1972 City House, Sutton

Pre-Demolition Audit

Rev 02

Issue	Date	Reason for Issue	Author	Checked	Approved
01	20/12/2023	Information	K Sutherland H Cormick C Fundrey (Tilley & Barrett) D Jameson (Tilley & Barrett)	M Mathew	M Mathew
02	31/01/2024	For planning	K Sutherland	M Mathew	M Mathew

Contents

1 Introduction

Expedition Engineering Ltd has been appointed to provide engineering and sustainability advice for the redevelopment of City House, Sutton.

The current redevelopment proposals involve demolishing and replacing an existing commercial building on the site. As a matter of both good practice in the context of the climate emergency and material scarcity, and because the redevelopment proposals are referable to the Greater London Authority (GLA), it is necessary to carry out a pre-demolition audit in accordance with GLA guidance.

Expedition have undertaken this audit with input from specialist demolition contractor Tilley & Barrett. It contains a detailed inventory of the materials that it is anticipated will arise from the deconstruction of any existing buildings on the site and assesses their potential for reuse.

The pre-demolition audit is part of a wider suite of documents whose aim is to maximise the reuse of buildings and materials at their highest level in accordance with the reuse hierarchy, minimise waste, and embed circular design principles in the proposed development. These are:

	Purpose	**By**
Pre-redevelopment audit	The basis of a decision to demolish rather than refurbish	Macar / Expedition
Pre-demolition audit	The inventory of materials that will arise from deconstruction and how they will be managed	Expedition
Site waste management plan (SWMP)	Waste management arrangements in construction	RGP
Operational waste management plan (OWMP)	Waste management arrangements in operations	RGP
Circular Economy (CE) Strategy	To be prepared based on the conclusion of the above documents	Useful Projects
Specification for Deconstruction	To be prepared based on the CE strategy	Others (TBC)

This audit is based on information from the following sources:

- AJPL Architects General Arrangement drawings 190/761/11 to 15 and 26 dated June 1995
- AJPL Architects Site and landscape drawings 190/761/ 34 to 36, 38,39 dated Sept 1995
- An external and internal walkaround carried out on 14 November 2023

Further description of these sources of information is provided in section 1.2.

1.1 Limitations

This audit is based on the limited information described above. Limited record drawings have been made available and no intrusive investigations carried out.

1.1.1 Health and safety

Whilst this audit describes the assumed outline sequence of deconstruction works, the demolition contractor is to be wholly responsible for safe sequencing and working methods and may not rely on this audit with regard to the condition, safety and stability of the existing structure, or the presence or otherwise of deleterious materials.

Given the age of the building it should be assumed that some asbestos containing materials (ACMs) may be found. An asbestos Refurbishment/Demolition survey as defined by the HSE must be carried out, and the findings taken into account in the planning of any deconstruction works.

1.1.2 Cost

This audit is a record of the materials that may be found in the existing building and does not consider what course of action is likely to be most economically advantageous to the client.

Whilst Expedition and demolition partners Tilley and Barrett have provided context on likely economic benefits and possibilities in the de-construction of the building, no information contained within or implied by this audit may be relied upon to form the basis of any commercial decisions by future contracting parties.

It should be recognised that the best practice demolition and reclamation methods described in this report may become more or less costly according to the prevailing market conditions at the time of deconstruction. Advice must be sought from a cost consultant at the appropriate time to determine the optimal course of action.

Similarly, the demolition contractor is wholly responsible for satisfying themselves as to the most appropriate demolition method, quantities of materials arising and the time and cost associated with deconstructing the existing building in accordance with the commitments made in the circular economy strategy.

Attempts to increase the recovery and circularity of existing materials may be accompanied by cost and programme implications. These factors must be managed as part of the deconstruction tender and contract.

1.2 Audit methodology

The audit methodology is in alignment with the GLA London Plan policy SI 7 circular economy statements guidance (March 2022) section 4.6. Further, the audit is aligned to the BREEAM New Construction Wst 01 pre-demolition audit requirements and the BRE pre-redevelopment audits Code of Practice (July 2017) requirements.

