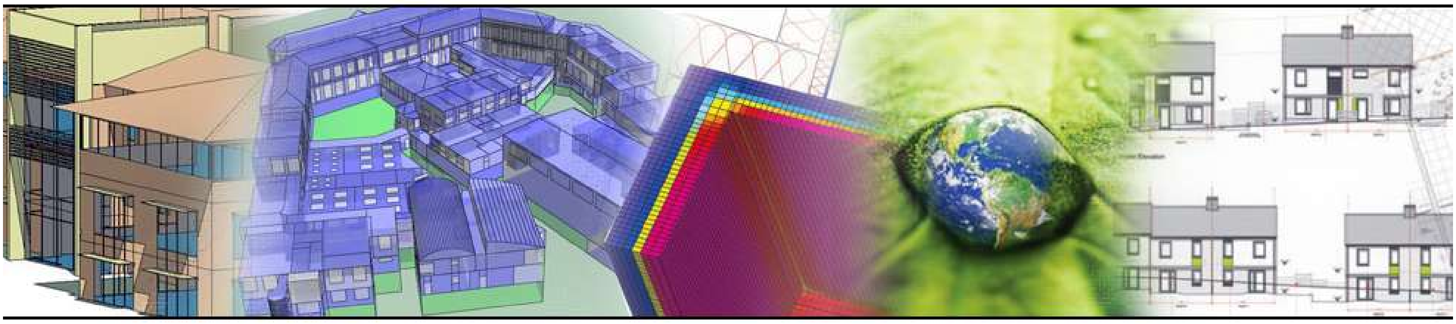

Circular Economy Statement

Harefield Grove

Stroma Reference: OPP-089359
Date: 14/08/2025
Prepared for: Comer Homes Group

1. Executive Summary

1.1. Scope

This Circular Economy Statement has been commissioned on behalf of Comer Homes Group to support the planning submission for the proposed development of Harefield Grove.

This report has been prepared in line with the guidance given in the GLA Document 'Circular Economy Statement guidance, March 2022' and against the requirements of London Plan Policy SI7 Reducing waste and supporting the circular economy .

1.2. Circular Economy Approach

The construction industry generates about 35% of waste to landfill across the globe (Solís-Guzmán et al., 2009). In the UK, out of 100% of waste generated in 2013, 44% was due to construction and the rest was as a result of commercial, industrial, household, mining and agricultural activities (Ajayi and Oyedele, 2017). More than half of construction and demolition waste (C&DW) is disposed directly to landfills In the UK (Chinda, 2016). C&DW generation for the UK in 2014 was 58 million tons (Menegaki and Damigos, 2018). Integrated and optimised management of this waste is one of the pillars of strategy 2020, "A Roadmap to a Resource-Efficient Europe", whose goal is to reduce, re-use and recycle the waste (European Commission, 2011, Rodríguez et al., 2015).

Policies worldwide recognise that the construction sector needs immediate mitigation actions for reducing greenhouse gas (GHG) emissions, climate change and resources depletion, with a focus on adopting circular economy approach to ensure sustainable use of construction materials (Hodge et al., 2010, Sieffert et al., 2014). Circular economy is an economic system that is based on business models which replace the 'end-of-life' concept with reducing, alternatively reusing, recycling and recovering materials in production/distribution and consumption processes (Kirchherr et al., 2017). The circular economy model tries to keep the products and materials 'in flow' by means of effective and smart re-use strategies, therefore, reducing the use of virgin materials and negative environmental impacts (Mirata, 2004). (Ghaffar, Burman and Braimah, 2020).

Opportunities for retaining and refurbishing the existing buildings and materials on site have been assessed to maximise the potential residual value of the existing structures and conserve resources by reducing the need to new materials. An assessment was made of the existing site to determine if any of the existing structures and hard landscaping could be retained, reused, or recycled.

The existing building will be retained to provide residential development with the creation of 6 apartments.

The new buildings will avoid unnecessary materials use arising from over specification without compromising structural stability durability or the service life of the building.

This will be achieved through:

1. Reduce cost as a result of a reduction of material use in building design.
2. Encourage the reuse of existing materials.
3. Encourage the use of materials with higher levels of recycled content.
4. Improve understanding of, and the performance of, alternative design and construction methods that result in lower material usage and waste levels.

A project specific Waste Management Strategy will be developed for the operation stage of the development to ensure that waste arising can be accommodated during occupancy stage of the development.

An initial assessment has been prepared against local, regional and national policy to determine the optimum sizing of waste storage areas on the site.

A Sustainable Procurement plan will be developed for the project. This plan sets out a clear framework for the responsible sourcing of construction products to guide procurement throughout a project and by all involved in the specification and procurement of construction products. The plan may be prepared and adopted at an organisational level or be site or project specific.

The plan will include the following criteria:

1. Include sustainability aims, objectives and strategic targets to guide procurement activities.
2. Include a requirement for assessing the potential to procure construction products locally. This includes a policy to procure construction products locally where possible.
3. Include details of procedures in place to check and verify the effective implementation of the sustainable procurement plan.

Contents

2. Quality Management

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Date: 14/08/2025	**Date:** 14/08/2025
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Version	Status	Date	Change Summary
CE1	First Issue	11/10/2022	-
CE2	Second Issue	24/08/2023	Inclusion of the revised GLA Assessment Spreadsheet
CE3	Third Issue	01/09/2023	Comments
CE4	Fourth Issue	13/08/2025	Updated for revised planning application

3. Development Site

Stroma Built Environment has been commissioned on behalf of Comer Homes Group to prepare a Circular Economy Statement in support of the planning application for the proposed development at Harefield Grove, Middlesex.

The site is situated some 1km to the north of Harefield Village on the eastern side of Rickmansworth Road. The site extends to approximately 7.8 hectares and is accessed via a long driveway from Rickmansworth Road. The site is currently vacant, although it is used sporadically for film and television sets. The site's last permanent use was for office purposes in c. 2002.

This planning application includes the subdivision and conversion of the Main House into 6no. residential units; demolition of the existing extension of the Main House and erection of a three storey 'stable block' building containing 28no. residential units; construction of a new dwellinghouse to the south-east (Orchard House); extension of Garden House to provide a new single storey dwelling; internal alterations to Cottage House to provide a new two storey dwelling; demolition of Conservatory building and replacement with a new two storey dwelling (Lake View House); and associated alterations to landscape, access and parking.

The total Gross Internal Area for the refurbished main house is 1,260m2 and 3,180m2 for the new build Stable Block. The other buildings on the site consist of a refurbished Cottage House to form a single dwelling, an extension to Garden House to provide a single dwelling, a new build Lake View House and a new build Orchard House.

Figure 1. Application Site Plan

4. Planning Policy

The London Plan 2021 includes the following policies in relation to the Circular Economy.

SI7 Reducing waste and supporting the circular economy

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

1) promote a more circular economy that improves resource efficiency and innovation to keep products and materials at their highest use for as long as possible

2) encourage waste minimisation and waste prevention through the reuse of materials and using fewer resources in the production and distribution of products

3) ensure that there is zero biodegradable or recyclable waste to landfill by 2026

4) meet or exceed the municipal waste recycling target of 65 per cent by 2030

5) meet or exceed the targets for each of the following waste and material streams:

- construction and demolition – 95 per cent reuse/recycling/recovery
- excavation – 95 per cent beneficial use

6) design developments with adequate, flexible, and easily accessible storage space and collection systems that support, as a minimum, the separate collection of dry recyclables (at least card, paper, mixed plastics, metals, glass) and food.

5. Method Statement

5.1. Assessment Process

The following process has been followed in developing the Circular Economy Strategy for the development:

- Key stakeholders within the design team have been consulted to develop an overall sustainability vision for the development. This early stakeholder engagement ensures that key project stakeholders are identified and engaged to determine end user requirements and operational adaptability, allowing them to be taken into account throughout the project.
- Adopting integrated design and engagement processes has been demonstrated to result in improved operational performance, greater project efficiencies, and reduced risks to performance, time and cost. Following an integrated design process, maximises the opportunities for performance and minimises risks of design conflicts appearing later on in a project when risks to time and cost are higher.
- A Sustainability Workshop is to be held during the concept design stages, in collaboration with the client and project team to help define the sustainability strategy.
- The strategy approach is summarised within table 1 (adapted from the Draft GLA Guidance document on preparing Circular Economy Statements).
- The proposals include demolition of some parts of the existing buildings and thus a pre demolition audit will be undertaken by the demolition contractor as part of this application.
- The new buildings will avoid unnecessary materials use arising from over specification without compromising structural stability durability or the service life of the building. This will be achieved through:
    - Reduced cost as a result of a reduction of material use in building design.
    - Encourage the reuse of existing materials.
    - Encourage the use of materials with higher levels of recycled content.
    - Improve understanding of, and the performance of, alternative design and construction methods that result in lower material usage and waste levels.
- A project specific Waste Management Strategy will be developed for the operation stage of the development to ensure that waste arising can be accommodated during occupancy stage of the development.
- The strategy will be prepared against local, regional and national policy to determine the optimum sizing of waste storage areas on the site.
- A Sustainable Procurement plan will be developed for the project. This plan sets out a clear framework for the responsible sourcing of construction products to guide procurement throughout a project and by all involved in the specification and procurement of construction products. The plan will include the following criteria:
    - Include sustainability aims, objectives and strategic targets to guide procurement activities.
    - Include a requirement for assessing the potential to procure construction products locally. This includes a policy to procure construction products locally where possible.

- Include details of procedures in place to check and verify the effective implementation of the sustainable procurement plan.

These key commitments are summarised in Table 2

5.2. Circular Economy Approach for the Project

A Circular Economy is defined in London Plan Policy SI7 '**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.

It is a new economic model that moves away from this current linear economy, where materials are mined, manufactured, used and thrown away, to a more circular economy where resources are kept in use and their value is retained.

For buildings, this means creating a regenerative built environment that prioritises retention and refurbishment over demolition and rebuilding. It means designing buildings that can be adapted, reconstructed and deconstructed to extend their life and that allow components and materials to be salvaged for reuse or recycling.

Designing buildings for a circular economy can increase their value by avoiding depreciation and can help to stave off obsolescence. It can even secure a positive residual value at end-of-life.

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

A workshop was held with the project team on the 6th October 2022 to establish the Circular Economy targets and aspirations. A summary of the points discussed is given below:

How can circularity be achieved?

- Examples of what is currently being done/ implemented
- What should/could be done to enhance circularity?
- How is product selection affected?
- What might the cost implications be?
- Target and metric setting and

6. Strategic Approach Summary

6.1. Materials Assessment

An Assessment has been undertaken within the OneCLick LCA Tool to establish the Circular Economy Design Principles by Building Layer.

The OneClick Tool Building Circularity score represents the total materials circularity both in use of materials for the project as well as end of life handling. It is calculated as the average of Materials Recovered (representing use of circular materials in the project) and Materials Returned (representing how effectively materials are returned, instead of disposed of or downgraded in value. The calculation is purely mass-based without material weighting. The image below shows the overall building Circularity of the proposed Stage 2 design.

