HOARE LEA

Manor Road / Richmond

Circular Economy Statement

Hoare Lea

July 2020

Audit Sheet.

Rev.	Date	Description	Prepared	Verified
01	17/07/2020	Draft for team comments	L. Wille	-
02	30/07/2020	For submission	L. Smith	S. Carlsson

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1. Executive Summary

Scope

This report sets out the strategic approach to Circular Economy implemented by the project. The Circular Economy Statement focuses on the work carried out to define a strategic approach to Circular Economy principles for the project and identify high level strategic opportunities early in the development process.

Development Description

The site is located to the south of the A316 arterial Lower Mortlake Road and is shaped by the railway lines and by Manor Road on each of its 3 sides. It is 1.5 ha. in size. Only one side of the site has street frontage, along Manor Road. It is currently occupied by a large Homebase store and associated surface level carparking. There is a functioning bus depot on the northern section of the site which will remain as part of the design proposal.

The site surroundings are dominated by large amounts of surface level carparking servicing the Sainsbury's store to the east of the site and on the site itself. There is a small pocket park adjacent to the Sainsbury's car park and some allotments to the south of the railway.

Project Team

Discipline	Organisation
Client / Developer	ICG Longbow / Avanton
Architect	Assael Architecture
Landscape Architect	Gillespies
Building Services Consultant	Hoare Lea
Sustainability Consultant	Hoare Lea
Civils Consultant	Fairhurst
Ecologist	Tyler Grange
Acoustic Consultant	Hoare Lea
Transport Consultant	Momentum

Table 1: Key Project Team Members

Summary of the approach to circular economy

The construction and operation of the built environment consumes 60% of all materials in the UK. At the end of life, materials are often diverted from landfill, but in reality, down-cycled, reducing their value.

There is growing industry consensus that the way we design, build, operate and dispose of our buildings and associated facilities needs a major overhaul to obviate waste and increase efficiency. There is an incredible breadth of opportunity that this shift in approach will create across the entire supply chain.

Designing for longevity and adaptability and maximising the use of recycled and renewable materials could reduce greenhouse gas emissions while increasing innovation opportunities and economic growth. Replacing finite and fossil-based materials with responsibly managed renewable materials can decrease carbon emissions whilst reducing dependency on finite resources.

Before considering future waste elimination and sustainable waste management practices though, opportunities for retaining and refurbishing /re-purposing existing buildings, materials and other resources on site have been assessed by the design team to maximise the residual value of existing structures and conserve resources by reducing the need for new materials.

An assessment was made of the existing site to gauge what, if any, elements of the existing structures and hard landscaping could be retained, reused, reclaimed or recycled.

It was not deemed feasible or desirable to retain the existing building, given the change in land use and aspirations for the project. By constructing a new development, the energy and operational efficiency of the building can be optimised without the fabric constraints of an existing building. A pre-demolition audit has been undertaken to investigate how recycling of construction, demolition and excavation material can be maximised. This has highlighted specific elements of the existing building and hardstanding on the Site which can be re-used or recycled/recovered, including but not limited to crushing existing concrete for reuse in the Proposed Development.

New buildings developed on the site will follow best practise principles in their design and construction with the overarching aims of reducing material usage, minimising waste, and embedding longevity, flexibility and adaptability. It is expected that the different building typologies will lead to a variance in the final strategies adopted across the site. Furthermore, advances in innovation and best practise over time combined with effective feedback loop mechanisms are expected to lead to continuous improvement as the design and construction develops. An initial assessment on material efficiency has identified the following key aspects for consideration within the design. These will continue to be progressed and pursued where feasible at the next stages of design.

- Efficient outline masterplan design.
- Regularised block layouts where possible.
- Where possible, items are to be prefabricated or assembled off-site. Including services (e.g. utility cupboards).

A project-specific Operational Waste Management Strategy has been developed for the Proposed Development making all necessary allowances to ensure that waste arisings can be accommodated under a full occupancy scenario. The strategy considers the flow of waste from waste generator (i.e. residents/tenants) through to storage and collection. The Strategy outlines how the development has been designed to be sustainable and forward- thinking in its approach to waste and recycling, whilst remaining workable during operation.

The Waste Management Strategy and subsequent addendum notes prepared for the proposed development at Manor Road Richmond include a review of the local, regional and national policy and best practice guidance to be used to in the waste strategy. Using LBRuT waste generation rates, the total general and recyclable waste arising for the development has been forecasted across the residential and commercial land uses at the site. 2.3 Following policy and best practice guidance the type and quantum of general waste & recycling storage bins have been proposed and sited at waste stores strategically located across the site. The quantity of bins has been chosen to strike a balance between the size of waste store required and number of waste collections per week. Furthermore, the waste stores have been located in order to minimise the distance travelled by residents at the development, and the distance full bins will be required to be moved by waste operatives on collection days. Finally, the stores have been located in spaces to allow for the safe access of refuse vehicles and allow for the continued efficient operation of the site.

A sustainable procurement plan has also been produced which outlines the benchmarks expected to be met by construction partners and the entire supply chain regarding sustainable development, including circular economy principles relating to recycled content. The project structural and civil engineers seek to embed high cement replacement with 30% Pulverised Fly Ash (PFA) or 70% Ground Granulated Blast Furnace Slag (GGBFS).

Designing for adaptability and disassembly is another key principle of the circular economy, and the design includes but is not limited to the following measures to reduce waste arisings at replacement or end of life stages:

- Allowance for all major plant to be dismantled and removed.
- All services infrastructure through the building to be designed within designated risers. All risers to be accessible.
- High quality, robust materials palette proposed
- Windows and retail fascias to be removable and replaceable independent of building frame.
- Shell and core units proposed for commercial areas allowing flexibility for the tenant fit out.

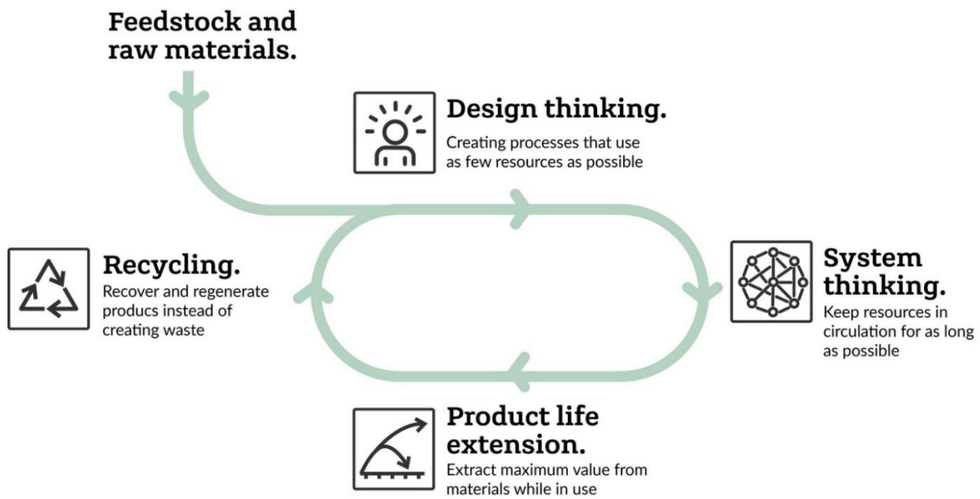


Figure 1: Circular Economy overarching principles

2. Development Description

2.1 The application

This Circular Economy Strategy has been prepared by Hoare Lea on behalf of Avanton Richmond Development Ltd ('the Applicant') following further amendments to the proposed scheme for the redevelopment of the Homebase store at 84 Manor Road, North Sheen ('the Site').