The pre-demolition audit was carried out by Expedition Engineering with input from specialist demolition contractor Tilley & Barrett. The material inventory was populated by both parties based on the following sources of information:

1.2.1 Superficial inspection

An external and internal walkaround was conducted by Expedition and Tilley & Barrett on 14 November 2023.

1.2.2 Photographic records.

Photographic records from the site walkaround in November 2023 were used.

In addition, photographs from the Google Maps entry for City House Sutton were also reviewed: https://maps.app.goo.gl/6Lvs5RnLLhWwo3NZ8

1.2.3 Survey drawings

AJPL Architect's general arrangement drawings 190/761/11 through to 15 and 26, dated June 1995, contain internal layouts of the building and elevations and are assumed to date from the original construction scheme. Some structural arrangements and dimensions can be surmised or interpreted from these drawings but they do not contain any material or technical information.

AJPL Architects site and landscape drawings 190/761/ 34 through to 36, 38,39 dated Sept 1995 contain external levels and some construction details but exclude superstructure, i.e., there are no roof levels, extents or other features.

1.2.4 Technical record drawings

Archive record drawing searches were not requested from LB Sutton

1.2.5 Intrusive investigations

Internal access was available during the site walkaround and it was possible to view into roof spaces and ceiling voids. No intrusive investigations were carried out. No trial pit or other below ground investigations were carried out to understand likely substructure and foundation details.

1.2.6 Embodied carbon calculation methodology

In order to measure the loss of embodied carbon in the existing building, the inventory assesses the embodied carbon of replacing each material with equivalent new materials. Generic embodied carbon factors (ECFs) from the iStructE and ICE databases have been used and cover upfront emissions only (A1-A5).

2 Existing site and buildings

2.1.1 Site description

City House, Sutton is a four-storey office building constructed in the mid 1990s. The total GIA is estimated at 1117m^2, broken down as below:

Ground floor	255m^2	Main entrance lobby and offices
1st floor	334m^2	Lift and stair lobby and offices
2nd floor	334m^2	Lift and stair lobby and offices.
3rd floor/ loft	194m^2	Lift overrun and loft storage and offices (restricted headroom)

The building appears to be predominantly precast concrete slab and loadbearing blockwork. No signs of distress, corrosion or spalling were observed externally, indicating that the structure is likely to be generally in good condition.

The pitched roof is formed with a number of hips and valleys to suit the winged plan form. The structure is traditional timber raftered construction on loadbearing block walls with a timber post and beam arrangement to support the ridge lines. Over the stairwell and lift core a dormer creates a raised roof line over the lift overrun.

Downstanding steel beams span the main office spaces and support the precast concrete floor decks. The beams and decks are set out in a winged plan form. The steel beams do not form part of a frame and instead bear directly onto the blockwork walls and sit within the ceiling void.

Typically, the floor construction was visible in ceiling voids as precast concrete slab (assumed hollowcore). The exception to this was over the approx. 70m^2 external carport at ground floor where an in-situ concrete slab was visible with substantial downstanding beams and brick clad concrete (assumed) columns.

External walls were found to be cavity construction with a brickwork external façade and blockwork internal loadbearing leaf. Generally, brickwork appears to be self supporting at ground/ foundation level with no visible horizontal movement joints but is assumed to be supported on brick support angles at first floor around the perimeter of the external carport.

Columns supporting the porch roofs at the side entrances were of unknown construction but are assumed to be over clad steel column sections possibly concrete encased.

The roof is clad in slate-like tiles which appear to be synthetic.

A full height single glazed curtain wall façade system forms the external wall to the stairwell. The stairs are assumed in-situ cast reinforced concrete.

Substructure and foundation details are not known. Based on the anticipated ground conditions and in the absence of more definitive information, it is anticipated the substructure will consist of in-situ floor slabs spanning between piled foundations. Pile caps and ground beams are also assumed to be present, though this is yet to be confirmed.

Photographs are provided in Appendix A.