The chart shows the materials specification for the development shows the potential to achieve a 37% Building Circularity Score

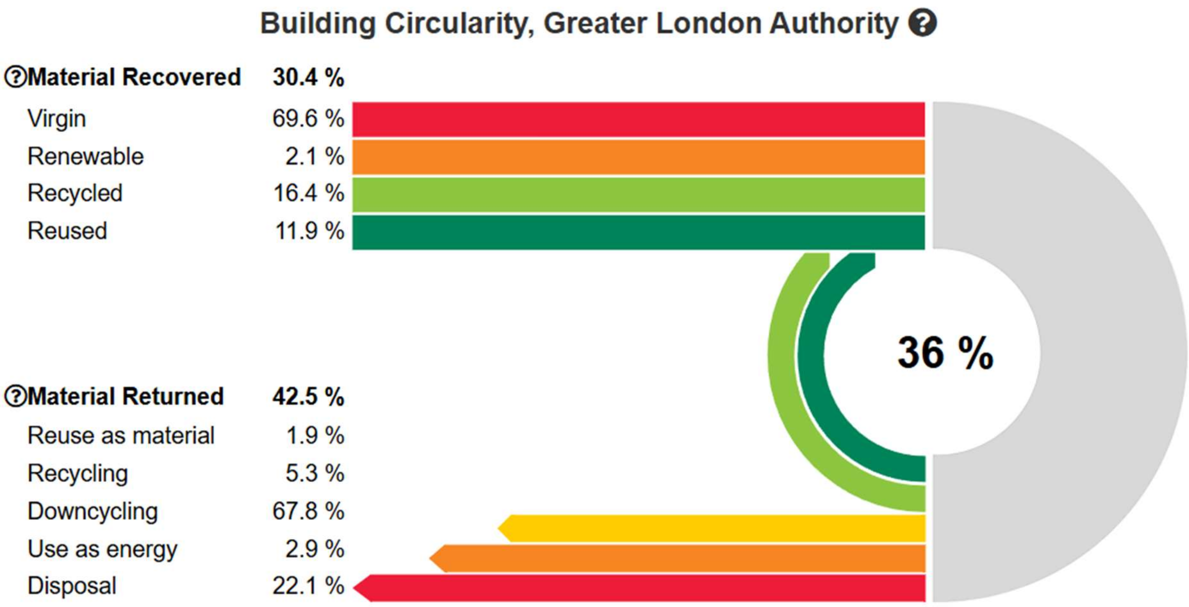


Figure 2.OneClick Building Circularity Score

The bubble chart and pie chart below shows the life cycle impacts of the different materials within the building specification. As can be seen from the charts, the material with the most life cycle impact is that of concrete and ready mix used within floor slabs, ceilings, roofing decks, beams and floors.

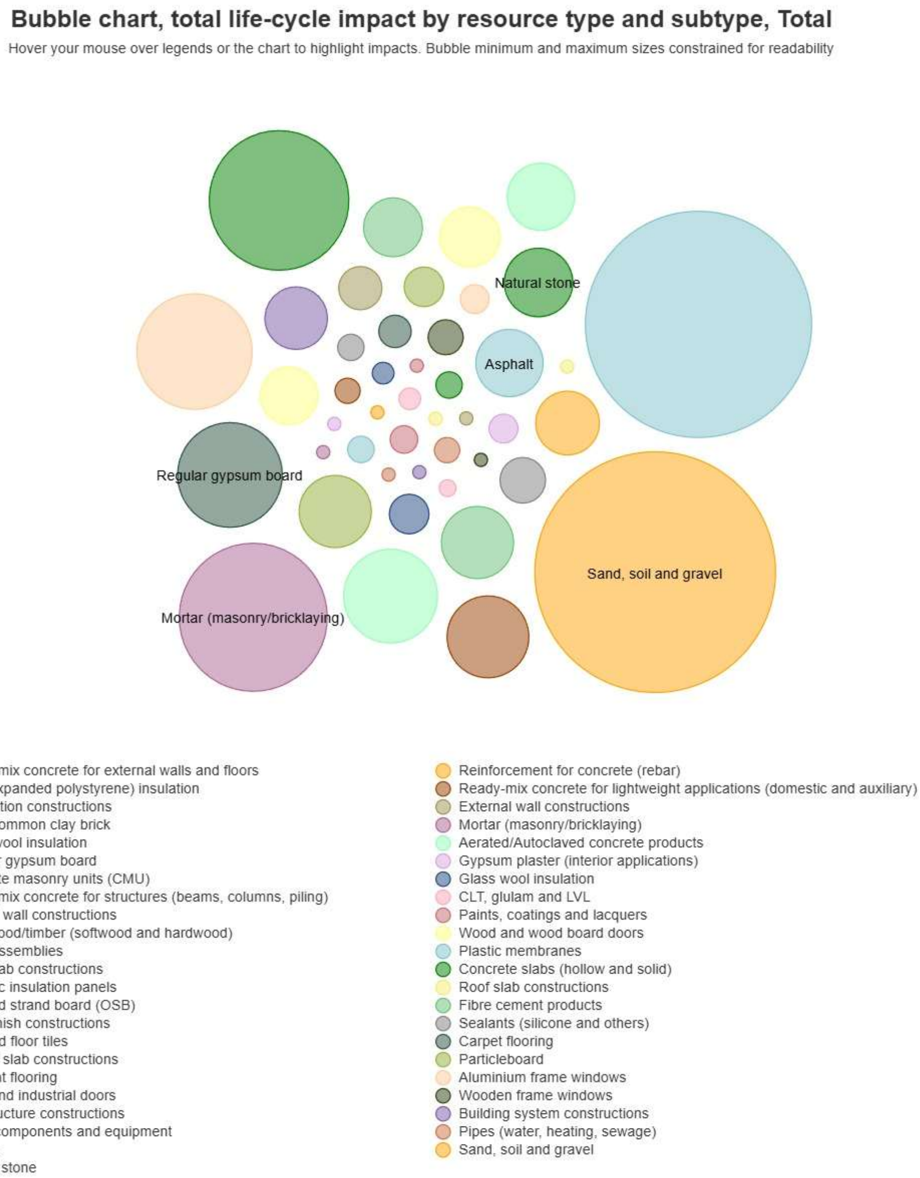


Figure 3.Bubble chart showing total life cycle impact by resource type and sub type

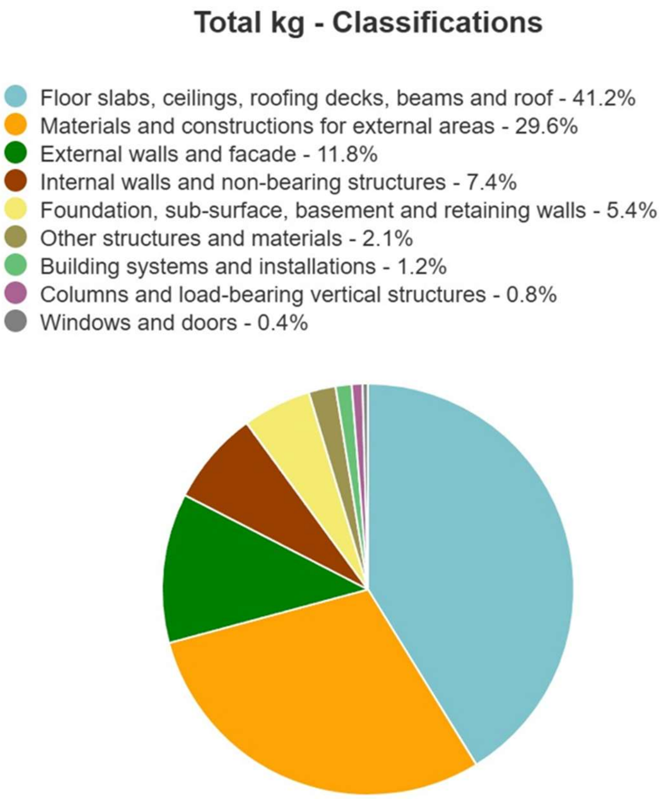


Figure 4.Total tonnes of materials

This strategic assessment has informed the Circular Economy approach and further actions taken to reduce the impact associated with the development. The assessment has shown that the concrete materials have the highest life cycle impact and the floor slabs, ceilings and roof structure within the building has the largest amount of embodied carbon.

This has allowed the circular economy aims to be focused on areas with the highest impact.

6.2. Circular Economy Narrative

6.2.1. Existing development

The site is occupied by a former mansion house in extensive grounds, is situated on the eastern side of Rickmansworth Road, approximately half a mile to the north of Harefield village, with Colne Valley, the Union Canal and M25 to the west, Rickmansworth and Watford to the north, Northwood and Ruislip to the east and Denham and the M40/A40 to the south. Images of the site are shown below.

The Design and Access Statement for the application states the following:

This new application proposes significant enhancement of the landscaped grounds and including a more appropriate restoration of the mansion house.

Consequently, the mansion house is to be restored and subdivided into 6No. apartments. The existing office and stable blocks are to be demolished and replaced with a new courtyard stable block.

The proposed stable block is a mixture of 1, 2 and 3 bedroom apartments across 3No. floors creating 28No. spacious units. In all, 38No. residential units will be provided with 61No. open car spaces. The total gross area of the proposed residential accommodation will be 4,900m² compared with an approved gross area of 3,930m².

The proposed scheme returns the site to its original purpose and seeks to make the best use of the attractive landscape and in particular removing the unsightly 1980's glazed extension.

To align the proposals with the decision tree for existing structures and buildings the design team have opted to retain and retrofit the existing building on site. The extract below shows how this has been followed:

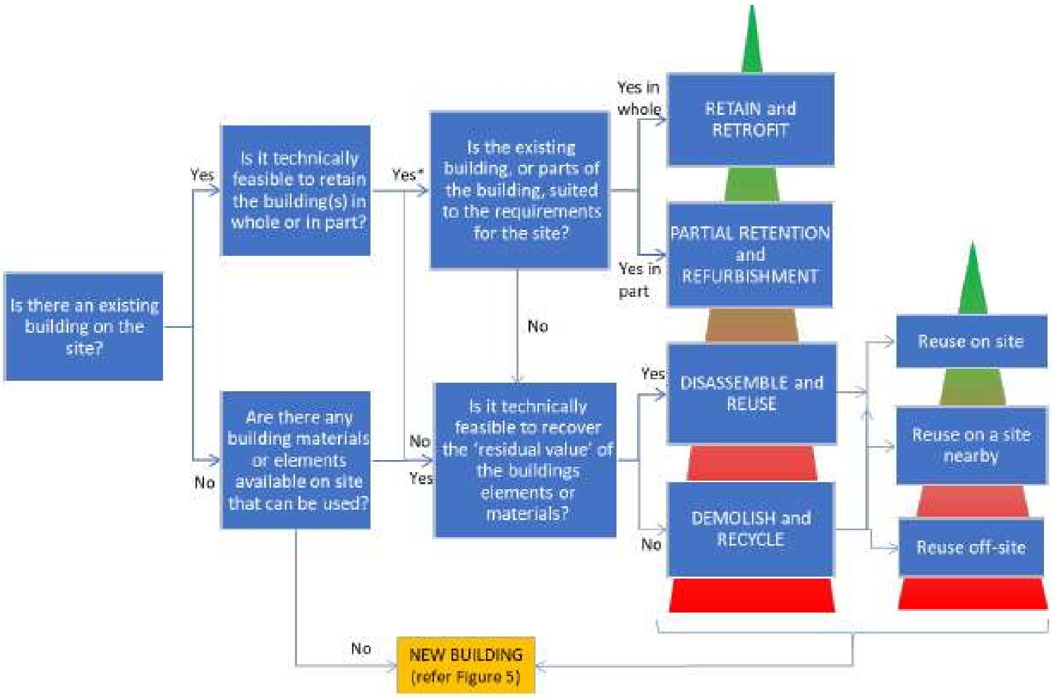


Figure 5. Decision Tree for design approaches for existing structures

1. Is there an existing Building on the site? – Yes
2. Is it technically feasible to retain the building in whole or in part – Yes
3. Is the existing building or parts of the building suited to the requirements for the site – Yes in part
4. Partial Retention and Refurbishment

6.2.2. Circular Economy Design Approach Existing Building

The main existing buildings on the site are retained and will be retrofitted to form 6 apartment buildings. These will be retrofitted with fabric improvements and services to comply with current Building Regulations. This will return the Main House at Harefield Grove to residential use, as apartments. This refurbishment repairs the historic fabric of the building, retaining detail and primary layouts. The proposal is to remove of the large extension and stables. The extension is currently attached to its south elevation, which will halt damage currently being inflicted by the frame of the building undermining the historic building fabric of the main house.

The proposed removal of the large extension currently attached to the house's south elevation has several significant advantages. The primary one is that it will halt physical damage currently being inflicted at the junction between the old and new which is undermining the historic building fabric of the main house. Whilst the concept of a glazed link between existing and proposed buildings was popular when the extension was built, water ingress and structural issues have resulted in distress to the heritage asset which will be alleviated by the extension's removal and careful repair of the south elevation. This removal also facilitates the south elevation to be fully exposed, and the symmetry of the house to be enjoyed without visual disruption by the extension.

Any suitable material from the existing hardstanding and existing buildings will be processed to be used as a piling mat by the Main Contractor where required. All excavated material will be utilised where feasible for filling and subbases during construction. Any surplus material will be removed by licenced waste contractors and reused on other constructions sites in the immediate and local area.

This approach ensures the retention of a building that would otherwise face demolition.

6.2.3. New Development Strategic Goals

The overall strategy for the development is to reduce material usage, minimise waste and embed longevity, flexibility and adaptability into the buildings design.

