming 95% of non-hazardous waste to be diverted from landfill	Possibility of asbestos contamination	Asbestos survey to be completed alongside Pre-demolition - audit	Pre-demolition audit to be completed
Excavation waste (how waste from excavation will be managed)	• Reduced use of sheet piles where possible	N/A										Cut and fill exercise
Construction waste (how waste arising from construction of the layers will be reused or recycled)	• Off-site construction and good practice site waste management						N/A		Reduce site waste arising	Depends on construction method	Potential to incentivise contractor to reduce waste	To be resolved at the next design stage
Municipal waste (how the building will be designed to support operational waste management)	• Segregation of six materials, hazardous waste, residual compactor and compactor pod											

3.2 Reporting forms

3.2.1 Table 3-2 shows the Bill of Materials based on the current stage of the design, and Table 3-3 summarises the Recycling and Waste Reporting.

Table 3-2 Bill of Materials

Layer	Element	Material quantity (tonnes)	Material intensity (kg/ sq m GIA)	Recycled content (% by value)	*Reused content (% by value)*	*Estimated reusable materials (kg/ sq m)*	*Estimated recyclable materials (kg/ sq m)*	Source of information
Structure	*Foundation and ground floor*	21,936*	472	*Target 20% recycled content by value*				Derived from cost plan
	Upper floor	31,893**	686					
	Roof	2,320***	50					

** Based on the total volume of the concrete foundations: 9,455 metres cubed. Derived from the Main Structural Model, dated 19.08.20)*

***Based on the total volume of the concrete floor slabs: 13,747 metres cubed. Derived from the Main Structural Model, dated 19.08.20)*

****Based on the total volume of the concrete roof: 1,562 metres cubed. Derived from the Main Structural Model, dated 19.08.20)*

Table 3-3 Recycling and Waste Reporting

Category	Total estimate	Of which…			Source of information
	t/sq m GIA	% reused or recycled onsite	% reused or recycled offsite	% to landfill / not reused or recycled	
Excavation waste	2.66	0%	95%	Max. 5%	• The excavation waste is calculated based on the volume of excavation waste (62,000m^3) from the Stage 2 Cost Plan and assumed density of 2000kg/m^3. It is assumed the soil is London Clay.
Demolition waste	1.34	To be confirmed through Pre-Demolition Audit	95%	Max. 5%	• The demolition waste is calculated based on the volume of demolition waste (44,000m^3) and assumed density of 1415kg/m^3 • The assumed density is based on the following calculation: Density of the demolition waste= 0.5*(density of brick)+0.4*(density of wood)+ 0.1*(density of roof tile)= 0.5*2,000+ 0.4*500+ 0.1*2,150
Construction waste	0.19	0%	95%	Max. 5%	• The construction waste is calculated based on average tonnes per 100 sq m from WRAP and assigned to each function as follows: - Healthcare (37% of GIA): 0.12 t/sq m - Education (4% of GIA): 0.23 t/sq m - Commercial Office (59% of GIA): 0.23 t/sq m
	t/annum	% reused, recycled or composted, on or off site		% to landfill / not reused or recycled	
Municipal waste	1,438	*65%*		Max. 35% and no recyclable or compostable waste	• Operational Recycling & Waste Management Strategy, submitted with the planning application.

The GLA guidance asks for written evidence that the destination landfill(s) have the capacity to receive waste. The project team will ensure that the demolition contractor and principal contractor provide this information once they are appointed.

3.3 Plans for implementation

3.3.1 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. However, in addition, at detailed design stage a 'Disassembly Manual' will be developed that provides 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.

3.4 End-of-life strategy

3.4.1 The proposed 'Deconstruction Manual', produced at the detailed design stage, will address techniques for prolonging the life of the building and reducing operational construction and demolition waste, as well as laying out an 'end-of-life' strategy, recognising that this may be defined differently for different components or layers of the building.

3.4.2 The intention is for consultants and project team members from different disciplines to propose key considerations when modifying or disassembling the building. For example, consideration will be given to developing connections that are easy to disassemble and selecting products that have considered design for disassembly.

4 Conclusion

4.1.1 Circular Economy commitments for the Proposed Development have been developed through a collaborative, cross-disciplinary approach. The interventions proposed address Moorfields Eye Hospital and UCL IoO's desire to embed sustainable practice, waste reduction and Circular Economy principles within the built environment and throughout their organisational activities.

4.1.2 This Detailed 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 throughout the lifecycle of the Proposed Development.

5 References

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