The Circular Economy Strategy summarises the responds to draft guidance put forward by the GLA in the Draft London Plan 'Intend to Publish' (2019, and supplementary guidance.

2.2 Development Description – Amended Scheme Summary

A planning application for the redevelopment of the Site was submitted to London Borough of Richmond Upon Thames (LBRuT) in February 2019 (ref. 19/0510/FUL) (the 'Original Proposed Development') and was considered at LBRuT Planning Committee on 3 July 2019. The Planning Committee resolved that they were minded to refuse the Application, however on 29 July 2019 it was confirmed that the Mayor of London would act as the local planning authority for the purposes of determining the application.

Proposed Amendments

Following review of LBRuT's reasons for refusal and discussions with Officers at the Greater London Authority (GLA) and Transport for London (TfL), the Applicant sought to review the scheme, with the principle aim of increasing the delivery of affordable housing through additional density and addressing other issues raised in the Mayor's Stage 2 Report. Initial scheme amendments were submitted in November 2019 ('the November 2019 Amendments') and increased the overall number of units by 48, primarily through the introduction of a new residential building known as Block E.

Following further discussions with TfL and the GLA, it was subsequently agreed that further revisions should be explored in order to deliver an improved scheme, without the need for this additional block.

The proposed changes are described in detail in the accompanying Design and Access Statement Addendum, however, of particular note is the increase in residential units from 385 within the Original Proposed Development to 454 within the Amended Proposed Development. This increases the total number of affordable units by 38 to a total of 172 affordable homes (40% by habitable room taking account of grant funding, increased from 35% as originally submitted). This increase in units and the higher affordable housing provision has been principally achieved through amendments to the height and internal layout in appropriate locations across the Site.

The proposed changes necessitate an amendment to the Application's description of development. The revised description of development (hereafter referred to as the 'Amended Proposed Development') is as follows:

Demolition of existing buildings and structures and comprehensive phased residential-led redevelopment to provide 453 residential units (of which 173 units will be affordable), flexible retail, community and office uses, provision of car and cycle parking, landscaping, public and private open spaces and all other necessary enabling works.

This Circular Economy Strategy has been updated in order to assess the Amended Proposed Development, and to address guidance put forward as part of the draft London Plan 'Intend to Publish' (2019).

2.3 Site context

The site is located to the south of the A316 arterial Lower Mortlake Road and is shaped by the railway lines and by Manor Road on each of its 3 sides. It is 1.5 ha. in size. Only one side of the site has street frontage, along Manor Road. It is currently occupied by a large Homebase store and associated surface level carparking. There is a functioning bus depot on the northern section of the site which will remain as part of the design proposal.

The site surroundings are dominated by large amounts of surface level carparking servicing the Sainsbury's store to the east of the site and on the site itself. There is a small pocket park adjacent to the Sainsbury's car park and some allotments to the south of the railway. There are various bus stops along Manor Road and Lower Mortlake Road, and North Sheen station is just 100m away. The site benefits from a high PTAL rating of 5.

Figure 2: Site Location

Use type	Gross External Area (GEA) Totals (Maximum Parameter)
Residential (C3)	40,567 m^2
Flexible commercial uses (A1, A2, A3, D2 and B1)	543 m^2
Ancillary / plant / bike stores	1,779 m^2
Total (including Plant / Ancillary)	**42,889 m^2**

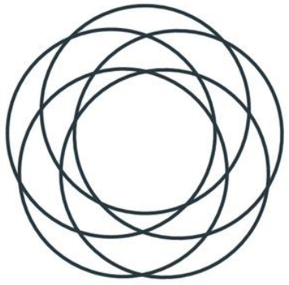
Table 2: Area Schedule.

Figure 3: Architect's Impression of the Amended Proposed Development.

3. Method Statement

A holistic, interdisciplinary approach has been adopted to define and communicate the sustainability strategy for Manor Road. The proposed framework utilises systems thinking and spans the whole project lifecycle with the project legacy in mind from day one.

The design of the Proposed Amendments is based on sustainable design and construction principles as informed by planning requirements and industry best practice. The project has utilised a sustainability framework based on five defined factors; the people, the building, the social network, the natural environment, and the economic aspects to capture the multi-faceted sustainability benefits and values that the development seeks to bring to the application site; local community; surrounding businesses and future building users.



A FRAMEWORK FOR
SUSTAINABLE DEVELOPMENT

CREATING VALUE

Social Capital	Placemaking - By enabling community identity, SOCIAL VALUE is increased where a great place brings people together, and creates a community.
Human Capital	People-centred design - With a focus on people, HUMAN VALUE is increased where quality and longevity of life is improved and happiness is increased.
Natural Capital	Enhancing the environment - By seeking to achieve positive gain, NATURAL VALUE is increased where existing quality is protected and new complementary resources are introduced.
Physical Capital	Mobility and form - Creating high quality buildings ensures PHYSICAL VALUE is increased where buildings and infrastructure design for longevity, and allow people to navigate easily on foot/by bicycle.
Economic Capital	Local prosperity - By ensuring equity for all, ECONOMIC VALUE is increased where all users of a place feel they have a level of ownership of the asset and buy-in to the outcomes it is seeking to achieve.