In line with Policy SI7, the newly constructed elements have been assessed to demonstrate how the material demands will be reduced and how building materials, components and products will be disassembled and reused at the end of their life. A Bill of Materials table has been produced in Appendix 1 which demonstrates how material demands have been minimised and on-site reuse and recycling maximised.

The proposed scheme design has been broken down into building layers to design out waste, optimise material use and keeping building elements/materials in use after the end of their life cycle. Please refer to the summary of strategies in section 6.3. The existing substructure and superstructure are being retained for the Mansion House.

The design objective for the elements with longer life cycle (more than 25 years) is to design for longevity, adaptability and flexibility. Concrete provides longevity and high thermal mass whilst steel is highly recyclable.

Building layers with shorter life expectancy (less than 25 years) will be designed for ease of maintenance, reuse and recoverability. The plant will be made accessible for replaceability and maintenance. In terms of building services, a water based wet system is proposed for the communal network thus reducing the use of refrigerant in the building. The proposed Exhaust Air Heat Pumps to the new buildings mean straight forward maintenance and replacement can occur.

Cooling has been designed-out of the assessment.

Opportunities will be explored for reusing hoardings and scaffoldings. Discussions with suppliers with regards to the possibility of sending back the packaging for reuse will be explored. Offsite and modern methods of construction may be considered to further optimise material use and waste minimisation.

The new building has been designed to incorporate the below Circular Economy approaches and principles from Policy SI7 of the London Plan. Following Figure 5 from the GLA Circular Economy Guidance (extracted below) the development will follow the below design approaches.

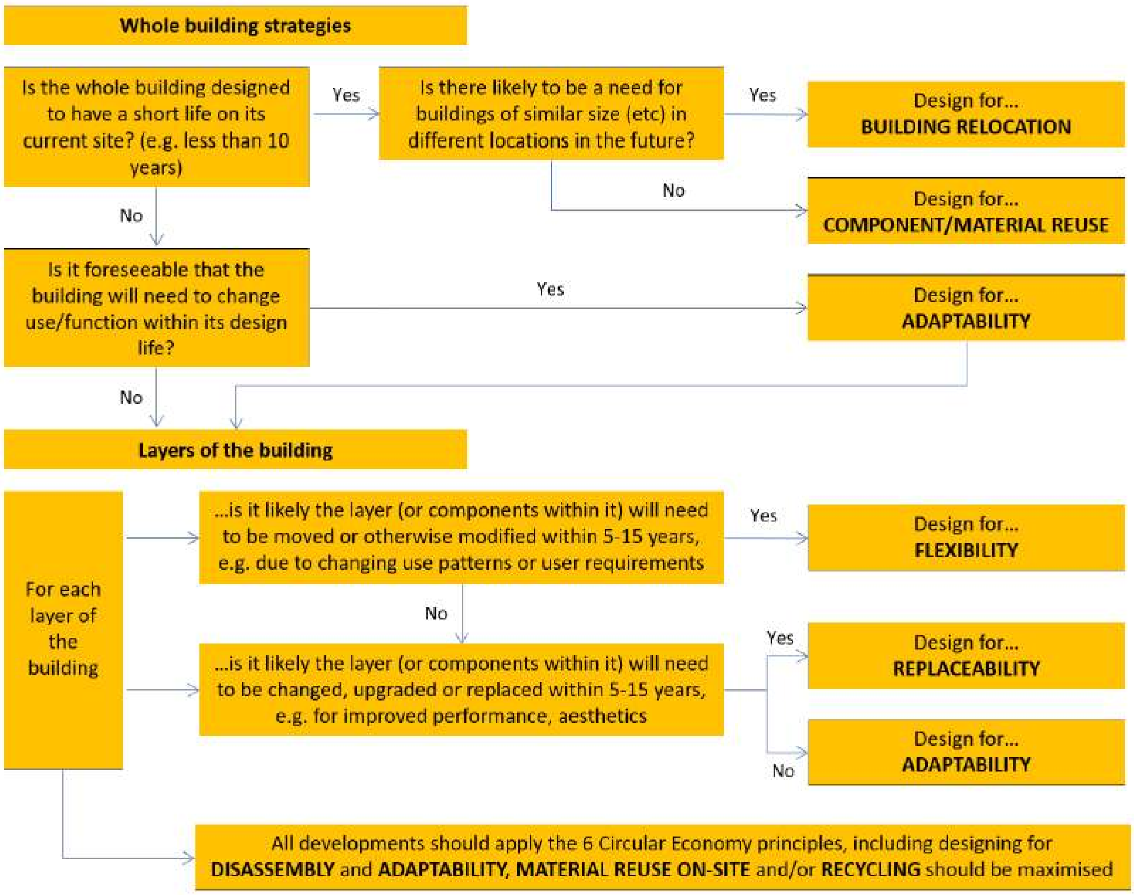


Figure 6. Decision tree for design approached for new buildings over the lifetime of development

The decision tree has been followed as below:

- The buildings are not designed to have a short life
- It is not foreseeable that the buildings will need to change their function over its lifetime
- For each layer of the building there are none that will need to move within 5-15 years
- There are no layers that will need to be changed, upgraded or replaced within 5-15 years

The building will therefore be designed for adaptability, disassembly, material reuse on-site and recycling in line with the design approach for new buildings and definitions from the GLA Circular Economy Guidance

6.2.4. Designing Out Waste

The initial approach for improving materials efficiency into the project is to include feasible options from the below commitments:

1. Increasing the utilisation factor of structural members.
2. Designing to standard material dimensions to reduce off-cuts and waste on site.
3. Removing redundant materials from the design.
4. Using materials that can be recycled or reused at the end of their service life.
5. Making use of recycled or reclaimed materials.
6. Designing for deconstruction and material reuse.
7. Using pre-fabricated elements where appropriate to reduce material waste. This will be explore to utilste off site construction for building elements such as pre fabricated concrete for floor and wall constructions.
8. Consider using an 'exposed thermal mass' design strategy to reduce finishes.
9. Avoiding over-specification of predicted loads.
10. Using lightweight structural design strategies.
11. Making use of bespoke structural elements where this will reduce overall material use.
12. 'Rationalisation' of structural elements.
13. Optimising the foundation design of the new construction for embodied environmental impact.

6.2.8. Designing out construction, demolition, excavation, industrial and municipal waste arising

Any suitable material from the existing hardstanding and existing building elements to be demolished will be processed to be used as a aggregate use by the Main Contractor where required. All excavated material will be utilised where feasible for filling and subbases during construction. Any surplus material will be removed by licenced waste contractors and reused on other constructions sites in the immediate and local area.

Making use of bespoke structural elements where this will reduce overall material use and a pre-fabricated envelope to the commercial spaces will be explored, both of which will result in less material wastage on site

Suppliers will be encouraged to take back all packaging for re use such as delivery pallets and plastic wrapping. Sufficient space will be set aside for the storage of construction waste during construction and municipal waste during operation.

A pre-demolition audit of any existing buildings, structures or hard surfaces being considered for demolition. This will be used to determine whether refurbishment or reuse is feasible and, in the case of demolition, to maximise the recovery of material for subsequent high grade or value applications. The audit will be:

- Carried out prior to strip-out or demolition works.
- Guide the design, consider materials for reuse and set targets for waste management.

- Engage all contractors in the process of maximising high-grade reuse and recycling opportunities.

The Pre-Demolition Audit will:

- Identify and quantify the key materials where present on the project see table 2.
- Establish potential applications and any related issues for the reuse and recycling of the key materials in accordance with the waste hierarchy.
- Research opportunities for reuse and recycling within the site boundary.
- Identification of local reprocesses or recyclers for recycling of materials.
- Commit to achieve at least 95% of all non-hazardous demolition waste diverted from landfill.

European Waste Catalogue	Key group	Examples
170102	Bricks	Bricks
170101	Concrete	Pipes, kerb stones, paving slabs, concrete rubble, precast and in situ
170604	Insulation	Glass fibre, mineral wool, foamed plastic
1501	Packaging	Paint pots, pallets, cardboard, cable drums, wrapping bands, polythene sheets
170201	Timber	Softwood, hardwood, board products such as plywood, chipboard, medium density fibreboard (MDF)
1602	Electrical and electronic	Electrical and electronic TVs, fridges, air-conditioning units, lamps equipment
1301	Oils	Hydraulic oil, engine oil, lubricating oil
1703	Asphalt and tar	Bitumen, coal tars, asphalt
170103	Tiles and ceramics	Ceramic tiles, clay roof tiles, ceramic, sanitary ware
1701	Inert	Mixed rubble or excavation material, glass
1704	Metals	Radiators, cables, wires, bars, sheet
170802	Gypsum	Plasterboard, plaster, fibre cement sheets
170101	Binders	Render, cement, mortar
170203	Plastics	Pipes, cladding, frames, non-packaging sheet
1705	Soils	Soils, clays, sand, gravel, natural stone
Most relevant	Liquids	Non-hazardous paints, thinners, timber treatments
Most relevant	Hazardous	Defined in the Hazardous Waste List (HWL) of the

Most relevant	Floor coverings	Carpets, vinyl flooring
Most relevant EWC	Architectural features	Roof tiles, reclaimed bricks, fireplaces
170904 (Mixed)	Mixed or other	Efforts will be made to categorise waste into the above categories wherever possible.

Figure 7.Waste Streams to be identified during demolition

The Main Contractor will be required to monitor, report and set targets on the generation of construction and demolition waste in line with the following project targets:

- **3.2 tonnes/100m2 GIA of construction waste generated.**
- **95% of Non-Hazardous Construction and demolition waste to be diverted from landfill.**

Operational Waste

A Waste Management Strategy will be undertaken during detailed design stage and will take into account the need to lessen the overall impact of waste generation through the recycling of materials from the operational phase. The building will be design to ensure all Operational waste will be managed in accordance with the waste hierarchy (extract below):

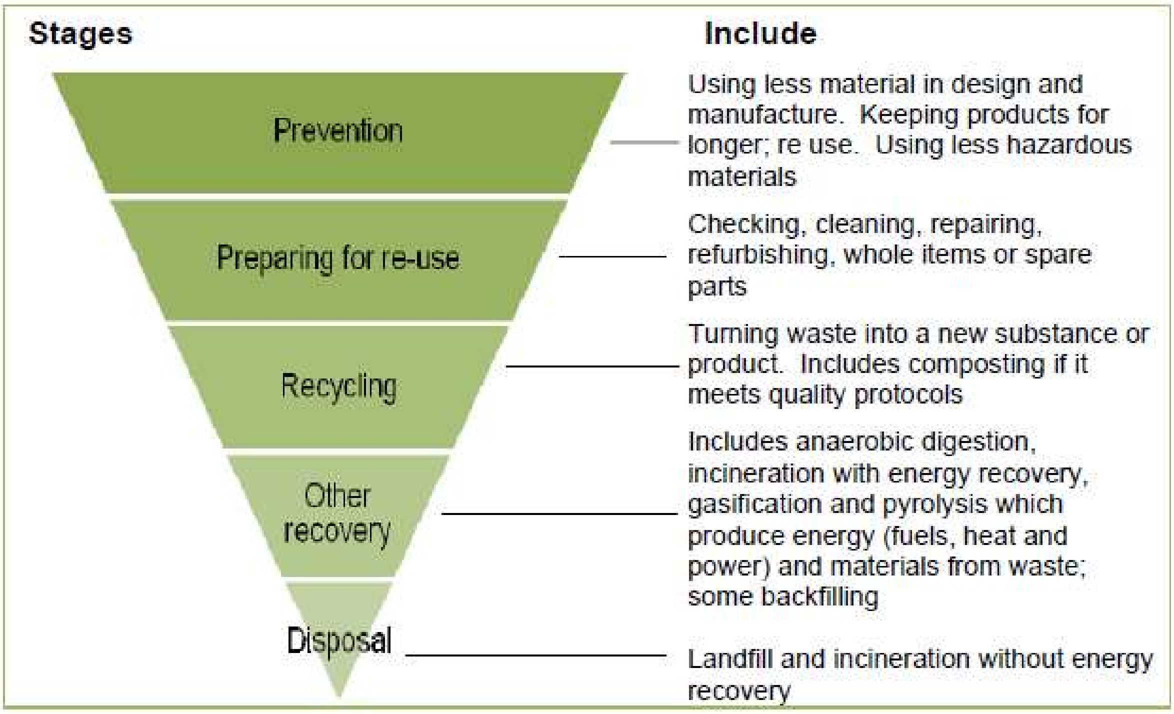


Figure 8.Extract from Waste Hierarchy Defra Guidance on Applying Waste Hierarchy

The proposals set out in this strategy will meet the requirements of relevant waste policy and follow applicable guidance. The strategy will consider the flow of waste from waste generator (i.e. residents/tenants and hotel guests) 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. Separate dry recyclable waste storage will be provided for car, paper, mixed plastics, metals and glass. Space will be allocated for food waste storage and collection for both the internal kitchen layouts and communal bin storage area

Whilst a detailed design for the space has not yet been undertaken. Waste commitments and storage areas have been allocated based on the following calculations:

- 1-4 bedroom houses are allocated 2 x 240 litre storage per dwelling + 140 litre organic waste
- Apartments are allocated 250 litres per dwelling

The development has allowed for the following waste provision based on the above allocations. This assumes 35% standard waste, 60% dry recycling and 5% food waste to be processed off site. The waste storage within the scheme on the drawings will incorporate 8 x 1,100 litre bins. The calculations in table 3 show 8 x 1,100 bins and 4 x 140l bins assuming weekly collections. Houses will required 1 x 240 litre dry recycling, 1 x 240 litre general waste and 1 x 140 litre food waste.