2.1.2 Pre-redevelopment audit outcomes

The existing building is of sound construction and appears in good condition. It is well suited to its current use and occupation as a series of tenanted office spaces with shared facilities. The structure is of simple loadbearing blockwork and precast concrete deck and while it could offer some scope to make alterations to internal plans, it is less well suited to modifications to the envelope and facades. Wider windows and the addition of balconies will be harder to achieve due to all external walls being loadbearing.

Floor areas in each wing are generous and could offer flexibility for alternative layouts if units are restricted to two per floor (ie one per wing). Subdivisions of the floor spaces will require some additional compartmentation for fire and acoustics and may require the addition of external fire escapes. While conversion of the building is feasible structurally it would offer diminished value architecturally and a lower quality of life for any occupants.

The simple construction of the building limits the ability to extend the form vertically (ie adding additional floors) due to the limits of the load bearing walls and foundations. Any new construction would need to be independent and would be constrained by the existing building if retained. A new build form that was built over the top of the existing would have higher carbon impact outcomes due to the additional structural constraints this would cause.

While demolition option is not sought it is the best solution for this site. Mitigation of carbon impacts should be fully explored through careful consideration of circular economy principles in the deconstruction and recycling of all building materials.

Table 1 offers an assessment of the existing building performance for its current use.

Table 1: Pre-redevelopment Audit Outcomes

Criteria	**Existing building performance**	**Score**
Floor to ceiling heights	Floor to ceiling heights in the range for 2.5 – 2.7 m. Below recommended for commercial buildings (BCO 2019). Good for residential conversion.	Moderate
Structural grid	The open plan office floor plan generally offers a 9 m clear span on plan.	Good
Condition of structure	The structure appears to be in good condition. No evidence of water ingress at key junctions in the envelope. Note: a condition survey has not been undertaken.	Good
Condition of façade	The masonry façades appear to be in good condition. The double-glazed window unit glass, gaskets and aluminium frames appear in good condition from initial walk around – no surveys have been undertaken	Good
Accessibility	The existing building has 1 core with functioning elevator with access to all floors. Level access on ground floor and accessible WCs exist. The single core may limit the potential to convert floor layouts to multi-units on any floor level. No alternative studies have been undertaken.	Moderate

Fire	The existing structure is protected by fireboarding. Compartmentation and other fire strategies unknown. The single core acting as a fire escape route will limit the extent of new layouts to serve more than 2 units per floor. Alternative external fire escape routes could be introduced but would impact external elevations and spaces.	Low
Internal flexibility	The simple building form and relatively high design loading for commercial use lends itself well to being internally flexible. The winged shape on plan offers scope for good daylighting for alternative interior floor layouts. While the approx. 280m2 footprint at each level is generous the issues of compartmentalising for fire escape routes will limit the options of subdividing the space into smaller units. Relatively small window openings restrict views out but could be enlarged to offer more generous daylight	Moderate
Services	Existing servicing strategy unknown. While the mechanical and electrical services appear to be functioning, they are 30 years old and therefore approaching the end of their service life.	Moderate
Heritage significance	The building holds no heritage significance.	Low

2.1.3 Proposed new development

The proposed new development (as per Wimhurst Pelleriti drawing set 30 November 2023) is for a new, 6,900m^2 residential development with commercial ground floor over a 750m^2 footprint. Proposed massing consists of a single form at two heights – one 5 storey and one 13 storey. Externally, it includes a landscaped public realm at ground level and an accessible terrace on the 5th storey roof area.

2.1.1 Extent of proposed demolition

It is proposed to demolish and replace the existing City House building in its entirety.

3 Material inventory

Table 2 summarises the material inventory including reporting on materiality, condition and quantity against which the opportunities for reclamation can be assessed.

