GOSH CCC
Circular Economy Statement

20/05/2022

GOSHCCC-BDP-ZZ-ZZ-RP-A-2000-0044

Rev: P03

NHS
Great Ormond Street Hospital for Children
NHS Foundation Trust

BDP.

A.1.1 Document History

Revision	Date	Author	Checked by	Description of Change
P01	04/02/22	JM	PG	First draft for comment
P02	25/03/22	JM	PG	Second draft for comment
P03	13/05/22	JM	PG	Issue for Planning

Executive Summary

This document sets out the Circular Economy Strategy for the proposed Great Ormond Street Hospital Children's Cancer Centre (GOSHCCC) development, meeting the relevant planning policy SI 7 Reducing waste and supporting the circular economy of the London Plan within the context of the constraints applicable at the site.

Strategic Approach

This project is necessitated by the requirement for a world leading specialist care hospital. As the existing building on the site is not fit for purpose and cannot be adapted to house the briefed functionality, the existing building is to be demolished and a new build hospital is proposed (connections into adjacent GOSH buildings is provided, driving space efficiency). Detailed reasoning is set out in a Demolition Feasibility Report submitted as part of this application, as well in this document (section 2, page 7). The three over arching strategic aims to the circular economy are:

- To re-use, recycle and redistribute as much material (resulting from demolition) as possible, retaining it in the highest possible value cycle
- To maximise longevity; the hospital building is intended to serve as a leading clinical cancer centre over many decades to come
- To provide capacity for future adaptation to suit changes in the approach to healthcare provision over time

Specific Commitments

The key commitments are:

- 95% of non-hazardous waste will be diverted from landfill
- A minimum of 95% of excavation and demolition waste generated from the Proposed Development will be diverted from landfill for beneficial use
- A minimum of 95% of construction waste generated by the Proposed Development will be diverted from landfill for reuse, recycling or recovery
- Construction waste generated <6.5t/100m^2
- Less than 10% of operational waste will be sent to landfill
- Develop a deconstruction strategy to illustrate which components might be reused, recycled or composted and how the building is envisioned to be disassembled
- Use of ground granulated blast furnace slag (GGBS) as cement replacement for the structural elements of the design. At a minimum 30% GGBS will be used on average across all elements with an aspiration of 50%
- Embodied carbon target of <600 kgCO_2e/m² (A1-A5)
- Off site prefabrication methods used where feasible and beneficial, including for facade, IPS units and MEP risers.

The GLA guidance asks for written evidence that the destination landfill(s) have the capacity to receive waste. This information will become available once the full construction plans are in place at the end of RIBA Stage 4, prior to commencement of on-site RIBA Stage 5 activities.

Overall Implementation Approach

The specific plans for short and medium-term targets are as follows:

- Ensure that the sub-contractor tender package include 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 periodic basis

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

- The demolition contractor and primary contractor to provide evidence that all commitments are addressed in as-built buildings
- The demolition contractor and primary contractor to report against all waste management targets
- The demolition contractor and primary contractor to provide written confirmation that the final destination landfills had sufficient capacity
- Great Ormond Street Hospital NHS Foundation Trust, as the Applicant, to provide a Post Completion Report to the Greater London Authority.

Contents

1 Introduction

This Circular Economy Statement has been prepared on behalf of the Applicant, Great Ormond Street Hospital for Children NHS Foundation Trust (referred to hereafter as the 'Applicant') in collaboration with the appointed design and build contractor John Sisk & Son (Holdings) Ltd (referred to hereafter as Sisk) to support an application to the London Borough of Camden (LBC) for full planning permission for the redevelopment of the Great Ormond Street Hospital (GOSH) Frontage Building and Entrance on Great Ormond Street WC1N 3JH (referred to hereafter as the 'site'), to provide a new Children's Cancer Centre (CCC).

1.1 Description of Site

The majority of the site is currently occupied by the existing GOSH Frontage Building, a five storey building (inclusive of basement) dating from the 1950s that was constructed in two separate phases. The building is currently occupied by a number of GOSH departments including Audiology Department, Clinical Research Facility (CRF), Department of Child and Adolescent Mental Health and Paediatric Psychology Department.

The western most part of the site is occupied by the main GOSH Entrance providing connections to the wider GOSH island site and by a small rear element (external staircase) of the Paul O'Gorman Building that will be demolished to facilitate the proposed development. The site is bounded by the Paul O'Gorman Building to the west, Octav Botnar Wing to the east, the Variety Club Building and Premier Inn Clinical Building to the north and Great Ormond Street to the south.

The proposed development involves the replacement of the existing Great Ormond Street Hospital Frontage Building of with an 18,288m^2 new build hospital, housing all the essential elements and functions of the GOSHCCC as well as providing a new main entrance to GOSH, illustrated below.

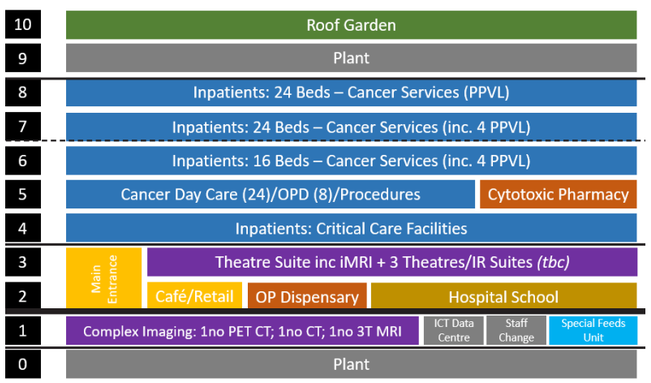

Figure 1. Functions in the proposed development

1.2 Method Statement

Circular Economy was a key focus of several sustainability workshops held over the course of RIBA 2 and 3 - both internal design team meetings and the wider project team including the client, contractor and design team. These workshops, aided by the Regenerate Tool have helped identify the high level strategic approach and design approaches to support the implementation of the key commitments.

The bill of materials has been developed using life cycle analysis software One Click LCA. The quantities of materials were extracted from a combination of the mid RIBA Stage 3 Cost Plan and architectural drawings. This exercise has been carried out in alignment with the GLA's Whole Life Carbon Assessment.

A pre-demolition audit has been undertaken to determine the existing materials onsite and the optimal end of life scenarios.

Targets and circular economy approaches for the project have been informed by the NHS Net Zero Carbon Client Brief, The NHS Sustainability Plan 2017-2022, Structural Engineering Eurocodes and the requirements in BREEAM New Construction 2018.

Table 1. Project Team

Applicant	Great Ormond Street Hospital NHS Foundation Trust
Tenants	Great Ormond Street Hospital NHS Foundation Trust
Project Management	Sisk
Architect	BDP
Structural engineer	BDP
MEP engineer	BDP
Acoustics	BDP
Sustainability	BDP
Cost consultant	McBains
Ecology consultant	ADAS
Transport Consultant	RSK
Planning Consultant	Turley
Contractor	Sisk

1.3 Circular Economy Aspirations

A Circular Economy is defined in the London Plan (Policy SI 7 Reducing waste and supporting the Circular Economy) as one where materials are retained in use at their highest value for as long as possible and are then reused or recycled, leaving a minimum of residual waste. Circular Economy Statements are intended to demonstrate how a development, including any public realm and supporting infrastructure, will incorporate Circular Economy measures into all aspects of the design, construction and operation process. This will help to ensure that developments:

- Consider strategies to facilitate the transition towards a circular built environment
- Report against numerical targets that will facilitate monitoring of waste and recycling
- Recognise opportunities to benefit from greater efficiencies that can help to save resources, materials and money

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 Draft for Consultation. This Circular Economy Statement sets out the aspirations and intentions concerning the responsible sourcing and environmental impact of construction products. The approach to resource efficiency will minimise whole-life cycle impacts by promoting reuse opportunities of existing materials on site, designing out waste arising from the proposed development at the end-of-life stage, and integrating principles to enable future disassembly and adaptability.

The project is proposed to target a BREEAM 'Excellent' rating using the BREEAM New Construction 2018 scheme, which represents high standards in environmental, social and economic sustainability performance

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).

2 Circular Economy Goals and Strategic Approach

2.1 Strategic Approach

High level strategic opportunities have been 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. Throughout this process the "decision tree" provided in the GLA's Circular Economy Statement Guidance Draft for Consultation was used (Figure 1).

Following the principles in the decision making tree the strategic approach to the circular economy of the new development will be addressed through the principles of Material Recovery, Design for Longevity and Design for Adaptability.

2.1.1 Design for Longevity

As a premium new hospital facility providing vital children's cancer services within a wider hospital estate, the building is not expected to change its fundamental use over the coming decades. Accordingly, a flat slab concrete structure has been adopted, which provides structural stability over many years.

2.1.2 Design for Adaptability

Although the fundamental clinical use is not expected to change, offering adaptability is a key consideration to enable internal re-configuration in the future, supporting any changes in the approach to healthcare provision over time. Adaptability is also highlighted as a key requirement in the client brief.

2.1.3 Material Recovery

The site is occupied by a mid century building known as The Frontage Building that is principally used for outpatient clinics. As outlined on the next page, the existing building on the site is not fit for purpose and cannot be adapted to house the briefed functionality.

Therefore, the existing building is to be demolished and a new build hospital is proposed. However given the age and construction of the existing building, the deconstruct and reuse option is not deemed viable. A pre-demolition audit has been undertaken to inform opportunities for material recovery, recycling and avoiding landfill waste.