3.1 Circular Economy Process

The following process has been followed in developing this strategy:

- Working with all key stakeholders, an overall sustainability vision for the development has been defined and agreed.
- A series of sustainability workshops have been held during the concept design stages, in collaboration with the client and project team to help define the sustainability strategy.
- The sustainability strategy, based on the five capitals framework, defines the project vision, themes and intended outcomes. Circular economy aspects are captured within both natural and physical capital.
- A detailed delivery plan capturing all elements of the strategy, target 'owners' and timelines for the proposed activities and milestones has been developed. It is intended that the agreed objectives are tracked and monitored throughout project delivery and operational phases.
- Circular economy principles have been reviewed by the project team as part of this process, specifically in relation to the physical capital.
- Sustainability certification is also being pursued, in the form of BREEAM assessment for the retail elements of the site. A BREEAM pre-assessment exercise has been undertaken via workshops in conjunction with the project team. This exercise has assisted in more detailed consideration of specific targets for these elements of the scheme.
- Additional workshops will be held during the detailed design stages to explore further opportunities to incorporate key Circular Economy principles into aspects of the design, procurement and construction process.
- As the proposals move toward the construction stage, early engagement will be sought with contractors to assist in refining strategies for delivery. Initial documentation that has been prepared to aid this are:
  - A Pre-Demolition Audit has been undertaken for the development to gauge which elements of the existing structures and hardstanding on site can be retained, reused, reclaimed or recycled.
  - A Sustainable Procurement Plan has been developed, setting out aims and targets for procuring products sustainably and locally where feasible.
- Robust data collection plans will be implemented through design and construction to facilitate ongoing monitoring against intended outcomes.
- Given the scale of the development and the likely nature of the construction programme over a couple of years, it is expected that the strategies and approach will evolve over time.

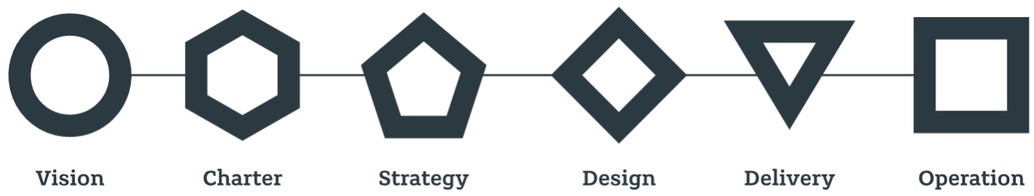


Figure 4: Sustainability Strategy – Delivery Phase (Inception to Completion).

4. Circular Economy Approach

Consumption of natural resources has historically followed a linear approach, heightened by the industrial revolution which, while lifting the living standards of millions, also dramatically increased pressure on environmental resources. Under the traditional take>make>use>dispose model, raw materials are collected, then transformed into products that are used until they are finally discarded as waste. Apart from failing to capture value over the lifetime of products, this approach also produces a range of negative externalities that include resource scarcity, unsustainable levels of water extraction, rising carbon emissions, and widespread ecosystem pollution.

In a circular economy, built environment assets are designed so that whole buildings, and materials, components and parts can be continually and easily recycled.

The built environment sector is a major consumer of natural resources. There is growing industry consensus that the way we design, build, operate and dispose of our buildings and associated facilities needs a major overhaul to obviate waste and increase efficiency. There is an incredible breadth of opportunity that this shift in approach will create across the entire supply chain.

Circular Economy considerations have formed a key part of the project sustainability strategy, given the scale of the development, and the client's wider sustainability aspirations. It is recognised that in order to implement Circular Economy principles most effectively, it is helpful to explore strategic opportunities as early in the development process as possible.

Considerations around resource efficiency, material circularity and ethical sourcing have been considered within the overarching sustainability strategy from the early stages.

ICG/Longbow and Avanton have extensive experience both developing and managing assets, often remaining involved with the operation and management of development projects or parts thereof, and therefore adopt a whole life-cycle approach to development.

It is acknowledged that the approach to circular economy will evolve as the design evolves, or in response to wider considerations and feedback from the GLA or other stakeholders.

As a site-wide strategy, the project has formulated commitments around the promotion of sustainable use of materials comprising several targets around materials and waste including priority given to renewable construction materials such as timber, diversion of construction waste from landfill, maximising the use of recycled or secondary aggregates giving preference to solutions available closer to the site, construction resource efficiency and an overarching ambition to reduce the project's supply chain carbon intensity from materials and manufacturing relative to standard industry performance to be achieved through measures including:

- "Smart" material choices (prioritisation of durable, biodegradable, recycled / recyclable materials and materials that can be reused or re-purposed, where possible)
- Incorporation of modular elements for higher levels of design flexibility and adaptability
- Procurement of products as a service – leasing access to a solution instead of buying it
- Product life extension through improved maintenance, remanufacturing, repairing and upgrading / upcycling
- Closed loop / Take back – working with manufacturers who take back used products to recover the value by using them to make new products.

An effective incorporation of circular economy principles represents an opportunity for the site and the UK as a whole. With its system-wide perspective, the circular economy has the potential to help us make better decisions about resource use, design out waste, provide added value for business and society, and proceed along a secure route to society-wide prosperity and environmental sustainability for future generations.

While specific values and levels of ambition / benchmarks have been defined for some of the metrics, it is recognised that these are preliminary targets and commitments which will be reviewed and may be adjusted as appropriate during the detailed design to respond to the specific requirements of each element and ensure that current best practice is being followed and opportunities to innovate are maximised.

There is a clear understanding that in order to achieve the ambitious objectives set for the project the design team will have to engage and collaborate extensively with the supply chain to foster knowledge sharing and fast track innovative ideas and techniques spanning the design, construction and operation stages thus enabling synergies

Layer	Summary and constituent elements	RICS reference
Site	The geographical setting, urban location and external works	NRM 8
Substructure	Excavations, foundations, basements and ground floors	NRM 1
Superstructure	Load-bearing elements above plinth including roof supporting structure	NRM 2.1, 2.2 and 2.4 - frame, upper floors, stairs
Shell/Skin	The layer keeping out water, wind, heat, cold, direct sunlight and noise	NRM 2.3, 2.5, 2.6 - roofs, external walls, windows and external doors
Services	Installations to ensure comfort, practicality, accessibility and safety	NRM 5
Space	The layout internal walls, ceilings, floors, finishes, doors, fitted furniture	NRM 2.7, 2.8 and NRM 3
Stuff	Anything that could fall if the building was turned upside down	N/a
Construction Stuff	Any temporary installations/works/ materials, packaging and equipment	NRM 0

Figure 5: GLA Building Layers (Guidance Section 2.3)

4.1 Existing Site

The existing site contains a Homebase store and hardstanding landscaping. An assessment was made of the existing site to gauge what, if any, elements of the existing structures and hard landscaping can be retained, reused, reclaimed or recycled.

It was not deemed feasible or desirable to retain the existing building. By constructing a new development, the energy and operational efficiency of the building can be optimised without the fabric constraints of an existing building. A pre-demolition audit has been undertaken to investigate how recycling of construction, demolition and excavation material can be maximised. This has highlighted specific elements of the existing building and hardstanding landscaping on the Site which can be re-used or recycled/recovered, as follows:

Retain / Prevent
- The nature of demolition works means that prevention cannot be applied.

Reuse
- Some of the existing equipment such as racking and shelving can be sold and reused.
- Some ferrous and non-ferrous metal, suitable for reuse can be sold and reused.