Table 2: Material inventory summary

BUILDING ELEMENT	MATERIAL	DESCRIPTION	QUANTITY

SUBSTRUCTURE	Concrete	Concrete piled foundations, in situ reinforced ground beams and in situ reinforced ground floor slab. Condition unknown – assumed good.	150 m3
	Reinforcement	Encased in concrete	22.5 t
SUPERSTRUCTURE	Concrete	Concrete insitu reinforced columns and first floor slab and downstand beams. Condition unknown – assumed good.	25 m3
	Reinforcement	Encased in concrete	4.5 t
	Steel	Steel beams, secondary framing. Curtain walling framing. Condition unknown – appears good where visible.	38 t
	Precast concrete	Precast concrete suspended slabs to upper floors. Condition – appears good where visible from below	200m3
	Glass	Window glazing. Condition unknown – assumed good.	10t
	Aluminium	Aluminium window frames. Condition unknown – assumed good.	6 t
	Blockwork	Load bearing blockwork and blockwork partitions and internal walls. Condition unknown – assumed good.	110 m3
	Brickwork	Facing bricks to all elevations. Condition good	70m3
	Timber	Raftered roof construction. Condition unknown – assumed good	15m3
FINISHES	Roof Tiles	Pitched roof with non slate tiles. Condition unknown – assumed fair	300 m2
	Vinyl	Vinyl tiling to kitchen and WC areas. Condition unknown – assumed good.	60 m2
	Steel	Raised metal deck flooring. Condition unknown – assumed good.	38 t
	Plasterboard	Suspended ceiling to entrance and office areas at ground, first and second floors. Plasterboard ceiling to 3rd floor. Condition good.	830 m2
FFE	*Unknown*		
BUILDING SERVICES AND MEP	*Unknown*		
EXTERNAL WORKS	Pre-cast concrete	Paving slabs to footpaths and hardstanding of ACU enclosure, paviours to carpark area. Condition fair to good.	33m3

Aggregate	Perimeter footpath and carpark subbase. Condition unknown – assumed good.	80m3
Steel	Lighting bollards	15no.
Steel	Perimeter fencing and automatic gates	6.5t.

4 Typical demolition methodology

4.1 Assumed demolition sequencing

It is understood that the selected demolition contractor will be appointed as principal contractor for the demolition works and will take responsibility for safety and security at the site during demolition. The demolition sequencing described here should serve as a baseline against which the demolition specification can refer, however it is acknowledged that there are numerous ways of deconstructing a building, all at the discretion of the appointed contractor. The recovery rates stated here reflect what is understood to be achievable following the assumed sequencing.

Due to the proximity of public access footpaths and the high traffic road intersection at the North West corner of the site and along the North and West boundaries, stability and collapse radius in this area will be a primary safety consideration. The demolition contractor will be responsible for a full structural survey to minimise risk of uncontrolled collapse. Due to the proximity of residential housing to the West of the site, best practice dust and noise minimisation strategies will be employed including use of mobile atomisers and decibel monitoring.

A soft strip will be carried out to remove internal finishing materials and the existing mechanical and electrical plant. Core materials for removal during soft strip will include (but are not limited to): timber, plasterboard, ceiling tiles, carpet tiles, vinyl and plastics, mild steel, plumbing and electrical cables. To maximise opportunities for on-site reuse and resale to secondary markets, the quality of materials salvaged during soft strip must not be degraded significantly during their removal, segregation, and storage. Extra care should be taken when stripping fittings and fixtures, especially those mechanical and electrical plant which may have higher potential reuse and resale value. To minimise extensions to deconstruction timelines and cost implications, materials identified as having higher reuse potential will be preferentially segregated and packaged.

Following soft strip, high reach demolition excavators will begin fragmentising structural concrete elements. Following reduction in structure height, the remaining structural elements will be demolished in sequence. Temporary support structures will be used to ensure stability throughout the deconstruction process.

To achieve recovery for reuse of roof tiles, roof timbers, precast concrete slabs, steel beams and external brickwork would require floor by floor demolition, scaffold and cranage methodology. Additional costs for this, more careful demolition could potentially be offset by sale of recovered steel. The value of using a track crane versus a long reach for recovery should be reviewed. The floor by floor methodology would require a longer programme.

4.1 Recovery rates

The recycling of scrap metal and inert demolition materials yields the highest recycling rates, due to the inherent recyclability of these materials, with waste management contractors in London frequently reporting recycling rates at or near to 100%. As these materials typically constitute the bulk of waste generated by full demolition projects, it is not uncommon for such projects to achieve overall diversion rates of 95% to 100% from landfill for the demolition phase.