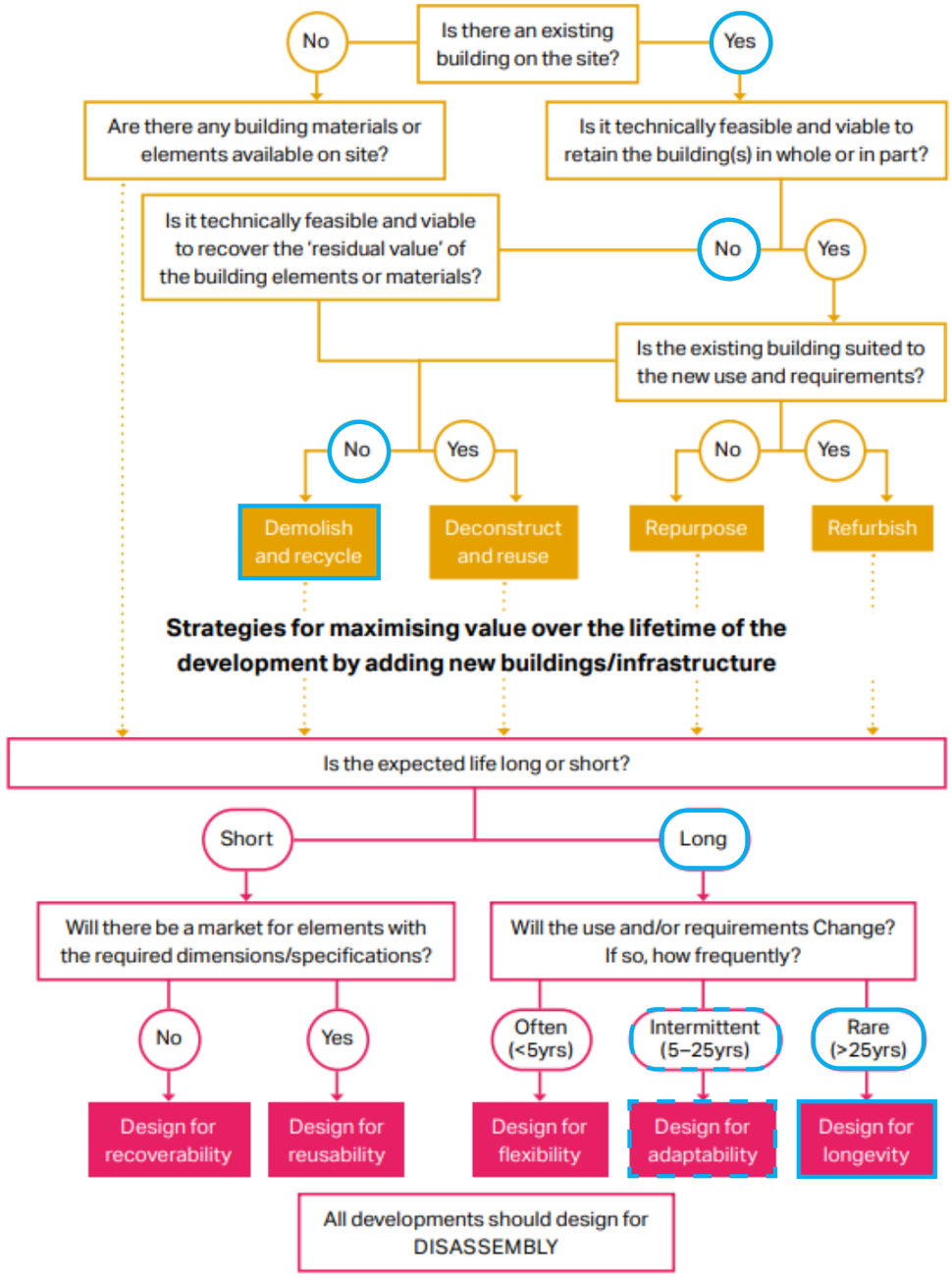

Figure 2. GLA Circular Economy Decision Tree - the blue outlines show the decision pathway

Reasons for Demolition

- The current building provides significantly less space than required for the proposed Cancer Centre over only 6 floors. Additional and extended floor levels would be required to meet the briefed area requirements.
- Columns would require significant strengthening to support additional floor levels.
- The creation of new basement levels below the existing building represents complex engineering.
- The building's current use (outpatient clinics/non acute care inpatients) means that the existing structure is incompatible with briefed functions that impose heavy loads or have strict vibration criteria (theatres/Imaging facility).
- A relatively tight existing structural grid provides layout and future flexibility constraint.
- Spatial constraints limit the area efficiency of services distribution strategies.
- The existing building envelope would require significant upgrade/ replacement to meet sustainability targets.
- New protected cores required to facilitate an acceptable fire strategy.
- Misalignment of existing building levels requiring significant removal and reconfiguration to ensure accessibility from the street and links to adjacent hospital buildings.

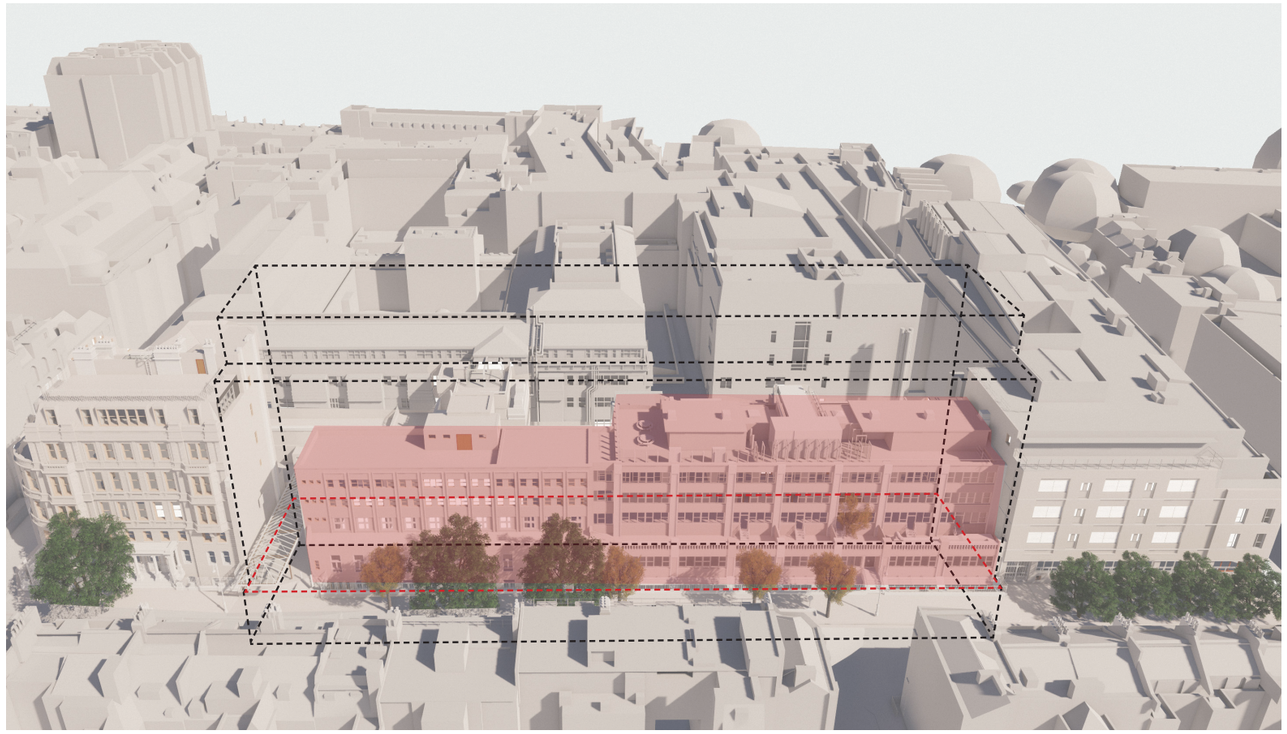

Figure 3. Comparison of existing Frontage building footprint against GOSHCCC design proposals

The existing Frontage Building provides 5,806m^2 of principally outpatient clinic space. The existing main entrance footprint (space between Frontage and Paul O'Gorman buildings) equates to 157m^2.
Proposals for Phase 4 (Frontage Building site) seek to provide 18,288m^2 of accommodation for the Children's Cancer Centre including a new Main Entrance to the Hospital.
This represents an increase of 12,325m^2 on the (inclusive of existing main entrance footprint) (circa 67% uplift)

Table 2. Circular Economy Approach

ASPECT	PHASE / BUILDING / AREA	STEERING APPROACH	EXPLANATION	TARGET	SUPPORTING ANALYSIS / STUDIES / SURVEYS / AUDITS
Circular economy approach for the new development	Structural Elements	Increasing recycled content	Concrete elements will target high levels of GGBS Structural steel will target high recycled content	Minimum 30% GGBS with aspiration for 50% Embodied carbon <600 $kgCO_2e/m^2$	
	All Elements	Designing out waste	Providing maximum functionality with least material consumption through the rationalisation and optimisation of structural solution	Embodied carbon <600 $kgCO_2e/m^2$	GLA Whole Life Carbon Assessment BREEAM Mat 01
	All Elements	Materials selection	Selecting low impact regenerative materials and high recycled content		
	All Elements	Design for Disassembly	The project will design elements for disassembly at end of life so the materials and be retained in as high value cycles as possible	TBC	
	All Elements	Reducing construction impacts	Construction waste will be reduced through careful design and construction management, including DfMA Engagement with supply chain, material and packaging take-back schemes	<6.5t/100m^2 of construction waste generated A minimum of 95% of construction waste generated from the proposed development will be diverted from landfill	BREEAM NC 2018
Circular economy approach for the existing site	Demolition	Optimise material value	A pre demolition audit identifies and quantifies the amount of waste from the existing site. Optimised end of life cycles will be identified for materials following the waste hierarchy	A minimum of 95% of excavation and demolition waste generated from the proposed development will be diverted from landfill	Pre-demolition audit
Circular economy approach for municipal waste during operation	All Areas	Segregation of municipal waste	Separate storage and collection of recyclable materials, including residual waste, mixed recyclable, organics, paper/card and glass	<10% of operational waste to landfill	NHS Sustainability Plan 2017-22

3 Circular Economy Commitments

3.1 Circular Economy Narrative

The following sections detail the Circular Economy opportunities identified for the proposed development. These are explored through the application of the following nine Circular Economy principles as outlined in the GLA's Circular Economy Statement Guidance Draft for Consultation:

- 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
- Manage municipal waste

The various strategies are summarised in Table 2.