Recycle/Recover
- Steelwork frame – potential for recycling as is or processed for reuse.
- The ground floor concrete slab and foundations are constructed of RC concrete, all will be demolished and crushed to a 6F2 specification for reuse within the site.
- Clean concrete will be processed back to aggregate for concrete construction.
- Other ferrous and non-ferrous metals, not suitable for reuse will be processed into new products.
- Plasterboard is separated into its powder and paper elements, the powder is processed for use in new plasterboard and new cement and the paper element is used for new paper and animal bedding.
- Insulation can be limited in its recoverability due to potential contamination. Where possible, insulation will be recovered at the recycling facility for reprocessing. Contaminated insulation will need to be forwarded for disposal.
- Tarmac, in some instances, can be recycled for reuse. However, tar bound product cannot be recycled and has to be disposed of as a waste product.

Dispose
- Insulation – please see note above.
- Tarmac – please see note above.

Opportunities for reuse within the development works
- The ground floor concrete slab and foundations are constructed of RC concrete which will all be demolished and crushed to a 6F2 specification for reuse on site.

Figure 6: Existing Site structures: Homebase store and hardstanding (image from Google Streetview).

4.3 New Development

New buildings developed on the site will follow best practise principles in their design and construction with the overarching aims of reducing material usage, minimising waste, and embedding longevity, flexibility and adaptability.

The following focus areas will be continually reviewed to maximise opportunities to embed circular economy principles:

- Lean design principles
- Material efficiency
- Adaptability
- Flexibility
- Low carbon construction
- Offsite / modular construction
- Design for Manufacture and Assembly (DfMA)
- Dry construction techniques minimising wet trades on-site
- Minimisation of demolition / excavation waste
- Re-use of materials on-site
- Recycled content
- Material circularity
- Material procurement via leasing frameworks
- Responsible procurement
- Sustainable sourcing
- Local sourcing
- Supply chain engagement
- Tenant engagement
- Structural and fabric resilience
- Life-cycle assessments
- Disassembly and demountability

It is expected that advances in innovation and best practise over time combined with effective feedback loop mechanisms will lead to continuous improvement as the design and construction develops.

Three specific documents have been developed which have fed into the Circular Economy targets with regards to the new construction at Manor Road:

Designing for Material Efficiency
This design note was developed with the aim to explain how the design has avoided unnecessary materials use arising from over-specification without compromising structural stability, durability or the service life of the building. Measures implemented in the design at RIBA Stages 1&2 include:

- Efficient outline masterplan design.
- Regularised block layouts where possible.
- High quality materials palette comprising brickwork masonry, reconstituted stone and anodised aluminium metalwork, windows and doors incorporated into the overall design.
- Where possible, items are to be prefabricated or assembled off-site. Including services (e.g. utility cupboards).

Sustainable Procurement Plan
This report outlines the benchmarks expected to be met by construction partners and the entire supply chain regarding sustainable development and best practice. Key development targets are to avoid the following where reasonable to do so:

- Virgin aggregates
- Anodised metals
- Crude-oil derived products
- Steel produced in traditional furnaces
- Stone and heavy materials manufactured outside the EU

Instead there is a preference to use:
- High recycled content and post-consumer reclaimed materials
- Renewable materials
- Steel produced in electric arc furnace
- Where possible, regional materials

Further requirements are made for the supply chain as follows:

- Companies must have a full relevant and up to date environmental policy
- Share information as and when reasonably required
- Ensure all materials comply with relevant legislation
- Adhere to the provisions of the UN Global Compact Principles regarding human rights, labour standards, the environment and anti-corruption
- Not use deleterious materials or environmentally harmful practices where a reasonable alternative is possible
- Adhere to industry standard payment terms & not unreasonably withhold payments to suppliers

Those companies that do comply with the below will be given preference during the tendering process:

- Give preference to locally sourced materials and provided opportunities to small and medium sized enterprises
- Invest in local communities we are working in and help to reduce emissions associated with vehicle movements to our sites
- Provide life cycle costings
- Are active members of the Supply Chain Management School
- Using products that are working towards the adoption of Environment Product Declarations
- Use products from a recognised responsible sourcing scheme
- Showcase innovation and industry best practice

Finally, targets are set for materials to be procured sustainably in accordance with BES6001 / ISO14001 /FSC / PEFC requirements as preference (depending on product type), and deleterious materials will not be allowed on site (e.g. asbestos, lead in plumbing and paintwork, Nickel sulphides).

Designing for adaptability and disassembly
This design note sets out how the design has minimised the need for unnecessary materials use, cost and disruption arising from the need for future adaptation works as a result of changing functional demands, and has maximised the ability to reclaim and reuse materials at final demolition in line with the principles of a circular economy.

Measures considered include:

- Allowance for all major plant to be dismantled and removed.
- All services infrastructure through the building to be designed within designated risers. All risers to be accessible.
- High quality, robust materials palette proposed

- Windows and retail fascias to be removable and replaceable independent of building frame.
- Shell and core units proposed for commercial areas.
  - Shell and core layout provides future tenants with flexibility in space planning and the ability to install various internal finishes.
  - All tenant ft-outs to be designed to be removable.
  - Column layout provides large spans and partition walls not yet defined.
  - Multiple entrances provided for each unit to allow for a range of uses.

Active engagement will continue to be required for key stakeholders engaged in the design and procurement of materials for the site, and the waste management of materials taken off site. These include, but are not limited to:

- Main contractor and sub-contractors
- Lead architect
- Structural engineer
- Civil engineer
- Landscape architect
- Operational waste consultant

4.4 Municipal Waste During Operation

A project-specific Operational Waste Management Strategy has been developed for the development covering both the detailed and outline components making all necessary allowances to ensure that waste arisings can be accommodated under a full occupancy scenario.

The strategy considers the flow of waste from waste generator (i.e. residents/tenants) through to storage and collection. The Strategy outlines how the development has been designed to be sustainable and forward-thinking in its approach to waste and recycling, whilst remaining workable during operation.

Sufficient storage for the segregation and storage of at least three waste streams (recycling, food and residual waste) in both individual units and communal bin stores will be provided to enable effective waste segregation and promote higher recycling and composting rates.

Operational waste has been considered as part of the Waste Management Strategy, issued for planning. A waste management strategy has been applied across the entirety of the site, including all of the residential blocks and the commercial unit.

Waste collection for the proposed development will be undertaken off-street. For the two residential blocks and commercial unit closest to Manor Road on-site facilities management operatives will move the bins to a single bin store located to the north of the site and serviced directly by the refuse vehicle. The two blocks to the southwest of the site will be serviced directly by refuse vehicles.

To balance the number of bins required to be stored on site, with the frequency of waste collections, the bin provision for the site has been planned for two waste collections by the LBRuT refuse collection service per week.