For other waste streams, the degree of segregation, wherever practical, significantly contributes to achieving high recycling rates. The waste transfer stations referenced are equipped with advanced sorting and recycling facilities, enabling them to routinely achieve good recycling rates for various waste fractions generated during demolition and construction projects. Any remaining waste is usually either sent to landfills or processed as refuse-derived fuel (RDF).

The recycling rate for materials that are more challenging to recycle, such as wood, carpet, insulation, polystyrene, canteen waste, and residual waste resulting from the sorting of mixed skips, can vary widely. From experience, the recycling rate for non-metal and non-inert waste streams can range from 65% to 98%, contingent on the specific materials or the contents of the mixed waste streams being sent offsite and the remaining sent for energy recovery and a very small percentage (if any) sent to landfill.

Table 3: Typical good practice recovery rates by EWC

Material	EWC	Reuse %	Recycle %	Incinerate %	Landfill %
Concrete insitu	17.01.01		100%		
Concrete precast	17.01.01		100%		
Structural steel	17.04.05		100%		
Mixed metals	17.04.07		100%		
Asphalt	17.03.02		100%		
Tiles and ceramics	17.01.03		100%		
Glass	17.02.02		100%		
Plasterboard	17.08.02		95-100%	0-5% (or landfill depending on WTS)	
Aluminium	17.04.02		100%		
Blockwork	17.01.07		100%		
Vinyl	17.02.03			100%	
Plywood	17.02.01		90%	*depending on WTS – some	10%

				100% incineration	
Aggregate	17.05		100%		

4.2 On site waste processing

In order to achieve the waste recovery potential, on site segregation would be expected. Dedicated storage on hard standing with appropriate signage and sorting processes need to be in place to ensure segregation is upheld on site. Waste must be collected and disposed of by a licenced contractor to an appropriately licenced waste destination in accordance with the Duty of Care and all other relevant environmental legislation.

Materials are segregated both manually and mechanically and loaded in general to 40 yard skips and removed to waste recycling yards where further segregation and treatment is undertaken. A demolition excavator with rotating sorting attachments is generally selected to process, segregate and load to appointed skips. As a minimum, the following segregated skips would be expected:

- Clean timber
- Plasterboard
- Carpet
- Plastic
- Mild Steel
- Nonferrous all types
- Asphalt (if inert)
- Residual general / mixed demolition waste

Considering the age of the buildings, mid 1990's, which was after the introduction of regulation on asbestos (but before out right banning in 1999) it is likely that no asbestos was used in this construction. This should be verified on site by a qualified surveyor and a full R&D asbestos survey will be required to identify all asbestos in the building. If any is found allow for appropriate removal and management to hazardous materials. If no COSHH register is available any such items will need to be tested and classified prior to removal offsite, which will also determine the most appropriate waste management route.

4.2.1 Concrete crushing

The demolition footprint for the site is large enough to facilitate onsite crushing of inert material arisings and reuse of site-won material onsite for future backfilling and engineering purposes. The arising concrete and hardcore will be removed by excavator and dump truck to a centrally located crushing stockpile, exposing the former ground floor slabs of the City House offices.

The slabs once exposed will be broken by use of hydraulic breaker and where possible excavated to reduce noise and vibration. Again, all material will be broken down and processed into manageable sections that will pass through the crusher successfully without blocking or jamming the jaws.

Foundations will be removed in sequence with the slab removal, as required split trenches will be excavated to undermine the foundations/pile caps and broken out by hydraulic breaker moving all arising to a centrally located stockpile ready for crushing. A crusher will be introduced to site once there is adequate material to provide continuous production from delivery to demobilisation.

4.3 Potential waste routes

The following waste routes can be expected by the appointed demolition contractor using typical good practice waste management practices.