3.1.1 Minimising the quantities of materials used

The sub and super structure has been optimised for structural efficiency, providing maximum clinical functionality within the constrained space:

- The new structure is designed to be an independent building, with no reliance on support from adjacent buildings to minimise demolition and strengthening works (and associated material quantities
- Building basement/foundations offset from adjacent buildings to ensure no impact on adjacent buildings (preventing settlement and damage to existing structures)
- Vertical support aligned with basement and efficient cantilevers employed around the columns to maximise the floorplan and make full use of the site
- Concrete frame has inherent durability and fire protection - treatments and finishes kept to a minimum
- The prefabrication of various elements as noted in section 3.1.5 also reduces the overall consumption of raw materials.

3.1.2 Minimising the quantities of other resources used

The design proposals offer highly efficient thermal envelope and building services systems, reducing the amount of energy consumed by the building over its lifetime. Please refer to the Energy Statement (GOSHCCC-BDP-ZZ-ZZ-RP-A-2000-0041) for further details of the energy strategy and systems.

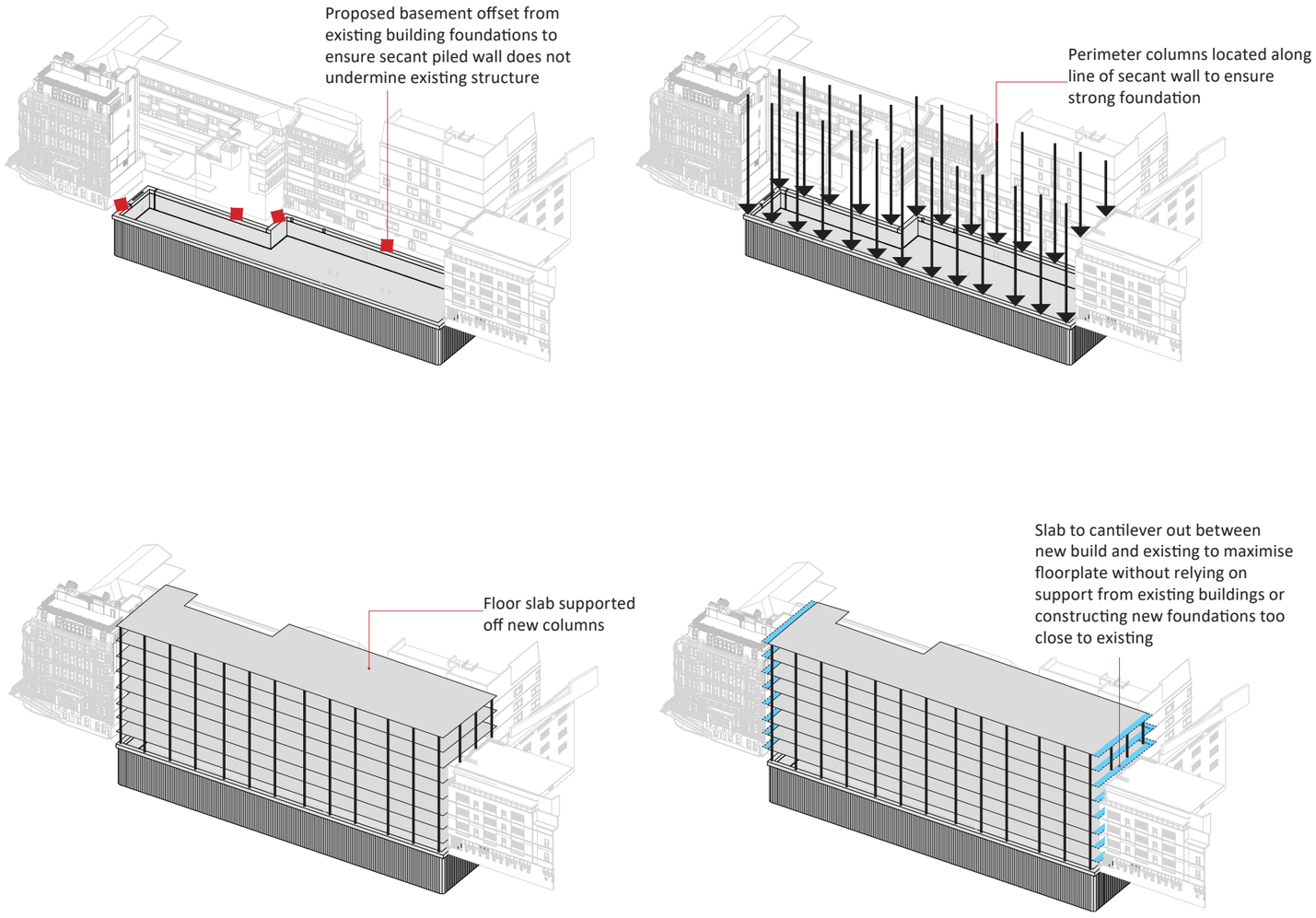

Figure 4. Structural solution for the GOSHCCC

Operational water consumption will be minimised through the use of efficient fixtures and fittings. Rainwater/greywater harvesting is not feasible due to infection control requirements.

3.13 Specifying and sourcing materials responsibly and sustainably

The sub and superstructure materials have the most significant impact and therefor need to be optimised from a sustainable sourcing perspective.

Multiple structural options were explored:
- Concrete flat slab: selected option for construction simplicity, relatively lower embodied carbon and its offer of longevity and adaptability
- Concrete and steel frame, using slimfloor beams: discounted on basis of extra materials required, structural inefficiency and relatively higher embodied carbon
- Mass timber frame with slimfloor beams: discounted on basis of strict vibration requirements of a hospital

For the concrete elements, the highest possible GGBS content will be specified. A minimum target of 30% GGBS has been set with an ambition for 50%. For the structural steel components the highest possible recycled content will used. As with the GGBS replacement, cost and availability may prove prohibitive.

All building materials are to be evaluated and selected for range of sustainability criteria, including health, embodied carbon, responsible sourcing, recycled content and ease of end of life recovery. Two credits are targeted under BREEAM 2018 Mat 03 Responsible Sourcing. Any timber products (this would be for interior design components) will be sourced from sustainable sources, ensuring that the impact of construction is regenerative, allowing for the inclusion of sequestered carbon in the whole life carbon calculations. Only FSC/PEFC certified timber will be used.

3.1.4 Design for longevity, adaptability or flexibility and reusability or recoverability

As outlined in section 2 above, the key principles relevant for the project are Designing for longevity and adaptability. The design proposals have been informed by these principles as follows:
- Concrete flat slab structure is inherently durable and long-lasting
- Structural grid allows for change of use/room layout and movement of partitions to create different spaces without altering structure
- Floor loading accommodates partition loads across the entire floorplate allowing for easy reconfiguration of room layers
- Shear walls not positioned where they would impede access to plant for replacement
- Concrete frame has inherent durability and fire protection - treatments and finishes kept to a minimum
- Concrete flat slab can accommodate floor openings in a range of locations, allowing for relocation of rooms (WC for e.g.) or plant runs and service distribution without significant structural intervention
- Risers are regularly spaced across the floorplate, allowing localised modification
- Additional openings/risers potentially easy to form in the concrete flat slab system
- Flat soffit allows for replacement or upgrade to ceiling services without significant coordination around structure
- The GOSHCCC includes direct connections into adjacent GOSH buildings, improving efficiency of space use and responding to the need of clinical services (and consequent resource consumption reduction)

3.1.5 Design out construction, demolition, excavation and municipal waste

The use of prefabrication will reduce on site material consumption and waste, through construction of elements off-site in a controlled environment. The following are opportunities for modularity:
- Modular facade, fabricated off-site
- Expand component assemblies such as pumps and plant to have pre-wired controls for ‘plug and run’ approach
- Pre-fabricated serviced wall panels for bedrooms
- Pre-fabricated and pre-wired internal partitions
- Pre-plumbed modular sanitaryware
- Balustrades and doors

Other opportunities including containerised plantrooms, corridor modules, stairs and bathroom pods have been explored but discounted due to spatial inefficiencies and limited opportunity to scale.

Additionally, the optimised structural design will reduce the amount of construction and excavated waste generated through material efficiency.

3.1.6 Manage demolition waste

A pre-demolition audit (Appendix A) was undertaken to support a reduction in waste being generated during the strip-out and demolition phases of the project. A lack of space prohibits on-site waste management potential.

Limited opportunities to reuse building components were identified. The components identified for reuse and upcycling off-site are being explored in collaboration with the contractor’s (Sisk) supply chain. Given the age of the building and unknown component qualities (e.g. fire capacity), there may be little appetite for re-use in the wider built environment industry.

The pre-demolition audit also identifies the types of demolition waste that will be generated, allowing a plan to be put in place to reduce waste to landfill. The demolition works will include a “soft demo” phase, to allow careful dismantling and strip-out, segregating items to enable the most suitable disposal route. Prior to any demolition works, all loose furniture and equipment deemed suitable for re-use will be removed. The Trust will endeavour to channel this through existing reuse projects relating to furniture refurbishment and sharing with both staff and community through an online reuse portal. Opportunities for re-use as part of temporary site structures is also under consideration (e.g. doors).