A waste compactor will not be provided for the site as these are not feasible for residential developments, and the commercial unit is not forecast to generate a large enough quantity of waste to warrant the utilisation of a waste compactor, and additional power requirements this would entail.

The number of bins required for this provision is indicated in the table below.

Table 3: Waste Storage for the Proposed Development

Land Use	Eurobin Type	General	Recyclable	Total
Residential (C3)	1,100L	28	23	51
Flexible (A1, A2, A3, D2, B1)	660L	1	1	2
Total		29	24	53

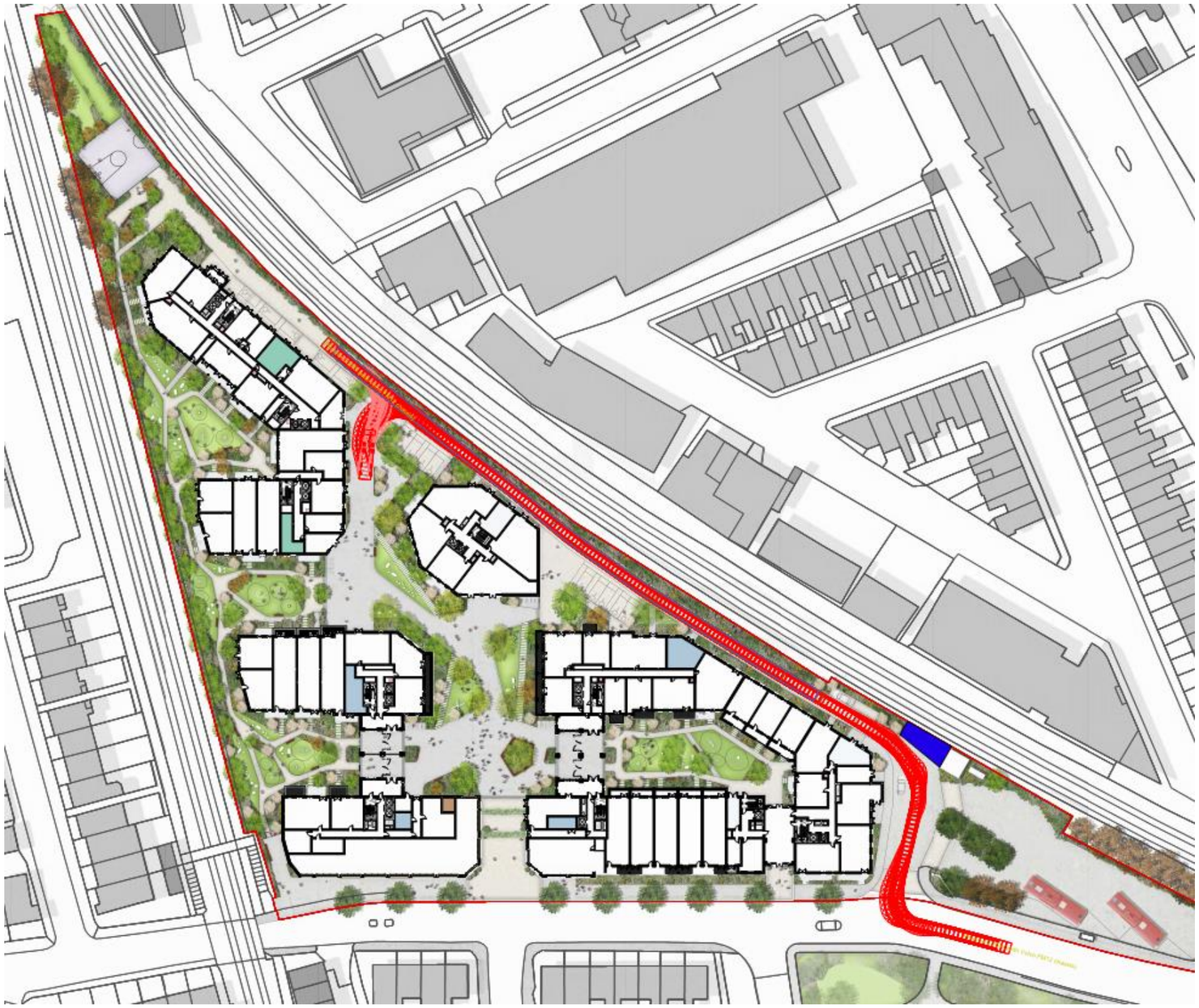


Figure 7: The proposed waste storage locations and collection strategy developed by the project transport consultant.

4.5 Waste During Demolition and Construction

Waste management during both the demolition and construction periods will be undertaken in accordance with the submitted Construction Environment Management Plan, provided by Avison Young.

Waste management procedures and documentation information is covered within the Waste Minimisation and Management section which sets out the processes for waste to be minimised as part of the construction process.

The Materials Management section indicates how materials and other arisings will be stored safely and efficiently, prior either for re-use on site or removal. This section demonstrates that any materials to be reclaimed / reused will be done so in accordance with the Waste & Resources Action Programme (WRAP) protocol. As such materials requiring off-site disposal will be classified within the Demolition and Site Waste Management Plan (D&SWMP).

As part of understanding the impact of the demolition and construction periods the Construction Environment Management Plan illustrates indicative construction vehicle routes.

In addition to this the figure on the overleaf illustrates indicative vehicle routes to recommended demolition waste processing plants, indicating a focus of these to be located within Greater London, minimising vehicle distances to travel, and such impacts of these vehicles on the surrounding environment.