		Waste calculations							
Dwelling		Total		General		Dry Recycling		Organic	
Type	Calculation	Litres	1100 bins	Litres	1100 bins	Litres	1100 bins	Litres	140 l bins
Apartment	250 litres per dwelling	8750	8	3062	3	5250	5	437	4
		Waste calculations							
Dwelling		Total		General		Dry Recycling		Organic	
Type	Calculation	Litres	240 bins	Litres	240 bins	Litres	240 bins	Litres	140 l bins
Houses	480 litres per dwelling	1920	8	672	4	1152	4	96	4

Figure 9.Waste sizing requirements

6.2.5. Minimise the quantities of other resources used

The Contractor will monitor and set targets against their energy, water and log all transportation data of material deliveries and waste collections. This will be achieved by appointing an individual to be responsible for monitoring, recording and reporting energy use, water consumption and transportation data resulting from all on-site construction processes (and dedicated off-site manufacturing) throughout the build programme. To ensure the robust collection of information, this individual will have the appropriate authority and responsibility to request and access the data required.

The project will set targets for the site energy consumption in kWh (and where relevant, litres of fuel used) as a result of the use of construction plant, equipment (mobile and fixed) and site accommodation. During construction the Contractor will monitor and record data for the energy consumption and report the total carbon dioxide emissions (total $kgCO_2$/project value) from the construction process.

In order to reduce the energy usage, the Contractor will investigate features which minimise energy wastage such as occupancy controls to switch off unnecessary lighting within site cabins.

The project will set targets for the potable water consumption (m^3) arising from the use of construction plant, equipment (mobile and fixed) and site accommodation.

During Construction the Contractor will monitor and record data for the potable water consumption described and report the total net water consumption (m^3), i.e. consumption minus any recycled water use from the construction processes.

A rainwater harvesting system for use in equipment and vehicle washing will be investigated by the Main Contractor along with the use of recycling water systems for processes such as wheel washing.

6.2.6. Specify and source materials responsible and sustainably

A Sustainable Procurement Plan will be developed for the project. This will include sustainability aims, objectives and strategic targets to guide procurement activities.

There will be a policy to procure construction products locally where possible.

The plan will include details of procedures in place to check and verify the effective implementation of the sustainable procurement plan.

Most construction products involve long and complex supply chains that result in a wide range of impacts locally and globally. These might include environmental (e.g. toxicity or biodiversity), economic (e.g. corruption) or social (e.g. slave labour, equality) issues and can occur during the extraction, processing, manufacturing or supply chain stages. The increasing globalisation of supply chains increases the difficulty of tracing the supply chain and mitigating negative impacts caused by it.

Credible certification schemes exist to increase confidence to specifiers that risks are being minimised or avoided and their use ensures that specifiers are able to demonstrate the responsible nature of their selection decisions.

It will be a requirement of the project to ensure the Main Contractor ensures the following criteria is met:

- 100% of timber and timber-based products used on the project are 'Legal' and 'Sustainable' as per the UK Government's Timber Procurement Policy through purchasing timber with Third party, independent forest certification schemes–Category A (e.g. FSC or PEFC).
- At least 25% of all major building elements must be sourced from suppliers demonstrating compliance with auditable third party responsible sourcing certification schemes such as BES6001 and ISO14001.

6.2.7. Design for longevity, adaptability or flexibility and reusability or recoverability

A project functional adaptability assessment will be undertaken which will cover the following main items:

- **Feasibility**: The likelihood to contain multiple or alternative building uses, area functions and different tenancies over the expected life cycle, e.g. related to the structural design of the building.
- **Accessibility**: Design aspects that facilitate the replacement of all major plant within the life of the building, e.g. panels in floors and walls that can be removed without affecting the structure, providing lifting beams and hoists. Accessibility also involves access to local services, such as local power, data infrastructure etc.
- **Versatility**: The degree of adaptability of the internal environment to accommodate changes in working practices.
- **Adaptability**: The potential of the building ventilation strategy to adapt to future building occupant needs and climatic scenarios.
- **Convertibility**: The degree of adaptability of the internal physical space and external shell to accommodate changes of in-use.
- **Expandability**: The potential for the building to be extended, horizontally or vertically.
- **'Refurbishment potential'**: The potential for major refurbishment, including replacing the façade

The report will follow the BREEAM framework to future adaption as per the below table:

Item	Accessibility	Spatial Adaptability	Expandability
Fabric and structure: – External walls. – Cladding. – Ground and first floor. – Roof.	Use of products or systems which allow easy replacements.	Location of structural components within the floor space.	Provision to add extensions or alterations to increase building capacity.
Core and local services: – Mechanical and electrical. – Plumbing. – Stairs and lifts. – Fire.	Inclusion of facilities management requirements and construction design management feedback for future operational needs.		Provision of capacity in infrastructure to enable future expansion and adaptation.
Interior design: – Finishes. – Floors. – Interior walls. – Connections.	Use of products or systems which allow easy replacements.	– Layout in standardised grids. – Use of inherent finishes to allow replacement. – Use of standardised material sizes.	– Identifying or recognising potential future functional requirements. – Efficient use of space to allow for any increase in occupancy.

Table 1. Design measures considers to allow future adaption

An ease of disassembly study will be undertaken that includes as many of the following concepts as possible:

- **Accessibility** (see Functional adaptation strategy study on the previous page).
- **Durability**: use of materials which require less frequent maintenance, repair or replacement, considering them within the context of the life span of the building.
- **Exposed and reversible connections**: making the connections more visible provides opportunities to optimise material and product reuse. Welded connections prohibit disassembly and it is preferable to use screws and bolts to allow for disassembly and material reuse.
- **Layer independence**: designing building systems and components in layers so that removal, adjustment or replacement of some elements is feasible, especially when different components have different life spans and maintenance needs.
- **Avoidance** of unnecessary toxic treatments and finishes. Some finishes can contaminate the substrate in a way that they are no longer reusable or recyclable. This should be avoided unless finishes serve a specific purpose.
- **Standardisation** can accommodate reuse and upgrading. It involves aspects such as dimensions, components, connections and modularity.

6.3. Summary of Strategic Approach to the Circular Economy

ASPECT	STEERING APPROACH	EXPLANATION	TARGET	SUPPORTING ANALYSIS / STUDIES / SURVEYS / AUDITS
Circular economy approach for the new development.	The development will follow best practice principles and adopt the guidance from BS 8895 Designing for material efficiency in building projects. Utilising the BREEAM methodology to select suitable credit criteria to follow to ensure opportunities to embed circular economy principles are included.	Consideration for the circular economy implementation will be made at each stage of the project design and construction process. 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*	• Sustainable Procurement Plan. • Materials Efficiency Report. • Energy Statement. • Demolition Environmental Management Plan • Construction Environmental Management Plan.
Circular economy approach for the existing site.	The development will produce a pre demolition audit in addition to a project site waste management plan and environmental management plan.	A pre-demolition audit will be undertaken to identify opportunities for reuse, recycling or recovery, disposal and opportunities for reuse within development works. Initial commitments for the project include Reuse • Use of re-usable hoardings, in non-aesthetic locations. • Recycle/ recover. • Rainwater harvesting system for use in equipment and vehicle washing will be investigated by contractors. • Use of recycling water systems such as wheel washes will be investigated by contractors. Opportunities for reuse within the development works • Any suitable material from the existing hardstanding and existing buildings undergoing demolition will be processed to be used as aggregate on site. • Excavated material will be utilised where feasible for filling and sub bases.	95% diversion from landfill	Pre demolition Audit. Construction environmental management plan. Demolition environmental management plan.
Circular economy approach for municipal waste during operation.	A project-specific Operational Waste Management Strategy will be 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 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 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 Scheme.	Waste arising and storage requirements have been calculated based on the requirements from the Local Authority. Waste arisings have been forecasted for general and recyclable waste.	65% diversion from landfill	Operational waste management strategy. Waste storage and collection requirements and calculation.

6.4. Summary of Key commitments for the Project from Circular Economy Workshop

	Site	Substructure	Super-structure	Shell/Skin	Services	Space	Stuff	Construction Stuff	Summary
Designing Out Waste Module A Product Sourcing and Construction Stage	The development retains as much of the existing structures and buildings on site as is practical A Sustainable Procurement Plan will be developed for the project. This will include sustainability aims, objectives and strategic targets to guide procurement activities. There will be a policy to procure construction products locally where possible.	During detailed design stage the design team will investigate the use of a concrete substructure that is designed to accommodate minimum 50% GGBS content. The use of recycled aggregate within the concrete will be considered in line with permitted quantities as defined by BS 8500, with an initial target of 30%.	The design will seek to increase the utilisation factor of structural members. Designing to standard material dimensions to reduce off-cuts and waste on site. Removing redundant materials from the design. The concrete superstructure will be designed to accommodate 50% GGBS. The use of recycled aggregate within the concrete will be considered in line with permitted quantities as defined by BS 8500, with an initial target of 30%. 100% of timber and timber-based products used on the project are 'Legal' and 'Sustainable' as per the UK Government's Timber Procurement Policy through purchasing timber with Third party, independent forest certification schemes–Category A (e.g. FSC or PEFC). At least 25% of all major building elements must be sourced from suppliers demonstrating compliance with auditable third party responsible sourcing certification schemes such as BES6001 and ISO14001. Recycled steel will be used	Utilising high quality materials requiring minimal replacement over the building lifespan.	Services will be designed using pre fabricated elements where possible to reduce material wastage.	All finishes will be a neutral colour palette to enable future occupiers to adapt the space as required.	No building furniture items will be supplied to the development leaving the occupiers to select their own requirements.	The Contractors Sustainable Procurement Plan will seek to utilise suppler packaging take back scheme, just in time material delivery to minimise waste and risk of damage and disposal on site. The contractor will be required to monitor and report energy and water use during construction works on-site. This will involve setting targets and monitoring progress The Contractor will be required to source their construction products in accordance with the project Sustainable Procurement Plan The Main Contractor will be required to achieve a construction waste target 3.2 tonnes/100m2 o GIFA for non hazardous construction waste. 95% of all construction waste will be diverted from landfill. Sort waste materials into separate key waste groups in below table either on-site or through a licensed contractor for recovery.	Lean design principles adopted, and elements prefabricated offsite where possible. Refinement of material quantities will be reviewed as design proceeds. Structural design to explore possibility of using cement replacements, Main Contract to contain requirements for Contractor to implement actions on site.