3.1.7 Manage excavation waste

The excavation of material has been minimised through the optimisation of the substructure. Excavated materials are proposed to be used for infill in other infrastructure projects, subject to contamination levels. A lack of space prohibits on-site waste management potential.

3.1.8 Manage construction waste

A Demolition and Construction Management Plan (DCMP) including environmental impacts and a Site Waste Management Plan (SWMP) has been produced by Sisk, putting emphasis on managing waste in accordance with the waste hierarchy. On-site storage will be consolidated within the building footprint as suitable. Limited space on-site poses difficulties for bulk storage. Where waste cannot be segregated on-site, it will be segregated off-site before transfer to waste disposal facilities.

Supply chain take-back and buy back schemes will be initiated to reduce waste from temporary elements during construction, including Proplex temporary protection, Panthera EnviroHoard system and LOOP Pallet.

3.1.9 Manage municipal waste

The proposal provide internal, dedicated and appropriately labelled and segregated waste management facilities, to enable and encourage future occupants to recycle waste and manage flows effectively. Engagement with the GOSH NHS Trust has informed the design, efficiently solving existing waste and logistics issues of dealing with consumables, disposal holds, supplies, linen and uniform management.

Table 3. Circular Economy Strategies

	Site	Sub Structure	Super Structure	Skin	Services	Space	Construction	Summary	Challenges	Actions	Plans to evidence and quantify
SECTION A: CONSERVE RESOURCES											
Minimising the quantities of materials used	Structural design allows building to be standalone, avoiding impact on adjacent buildings, reducing new material needed to augment them	Number of piles rationalised as far as possible	Optimisation of the structural grid, efficient cantilever design to maximise functionality, allowing efficient use of the full area	Largely linear rectangle form optimises surface area to volume ratio balancing material use with spatial provision against thermal performance	–	–	–	Efficient design and construction approaches to support longevity and adaptability	Cost and programme implications	Design and construction team to develop detailed design	BREEAM Mat 01 Report
Minimising the quantities of other resources used (energy, water, land)	Use of dense urban site and infill, extracting maximum function from minimal land	–	–	Optimised facade for thermal performance	Water-efficient sanitary fittings The water meters and leak detection will be connected to the BMS Energy efficient fabric performance and services following the energy hierarchy	–	–	Energy strategy following the energy hierarchy	Constrained site Cost implications Infection control in clinical requirement prevents rain/ greywater harvesting	Design and construction team to develop detailed design	Energy and sustainability statement BREEAM Part L energy modelling
Specifying and sourcing materials responsibly and sustainably	–	Selection of high content GGBS. Minimum 30%, targeting 50% average across concrete elements All specifications to be evaluated against range of criteria including embodied carbon, recycled content, end of life options, toxicity, responsible sourcing						Incorporation of high recycled aggregate and cement replacement	Cost implications Availability and programme implications	Consultation with contractors, market and review of programming	Specifications when detailed at RIBA Stage 4

	Site	Sub Structure	Super Structure	Skin	Services	Space	Construction	Summary	Challenges	Actions	Plans to evidence and quantify
SECTION B: DESIGN TO ELIMINATE WASTE (AND FOR EASE OF MAINTENANCE)											
Designing for reusability / recoverability /longevity / adaptability / flexibility	–	–	Optimisation of the structural grid to accommodate multiple spaces/ uses Concrete flat slab structural option provides longevity, ensuring demolition and re-build is not required for many decades Mechanical fixings to allow for disassembly and adaptability	Facade designed for longevity - minimal replacement cycles. Mechanical fixings to allow for disassembly and adaptability	Plant and distribution designed for access and maintenance and adaptability Suitable distribution of large lifts shafts and risers allow for different space uses. Mechanical fixings to allow for disassembly and adaptability Ceiling distributed services will allow for reconfiguration of space and function without additional construction works requiring resource use	Ability to move partitions across floorplate and reconfigure space/ function in the future without resource intensive works Internal ceiling finishes designed to be demountable Plasterboard internal walls to potentially use Fermacell board - no pattressing allowing flexibility		Use of mechanical fixings and durable elements designed for disassembly. Information to support the future re-use of materials will be required for optimising end of life cycles. Structural grid and structure permits a vast range of future uses and potential adaptations	Cost implications Deconstruction action plan / strategy required to realise benefits	Design and construction team to develop detailed design	Design drawings and specifications Deconstruction strategy BREEAM Wst 06 report

	Site	Sub Structure	Super Structure	Skin	Services	Space	Construction	Summary	Challenges	Actions	Plans to evidence and quantify
Designing out construction, demolition, excavation, industrial and municipal waste arising	–	–	Use of prefabricated elements including façade, wall panels, stair systems					Off-site fabrication	Optimising the use of MMC whilst avoiding over engineering Spatial constraints, fitting in high clinical functionality in a fixed site	Design and construction team to develop detailed design, exploring modular opportunities	TBC
SECTION C: MANAGE WASTE											
Demolition waste (how waste from demolition of the layers will be managed)	Site Waste Management Plan developed in line with the waste hierarchy, aiming for a 95% by tonnage diversion from landfill Pre-demolition undertaken, identifying concrete/brick, steel and glazing panels and frames as largest waste streams, which can be down-cycled and issued to approved processing plants for recirculation. A small proportion of identified waste has been proposed for recovery reuse, these include residual fuels and oils, internal fixings and fixtures such as clinical furniture, doors and ceiling tiles. Opportunities for re-use as part of temporary site structures is also under consideration (e.g. doors). The specific elements and quality are to be determined and quantified during RIBA Stage 4 design development. Due to no viable other option, a proportion of building materials will be disposed of through landfill. Falling into this category includes asbestos containing materials present on site. Sisk supply chain engagement ongoing to ascertain logistical and deconstruction methodologies. Site waste records to be maintained throughout deconstruction period to enable tracing of all materials. Limited site processing carried out to increase the amount able to be carried in each load by reducing voyage. This will reduce the number of loads and associated emissions involved with this waste stream.							Pre-demolition audit undertaken to inform waste handling	Constrained site (space and logistics) means on site waste management is prohibitive Lack of storage space Lack of economies of scale of reusing elements such as doors Lack of appetite in industry for re-use of components	Explore opportunities for demolition/ deconstruction items to be used in industry	Ensure demolition contractor follows requirements

	Site	Sub Structure	Super Structure	Skin	Services	Space	Construction	Summary	Challenges	Actions	Plans to evidence and quantify
Excavation waste (how waste from excavation will be managed)	Structural optimisation reduces the quantity of excavated material. Sequencing of deliveries and construction to reduce contamination during stockpiling. Exported material to be processed and reused on other construction projects. Sisk to segregate all waste materials at source where feasible and limit the storage of potentially polluting materials on site as far as reasonably possible.	Existing piles are to be cropped where required. Materials are to be removed from site and processed for recycling.	–	–	–	–	–	Structural optimisation reduces the quantity of excavated material	Constrained site prevents the ability of bulk storage onsite.	Engagement with supply chain during Stage 4 design to minimise excavation waste.	Construction site waste management plan and reporting
Construction waste (how waste arising from construction of the layers will be reused or recycled)	Construction and deliveries/waste removals sequenced strategically, reducing the risk of potential damage to materials and plant and reduce vehicular movements. Limited space for storage optimised within footprint of proposed building. All waste to be segregated onsite where possible, during periods where this is not obtainable all waste is to be exported in mixed refuse collections and sorted off site for recycling processing, i.e. metal, timber and plasterboard. Modular solutions for facade and other suitable elements proposed and to be explored, offsite fabrication will reduce the quantities of waste materials, packaging and transport. Arrangements to be incorporated within sub-contractor packages for certain waste metals to be removed from site where possible. All timber pallets are to be stored appropriately onsite and collected for reuse.							Material efficiency through off site prefabrication of building elements. Control of materials on site	Optimising the use of MMC whilst avoiding over engineering Cost implications Constrained site prevents the ability of bulk storage onsite.	Include requirements in contractors contract	Construction site waste management plan and reporting
Municipal and industrial waste (how the design will support operational waste management)	Engagement with GOSH NHS Trust to ensure needs are understood, and sufficient space is provided for on-site waste segregation and storage and logistics - including consumables, linen management, clinical supply and waste, disposal holds							Segregation of operational waste Review of procurement practices	Complex clinical functions and changing requirements	Ongoing engagement with GOSH NHS Trust	Operational waste management plan ISO 14001 NHS Sustainability Plan