Table 4: Typical recovery routes

BUILDING ELEMENT	MATERIAL	POTENTIAL WASTE ROUTES		QUANTITY
SUBSTRUCTURE	Concrete	Low – downcycled	All recovered concrete can be processed and crushed for onsite recycling or removal from site to secondary recycling yard for crushing to a 6f2-Type 1 Aggregate.	150 m3
	Reinforcement	Medium – recycled	All reinforcing bar is recycled through appointed Scrap Metal Yard	22.5 t
SUPERSTRUCTURE	Concrete	Low – downcycled	All recovered concrete can be processed and crushed for onsite recycling or removal from site to secondary recycling yard for crushing to a 6f2-Type 1 Aggregate.	25 m3
	Reinforcement	Medium – recycled	All reinforcing bar is recycled through appointed Scrap Metal Yard	4.5 t
	Steel	Medium – recycled	Given the relatively low quantum of steel to be recovered and the cost associated with recovery methodologies, reuse potential is deemed low. Steel elements are long but few and would require additional cranage to achieve careful recovery. Recycling through appointed Scrap Metal Yard is widely available	38 t

	Precast concrete	Low - downcycled	Broken by high reach excavator and dropped to the ground for processing and crushing for onsite recycling or removal from site to secondary recycling yard for crushing to a 6f2-type 1 Aggregate	200m3
	Glass	Medium – recycled	Glass is infinitely recyclable when segregated correctly.	10 t
	Aluminium	Medium – recycled	Aluminium is recycled through appointed Scrap Metal Yard	6 t
	Blockwork	Low – downcycled	Blockwork demolition by excavator, stockpiled for crushing and reuse onsite for engineering purposes.	110 m3
	Brickwork	Low- downcycled	Brickwork demolition by excavator, stockpiled for crushing and reuse on site for engineering purposes	70m3
	Timber	Low - incineration	Timber demolition by mini excavator at roof level	15m3
FINISHES	Roof tiles	Low -downcycled	Typically demolished and loaded to stockpile for crushing	300 m2
	Vinyl	Low - incineration	Low deconstructability due to adhesive applied.	60 m2
	Steel	Medium – recycled	Steel raised floors deconstructed and stored for salvage/ resell. Metal cladding and suspended ceiling grids demolishes in soft strip and recycled through appointed Scrap Metal Yard	38 t
	Plasterboard	Medum - recycled	Typically demolished and segregated for recycling.	830 m2
FFE	Ceramic	Low – recycled	Typically demolished and segregated for recycling	Not quantified
BUILDING SERVICES AND MEP	Metals	Low – downcycled	Typically demolished and segregated for recycling	Not quantified

EXTERNAL WORKS	Pre-cast concrete	Low – downcycled	Typically broken up with excavator and loaded to stockpile for crushing	33m3
	Aggregate	Medium – recycled	Removed by excavator and removed to stockpile for crushing / processing onsite with inert demolition arisings	80m3
	Asphalt and tar	Medium – recycled	Removal by excavator and segregated for recycling	0 t
	Steel bollards	Medium – recycled	Depending on connections – unbolt base connections to go for scrap	15no.
	Steel fencing and automatic gates	Medium – recycled	Depending on connections - unbolt / hot cut bolts or break out if in concrete pads to go for scrap.	6.5t.

4.4 Potential offsite receptors

Once onsite applications for material arisings have been exhausted, the London Waste Map is a useful tool to identify suitable waste contractors local to the project, with the view to also keep resources localised in London: https://apps.london.gov.uk/waste/.

Identification of local waste management contractors has also been considered to reduce distance travelled and associated carbon emissions for the development's waste removal and to support the wider sustainability strategy.

Table 5: Local waste processors

MIXED METAL	European Metal Recycling (EMR) Merton	4 miles. Scrap metal recycling.
INERT DEMOLITION MATERIAL	Sipson Combined Inert Landfill Hillingdon	4 miles. Recycling and disposal of inert waste.
SEGREGATED DELETERIOUS MATERIALS (SOFT STRIP)	UK and European Construction ltd Merton	4 miles. Waste Transfer Station.
	Raven Recycling Sutton	2 miles. Waste Transfer Station.
	Hydro Cleansing Ltd Sutton	2 miles. Waste transfer Station.
	Henry Woods Waste Management	3 miles. Waste transfer Station.

	Croydon	
WELFARE / OFFICE WASTE	First Mile	Waste transfer – commercial waste offering various recycling options for paper, cardboard, mixed dry recycling, batteries etc.