Designing Out Waste Module B In-Use Stage	N/A	N/A	N/A	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. Use of low GWP Refrigerant for heat pump systems will lower the in use refrigerant emissions	N/A	N/A	N/A	A Functional Adaptation Strategy Study and Plan will be adhered to. Monitoring and reporting of energy and water use during construction works.
Designing Out Waste Module C End of Life Stage	The concrete and steel elements of the sub structure will be extracted and reprocessed. Concrete elements will be crushed and resued off site. Steel work will be recycled	Window frames and glazing demounted for reuse or disassembled and recycled in component parts (steel / glass); Concrete elements crushed on-site to secondary aggregate Brick and stonework reclaimed where possible Steel reinforcement recycled;	Gypsum recycled, Floor finishes recycled,	Products and MEP reclaimed or recycled where possible.	N/A	N/A	N/A	
Designing for Longevity				The building has been designed with the use of products or systems which allow easy replacements. – Layout in standardised grids. – Use of inherent finishes to allow Replacement. – Use of standardised material sizes. – Identifying or recognising potential future Functional requirements. – Efficient use of space to allow for any increase inoccupancy.	The design will incorporate decision to ensure the potential for major refurbishment, including replacing the façade elements such as windows is incorporated.	The development will include design aspects that facilitate the replacement of all major plant within the life of the building, e.g. panels in floors and walls that can be removed without affecting the structure, Accessibility also involves access to local services, such as local power, data infrastructure etc.		The design and construction will follow Layer independence: designing building systems and components in layers so that removal, adjustment or replacement of some elements is feasible, – Avoidance of unnecessary toxic treatments and finishes. Avoid finishes that contaminate the substrate in a way that they are no longer reusable or recyclable. purpose. Standardisation can accommodate reuse and upgrading. It involves aspects such as dimensions, components, connections and modularity.
Designing for adaptability or flexibility	The position of the building on the site should take into consideration where an extension would be placed if it was proposed. Where a building sits tight up against a boundary this will prohibit the possibility of increasing the footprint of the building. Positioning of green area, car parking, external buildings and stores will also need to take into consideration where an extension would be placed if it was proposed			The building layers have been designed for replaceability. Windows can be remove and deconstructed into their component parts. Roofing materials including tiles and timbers can be removed and reclaimed for use elsewhere.	The main plant consists of standalone exhaust air heat pumps within each apartment. These can be altered and replaced without any fabric implications WC's are stacked through the building where possible to minimise fixed items to the ground and first floor level to allow maximum flexibility of the floor plate to adapt to future changes in use.			

Designing for disassembly		Footing foundations would be dug out and reprocess on or off site	The disassembly of the building structure can be achieved by removing all fixtures, fittings and services following which the building envelope can then be removed, see Building Envelope below. Once the steel frame is revealed the pre cast floors and stairs can be lifted out using a crane and removed from site for recycling.	The disassembly of the envelope would follow the reverse form of the build. This require that the windows and doors be removed first. These are fixed using bracket fixings screwed to the external walls. Party wall are formed comprising two skins of blockwork. Disassembly/ alterations would require the erection of a scaffold to both sides of the party wall to allow the blocks to be removed, coarse by coarse with the scaffolding being adapted to provide a safe working platform. The materials can be removed from site for recycling.	The services provided are such that they can be easily accessed for maintenance, adaptions and or removal. Isolation of the services will require to be undertaken by specialised and or licenced contractors. These will include working with refrigerant, gas and electricity. Once the service is isolated they be safely removed or adapted.	Internal finishes selected are non toxic and as such can all be safely removed and recycled. Generally, the finished can be removed with out much destruction. The exceptions being ceramic wall and floor tiles and plaster board internal walls. Plaster board which would likely be destroyed during disassembly can be segregated and recycled.		Designing out waste through regular / modular design. Consideration for just-in-time delivery, reducing packaging, and supplier takeback schemes.
Excavation waste (how waste from excavation will be managed).	The site is likely to be made up of made ground and undisturbed soils. The new buildings and site levels will require excavation and fill material.	The substructure of the current buildings are likely to be shallow strip foundations, which will be dug out and crushed to be re-used on this site or off site.	N/A	N/A	N/A	N/A	N/A	Excavated materials will be reused on site wherever possible.

<table>
<tr><th></th><th>Site</th><th>Substructure</th><th>Super-structure</th><th>Shell/Skin</th><th>Services</th><th>Space</th><th>Stuff</th><th>Construction Stuff</th><th>Summary</th></tr>
<tr><td>Construction waste (how waste arising from construction of the layers will be reused or recycled.</td><td colspan="8">The Main Contractor will be required to achieve a construction waste target 3.2 tonnes/100m2 o GIFA for non hazardous construction waste.

95% of all construction waste will be diverted from landfill.

Sort waste materials into separate key waste groups in below table either on-site or through a licensed contractor for recovery.
<table>
<tr><th>European Waste Catalogue</th><th>Key group</th><th>Examples</th></tr>
<tr><td>170102</td><td>Bricks</td><td>Bricks</td></tr>
<tr><td>170101</td><td>Concrete</td><td>Pipes, kerb stones, paving slabs, concrete rubble, precast and in situ</td></tr>
<tr><td>170604</td><td>Insulation</td><td>Glass fibre, mineral wool, foamed plastic</td></tr>
<tr><td>1501</td><td>Packaging</td><td>Paint pots, pallets, cardboard, cable drums, wrapping bands, polythene sheets</td></tr>
<tr><td>170201</td><td>Timber</td><td>Softwood, hardwood, board products such as plywood, chipboard, medium density fibreboard (MDF)</td></tr>
<tr><td>1602</td><td>Electrical and electronic equipment</td><td>Electrical and electronic TVs, fridges, air-conditioning units, lamps equipment</td></tr>
<tr><td>1301</td><td>Oils</td><td>Hydraulic oil, engine oil, lubricating oil</td></tr>
<tr><td>1703</td><td>Asphalt and tar</td><td>Bitumen, coal tars, asphalt</td></tr>
<tr><td>170103</td><td>Tiles and ceramics</td><td>Ceramic tiles, clay roof tiles, ceramic, sanitary ware</td></tr>
<tr><td>1701</td><td>Inert</td><td>Mixed rubble or excavation material, glass</td></tr>
<tr><td>1704</td><td>Metals</td><td>Radiators, cables, wires, bars, sheet</td></tr>
<tr><td>170802</td><td>Gypsum</td><td>Plasterboard, plaster, fibre cement sheets</td></tr>
<tr><td>170101</td><td>Binders</td><td>Render, cement, mortar</td></tr>
<tr><td>170203</td><td>Plastics</td><td>Pipes, cladding, frames, non-packaging sheet</td></tr>
<tr><td>1705</td><td>Soils</td><td>Soils, clays, sand, gravel, natural stone</td></tr>
<tr><td>Most relevant EWC</td><td>Liquids</td><td>Non-hazardous paints, thinners, timber treatments</td></tr>
<tr><td>Most relevant EWC</td><td>Hazardous</td><td>Defined in the Hazardous Waste List (HWL) of the European Waste Catalogue (EWC)</td></tr>
<tr><td>Most relevant EWC</td><td>Floor coverings (soft)</td><td>Carpets, vinyl flooring</td></tr>
<tr><td>Most relevant EWC</td><td>Architectural features</td><td>Roof tiles, reclaimed bricks, fireplaces</td></tr>
<tr><td>170904 (Mixed)</td><td>Mixed or other</td><td>Efforts should be made to categorise waste into the above categories wherever possible.</td></tr>
</table></td><td></td></tr>
<tr><td>Municipal and industrial waste (how the design will support operational waste .management)</td><td>Provide a dedicated space for the segregation and storage of operational recyclable waste generated. The
Space will be: Clearly labelled, to assist with segregation, storage and collection of the recyclable waste streams.

Accessible to building occupants or facilities operators for the deposit of materials and collections by waste management contractors.</td><td></td><td></td><td></td><td></td><td>1-4 bedroom houses are allocated 2 x 240 litre storage per dwelling + 140 litre organic waste Apartments are allocated 250 litres per dwelling</td><td>Each residential kitchen will be design to include dedicated storage space for recyclable, food and general waste.</td><td></td><td></td></tr>
</table>

6.5. Bill of Materials

A summary of the Bill of Materials is shown below. This is taken from the approved One Click LCA Software and has been entered into the GLA Circular Economy Spreadsheet tool to demonstrate the quantity of materials used in each 'layer' of the building (kg), the material intensity (kg/m^2 GIA) and set targets for the minimum amount of recycled content to be used (% by value).

The following evidence is displayed in the table:

- Building weight calculation (load take-down) to be used in calculating material intensity.
- Reused or recycled content calculations

The detailed bill of materials provided within Appendix A shows the individual materials specified, their recycled and reused content and their end of life strategy

Section	Result category	Material quantity kg	Material intensity kg/m2 Gross Internal Area	Recycled content by value %	Estimated reusable materials kg/m2	Estimated recyclable materials kg/m2
1	1 Substructure	**1793930**	**384.63**	**1.96**		**382.98**
21	2.1 Superstructure: Frame	**456647.4**	**97.91**	**1.10**		**97.47**
2.2	2.2 Superstructure: Upper Floors	**1045921**	**224.25**	**0.35**		**214.55**
2.3	2.3 Superstructure: Roof	**126602.1**	**27.14**	**0.2**		**9.46**
2.4	2.4 Superstructure: Stairs and Ramps	**105777.4**	**22.68**	**0.13**		**22.55**
2.5	2.5 Superstructure: External Walls	**793958.7**	**170.23**	**0.22**		**158.25**
2.6	2.6 Superstructure: Windows and External doors	**16177.36**	**3.47**	**0**		**3.47**
2.7	2.7 Superstructure: Internal Walls and Partitions	**261613.7**	**56.09**	**0.21**		**51.49**
2.8	2.8 Superstructure: Internal doors	**39773.16**	**8.53**	**0**		
3	3 Finishes	**84475.03**	**18.11**	**0.19**		**8.41**
4	4 Fittings, furnishings & equipments					
5	5 Services (MEP)	**47729.07**	**10.23**	**0**		**10.23**
6	6 Prefabricated buildings and building units					
7	7 Work to existing building					
8	8 External works	**1680936**	**360.41**	**12.43**	**24.76**	**60.39**
0	0 Unclassified / Other					
total	Total	**6453541**	**1383.69**	**16.78**	**24.76**	**1019.25**

Table 2. Bill of Materials

6.6. Recycling and Waste

The table below sets out targets for reporting the total amount of waste / material generated during excavation, demolition, and management methods construction.

CATEGORY	TOTAL ESTIMATE	OF WHICH…			
	Tonnes/100m2 Gross Internal Area (GIA)	% reused or recycled onsite	% reused or recycled offsite	% not reused or recycled max 5%	
				% to landfill	*% to other management (e.g. incineration)*
Excavation waste	TBC	TBC	remainder	*5% (Hazardous Waste only)*	*N/A assume all non reusable and non recyclable waste is sent to landfill.*
Demolition waste	TBC	20%	remainder	*N/A*	
Construction waste	6.5 tonnes/100m2	0	95%	*5% (Hazardous Waste only)*	
	t/annum	**% reused on or off site**	**% recycled or composted, on or off site**	**% not reused or recycled**	
				% to landfill	***% to other management (e.g. incineration)***
Municipal waste	1-4 bedroom houses are allocated 2 x 240 litre storage per dwelling + 140 litre organic waste Apartments are allocated 250 litres per dwelling	*0%*	*65%*	*35%*	*N/A assume all non reusable and non recyclable waste is sent to landfill.*

7. Plan for Implementation

7.1. Short and Medium Term

The project team will incorporate the requirements of this strategy into their specifications and contract documents during the next design phases. The performance targets and proposals outlined by this document will be used to specify suitable materials and design solutions as appropriate. The design parameters that require review during the next phase include:

- Replace the district heating system in the new build stable block with individual exhaust air heat pumps to each dwelling
- Introduce a solar photovoltaic array to all new buildings
- GGBS and admixture content within structural concrete;
- Recycled Steel within structural elements
- Explore use of offsite construction for components of major building elements including floors and external wall
- Recycled aggregate content within concrete;
- Opportunities for use of recycled material within landscaping;
- Use of modular bathroom pods; and
- Consideration of consolidated and smart logistics.
- In order to reduce the energy usage, the Contractor will investigate features which minimise energy wastage such as occupancy controls to switch off unnecessary lighting within site cabins.
- The project will set targets for the potable water consumption (m^3) arising from the use of construction plant, equipment (mobile and fixed) and site accommodation.

7.2. Post Completion

Following project completion, the Circular Economy Statement will be reviewed and updated to measure against the predicted performance. The specified targets and commitments will be compared during each phase and reported to relevant bodies in accordance with any conditions stipulated by the planning process.

A Post Completion Report will be produced, as per the CE Statement Guidance.