3.2 Bill of Materials and End of Life Strategy

Table 4. Bill of materials

Layer	Material	Mass (kg)	Material Intensity (kg/m2)	Recycled Content (%)	Service life	End of Life Scenario
Site	Soil for tree planting	12800	0.71	0	As building	Landfilling (for inert materials)
	Concrete paving	45600	2.52	Minimum 10%	As building	Crushed for aggregate
Substructure	Reinforced Concrete C40/50	7917764	436.99	0	100	Crushed for aggregate
Frame	Rebar (97% recycled steel)	621328	34.29	Minimum 97%	As building	Steel recycling
	Concrete C32/40	1003608	55.39	Minimum 40% GBBS	As building	Crushed for aggregate
	Concrete C50/60	1059624	58.48	Minimum 40% GBBS	As building	Crushed for aggregate
	Concrete C40/50	5850696	322.90	Minimum 40% GBBS	As building	Crushed for aggregate
Superstructure - Upper Floors	Concrete C32/40	14400912	794.80	Minimum 40% GBBS	As building	Crushed for aggregate
	Rebar (97% recycled steel)	1478940	81.62	Minimum 97%	As building	Steel recycling
	Steel decking	51649	2.85	0	As building	Steel recycling
	Concrete C40/50	3416127	188.54	Minimum 40% GBBS	As building	Crushed for aggregate
	Concrete C30/37 (stairs)	211200	11.66	Minimum 10% GBBS	As building	Crushed for aggregate
	Rebar (90% recycled steel, stairs)	8706	0.48	Minimum 90%	As building	Steel recycling
Substructure - Roof	Soil - green roof	474700	26.20	0	As building	Landfilling (for inert materials)
	Bitumen waterproofing layer	3144	0.17	0	20	Landfilling (for inert materials)
	Insulation - glass wool	2428	0.13	0	As building	Landfilling (for inert materials)
	Plastic membrane	78	0.00	0	30	Plastic-based material incineration
	Drainage floor underlay	202	0.01	0	As building	Plastic-based material incineration
	Plastic geotextile	173	0.01	0	10	Plastic-based material incineration
Skin - Façade	Aluminium louvres	4875	0.27	0	As building	Aluminium recycling
	Architectural precast concrete	877800	48.45	0	As building	Crushed for aggregate
	Brick	108851	6.01	0	As building	Crushed for aggregate / reused
	Insulation - rockwool	55424	3.06	0	As building	Returned to manufacturer for recycling
	Plasterboard	69695	3.85	Minimum 80%	As building	Gypsum recycling
	Precast C30/37 concrete	70680	3.90	0	As building	Crushed for aggregate
	Render	5434	0.30	0		
	Steel framing system	4209	0.23	Minimum 15%	As building	Steel recycling
	Steel stud wall	6868	0.38	Minimum 15%	As building	Steel recycling
	Weather defence barrier plasterboard	22075	1.22	Minimum 80%	40	Gypsum recycling
	Aluminium blanking spandrels	929	0.05	0	As building	Aluminium recycling
	Aluminium curtain wall system	4698	0.26	0	As building	Glass recycling
	Double glazing windows	32870	1.81	0	As building	Glass recycling

Layer	Material	Mass (kg)	Material Intensity (kg/m2)	Recycled Content (%)	Service life	End of Life Scenario
Space - Internal Partitions	Blockwork partioning - concrete	239894	13.24	0	As building	Crushed for aggregate
	Blockwork partioning - mortar	118389	6.53	0	As building	Cement/mortar use in a backfill
	Glazed partitioning	6955	0.38	0	As building	Glass recycling
	Plasterboard partioning - insulation	15620	0.86	0	As building	Landfilling (for inert materials)
	Plasterboard partioning - plasterboard	440954	24.34	Minimum 80%	As building	Gypsum recycling
	Plasterboard partitioning - steel stud	40520	2.24	Minimum 15%	As building	Steel recycling
	Water-borne paint	5852	0.32	0	15	
Space - Internal Doors	Internal wooden doors	20800	1.15	0	40	Wood-containing product incineration (80% wood)
Space - Internal Finishes	Vinyl flooring	831	0.05	0	25	Plastic-based material incineration
	Carpet flooring	3268	0.18	Minimum 10%	15	Plastic-based material incineration
	Porcelain flooring	16720	0.92	0	30	Brick/stone crushed to aggregate (for sub-base layers)
	Plasterboard ceiling	14849	0.82	Minimum 80%	40	Gypsum recycling
	Suspended tile system (metal)	53000	2.93	Minimum 15%	40	Metal recycling
	Epoxy flooring	194	0.01	0	10	Landfilling (for inert materials)
	Plasterboard ceiling	91512	5.05	Minimum 80%	As building	Gypsum recycling
	Rubber flooring	35699	1.97	0	25	Plastic-based material incineration
Services	Heat distribution system	3354	0.19		60	Metal-containing product recycling (90 % metal)
	Drinking water distribution system	4731	0.26		30	Metal-containing product recycling (90 % metal)
	Sewage water distribution system	2899	0.16		60	Metal-containing product recycling (90 % metal)
	Air conditioning system	268	0.01		25	Metal-containing product recycling (90 % metal)
	Radiators	552	0.03		25	Metal-containing product recycling (90 % metal)
	Electricity distribution system	71751	3.96		25	Metal-containing product recycling (90 % metal)
	Air handling units	1472	0.08		25	Metal-containing product recycling (90 % metal)
	Ventilation distribution system	49827	2.75		25	Metal-containing product recycling (90 % metal)
	Heat pumps	729	0.04		22	Metal-containing product recycling (90 % metal)

N.B. The table above has been compiled through inputting architectural drawings and cost plans into OneClickLCA

3.3 Waste Reporting Form

Table 5. Waste Reporting Form

CATEGORY	TOTAL ESTIMATE	OF WHICH...				SOURCE OF INFORMATION
	t/m² (GIA)	% Re-used or recycled on site	% Re-used or recycled off site	% Not re-used or recycled		
				% Landfill	% Other (i.e. EfW)	
Excavation waste	1.04	0%	100%	0%		Sisk (contractor
				0%	0%	
Demolition Waste	3.4 (based on GIA of demolished building)	0%	65%	>35%		Pre-demo audit
				<5%	>30%%	
Construction Waste	0.06	TBC	65%	>35%		Estimated from BREEAM target
				<5%	>30%	
	t/annum	% Re-used or recycled on site	% Re-used or recycled off site	% Not re-used or recycled		
				% Landfill	% Other (i.e. EfW)	
Municipal Waste	650	2% est	42%	*max 10%*		Estimated by GOSH NHS Trust based on existing monthly waste reports
				2%	58%	
Industrial Waste (if applicable)				*max 10%*		
				TBC	TBC	

3.4 Plans for Implementation

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

- Ensure that the sub-contractor tender package include 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 periodic basis

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

- The Demolition Contractor and Lead Contractor (Sisk) to provide evidence that all commitments are addressed in as-built buildings.
- The Demolition Contractor and Lead Contractor (Sisk)to report against all waste management targets.
- The Demolition Contractor and Lead Contractor (Sisk) to provide written confirmation that the final destination landfills had sufficient space
- Great Ormond Street Hospital NHS Foundation Trust, as the Applicant to provide a Post Completion Report to the Greater London Authority.

3.4 End of Life Strategy

Table 6. End of life scenarios for building components

Layer	Material	Mass (kg)	Service life	End of Life Scenario
Site	Soil for tree planting	12800	As building	Landfilling (for inert materials)
	Concrete paving	45600	As building	Crushed for aggregate
Substructure	Reinforced Concrete C40/50	7917764	100	Crushed for aggregate
Frame	Rebar (97% recycled steel)	621328	As building	Steel recycling
	Concrete C32/40	1003608	As building	Crushed for aggregate
	Concrete C50/60	1059624	As building	Crushed for aggregate
	Concrete C40/50	5850696	As building	Crushed for aggregate
Superstructure - Upper Floors	Concrete C32/40	14400912	As building	Crushed for aggregate
	Rebar (97% recycled steel)	1478940	As building	Steel recycling
	Steel decking	51649	As building	Steel recycling
	Concrete C40/50	3416127	As building	Crushed for aggregate
	Concrete C30/37 (stairs)	211200	As building	Crushed for aggregate
	Rebar (90% recycled steel, stairs)	8706	As building	Steel recycling
Substructure - Roof	Soil - green roof	474700	As building	Landfilling (for inert materials)
	Bitumen waterproofing layer	3144	20	Landfilling (for inert materials)
	Insulation - glass wool	2428	As building	Landfilling (for inert materials)
	Plastic membrane	78	30	Plastic-based material incineration
	Drainage floor underlay	202	As building	Plastic-based material incineration
	Plastic geotextile	173	10	Plastic-based material incineration
Skin - Façade	Aluminium louvres	4875	As building	Aluminium recycling
	Architectural precast concrete	877800	As building	Crushed for aggregate
	Brick	108851	As building	Crushed for aggregate / reused
	Insulation - rockwool	55424	As building	Returned to manufacturer for recycling
	Plasterboard	69695	As building	Gypsum recycling
	Precast C30/37 concrete	70680	As building	Crushed for aggregate
	Render	5434		
	Steel framing system	4209	As building	Steel recycling
	Steel stud wall	6868	As building	Steel recycling
	Weather defence barrier plasterboard	22075	40	Gypsum recycling
	Aluminium blanking spandrels	929	As building	Aluminium recycling
	Aluminium curtain wall system	4698	As building	Glass recycling
	Double glazing windows	32870	As building	Glass recycling

Layer	Material	Mass (kg)	Service life	End of Life Scenario
Space - Internal Partitions	Blockwork partioning - concrete	239894	As building	Crushed for aggregate
	Blockwork partioning - mortar	118389	As building	Cement/mortar use in a backfill
	Glazed partitioning	6955	As building	Glass recycling
	Plasterboard partioning - insulation	15620	As building	Landfilling (for inert materials)
	Plasterboard partioning - plasterboard	440954	As building	Gypsum recycling
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	Water-borne paint	5852	15	
Space - Internal Doors	Internal wooden doors	20800	40	Wood-containing product incineration (80% wood)
Space - Internal Finishes	Vinyl flooring	831	25	Plastic-based material incineration
	Carpet flooring	3268	15	Plastic-based material incineration
	Porcelain flooring	16720	30	Brick/stone crushed to aggregate (for sub-base layers)
	Plasterboard ceiling	14849	40	Gypsum recycling
	Suspended tile system (metal)	53000	40	Metal recycling
	Epoxy flooring	194	10	Landfilling (for inert materials)
	Plasterboard ceiling	91512	As building	Gypsum recycling
	Rubber flooring	35699	25	Plastic-based material incineration
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	Drinking water distribution system	4731	30	Metal-containing product recycling (90 % metal)
	Sewage water distribution system	2899	60	Metal-containing product recycling (90 % metal)
	Air conditioning system	268	25	Metal-containing product recycling (90 % metal)
	Radiators	552	25	Metal-containing product recycling (90 % metal)
	Electricity distribution system	71751	25	Metal-containing product recycling (90 % metal)
	Air handling units	1472	25	Metal-containing product recycling (90 % metal)
	Ventilation distribution system	49827	25	Metal-containing product recycling (90 % metal)
	Heat pumps	729	22	Metal-containing product recycling (90 % metal)

4 Conclusion

The circular economy approach for the GOSHCCC development is addressed through designing for longevity and adaptability whilst reducing the quantum and impact of new materials through designing out waste and the specification of low carbon high recycled content. The whole life impact of the development will be reduced through designing for disassembly. The proposals support the circular economy through provision of maximum clinical functionality for a premium hospital development using the least resources, densifying a Central London site.