5 Circular economy opportunities

5.1 Identification of high value materials

Circular economy opportunities, those that go beyond typical 'business as usual' practice, have been identified based on classification of site materials, their embodied carbon content, condition, deconstructability, reclamation potential and value in the secondary marketplace. These opportunities are likely to fall outside the scope of typical demolition methodology (Section 4.1) and would therefore require close engagement with the demolition contractor to implement. Key considerations for the adoption of best practice material recovery strategies include: extensions to demolition timelines and costs; health and safety; materials segregation and assessment; storage and transport logistics; offsite brokers and secondary materials marketplaces.

Below is a summary table showing the estimated total embodied carbon of the building (excluding MEP and FFE). Selected materials that could be salvaged either by reuse or recycling are listed with their potential savings in embodied carbon (based on 100% recoverability). Together these are equivalent to 23% of the estimated total embodied carbon of the building.

Table 6: Summary of estimated total embodied carbon of the building

Total embodied carbon in building	878	Tonnes CO^2e
Approx embodied carbon in steel floor beams	70	Tonnes CO^2e
Approx embodied carbon in precast concrete decks	21	Tonnes CO^2e
Approx embodied carbon in steel raised modular floor decks	51	Tonnes CO^2e
Approx embodied carbon in roof tiles	52	Tonnes CO^2e
Approx embodied carbon in timber rafters/joists	14	Tonnes CO^2e

5.2 Opportunity 1: Offsite reuse of steel beams

Substantial steel beams (12No overall) are visible in the ceiling voids, with high recovery potential following further structural investigation. The condition of the beams has not been assessed but is assumed to be good based on the general condition of the structure. The length of each steel beam (8 to 10 metres) make resale and reuse very favourable but will require special cranage methodology for removal and long bed truck for transport from site. Due to the relatively low quantities of steel available, engagement with steel recovery services is required to determine minimum quantities for collection.

Cleveland Steel and European Metal Recycling (EMR) accept reclaimed structural steel for reuse following circular economy principles. Collaboration between Cleveland Steel / EMR would be required prior to demolition for identification of steel sections for recovery and implementation of removal strategies to minimise damage to valuable steel. The beams appear to be simply supported on bearings into the blockwork and potentially will require little preparation or cutting ahead of lifting from position and are therefore favourable for a damage free recovery. Careful removal of the precast concrete slabs sitting on the beams would be required to ensure best outcomes for steel beam recovery.

The recovery of steel beams at City House would not typically be considered due to the need for high level cranage for safe removal and low volume of steel for recovery. Alterations to the demolition process to facilitate recovery of the beams (including extended temporary works, health and safety considerations and more careful removal and storage of steel) is expected to add to the programme timeline with concomitant cost increases. These costs could outweigh the recovery value for the demolition contractor, but provision of the steel beams to the secondary reuse market would contribute significantly to circular economy commitments and is considered the most sustainable approach to structural steel disposal.

5.3 Opportunity 2: Onsite reuse of precast concrete slabs

Precast concrete slabs at upper floor levels of the structure are visible in the ceiling voids and considered to be recoverable by the demolition contractor but would not be recovered according to the typical demolition process An evaluation of potential on-site reuse applications for the concrete slab panels such as reuse as floor panels on the ground floor of the new centre or in the landscape can provide justification for salvage. Recovery of the concrete slabs (including extended temporary works, health and safety consideration and more careful removal of the slabs) is expected to add to the programme timeline.

Provision of on site storage would be required if the slabs are proposed for reuse in the next development.

5.4 Other items for potential reuse

Furniture recovered during soft strip can be donated to local charities such as Emmaus or the British Heart Foundation. Condition assessment of furniture during soft strip will provide justification for careful handling and storage.

Concrete paving tiles can be easily recovered and incorporated in the new external works as an alternative to crushing.

Existing roof tiles and timber rafters can be recovered but would require scaffolded access to allow manual removal.