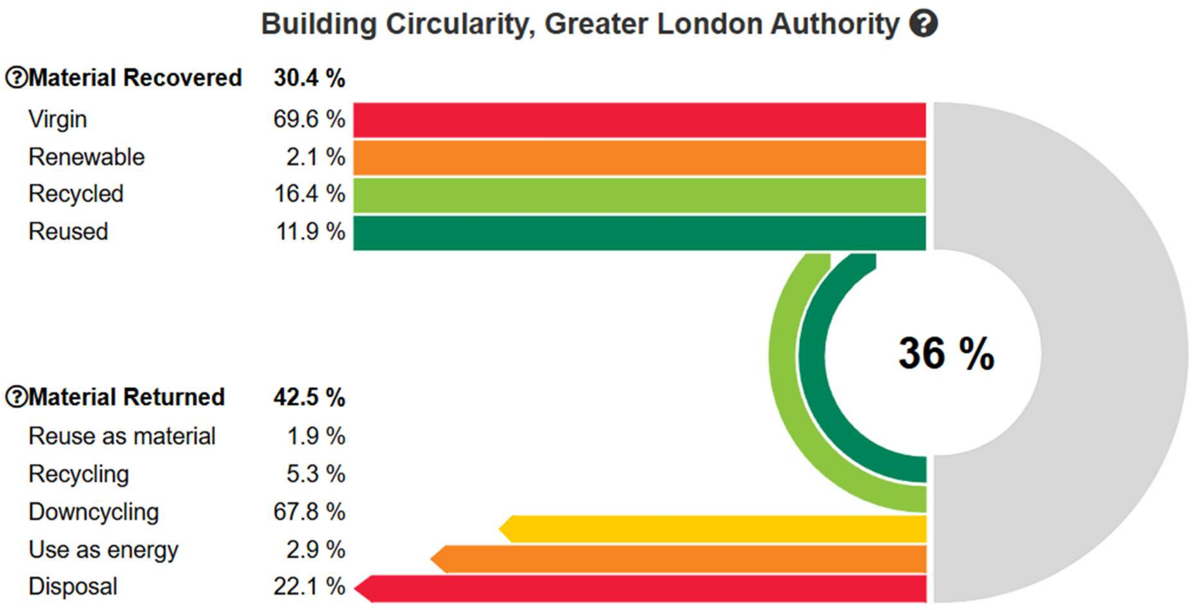
7.3. End of Life Strategy

This strategy sets out how the building materials, components, and products will be deconstructed and at the end of their useful life. As set out in the previous sections, material demand has been minimised by the building design and construction methods. It is anticipated that the following activities will be conducted at the end of life:

- Curtain Walling façade demounted for reuse or demounted for reuse or disassembled and recycled in component parts (steel / glass)

- Window frames and glazing demounted for reuse or disassembled and recycled in component parts (steel / glass);
- Concrete elements crushed on-site to secondary aggregate;
- Cement/mortar use in a backfill
- Gypsum recycled;
- Steel reinforcement recycled;
- Bricks reclaimed;
- Products and MEP reclaimed or recycled where possible.

The One Click LCA Building Circularity tool was used to estimate the opportunity for returning the material at the end of life of the building. The results presented here for the development based on the inputs used for the whole life carbon analysis of the development. The material quantity and specification inputs are in alignment with the bill of quantities. Though, it is impossible to predict construction processes and minimum recycling rates in 60 years times but based on current practices and industry benchmarks applied by default by the One Click tool results have been included.



It is estimated that 16% of the materials used will be recycled materials. This includes the recycled content within the steel rebars and recycled paving. The End of Life (EoL) scenarios are noted within Appendix A for each materials proposed

This building circularity is being mainly evaluated in terms of the mass of the recovered building material as compared to virgin material likely to be used in the building construction and the percentage of the material that can be returned to building construction at the end of life of the building.

Material Recovered

The calculation takes into account the reused, recycled and renewable materials to ascertain the mass of the recovered material as compared to virgin material..

Material Returned

As mentioned earlier, it is impossible to predict the recycling rates in 60 years' time, however, it has been considered that at least current rates of recycling will be achievable. The inputs used for materials returned are based on industry benchmarks applied by the software.

References

Ghaffar, S., Burman, M. and Braimah, N., 2020. Pathways to circular construction: An integrated management of construction and demolition waste for resource recovery. *Journal of Cleaner Production*, 244, p.1187

Appendix 1 – Bill of Materials includes building weight calculations and reused or recycled content calculations