The existing Frontage building is not fit for purpose, and will be demolished to make way for the GOSHCCC development. A pre-demolition audit has been undertaken, the outputs of which will inform a soft-demolition process, reducing demolition waste to landfill as per the waste hierarchy.

During the construction phase the project will reduce the amount of waste produced through the use of modern methods of construction. This will reduce the amount of on site construction waste generated through efficient manufacture of building elements, whilst also inherently supporting the approach to adaptability and end of life disassembly.

All building specifications are to be carefully selected to ensure responsible, sustainable procurement. All opportunities mentioned in the body of the document are to be robustly interrogated for feasibility.

Appendix A - Pre-demolition Audit

C12200 Great Ormand Street Hospital

Pre-Demolition Audit and Site Waste Management Plan - Version 3

Head Office
Arden House
Arden Road
Heartlands
Birmingham
B8 1DE

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Email info@dsmgroup.info
Web www.dsmgroup.info

www.dsmgroup.info
decommission / demolish / decontaminate

Contents

1.0 Document Status

1.1 Document Authorisation

	Author	Technical Reviewer
Name	Robert Cooke	Billy Young
Position	Quality & Environmental Manager	Director – Technical & Business Development
Signature	R. Cooke	B. Young

- This document is classified as a design document for the works described. Before issue and use it must be signed by the author, and after formal review, by a technically competent reviewer.
- Further reviews of this document by other designated persons are also carried out and recorded before this document is issued.
- **Note:** Electronic versions of this document do not contain signatures

1.2 Document / Change History

Review Date	Section No.	Version No.	Comment / Amendments	Issuer Initials
14 Feb. 2020	n/a	1	Internal Initial Issue – Tender Stage	RJC
08 Feb 2021	2.3 & 3.2	2	Inclusion of John Sisk information	RJC
10 Aug 2021	All	3	Full review following client comments	RJC

This table records changes to the actual document excluding:

- Training records (section 6.1)
- SWMP routine reviews (section 6.2)
- Close out review (section 6.3)
- document reviews of the document or updates to the waste management plans.
- Actual waste plans (section 8.1)

1.3 Document Format

- This document has been written to meet the requirements of the Institute of Civil Engineers Demolition Protocol (2008) and BREEAM Wst 01 Construction waste management scheme document 2011.

1.4 Sign Up

- The following table records the site manager signing up to the requirements of this plan.
- Signing the table indicates that the manager understands:
  - The way the works are to be done, and why
  - The potential environmental issues and how they are being addressed

Date	Name (Print)	Signature

2.0 General Information

2.1 Contract Name and Number

DSM Contract Number	C12200
DSM Contract Name	Great Ormand Street Hospital

2.2 Contract Directory

Client	The Great Ormond Street Hospital Trust
Client's Agent	Currie & Brown
Principal Contractor	John Sisk & Sons
Contract Value (approximate)	£149 million Construction Contract Value £ 9.75 million PCSA Contract Value

2.3 Contract Work Details

Contract Address	Great Ormand Street, London WC1N 3JH
Scope of Works	DSM - Demolition of Six storey hospital block and provision of a level development platform. Redevelopment to include 10-storey new building children's cancer care centre, secant piling, basement construction for plant distribution, pharmacy, school and activity centre, complex imaging suits, critical care units, day-care and aseptic suit, specialist clinical wards.
Site Description	World renowned children's hospital close to the centre of London in a heavily built up area.
Total Site Area	Approximately 17,500 square metres
Buildings Floor Area	Approximately 16,000 square metres
Contract Start Date	Demolition Works 30 May 2023 Whole Contract 30 May 2023
Contract End Date	Demolition Works 12 January 2024 (32 weeks) Whole Contract 15 April 2026 (150 weeks)

2.4 Outline Site View

3.0 Audit & Plan General

3.1 Aims

The aims of this pre-demolition & site waste management plan are to:

- Minimise the amount of actual waste sent to landfill.
- Maximise the amount of re-used, recycled and recovered materials.
- Produce waste as high up the waste triangle as possible.
- Maximise the amount of waste re-used on site to eliminate transport impacts
- Review the actual performance levels against the planned levels to drive improvement.

Core to DSM's management is the "Plan – Do – Check – Act" principle that this document forms part of.

3.2 Roles and Responsibilities

DSM Team

Person Responsible for Producing this Document

Rob Cooke
DSM Demolition Ltd
Quality & Environmental Manager
07795 267 961

Person Responsible for Implementing the SWMP

TBD
DSM Demolition Ltd
Director

Site Waste Champion

TBD
DSM Demolition Ltd
Role

Site Manager

TBD
DSM Demolition Ltd
Role

Sisk Team

Discipline	Telephone / Fax	Contact	Mobile	E-Mail
Regional Construction Director	0121 329 0600	Allen Westgate	07788 300498	allenwestgate@sisk.co.uk
PCSA Project Director	0121 329 0600	Stephen Knight-Stringer	07825 850817	stephenstringer@sisk.co.uk
Commercial Manager	0121 329 0600	Stephen Knight-Stringer	07825 850817	stephenstringer@sisk.co.uk
Clinical Design Manager	0121 329 0600	Michael Clarke	07557 802884	michaelclarke@sisk.co.uk
Pre-Construction Manager	0121 329 0600	Nick Fitzgerald	07771 814895	NickFitzgerald@sisk.co.uk
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Assistant Design Manager	0121 329 0600	Andreia Hotta	-	andreiahotta@sisk.co.uk
Sustainability Manager	0121 329 0600	Sara – jane davis	07880475831	sarahjanedavies@sisk.co.uk

3.3 Records

- A paper copy of this document will be held on site by DSM.
- An electronic copy of this document will be held at Arden House by DSM.

- Actual waste tickets will be held on site for a short period of time before being sent Arden House for verification and the details entering onto DSM's systems. Actual tonnages of waste are only known once loads reach their destination and this information is issued sometime later to Arden Road and not site.

- Summary record sheets of all tickets will be kept on site, see section 7.

3.4 Declaration

- DSM undertakes to take all reasonable steps to ensure our duty of care obligations regarding all waste matters are taken.

- DSM has KIPs and objectives to maximise waste recovery and minimise any associated impacts, such as the carbon footprint from our works. These principles apply to this and all of our works.

Name

Signature (hard copy)

Date

4.0 Pre-Demolition Audit

4.1 Procedure

- During the pre-site works stage of the contract the nature and quantity of the various component parts of the structures was determined. This determination is carried out to both quantify the various materials types and to identify the optimum recycling routes to minimise the amount of actual waste going to landfill.

- The area being redeveloped is still in use as a live clinical building and this has impacted the amount of investigative works carried out to produce this report. This restriction is minimised as the building has been operated and maintained by one user and structurally is of uniform construction throughout.

4.2 Waste Hierarchy

- The waste operations on this site have been designed in accordance with the waste hierarchy.

Prevention

- This option is not applicable to the scheme overall as the facility is no longer required and has been determined, by others, as not suitable for re-use for other purposes.

Re-Use

- The nature of the construction and the difficulty of getting certification for structural components eliminates large scale re-use of any components. Where practicable suitable items will be removed for re-use.

Recycling

- To minimise any carbon footprint from the transportation of these materials, or for the importation of similar materials in the future development DSM will recommend that a suitable proportion of these materials are retained on site.

- For other waste types steaming and sorting will be carried out both on site and off site at transfer stations. Modern technologies allow transfer stations to recover a greater proportion of materials than simple sorting on site can achieve. In addition, sending single mixed loads rather than several small loads of different waste streams can reduce the carbon footprint of the associated transportation.

- Due to project specific environmental targets and logistical challenges the site has no space for the crushing of hard arisings or brick dressing and therefore these operations are not feasible. These materials will be removed from site for processing by others.

Down-cycling

- The majority of the material forming the structures will be recycled. The three largest waste streams undergoing this processing have been identified as:

- Concrete and Brick - Recycled into secondary aggregates
- Steel – structural and reinforcement - Placed in the scrap metal re-processing industry
- Glazing panels and frames - Placed in the scrap metal re-processing industry

Recovery

- A small proportion of waste removed from site will be recovered. An example of this will be residual fuels and oils which will be used as a fuel source.

Disposal

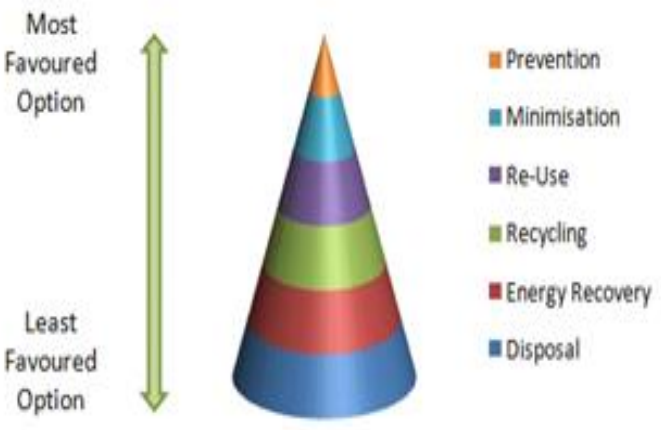
- A proportion of waste will be disposed to landfill as no viable other option exists. Falling into this category will be the asbestos containing materials present on site.