Existing brick facades could be considered for recovery by lowering to the slab at each level as demolition progresses down the building. This would require scaffolding to all elevations for access and safety. Bricks could be cleaned and sorted on site before palleting for removal by crane. This would expect to add to the programme to allow for temporary protection and processing on stie.

5.5 London material re-use platforms

The secondary materials marketplace is growing in London through hubs, platforms and community initiatives:

O’Donovan’s Re-use Hub accepts pallets, wood, doors and furniture for repurposing.

Globechain is an online platform for listing of reclaimed materials for free.

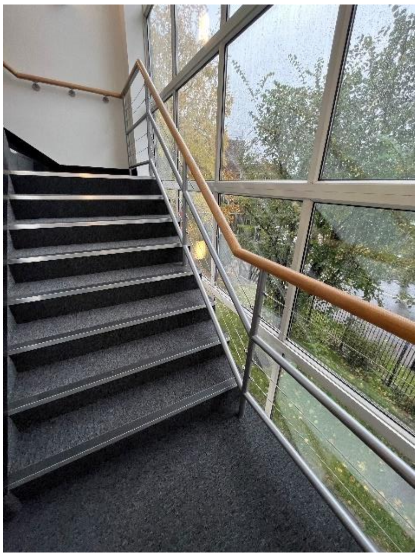
Community Wood Recycling is a social enterprise collecting waste wood for resale.

Direct engagement with end-users or resellers is the preferred approach, since off-site storage of materials in alternative facilities can lead to valuable materials sitting in storage and ultimately being disposed of through conventional waste streams with heightened carbon footprint due to extra handling and transport. Early engagement, collaboration and planning with third-parties is essential to facilitate maximal materials recovery and reuse.

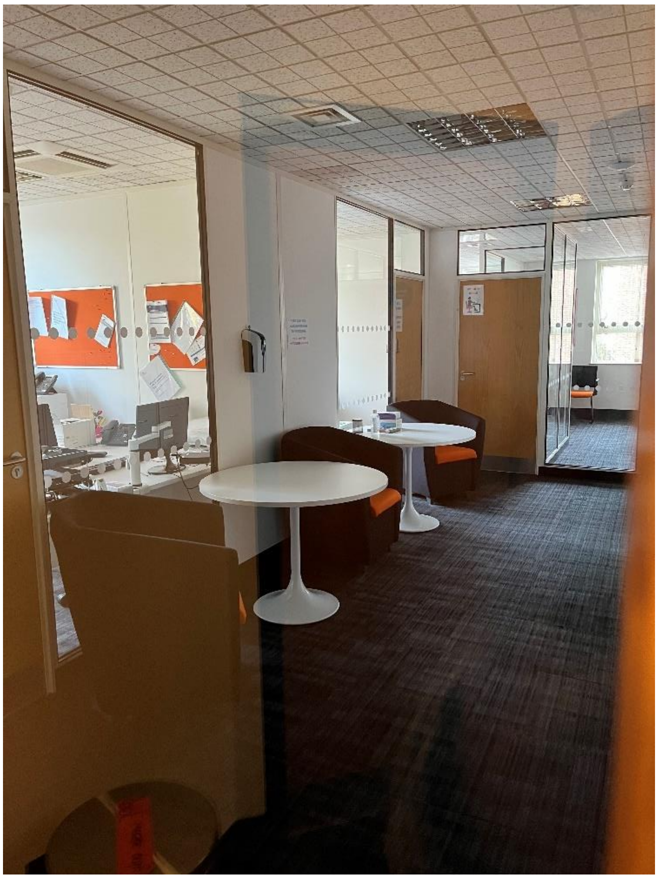
Appendix A – Selected photographs

1.1		External façade - view from main road
1.2		External façade – main entrance

1.3		In situ concrete frame and slab to carport
1.4		Pitched rafter roof timbers
1.5		Timber post to support roof ridgeline

1.6		Fire door and frame 3rd floor
1.7	 	Internal and external view of stairwell
1.8		View of fireboard clad downstand beam in ceiling void

1.9		View of end of downstand beam supported directly on internal block wall (to back of lift lobby)
1.10		Ceiling at first floor with fancoil unit

1.11		Glazed internal partitions to offices

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