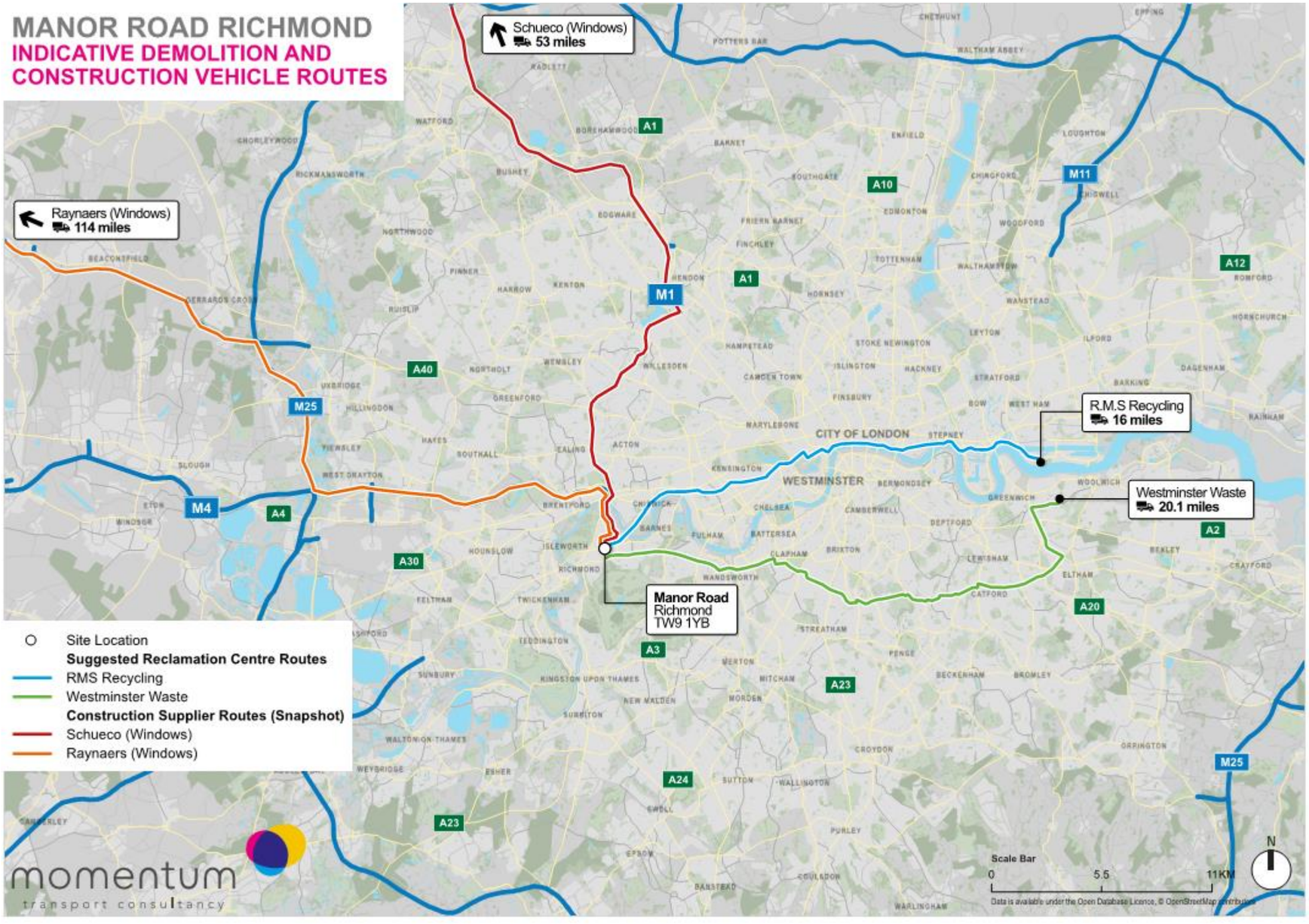


Figure 8: Indicative vehicle routes to recommended demolition waste processing plants provided by the project transport consultant.

5. Strategic Approach Summary – GLA Table 1

Aspect	Steering Approach	Strategy implemented	Target	Supporting Analysis / Studies / Surveys / Audits
Circular economy approach for the existing site	It was not deemed feasible or desirable to retain the existing building. By constructing a new development, the energy and operational efficiency of the building can be optimised without the fabric constraints of an existing building. A pre-demolition audit has been undertaken to investigate how recycling of construction, demolition and excavation material can be maximised. This has highlighted specific elements of the existing building and hardstanding on the Site which can be re-used or recycled/recovered.	Opportunities identified for the development are: **Reuse** – Some of the existing equipment such as racking, and shelving can be sold and reused. – Some ferrous and nonferrous metal, suitable for reuse can be sold and reused. **Recycle/Recover** – Steelwork frame – potential for recycling as is or processed for reuse. – The ground floor concrete slab and foundations are constructed of RC concrete, all will be demolished and crushed to a 6F2 specification for reuse within the site. – Clean concrete will be processed back to aggregate for concrete construction. – Other ferrous and nonferrous metals, not suitable for reuse will be processed into new products. – Plasterboard is separated into its powder and paper elements; the powder is processed for use in new plasterboard and new cement and the paper element is used for new paper and animal bedding. – Insulation can be limited in its recoverability due to potential contamination. Where possible, insulation will be recovered at the recycling facility for reprocessing. Contaminated insulation will need to be forwarded for disposal. – Tarmac, in some instances, can be recycled for reuse. However, tar bound product cannot be recycled and has to be disposed of as a waste product. **Dispose** – Insulation – please see note above. – Tarmac – please see note above. **Opportunities for reuse within the development works** – The ground floor concrete slab and foundations are constructed of RC concrete which will all be demolished and crushed to a 6F2 specification for reuse on site.	95% diversion from landfill (GLA target)	Pre-Demolition Audit

Aspect	Steering Approach	Strategy implemented	Target	Supporting Analysis / Studies / Surveys / Audits
Circular economy approach for the new development	The new buildings developed on the site will follow best practise principles in their design and construction with the overarching aims of reducing material usage, minimising waste, and embedding longevity, flexibility and adaptability. The following focus areas will be reviewed to maximise opportunities to embed circular economy principles: – Lean design principles – Material efficiency – Adaptability – Flexibility – Low carbon construction – Offsite / modular construction – Design for Manufacture and Assembly (DfMA) – Dry construction techniques minimising wet trades on-site – Minimisation of demolition / excavation waste – Re-use of materials on-site – Recycled content – Material circularity – Material procurement via leasing frameworks – Responsible procurement – Sustainable sourcing – Local sourcing – Supply chain engagement – Tenant engagement – Structural and fabric resilience – Life-cycle assessments – Disassembly and demountability	It is expected that advances in innovation and best practise over time combined with effective feedback loop mechanisms will lead to continuous improvement as the development design and construction progresses. Consideration for circular economy implementation will be required at each stage, with the overarching circular economy ambitions embed in the brief for detailed design and construction. Active engagement will continue to be required for key stakeholders engaged in the design and procurement of materials for the site, and the waste management of materials taken off site. These include, but are not limited to: – Main contractor and sub-contractors – Lead architect – Structural engineer – Civil engineer – Landscape architect – Operational waste consultant	95% diversion from landfill at end of life (GLA target)	Sustainable Procurement Plan Pre-Demolition Audit Sustainability strategy Architecture reports Structural technical report Operational Waste Management Strategy BREEAM Pre-assessment Pre-construction engagement with main contractor and supply chain.
Circular economy approach for municipal waste during operation	A project-specific Operational Waste Management Strategy has been prepared in accordance with relevant requirements, in order to embed and enable sustainable waste management in operation. This Strategy provides an overview of how the Revised Scheme has been designed to consider the flow of waste through the development, from waste generator (i.e. residents/tenants) through to storage and collection, in a sustainable manner during its operation. The Strategy outlines how the Revised Scheme has been designed to be sustainable and 'forward-thinking' in its approach to waste and recycling, whilst remaining 'workable' during the operation of the Revised Scheme.	Waste arisings and storage requirements are based upon guidance produced by LBRuT, published in April 2015. This guidance was seen as the most relevant as it is proposed that the borough is the primary waste collection contractor for the proposed development. As such waste arisings have been forecast for general and recyclable waste, as LBRuT do not presently collect food waste. As such, following the adopted waste management policy at LBRuT the target is for 50% of waste diversion from landfill.	65% diversion from landfill notionally targeted (including energy recovery & acknowledging requirements of LBRuT for 50:50 waste storage for general & recycled waste)	Operational Waste Management Strategy Waste Storage and Collection Requirements & Calculations Waste Streams - Definitions and Responsibilities

Table 4: Strategic Approach.