4.3 Identified Site Waste Quantities

- Descriptions and the quantities of the various wastes which will be produced from this site are contained in section 8 of this document.

- This table also discusses disposal routes, selected to minimise the residual amount of actual disposed waste as well as re-using, recycling and recovering waste as high up the waste hierarchy as possible.

Waste Hierarchy

<table>
<tr>
<td rowspan="7"> 
</td>
<td>Prevention – not applicable buildings not suitable for new use.</td>
</tr>
<tr>
<td>Minimisation – Selection of method and waste streaming to reduce to a minimum residual waste.</td>
</tr>
<tr>
<td>Re-Use – Limited / low potential due to nature of waste and verification of quality of item</td>
</tr>
<tr>
<td>Recycling – Maximum potential ie Bricks, internal furniture, internal fixtures and fixings.</td>
</tr>
<tr>
<td>Down-cycling – Maximum potential ie secondary aggregates, metal processing.</td>
</tr>
<tr>
<td>Recovery – use of waste as an energy source.</td>
</tr>
<tr>
<td>Landfill – where no other viable disposal exists.</td>
</tr>
</table>

5.0 Duty of Care

5.1 Waste Carriers

- DSM maintains an approved list of registered waste carriers. All waste carriers on the list have the registration details checked using on line public registers.

- When a waste carrier is selected for entry on the Contract Materials Management Plan spreadsheet the validity of the carrier's registration is automatically checked. This operation is carried out at Head office not site level, where the central records are maintained.

- The Contract Materials Management Plan spreadsheet forms the core record relating to waste, a copy of which will be produced on contract award. It gives both the name of the waste carrier and their registration number.

5.2 Waste Disposal Points

- DSM maintains an approved list of permitted waste disposal points. All disposal points on the list have their permit details checked using public registers and copies of full permit condition provided by the facility operator.

- When a disposal point is selected for entry on the Contract Materials Management Plan spreadsheet the availability of the held information is automatically checked. Facilities are not added to the database until they have been checked and approved.

- Due to the variable nature of wastes handled, and the geographical spread of sites, contract specific disposal points are frequently used. The checking of these facilities is carried out at Head Office, not site level, although site staff often propose facilities to use.

- As well as waste facilities with permits some wastes may be taken to sites with exemptions to except waste, for example U1 Exemption to use waste in construction. Such exemptions are verified by DSM as well as being obtained by DSM where applicable.

5.3 Post Contract Information File

- On completion of the contract a Post Contract Information File will be produced. This contains both the information required in a Health and Safety Files and Duty of Care Information as well as details of ancillary operations such as environmental impacts and monitoring.

- DSM's standard policy regarding waste reporting is to issue the final and complete Contract Materials Management Plan spreadsheet together with lists of all individual waste movements by waste type. Details include waste ticket number, mass of waste, carrier and disposal point. Copies of tickets are not issued unless requested due to the very large number of tickets that can be involved.

6.0 Training and Plan Reviews

6.1 Training

- To eliminate the creation of waste where practicable, or maximise the re-use, recycling and recovery of waste that has to be generated it is essential that everybody involved with this project understands the issues.

- To maximise the understanding of waste issues DSM has appointed for this site a Waste Champion, see section 3.2. Their task is to ensure that waste issues are understood by all and that the most appropriate operations are carried out consistently to minimise waste.

- To reinforce this on-site training is given in the following three ways.

- During the site induction that all staff have to attend.

- By routine toolbox talks on the issue of waste (Reason R).

- By toolbox talks where a specific waste issue on site has been recognised (Reason I).

- The table below record the toolbox talks relating to waste given on this contract. Details of the attendees etc to individual toolbox talks are contained within DSM's standard tool box talk records.

Date	Topic	Reason

6.2 Waste Plan Routine Reviews

- The actual waste plan will be reviewed at least every six months. These reviews will be carried out by the site staff in conjunction with Head Office where all waste data is held. (Actual measured waste tonnages are issued by facilities with invoices direct to Head Office).

- Waste reviews can be requested by site staff or head office staff at any time should an issue be identified.

- The table below is used by site management to record that dates that reviews of this site waste management plan have been undertaken.

Date	Comments / Actions	Initials

6.3 Post Contract Review

- This review must be carried out within three months of the completion of the site works and the receipt of all waste details from all receiving sites.

- The review must include:

- Any significant variation between pre-work estimated waste quantities and actual and why.
- Any waste types missing from pre-works estimate and why
- Any changes to disposal route eg recycled to disposed
- (change of used facilities are judged valid changes and do not automatically require comment).
- Variation between estimated and actual overall recycling rate
- Comment on success of the plan
- Comment on lessons learnt moving forward

Review carried out by

Date	Name	Signed

Post Contract Review

7.0 Waste Movement Records

7.1 Site Waste Records

- All loads of waste removed from site will have either a waste duty of care note or a hazardous waste consignment note.
- The site staff check that the waste is being taken to the agreed disposal point and that all notes are correctly completed.
- The top copy of each note is retained and the details entered on a record form, paper or electronic depending on the size of the site. The actual notes and a copy of the record form are sent to Head Office weekly.
- Site records of waste comprise copies of the record form and details issued from Head Office once the individual load weights are known. These are issued to the site on request.
- A copy of the standard waste record form, F365, is given below.

Material Record Sheet (One sheet per carrier / per day)

Contract No				Contract Name					YOU MUST ENTER ONE OF THE DESCRIPTIONS AS BELOW	
Date	Vehicle Reg	Carrier	Destination	Time In	Time Out	Ticket Number	No of Loads / Qty	Material Type	Description Imported / Exported	DSM Employee Signature

001 F365

8.0 Site Waste Management Plan

8.1 Initial Site Waste Management Plan

- The following pages contain the report on the site audit carried out by DSM to identify the types and quantities of each waste stream that will be produced by the initial demolition and site clearance phase of the planned redevelopment.

Introduction

- This document details the findings of a pre-demolition audit carried out on the section of the hospital that is scheduled for demolition. It contains details of the various component types, an appraisal of their condition and options to both minimise the amount finally disposed as waste as well as using a disposal route as high up the waste hierarchy as possible.

- During the actual works items / materials of the same type will not be identified as to the source location. This report does however detail source locations to assist the identification of the materials with respect to the report produced following the site inspection visit.

Target

- Overall target of diversion from landfill of 85% volume / 95% tonnage.

General Points

- The works are to be carried out on a congested city centre site with little or no available working space. Accordingly, the works will have to be planned to minimise any waste storage on site.

- To reduce the amount of heavy goods vehicle movements and the associated carbon footprint from them disposal points for the materials removed will take into account the distance from the site.

- Due to the above two points removal of mixed waste loads is judged preferable to on-site sorting. This solution also benefits from the high rates of diversion from landfill achieved by transfer stations.

- Where possible off waste facilities used will hold a current registration to PAS 402 : 2013 “Waste Resource management – Specification for Performance Rating”.

Structural Elements

- The following structural components have been identified.

Description	EWC Code	Source	Amount	
Concrete	17 01 01	Slabs and Foundations	6,346	tonnes
		Building Frame	1,030	tonnes
		Total	7,376	tonnes
Bricks (& blocks)	17 01 02	All Walls	1,920	tonnes

- The concrete elements will be reduced in size to remove from the structure and transport off site. Some minimal site processing will be carried out on site to increase the amount able to be carried in each load by reducing voidage. This will reduce the number of loads and associated emissions involved with this waste stream.

- Bricks and blocks is intended to be removed from site in the same manner as the concrete.

- Due to site logistical constraints and deconstruction programme restrictions the ability of dismantling existing brick internal and external walls "brick by brick" will be limited and not suitable for the project.

Description	EWC Code	Diversion from Landfill
Concrete	17 01 01	100%
Bricks (& blocks)	17 01 02	100%

Windows

- The following double-glazed windows, in generally good to fair condition, are present in the external faces of the buildings.

- Enquiries have been made with a number of architectural salvage firms but the level of interest, even as a free of charge issue item has been low. Suggestions to advertise the windows on sites such as Gumtree were received, but such a disposal route is not thought viable given the number of windows involved, the programme timescale and lack of storage areas.

- Due to the existing Frontage Building being largely constructed in the 1960's there is limited existing as-built information from which we are unable to determine the original manufacturer of the windows and propose reuse.

- No viable re-use option has so far been identified. The only viable disposal route so far identified is to send the windows to an off-site transfer station. At such sites the windows would be able to be streamed into the following waste groups.

- The plastic frame material would be re-introduced into the plastic industry for regranulation and re-use.

- The glass has possibly two disposal routes. The preferred route is to process into glass cullet for re-use as the raw material in the manufacture of new glass. Where the use of specialist films or coatings to the glass prevent this it would be processed into an aggregate.

Description	EWC Code	Source	Amount	
Windows	~	Building Perimeter	172	Number
Glass	17 02 02	Approximate total area (2 panes)	2,000	Sq m
Plastic	17 02 03	Plastic Frames	1,700	Lin m
Sealing Beads	17 09 04	Rubber type gaskets	1,700	Lin m

- Should a viable re-use option become available for the windows this would be used, but it would have associated with it programme and cost implications as well as an increased health and safety risk which would have to be addressed by a suitable method of working.

Description	EWC Code	Diversion from Landfill
Glass	17 02 02	100%
Plastic	17 02 03	100%
Sealing Beads	17 09 04	0%

Non-Structural Items and Fittings and Fixtures

Introduction

A detailed audit of existing fitting and fixtures has been carried out to support the findings below. Within this report includes a floor-by-floor analysis of existing finishes. Due to the existing Frontage Building remaining to be a live clinical building certain spaces within the Frontage Building were unable to be assessed. Nevertheless, due to the nature of the building the internal layout is repetitive and for the purpose of this report assumptions have been included within the quantities.