Entity use	Project na	Design na	Indicator name																												
Alison Ewi	Harefield (	2 - Option	Building Circularity, Greater London Authority																												
Section	Resource	User input	Unit	Total kg	Virgin kg	Waste factor	quantity (Module	Renewable kg	renewable	Recycled kg	Reused kg	content by value	Recycling %	Reusing %	Downcycling kg	energy kg	Disposal kg	Total cost £	Question	Comment	RICS category	Service life	Recycled	Renewable	Reused	DfD	DfA	EOL Process	Resource type	uniClass	csiMasterformat
A1-A3	Air handlir	0.17	unit	213.44	213.44	0.01	215.58	0	213.44	0	0	0	100					0	Building sy		5.7.Ventila	25	0	0	0	false	false	Metal-cont	HVAC con	P8	23
A1-A3	Air handlir	0.27	unit	339	339	0.01	342.39	0	339	0	0	0	100					0	Building sy		5.7.Ventila	25	0	0	0	false	false	Metal-cont	HVAC con	P8	23
A1-A3	Air handlir	0.78	unit	979.33	979.33	0.01	989.12	0	979.33	0	0	0	100					0	Building sy		5.Services	25	0	0	0	false	false	Metal-cont	HVAC con	P8	23
A1-A3	Air heat pu	4	unit	140	120.19	0.01	141.4	19.81	120.19	0	0	0	100					0	Building sy	House, Or	5.6.Space	20	0	14.15135	0	false	false	Metal-cont	HVAC con	P8	23
A1-A3	Water circ	13	kW	679.51	679.51	0.01	686.31	0	679.51	0	0	0	100					0	Building sy	Cottage H	5.6.Space	30	0	0	0	false	false	Metal-cont	HVAC con	P8	23
A1-A3	District hea	68.004	kW	312.82	312.82	0.01	315.95	0	312.82	0	0	0	100					0	Building sy		5.6.Space	30	0	0	0	false	false	Metal-cont	HVAC con	P8	23
A1-A3	Water circ	104.3	kW	5451.76	5451.76	0.01	5506.28	0	5451.76	0	0	0	100					0	Building sy		5.6.Space	30	0	0	0	false	false	Metal-cont	HVAC con	P8	23
A1-A3	Heat distri	134	m2	24.8	24.8	0.06	26.29	0	24.8	0	0	0	100					0	Building sy	Cottage H	5.6.Space	30	0	0	0	false	false	Metal-cont	Pipes (wat	P8	33
A1-A3	District hea	193.253	kW	888.96	888.96	0.01	897.85	0	888.96	0	0	0	100					0	Building sy		5.Services	30	0	0	0	false	false	Metal-cont	HVAC con	P8	23
A1-A3	Ventilation	216.153	m	183.73	183.73	0.01	185.57	0	183.73	0	0	0	100					0	Building sy		5.7.Ventila	60	0	0	0	false	false	Metal-cont	HVAC con	P8	23
A1-A3	Water circ	296.4	kW	15492.83	15492.83	0.01	15647.76	0	15492.83	0	0	0	100					0	Building sy		5.Services	30	0	0	0	false	false	Metal-cont	HVAC con	P8	23
A1-A3	Ventilation	343.15	m	291.68	291.68	0.01	294.59	0	291.68	0	0	0	100					0	Building sy		5.7.Ventila	60	0	0	0	false	false	Metal-cont	HVAC con	P8	23
A1-A3	Electricity	657	m2	2601.72	2601.72	0.01	2627.74	0	2601.72	0	0	0	100					0	Building sy	House, Or	5.Services	30	0	0	0	false	false	Metal-cont	HVAC con	P8	23
A1-A3	Drinking w	657	m2	171.54	171.54	0.06	181.84	0	171.54	0	0	0	100					0	Building sy	House, Or	5.Services	30	0	0	0	false	false	Metal-cont	Pipes (wat	P8	33
A1-A3	Sewage w	657	m2	121.15	121.15	0.06	128.42	0	121.15	0	0	0	100					0	Building sy	House, Or	5.Services	30	0	0	0	false	false	Metal-cont	Pipes (wat	P8	33
A1-A3	Ventilation	975.156	m	828.88	828.88	0.01	837.17	0	828.88	0	0	0	100					0	Building sy		5.Services	60	0	0	0	false	false	Metal-cont	HVAC con	P8	23
A1-A3	Heat distri	1043	m2	193.06	193.06	0.06	204.64	0	193.06	0	0	0	100					0	Building sy		5.6.Space	30	0	0	0	false	false	Metal-cont	Pipes (wat	P8	33
A1-A3	Electricity	1043	m2	4130.28	4130.28	0.01	4171.58	0	4130.28	0	0	0	100					0	Building sy	Main Hous	5.Services	30	0	0	0	false	false	Metal-cont	HVAC con	P8	23
A1-A3	Drinking w	1043	m2	272.33	272.33	0.06	288.67	0	272.33	0	0	0	100					0	Building sy	Main Hous	5.Services	30	0	0	0	false	false	Metal-cont	Pipes (wat	P8	33
A1-A3	Sewage w	1043	m2	192.33	192.33	0.06	203.87	0	192.33	0	0	0	100					0	Building sy	Main Hous	5.Services	30	0	0	0	false	false	Metal-cont	Pipes (wat	P8	33
A1-A3	Heat distri	2964	m2	548.64	548.64	0.06	581.55	0	548.64	0	0	0	100					0	Building sy		5.Services	30	0	0	0	false	false	Metal-cont	Pipes (wat	P8	33
A1-A3	Electricity	2964	m2	11737.44	11737.44	0.01	11854.81	0	11737.44	0	0	0	100					0	Building sy	Stable Blo	5.Services	30	0	0	0	false	false	Metal-cont	HVAC con	P8	23
A1-A3	Drinking w	2964	m2	773.9	773.9	0.06	820.33	0	773.9	0	0	0	100					0	Building sy	Stable Blo	5.Services	30	0	0	0	false	false	Metal-cont	Pipes (wat	P8	33
A1-A3	Sewage w	2964	m2	546.56	546.56	0.06	579.36	0	546.56	0	0	0	100					0	Building sy	Stable Blo	5.Services	30	0	0	0	false	false	Metal-cont	Pipes (wat	P8	33
A1-A3	Glue lamir	1.5	m3	750	0	0.17	875.25	750	0	0	0	0				750		858	Columns a	190 mm x	2.1.5.Timb	As building	0	100	0	false	false	Wood inci	CLT, glula	P5	6
A1-A3	Reinforcer	4860	kg	4860	486	0.048	5095.71	0	4860	4374	0	0.16	100					2786	Columns a		2.1. Frame	As building	90	0	0	false	false	Steel recy	Reinforcer	P4	5
A1-A3	Ready-mix	58590	kg	58590	57418.2	0.04	60933.6	0	58590	1171.8	0	0.004			58590			3214	Columns a		2.1. Frame	As building	2	0	0	false	false	Concrete c	Ready-mix	P2	3
A1-A3	Gravel, dry	484	m2	81312	81312	0	81312	0	81312	0	0	0					81312	1307	Materials a	Gravel par	8.2.1.Road	As building	0	0	0	false	false		Sand, soil	P3	31
A1-A3	Aggregate	1100	m2	176000	176000	0	176000	0	176000	0	0	0					176000	2970	Materials a	Self bindin	8.2.1.Road	As building	0	0	0	false	false		Sand, soil	P3	31
A1-A3	Crushed ro	1527	m2	256536	256536	0	256536	0	256536	0	0	0					256536	4123	Materials a	Self bindin	8.2.1.Road	As building	0	0	0	false	false		Sand, soil	P3	31
A1-A3	Asphalt, g	115488	kg	115488	92390.4	0	115488	0	115488	23097.6	0	0.096		100				7592	Materials a	2 cm	8.2.1.Road	As building	20	0	0	false	false	Asphalt re	Asphalt	P3	31
A1-A3	Macadam	192480	kg	192480	192480	0	192480	0	192480	0	0	0					192480	2598	Materials a	4 cm	8.2.1.Road	As building	0	0	0	false	false		Sand, soil	P3	31
A1-A3	Sandstone	269550	kg	269550	0	0.045	281679.8	0	269550	269550	0	11.72			269550			186076	Materials a	Yorkstone	8.2.1.Road	As building	100	0	0	false	false	Brick/stone	Natural sto	P1	31
A1-A3	Aggregate	577440	kg	577440	0	0	577440	0	577440	577440	0	0.61					577440	9744	Materials a	15 cm	8.2.1.Road	As building	100	0	0	false	false		Sand, soil	P3	31
A1-A3	Masonry m	22.79	m2	7349.78	7349.78	0.13	8305.25	0	7349.78	0	0	0			7349.78			4114	External w		2.5.1.Exter	30	0	0	0	false	false	Cement/m	Mortar (ma	P2	4
A1-A3	Masonry m	26.676	m2	400.14	400.14	0.13	452.16	0	400.14	0	0	0			400.14			224	External w		2.5.1.Exter	30	0	0	0	false	false	Cement/m	Mortar (ma	P2	4
A1-A3	Masonry m	26.676	m2	400.14	400.14	0.13	452.16	0	400.14	0	0	0			400.14			224	External w		2.5.1.Exter	30	0	0	0	false	false	Cement/m	Mortar (ma	P2	4
A1-A3	Masonry m	35.48	m2	11442.3	11442.3	0.13	12929.8	0	11442.3	0	0	0			11442.3			6405	External w		2.5.1.Exter	30	0	0	0	false	false	Cement/m	Mortar (ma	P2	4
A1-A3	Masonry m	68.15	m2	10478.06	10478.06	0.13	11840.21	0	10478.06	0	0	0			10478.06			5865	External w		2.5.1.Exter	30	0	0	0	false	false	Cement/m	Mortar (ma	P2	4
A1-A3	Masonry m	106.11	m2	16314.41	16314.41	0.13	18435.29	0	16314.41	0	0	0			16314.41			9132	External w		2.5.1.Exter	30	0	0	0	false	false	Cement/m	Mortar (ma	P2	4
A1-A3	Red brick,	353.847	m2	53859.94	53859.94	0.05	56552.93	0	53859.94	0	0	0			53859.94			7863	External w	60 bricks (	2.5.1.Exter	As building	0	0	0	false	false	Brick/stone	Brick, com	P33	4
A1-A3	Lightweigh	399.212	m2	55789.88	55789.88	0.075	59974.12	0	55789.88	0	0	0			55789.88			30374	External w	440mm x 2	2.5.1.Exter	As building	0	0	0	false	false	Concrete c	Aerated/Au	P2	3
A1-A3	Stone woo	422	m2	9495	7785.9	0.08	10254.6	0	9495	1709.1	0	0.035					9495	3072	External w		2.5.1.Exter	As building	18	0	0	false	false	Landfilling	Stone woo	P3	7
A1-A3	Gypsum p	422	m2	4526.1	4381.26	0.13	5091.86	0	4526.1	144.84	0	0.0019	100					933	External w		2.5.1.Exter	30	3.2	0	0	false	false	Gypsum re	Regular gy	P232	9
A1-A3	Gypsum p	422	m2	1392.6	1392.6	0.13	1573.64	0	1392.6	0	0	0					1392.6	2089	External w		2.5.1.Exter	30	0	0	0	false	false	Landfilling	Gypsum p	P232	9
A1-A3	Gypsum p	494	m2	1630.2	1630.2	0.13	1842.13	0	1630.2	0	0	0					1630.2	2445	External w		2.5.1.Exter	30	0	0	0	false	false	Landfilling	Gypsum p	P232	9
A1-A3	Render mo	494	m2	15314	15314	0.13	17304.82	0	15314	0	0	0			15314			8296	External w		2.5.1.Exter	30	0	0	0	false	false	Cement/m	Mortar (ma	P2	4
A1-A3	Stone woo	494	m2	10719.8	8830.97	0.08	11577.38	0	10719.8	1888.83	0	0.037					10719.8	3357	External w		2.5.1.Exter	As building	17.62	0	0	false	false	Landfilling	Stone woo	P3	7
A1-A3	Gypsum p	494	m2	5298.32	4980.42	0.13	5960.61	158.95	5139.37	158.95	0	0.0021	100					1093	External w		2.5.1.Exter	30	3	3	0	false	false	Gypsum re	Regular gy	P232	9
A1-A3	Red brick,	550.89	m2	83852.34	83852.34	0.05	88044.96	0	83852.34	0	0	0			83852.34			12242	External w	60 bricks (	2.5.1.Exter	As building	0	0	0	false	false	Brick/stone	Brick, com	P33	4
A1-A3	Lightweigh	621.52	m2	86857.42	86857.42	0.075	93371.73	0	86857.42	0	0	0			86857.42			47289	External w	440mm x 2	2.5.1.Exter	As building	0	0	0	false	false	Concrete c	Aerated/Au	P2	3
A1-A3	Gypsum p	657	m2	7046.56	6821.07	0.13	7927.37	0	7046.56	225.49	0	0.0029	100					1453	External w		2.5.1.Exter	30	3.2	0	0	false	false	Gypsum re	Regular gy	P232	9
A1-A3	Gypsum p	657	m2	2168.1	2168.1	0.13	2449.95	0	2168.1	0	0	0					2168.1	3252	External w		2.5.1.Exter	30	0	0	0	false	false	Landfilling	Gypsum p	P232	9
A1-A3	Stone woo	657	m2	22995	18855.9	0.08	24834.6	0	22995	4139.1	0	0.063					22995	5580	External w		2.5.1.Exter	As building	18	0	0	false	false	Landfilling	Stone woo	P3	7
A1-A3	Concrete r	683	m2	83667.5	0	0.05	87850.88	0	83667.5	0	83667.5	0			83667.5			43622	External w	Main Hous	2.5.1.Exter	As building	0	0	100	false	false	Concrete c	Concrete r	P2	3
A1-A3	Perforated	683	m2	113070.7	-1.5E-11	0.075	121551	0	113070.7	0	113070.7	0			113070.7			61561	External w	Main Hous	2.5.1.Exter	As building	0	0	100	false	false	Concrete c	Aerated/Au	P2	3
A1-A3	Gypsum p	722	m2	7743.7	-247.8	0.13	8711.67	0	7743.7	247.8	7743.7	0.0032	100					1597	External w	Main Hous	2.5.1.Exter	30	3.2	0	100	false	false	Gypsum re	Regular gy	P232	9
A1-A3	Finishing v	722	m2	20216	0	0.13	22844.08	0	20216	0	20216	0			20216			12124	External w	Main Hous	2.5.1.Exter	30	0	0	100	false	false	Cement/m	Mortar (ma	P2	4
A1-A3	Finishing v	722	m2	3032.4	0	0.13	3426.61	0	3032.4	0	3032.4	0			3032.4			1819	External w	Main Hous	2.5.1.Exter	30	0	0	100	false	false	Cement/m	Mortar (ma	P2	4
A1-A3	Glass woo	722	m2	3104.6	-372.55	0.08	3352.97	0	3104.6	372.55	3104.6	0.043					3104.6	5634	External w	Main Hous	2.5.1.Exter	As building	12	0	100	false	false	Landfilling	Glass woo	P3	7
A1-A3	Masonry m	21660	kg	21660	0	0.13	24475.8	0	21660	0	21660	0			21660			18187	External w	Main Hous	2.5.1.Exter	30	0	0	100	false	false	Cement/m	Mortar (ma	P2	4
A1-A3	Masonry m	21660	kg	21660	0	0.13	24475.8	0	21660	0	21660	0			21660			18187	External w	Main Hous	2.5.1.Exter	30	0	0	100	false	false	Cement/m	Mortar (ma	P2	4
A1-A3	Concrete r	26182	kg	26182	25789.27	0.05	27491.1	0	26182	392.73	0	0.013			26182			13651	External w	440mm x 2	2.5.1.Exter	As building	1.5	0	0	false	false	Concrete c	Concrete r	P2	3
A1-A3	Concrete r	29146	kg	29146	28708.81	0.05	30603.3	0	29146	437.19	0	0.014			29146			15196	External w		2.5.1.Exter	As building	1.5	0	0	false	false	Concrete c	Concrete r	P2	3
A1-A3	EPS Insula	22	m2	70.4	70.4	0.04	73.22	0	70.4	0	0	0				70.4		327	Foundatio	Garden Ho	1.1.3.Lowe	As building	0	0	0	false	false	Plastic-bas	EPS (expa	P7	7
A1-A3	EPS Insula	110	m2	352	352	0.04	366.08	0	352	0	0	0				352		1634	Foundatio	Stable Blo	1.1.3.Lowe	As building	0	0	0	false	false	Plastic-bas	EPS (expa	P7	7
A1-A3	Ready-mix	328.5	m2	39420	39420	0.04	40996.8	0	39420	0	0	0			39420			2085	Foundatio	Garden Ho	1.1.1.Stan	As building	0	0	0	false	false	Concrete c	Ready-mix	P2	3
A1-A3	Ready-mix	348	m2	38280	0	0.04	39811.2	0	38280	0	38280	0			38280			1834	Foundatio	Main Hous	1.1.1.Stan	As building	0	0	100	false	false	Concrete c	Ready-mix	P2	3
A1-A3	Ready-mix	988	m2	118560	118560	0.04	123302.4	0	118560	0	0	0			118560			5681	Foundatio	Stable Blo	1.1.1.Stan	As building	0	0	0	false	false	Concrete c	Ready-mix	P2	3
A1-A3	Reinforcer	2070	kg	2070	207	0.048	2170.4	0	2070	1863	0	0.067	100					1187	Foundatio		1.1.1.Stan	As building	90	0	0	false	false	Steel recy	Reinforcer	P4	5
A1-A3	Reinforcer	3285	kg	3285	-2956.5	0.048	3444.32	0	3285	2956.5	3285	0.11	100					1883	Foundatio		1.1.1.Stan	As building	90	0	100	false	false	Steel recy	Reinforcer	P4	5
A1-A3	Reinforcer	8429.4	kg	8429.4	842.94	0.048	8838.23	0	8429.4	7586.46	0	0.27	100					4832	Foundatio	Stable Blo	1.1.1.Stan	As building	90	0	0	false	false	Steel recy	Reinforcer	P4	5
A1-A3	Ready-mix	31800	kg	31800	31482	0.04	33072	0	31800	318	0	0.0011			31800			1682	Foundatio		1.1.1.Stan	As building	1	0	0	false	false	Concrete c	Ready-mix	P2	3
A1-A3	Ready-mix	50484	kg	50484	-504.84	0.04	52503.36	0	50484	504.84	50484	0.0017			50484			2670	Foundatio		1.1.1.Stan	As building	1	0	100	false	false	Concrete c	Ready-mix	P2	3
A1-A3	Ready-mix	129525	kg	129525	128229.8	0.04	134706	0	129525	1295.25	0	0.0043			129525			6850	Foundatio	Stable Blo	1.1.1.Stan	As building	1	0	0	false	false	Concrete c	Ready-mix	P2	3