6. Key Commitments for Manor Road – GLA Table 2

*Related BREEAM credits. Note, in some instances numerical targets proposed here are beyond BREEAM requirements.

Building "Layer" (as per GLA guidance)	Site	Substructure	Superstructure	Shell/Skin	Services	Space	Stuff	Construction Stuff	Summary	Challenges	Counter-Actions + Who + When	Plan to prove and quality
	SECTION A: CONSERVE RESOURCES											
Minimising the quantities of materials used	Regularised block layouts where possible. (Mat 06)*	Seeking to embed high cement replacement with 30% PFA or 70% GGBFS.	Lean design principles adopted. (Mat 06)* Post tensioned slabs to reduce concrete fraction to be considered at the appropriate stage of design.	High quality materials palette comprising brickwork masonry, reconstituted stone and anodised aluminium metalwork, windows and doors incorporated into the overall design. (Mat 01/06)*	Where possible, items are to be prefabricated or assembled off-site. Including services (e.g. utility cupboards). (Mat 06)*	Limit any finishes installed prior to leasing to absolute minimum. (Mat 06)* Use of recycled raised access floors to be reviewed in detailed design.	To be considered with tenant as part of incoming fit-outs.	Accurately forecasting the amount of materials needed, using larger pack sizes to reduce the amount of packaging per unit and by using cardboard packaging instead of plastic where possible.	**Lean design principles adopted, and elements pre-fabricated off-site where possible. Refinement of material quantities will be reviewed as design proceeds.**	Ensuring sub/structure material quantities are minimised whilst dealing with below ground site constraints	Ensure structural design is optimised for substructure and superstructure (Structural engineer)	Material efficiency review exercise at next stage of design. Bill of quantities analysis against material benchmarks.
Minimising the quantities of other resources used (energy, water, land)	A Whole Life Carbon Assessment has been undertaken, taking a holistic view to reducing embodied and operational carbon emissions (Mat 01)*	A Whole Life Carbon Assessment has been undertaken, taking a holistic view to reducing embodied and operational carbon emissions (Mat 01)*	Consider DfMA and modular design opportunities in order to reduce construction programme therefore associated resources (energy, water, packaging) (Wst 06)* A Whole Life Carbon Assessment has been undertaken, taking a holistic view to reducing embodied and operational carbon emissions (Mat 01)*	Consider DfMA and modular design opportunities in order to reduce construction programme therefore associated resources (energy, water, packaging) (Wst 06)* A Whole Life Carbon Assessment has been undertaken, taking a holistic view to reducing embodied and operational carbon emissions (Mat 01)*	Residential areas will target a water consumption of 105 l/p/day or less. The development is being designed to be highly energy efficient, as confirmed within the Energy Strategy, submitted in support of the Planning Application. (Ene 01)* A Whole Life Carbon Assessment has been undertaken, taking a holistic view to reducing embodied and operational carbon emissions (Mat 01, Ene 01)*	Commercial units designed to accommodate a variety of uses. Column layout provides large spans and partition walls not yet defined. Multiple entrances provided for each unit to allow for a range of uses.	Minimise carbon emissions from tenant's operational activities and fit out (Ene 01)*	The contractor will be required to monitor and report energy and water use during construction works on-site.	**Consideration of DfMA and offsite fabrication where possible.** **Monitoring and reporting of energy and water use during construction works.**	Maturity of the market /design solutions. Specific site constraints driving bespoke solutions.	Ensure structural design is optimised (Structural engineer) Pre-construction supply chain engagement	Review exercise at next stage of design.

Building "Layer" (as per GLA guidance)	Site	Substructure	Superstructure	Shell/Skin	Services	Space	Stuff	Construction Stuff	Summary	Challenges	Counter-Actions + Who + When	Plan to prove and quality
Specifying and sourcing materials responsibly and sustainably	Sustainable procurement plan established across the development. (Mat 03)* Prioritise locally sourced materials where possible Recycled aggregates being used in sub-base (Wst 02)*	Prioritise certified products / materials, i.e: - EPDs - ISO14001 - BES6001 - FSC - PEFC - CARES (Mat 03)* Concrete GGBS content to be optimised. Target to use materials that can be reused at end of life.	Prioritise products certified with BES6001 'Good' certification. (Mat 03)* Concrete GGBS content to be optimised. (Wst 02)* Recycled content of structural steel to be maximised. UK average currently approx. 20%. Target to use materials that can be reused at end of life.	Prioritise façade systems with EPDs. (Mat 02)* Review equivalent façade manufacturers and their associated product stage carbon emissions.	Recycled content of ductwork to be maximised.	-	To be considered with tenant as part of incoming fit-outs.	Sustainable Procurement Plan has been developed. To be reviewed with contractor during pre-construction supply chain engagement	**Materials to be responsibly sourced, and locally sourced where possible.** **Structural elements to have high recycled content or cement replacement levels.**	Potential cost premium. Higher recycled content targets may limit supply chain. Structural constraints for higher GGBS content.	Ensure structural design is optimised (Structural engineer) Pre-construction supply chain engagement	Review exercise at next stage of design
	SECTION B: DESIGN TO ELIMINATE WASTE (AND FOR EASE OF MAINTENANCE)											
Designing for reusability / recoverability / longevity / adaptability / flexibility	-	-	The following aspects have been considered: - Flexible floorplates layouts / structural grids - Avoidance of toxic treatments and finishes. - Floor to ceiling heights - Placement of the core. - Standardised components (Mat 05/Wst 06)*	The following aspects have been considered: - Modular assembly of curtain walling - Off-site fabrication - Disassembly strategy - Standardised components (Mat 05/Wst 06)*	The following aspects have been considered: - Flexibility / adaptability - Metering / split tenancies - Standardised components - Disassembly strategy (Mat 05/Wst 06)*	The following aspects have been considered: - Flexible floor plates and layout of core (Mat 05 / Wst 06)*	To be considered with tenant as part of incoming fit-outs..	Sustainable Procurement Plan has been developed. To be reviewed with contractor during pre-construction supply chain engagement	**Design spaces for flexibility whilst enabling access to all elements that could be re-used/replaced.**	Avoiding design solutions which constrain disassembly / recoverability.	Disassembly / recoverability review during detailed design (structural engineer, architect, contractor input)	-