A copy of the detailed material assessment can be found within the appendices of this report.

Doors

- There are a large number of high-quality doors of various types situated throughout the building. The vast majority are visually fire doors although the rating of them is not known. It is presumed from their style and appearance that none of the doors has an asbestos core.
- No written evidence of the fire rating of the doors may restrict their future use.
- Details of the doors are contained in the following table.

Level	One	Two	Three	Four	Five	Six	External	Total
Single Leaf	37	69	48	71	50	2	1	278
One and a Half Leaf	16	9	0	1	6	0	0	32
Double Leaf	2	9	5	14	6	1	8	45
Total	55	87	53	86	62	3	9	355

- The external doors have been determined to be unlikely to be able to commercially re-used, unless used in the new development on site, and will almost certainly be removed from site to a waste transfer station. The most likely final disposal route would be recovery, although recycling into a timber product may be possible.
- Should the doors be taken off as wood waste they would have the EWC code 17 02 01.
- Enquiries have been made with a number of architectural salvage firms but no firm interest has been found for the internal doors. The re-use market appears heavily skewed towards older feature doors such as pine panel doors.

- The most viable re-use option is with the hospital trust itself, as clearly the new build will require similar doors and the fire rating of each door may be able to be verified by the trust.

- Removing the door for re-use will have programme and cost implications as well as requiring a suitable storage area to be made available. If this option is pursued it is recommended that only the doors and furniture are re-used (hinges, frame striker plates, closers etc). The cost and time impact of removing the frames in a condition suitable for re-use has been judged to be too high to be viable.

Description	EWC Code	Diversion from Landfill
Wood	17 02 01	85%
Glass	17 02 02	100%
Door furniture (mixed metal)	17 04 07	100%

Skirtings and Architraves

- To remove, sort and handle the skirtings and architraves for re-use would take measurably longer than simply removing them for recycling. Generally where a demand for timber for re-use is present it is a requirement that the timber is de-nailed which has programme and cost implications.

- Enquiries have been made with a number of architectural salvage firms but no firm interest has been found for the wood. Information on if the paint used on the wood was lead based was also requested from one firm. From previous contracts the wood would almost certainly meet the requirement of PAS 111 for recycling.

- Details of the timber quantity (linear metres) is contained in the following table.

Level	One	Two	Three	Four	Five	Six	Total
Architraves	452	836	1,001	750	495	12	3,546
Skirtings	1,137	1,191	853	998	914	0	5,093
Total	1,589	2,027	1,854	1,748	1,409	12	8,639

- Assuming a mean nominal size of 120mm x 20mm and a wood density of 700 kg/m^3 the quantity of wood equates to:

20.7 m^3
14.5 tonnes

Description	EWC Code	Diversion from Landfill
Wood	17 02 01	85%

Vinyl Flooring

- There is a large square metreage of generally good condition vinyl flooring within the building as detailed in the table below:

Level	One	Two	Three	Four	Five	Six	Total
Vinyl	1,163	1,040	778	784	797	131	4,693

- It is assumed that the vinyl is stuck to the floors and that during its removal damage, either tears or stretching may take place rendering large quantities unusable.

- No interest was found with any companies for possible re-use of this material. Enquiries were made with the industry's recycling scheme, Recofloor, but it only takes back off cuts from sheeting from the laying process. The majority of the taken back material is re-processed into new sheeting with a smaller amount being put into the supply chain for lower quality products such as road cones.

- Waste transfer stations follow the same route for disposal of vinyl waste and this appears the only viable option.

- Clarification will need to be obtained as to the substrate the floor is fixed to. Vinyl flooring over areas of asbestos containing floor tiles or exposed asbestos filled adhesive may have to be disposed of as asbestos contaminated waste.

- On the basis that the flooring is 5mm thick with a density of 1,500 kg/m^3 the quantity of vinyl equates to:

23 m^3
35 tonnes

Description	EWC Code	Diversion from Landfill
Plastic	17 02 03	85%

Ceiling Tiles

- There is a large square metreage of generally good condition mineral ceiling tiles within the building as detailed in the table below:

Level	One	Two	Three	Four	Five	Six	Total
Mineral Tiles	1,163	1,040	778	784	797	16	4,578

- No interest was found with any companies, architectural salvage and companies fitting ceiling tiles, for possible re-use of this material. Enquiries ware made with the industry's largest supplier, Armstrong, and they do accept demolition sourced ceiling tiles at their plant in Gateshead. Here they are inspected and then ground to produce the raw material for new tiles.

- Due to site logistical challenges, there is no safe space within the redline boundary for a large enough quantum to be safely storge and then relocated off-site. Arranging to send the tiles to Gateshead has been discounted due to the carbon footprint of the transport which would be assigned to the contract.

- Implementing the reuse of ceiling has been discounted due to the anticipated cost associated to storing these materials off-site for a long duration until new CCC building.

- Sisk have requested that GOSH Trust are to review and remove any existing ceiling tiles they wish to store and reuse throughout the remaining hospital realm prior to site occupation and deconstruction operations.

- Subject to asbestos survey, the determination of hazardous materials is yet to be confirmed. The asbestos surveys are programme to commence upon site occupation.

- The tiles are proposed to be taken to a local transfer station for recycling into their established outlets.

- On the basis that the tiles are all mineral fibre with a density of 3.4 kg/m^2 the quantity of tiles equates to:

16 tonnes

Description	EWC Code	Diversion from Landfill
Insulation Materials	17 06 04	85%

Sanitary Ware

- There are a number of good condition sanitary ware items within the building as detailed in the table below:

Level	One	Two	Three	Four	Five	Six	Total
Low Level WCs	3	9	6	7	6	0	31
WC Partitions	0	5	0	0	0	0	5
Wash Hand Basins	9	30	11	11	8	0	69
Hand Dryers	6	29	11	11	8	0	65
Showers	0	0	1	0	2	0	3
Baths	2	0	0	0	2	0	4
Mirrors	7	30	11	11	8	0	67
Soap Dispensers	7	30	11	11	8	0	67
Tissue Paper Holders	5	23	10	9	8	0	55

- Limited interest was found with architectural salvage companies for possible re-use of these items.
- At present the only viable option appears to send the items to a waste transfer station where some items may be separated for re use, with units unsuitable for re-use due to lack of demand or condition predominantly being processed and blended into a secondary aggregate.

Description	EWC Code	Diversion from Landfill
Sanitaryware	17 01 03	100%
Glass	17 02 02	100%
Electrical Equipment WEEE	20 01 36	100%
Soft Strip	17 09 04	80%

Other Items

- The building contains other items that will need to be removed as part of the redevelopment of the site.
- These include fabrics, window blinds, internal embedded services (water, gases, electrical etc) as well as items of electrical and mechanical plant.
- Due to certification issues the re-use of such equipment is problematical and the only identified disposal route is to recycle the equipment.

Conclusions

- We are cognisant of the client's aim to re-use as much of the arisings as possible, but this can only be achieved when the following conditions are able to be satisfied.
- Viable market for the items at a cost that is affordable (if negatively valued).
- Work programme allows for extra time in removal of items in suitable condition for re-use.
- Items can be safely removed and handled.
- Financial implications allowed for in costings, some re-used items have a negative value.
- Suitable storage areas for items awaiting disposal.
- Sisk are in partnership with a number of social enterprise schemes which offer potential solutions to enhancing the level of reuse, recycling and dow-cycling. As of Q4 2021 these consist of the following:
    - Recycling lives – waste broker to manage all construction and office waste.
    - Community wood recycling – Removal of all timber generated during deconstruction and construction activities for reuse and recycling purposes.
    - Paint 360 – recycling of left over paint and paint containers.
    - TRACuk – Deal with the removal of building soft-strip and furniture clearance.

  Prior to the commencement of deconstruction and construction operations this document will be reviewed and updated to suit current social enterprise schemes that Sisk are in partnership with.

- The identified potential user of items removed from the buildings is the client as they are constructing a new development on the footprint of the works. Every assistance will be given to the hospital in viewing and identifying items that they can re-use.

- Prior to works commencing items with a potential for re-use will be publicised on sites such as:

    - NISP - National industrial symbiosis programme
    - Waste Exchange WAX
    - Gumtree

9.0 Potential Waste Receivers / Processors

9.1 Waste Carriers

- The selection of waste carriers will be made once the disposal route of the waste has been determined. At this stage of the contract no waste carriers have been selected.

9.2 Waste Transfer Stations

- DSM has well-established relationships with a number of waste recyclers within London.

- Any waste recycling company DSM uses has to be on our approved supplier list. To become an approved supplier DSM undertakes a number of checks including:

    - Trading history
    - Environmental and health and safety performance
    - Recycling rates
    - Insurances
    - Trade body memberships
    - Accreditations
    - Corporate standards

- The following organisations have been identified as probable / possible waste receivers, and a number have been approached regarding the wastes on this contract.

Organisation	Postcode	Wastes Handled	Permit	PAS 402
EMR	TW8 9HA	Metals / WEEE	80370	No
O'Donovan Waste	HA10 1PX	All Materials	LP3037WG	No
Westminster Waste	SE7 8NW	All Materials	EB3505LC	No
Powerday	NW10 6NJ	All Materials	PP3093EE	Yes

10.0 Appendices

Pre-demolition Materials. Detailed A

Pre-demolition Materials. Detailed A

Pre-demolition Materials. Detailed A

Pre-demolition Materials. Detailed A

Pre-demolition Materials. Detailed A

Pre-demolition Materials. Detailed A

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