Building "Layer" (as per GLA guidance)	Site	Substructure	Superstructure	Shell/Skin	Services	Space	Stuff	Construction Stuff	Summary	Challenges	Counter-Actions + Who + When	Plan to prove and quality
Designing out construction, demolition, excavation, industrial and municipal waste arising	-	The ground floor concrete slab and foundations are constructed of RC concrete. All will be demolished and crushed to a 6F2 specification for reuse within the site (Mat 06)*	The following have been considered: - Modular construction - DfMA approaches - Supplier take-back schemes (Wst 01/06)*	The following have been considered: - Modular construction - DfMA approaches - Supplier take-back schemes - Just-in-time delivery (Wst 01/06)*	The following have been considered: - Modular construction - DfMA approaches - Supplier take-back schemes - Just-in-time delivery (Wst 01/06)*	The following have been considered: - Supplier take-back schemes - Just-in-time delivery - Minimising Packaging (Wst 01)*	To be considered with tenant as part of incoming fit-outs.	Accurately forecasting the amount of materials needed, using larger pack sizes to reduce the amount of packaging per unit and by using cardboard packaging instead of plastic where possible.	**Designing out waste through regular / modular design.** **Consideration for just-in-time delivery, reducing packaging, and supplier take-back schemes**	Supplier take-back schemes still an immature market for certain materials in the UK.	Review during detailed design	Review procurement plan with contractor during pre-construction supply chain engagement
	SECTION C: MANAGE WASTE											
Demolition waste (how waste from demolition of the layers will be managed)	Aim to achieve 90% diversion from landfill (Wst 01)* Tarmac, in some instances, can be recycled for reuse. However, tar bound product cannot be recycled and has to be disposed of as a waste product.	The development will be on piled foundations (rather than shallow foundations). The piled foundations will be bounded in strata, which means the foundation will not be influenced by the changing climate.	Steelwork frame – potential for recycling as is or processed for reuse. The ground floor concrete slab and foundations are constructed of RC concrete, all will be demolished and crushed to a 6F2 specification for reuse within the site. Clean concrete will be processed back to aggregate for concrete construction.	Plasterboard is separated into its powder and paper elements, the powder is processed for use in new plasterboard and new cement and the paper element is used for new paper and animal bedding. Insulation can be limited in its recoverability due to potential contamination. Where possible, insulation will be recovered at the recycling facility for reprocessing. Contaminated insulation will need to be forwarded for disposal.	N/A	N/A	Some of the existing equipment such as racking and shelving can be sold and reused. Some ferrous and non ferrous metal, suitable for reuse can be sold and reused.	Waste relating to the demolition phase will be managed through the implementation of a D&SWMP to be submitted prior to above-ground works, with a primary aim to minimise waste during this period. The contractor will support the segregation of recoverable and non-recoverable waste streams and indicative vehicle routes have been mapped, focusing on reducing vehicle milage.	**Pre-demolition audit undertaken , targeting 90% of waste diversion from landfill.**	Ensuring 90% of waste is diverted from landfill.	Pre-demolition audit, pre-contract engagement with demolition contractor.	Demolition SWMP records.

Building “Layer” (as per GLA guidance)	Site	Substructure	Superstructure	Shell/Skin	Services	Space	Stuff	Construction Stuff	Summary	Challenges	Counter-Actions + Who + When	Plan to prove and quality
Excavation waste (how waste from excavation will be managed)	Opportunities to re-use excavation waste as per DoWCoP will be investigated. Tarmac, in some instances, can be recycled for reuse. However, tar bound product cannot be recycled and has to be disposed of as a waste product.	The ground floor concrete slab and foundations are constructed of RC concrete. All will be demolished and crushed to a 6F2 specification for reuse within the site.	N/A	N/A	N/A	N/A	N/A	N/A	Excavated waste to be re-used on site where possible.	Finding applicable uses for excavated waste.	Opportunities to be investigated for re-use (structural engineer, architect)	
Construction waste (how waste arising from construction of the layers will be reused or recycled)	Aim to achieve 90% diversion from landfill. (Wst 01)* Overall project target waste arisal <6.5 ton/100m² GIFA of non-hazardous construction waste. (Wst 01)*	Aim to achieve 90% diversion from landfill. (Wst 01)* Overall project target <3.2 ton/m² GIFA of non-hazardous construction waste. (Wst 01)*	Aim to achieve 90% diversion from landfill. (Wst 01)* Overall project target <3.2 ton/m² GIFA of non-hazardous construction waste. (Wst 01)*	Aim to achieve 90% diversion from landfill. (Wst 01)* Overall project target <3.2 ton/m² GIFA of non-hazardous construction waste. (Wst 01)*	Aim to achieve 90% diversion from landfill. (Wst 01)* Overall project target <3.2 ton/m² GIFA of non-hazardous construction waste. (Wst 01)*	Aim to achieve 90% diversion from landfill. (Wst 01)* Overall project target <3.2 ton/m² GIFA of non-hazardous construction waste. (Wst 01)*	To be considered with tenant as part of incoming fit-outs. Guidance / targets included in fit-out guide.	To be reviewed with contractor during pre-construction supply chain engagement	Overarching project targets of 90% diversion from landfill and <6.5 ton/100m² GIFA of non-hazardous construction waste	Dealing with the most challenging waste streams commonly sent to landfill.	Pre-construction review with contractor	Final site waste management plan data as used for BREEAM PCR assessment
Municipal and industrial waste (how the design will support operational waste management)	Refuse storage planned in conjunction with site waste management strategy (Wst 03)*	Suitable refuse storage provided to enable segregation and storage of waste. (Wst 03)*	N/A	N/A	N/A	N/A	N/A	N/A	Appropriate refuse storage to enable recycling and best practise waste management	-	-	-

Table 5: Key Commitments.

Appendix

References

A wide range of established and emerging industry guidance and best practice has informed the circular economy approach adopted to date, including but not limited to:

- GLA (2020) Draft whole life carbon assessment guidance
- RIBA 2030 Climate Challenge
- LETI Net Zero Operational Carbon requirements for new buildings
- UK GBC Net Zero Carbon: Energy Performance Targets (for office buildings)
- Design for Performance (DfP) star rating (for office buildings)

Project team industry engagement

GREATER LONDON AUTHORITY

RIBA Royal Institute of British Architects

LONDON ENERGY TRANSFORMATION INITIATIVE

BBP BETTER BUILDINGS PARTNERSHIP

UK GBC

LEIGHTON SMITH
SUSTAINABILITY CONSULTANT

+44 20 3668 7371
leightonsmith@hoarelea.com

HOARELEA.COM

Western Transit Shed
12-13 Stable Street
London
N1C 4AB
England