A1-A3	Planed tim	2.4	m3	1008	10.08	0.18	1188.43	997.92	10.08	0	0	0				1008		1640	Floor slabs	190 mm x	2.1.5.Timb	As building	0	99	0	false	false	Wood inci	Plain wooc	P5	6
A1-A3	Planed tim	13.92	m3	5846.4	58.46	0.18	6892.91	5787.94	58.46	0	0	0				5846.4		9514	Floor slabs	Assumed a	2.3.Roofs	As building	0	99	0	false	false	Wood inci	Plain wooc	P5	6
A1-A3	Planed tim	26.28	m3	11037.6	110.38	0.18	13013.33	10927.22	110.38	0	0	0				11037.6		17962	Floor slabs	Assumed a	2.3.Roofs	As building	0	99	0	false	false	Wood inci	Plain wooc	P5	6
A1-A3	Planed tim	31.32	m2	302.55	3.03	0.18	356.71	299.53	3.03	0	0	0				302.55		492	Floor slabs	Quantity a	2.3.Roofs	As building	0	99	0	false	false	Wood inci	Plain wooc	P5	6
A1-A3	Planed tim	39.6	m3	16632	166.32	0.18	19609.13	16465.68	166.32	0	0	0				16632		27065	Floor slabs	Assumed a	2.3.Roofs	As building	0	99	0	false	false	Wood inci	Plain wooc	P5	6
A1-A3	Planed tim	48.216	m2	4515.91	45.16	0.18	5324.26	4470.75	45.16	0	0	0				4515.91		7349	Floor slabs	Quantity a	2.2.1.Floo	As building	0	99	0	false	false	Wood inci	Plain wooc	P5	6
A1-A3	Planed tim	59.13	m2	571.2	5.71	0.18	673.44	565.48	5.71	0	0	0				571.2		930	Floor slabs	Quantity a	2.3.Roofs	As building	0	99	0	false	false	Wood inci	Plain wooc	P5	6
A1-A3	Planed tim	89.1	m2	860.71	8.61	0.18	1014.77	852.1	8.61	0	0	0				860.71		1401	Floor slabs	Quantity a	2.3.Roofs	As building	0	99	0	false	false	Wood inci	Plain wooc	P5	6
A1-A3	Waterproc	100	m2	150	150	0.1	165	0	150	0	0	0					150	500	Floor slabs		3.Internal	10	0	0	0	false	false	Landfilling	Sealants (	P7	7
A1-A3	Tile adhes	100	m2	140	140	0.13	158.2	0	140	0	0	0			140			84	Floor slabs		3.Internal	30	0	0	0	false	false	Cement/m	Mortar (ma	P2	4
A1-A3	Ceramic w	100	m2	2400	2400	0.1	2640	0	2400	0	0	0			2400			3405	Floor slabs		3.Internal	10	0	0	0	false	false	Brick/stone	Wall and f	P2	9
A1-A3	Planed tim	102.165	m2	9568.77	-9473.09	0.18	11281.58	9473.09	95.69	0	9568.77	0				9568.77		15571	Floor slabs	Quantity a	2.2.Upper	As building	0	99	100	false	false	Wood inci	Plain wooc	P5	6
A1-A3	Waterproc	139	m2	208.5	208.5	0.1	229.35	0	208.5	0	0	0					208.5	695	Floor slabs		3.2.Floor f	10	0	0	0	false	false	Landfilling	Sealants (	P7	7
A1-A3	Tile adhes	139	m2	194.6	194.6	0.13	219.9	0	194.6	0	0	0			194.6			117	Floor slabs		3.2.Floor f	30	0	0	0	false	false	Cement/m	Mortar (ma	P2	4
A1-A3	Ceramic w	139	m2	3336	3336	0.1	3669.6	0	3336	0	0	0			3336			4734	Floor slabs		3.2.Floor f	10	0	0	0	false	false	Brick/stone	Wall and f	P2	9
A1-A3	Vinyl floori	139	m2	225.65	225.65	0.1	248.21	0	225.65	0	0	0				225.65		2156	Floor slabs	Main Hous	3.2.Floor f	10	0	0	0	false	false	Plastic-bas	Resilient fl	P7	6
A1-A3	Vinyl floori	200	m2	324.68	324.68	0.1	357.14	0	324.68	0	0	0				324.68		3103	Floor slabs	House, Or	3.Internal	10	0	0	0	false	false	Plastic-bas	Resilient fl	P7	6
A1-A3	Glass woo	279.78	m2	1573.76	1384.91	0.08	1699.66	0	1573.76	188.85	0	0.022					1573.76	2856	Floor slabs	Quantity a	2.2.1.Floo	As building	12	0	0	false	false	Landfilling	Glass woo	P3	7
A1-A3	EPS Insula	328	m2	1312	1312	0.04	1364.48	0	1312	0	0	0				1312		6090	Floor slabs	House, Or	1.1.3.Lowe	As building	0	0	0	false	false	Plastic-bas	EPS (expa	P7	7
A1-A3	Ready-mix	328	m2	236160	233798.4	0.04	245606.4	0	236160	2361.6	0	0.0079			236160			12489	Floor slabs	House, Or	1.1.3.Lowe	As building	1	0	0	false	false	Concrete c	Ready-mix	P2	3
A1-A3	Plastic vap	328	m2	60.68	60.68	0.1	66.75	0	60.68	0	0	0				60.68		121	Floor slabs	House, Or	1.1.3.Lowe	30	0	0	0	false	false	Plastic-bas	Plastic me	P7	7
A1-A3	Self levelli	328	m2	9184	9184	0.13	10377.92	0	9184	0	0	0			9184			5508	Floor slabs	House, Or	1.1.3.Lowe	30	0	0	0	false	false	Cement/m	Mortar (ma	P2	4
A1-A3	Self levelli	328	m2	9184	9184	0.13	10377.92	0	9184	0	0	0			9184			5508	Floor slabs		2.2.1.Floo	30	0	0	0	false	false	Cement/m	Mortar (ma	P2	4
A1-A3	Gypsum p	328	m2	3658.63	3541.56	0.13	4115.96	0	3658.63	117.08	0	0.0015	100					754	Floor slabs		2.2.1.Floo	30	3.2	0	0	false	false	Gypsum re	Regular gy	P232	9
A1-A3	Particlebo	328	m2	4408.98	88.18	0.17	5145.27	4320.8	88.18	0	0	0				4408.98		3375	Floor slabs		2.2.1.Floo	30	0	98	0	false	false	Wood inci	Particlebo	P5	6
A1-A3	EPS Insula	348	m2	1392	0	0.04	1447.68	0	1392	0	1392	0				1392		6461	Floor slabs	Main Hous	1.1.3.Lowe	As building	0	0	100	false	false	Plastic-bas	EPS (expa	P7	7
A1-A3	Plastic vap	348	m2	64.38	0	0.1	70.82	0	64.38	0	64.38	0				64.38		129	Floor slabs	Main Hous	1.1.3.Lowe	30	0	0	100	false	false	Plastic-bas	Plastic me	P7	7
A1-A3	Plastic vap	348	m2	64.38	64.38	0.1	70.82	0	64.38	0	0	0				64.38		129	Floor slabs		2.3.Roofs	30	0	0	0	false	false	Plastic-bas	Plastic me	P7	7
A1-A3	Self levelli	348	m2	9744	0	0.13	11010.72	0	9744	0	9744	0			9744			5844	Floor slabs	Main Hous	1.1.3.Lowe	30	0	0	100	false	false	Cement/m	Mortar (ma	P2	4
A1-A3	Glass woo	348	m2	2610	2296.8	0.08	2818.8	0	2610	313.2	0	0.036					2610	4736	Floor slabs		2.3.Roofs	As building	12	0	0	false	false	Landfilling	Glass woo	P3	7
A1-A3	Oriented s	348	m2	3184.2	63.68	0.17	3715.96	3120.52	63.68	0	0	0				3184.2		3262	Floor slabs		2.3.Roofs	30	0	98	0	false	false	Wood inci	Oriented s	P5	6
A1-A3	PVC based	348	m2	487.2	487.2	0.1	535.92	0	487.2	0	0	0				487.2		643	Floor slabs		2.3.Roofs	30	0	0	0	false	false	Plastic-bas	Plastic me	P7	7
A1-A3	Ready-mix	348	m2	250560	-2505.6	0.04	260582.4	0	250560	2505.6	250560	0.0083			250560			13250	Floor slabs	Main Hous	1.1.3.Lowe	As building	1	0	100	false	false	Concrete c	Ready-mix	P2	3
A1-A3	Plastic vap	357	m2	66.05	66.05	0.1	72.65	0	66.05	0	0	0				66.05		132	Floor slabs		3.Internal	30	0	0	0	false	false	Plastic-bas	Plastic me	P7	7
A1-A3	Massive w	357	m2	4502.05	45.02	0.18	5307.92	4457.03	45.02	0	0	0				4502.05		3416	Floor slabs		3.Internal	As building	0	99	0	false	false	Wood inci	Plain wooc	P5	6
A1-A3	Waterproc	554	m2	831	831	0.1	914.1	0	831	0	0	0					831	2770	Floor slabs		3.2.Floor f	10	0	0	0	false	false	Landfilling	Sealants (	P7	7
A1-A3	Tile adhes	554	m2	775.6	775.6	0.13	876.43	0	775.6	0	0	0			775.6			465	Floor slabs		3.2.Floor f	30	0	0	0	false	false	Cement/m	Mortar (ma	P2	4
A1-A3	Ceramic w	554	m2	13296	13296	0.1	14625.6	0	13296	0	0	0			13296			18866	Floor slabs		3.2.Floor f	10	0	0	0	false	false	Brick/stone	Wall and f	P2	9
A1-A3	Carpet tile	554	m2	2471.95	1853.96	0.1	2719.14	0	2471.95	617.99	0	0.18				2471.95		11201	Floor slabs	Stable Blo	3.2.Floor f	10	25	0	0	false	false	Plastic-bas	Carpet floo	P7	6
A1-A3	Glass woo	592.84	m2	3334.73	-400.17	0.08	3601.5	0	3334.73	400.17	3334.73	0.046					3334.73	6051	Floor slabs	Quantity a	2.2.Upper	As building	12	0	100	false	false	Landfilling	Glass woo	P3	7
A1-A3	Plastic vap	648	m2	119.88	119.88	0.1	131.87	0	119.88	0	0	0				119.88		240	Floor slabs		3.2.Floor f	30	0	0	0	false	false	Plastic-bas	Plastic me	P7	7
A1-A3	Massive w	648	m2	8171.79	81.72	0.18	9634.54	8090.07	81.72	0	0	0				8171.79		6200	Floor slabs		3.2.Floor f	As building	0	99	0	false	false	Wood inci	Plain wooc	P5	6
A1-A3	Plastic vap	657	m2	121.55	121.55	0.1	133.7	0	121.55	0	0	0				121.55		243	Floor slabs		2.3.Roofs	30	0	0	0	false	false	Plastic-bas	Plastic me	P7	7
A1-A3	Glass woo	657	m2	4927.5	4336.2	0.08	5321.7	0	4927.5	591.3	0	0.068					4927.5	8942	Floor slabs		2.3.Roofs	As building	12	0	0	false	false	Landfilling	Glass woo	P3	7
A1-A3	Oriented s	657	m2	6011.55	120.23	0.17	7015.48	5891.32	120.23	0	0	0				6011.55		6159	Floor slabs		2.3.Roofs	30	0	98	0	false	false	Wood inci	Oriented s	P5	6
A1-A3	PVC based	657	m2	919.8	919.8	0.1	1011.78	0	919.8	0	0	0				919.8		1215	Floor slabs		2.3.Roofs	30	0	0	0	false	false	Plastic-bas	Plastic me	P7	7
A1-A3	Fibre cem	657	m2	9158.58	9158.58	0.05	9616.51	0	9158.58	0	0	0			9158.58			12152	Floor slabs	House, Or	2.3.1.Roof	30			0	false	false	Concrete c	Fibre cem	P2	6
A1-A3	Self levelli	695	m2	19460	0	0.13	21989.8	0	19460	0	19460	0			19460			11671	Floor slabs		2.2.Upper	30	0	0	100	false	false	Cement/m	Mortar (ma	P2	4
A1-A3	Gypsum p	695	m2	7752.28	-248.07	0.13	8721.32	0	7752.28	248.07	7752.28	0.0032	100					1599	Floor slabs		2.2.Upper	30	3.2	0	100	false	false	Gypsum re	Regular gy	P232	9
A1-A3	Particlebo	695	m2	9342.19	-9155.35	0.17	10902.34	9155.35	186.84	0	9342.19	0				9342.19		7152	Floor slabs		2.2.Upper	30	0	98	100	false	false	Wood inci	Particlebo	P5	6
A1-A3	Fibre cem	988	m2	13772.72	13772.72	0.05	14461.36	0	13772.72	0	0	0			13772.72			18274	Floor slabs	Main Hous	2.3.Roofs	30			0	false	false	Concrete c	Fibre cem	P2	6
A1-A3	EPS Insula	990	m2	3960	3960	0.04	4118.4	0	3960	0	0	0				3960		18380	Floor slabs	Stable Blo	1.1.3.Lowe	As building	0	0	0	false	false	Plastic-bas	EPS (expa	P7	7
A1-A3	Ready-mix	990	m2	712800	705672	0.04	741312	0	712800	7128	0	0.024			712800			37694	Floor slabs	Stable Blo	1.1.3.Lowe	As building	1	0	0	false	false	Concrete c	Ready-mix	P2	3
A1-A3	Plastic vap	990	m2	183.15	183.15	0.1	201.47	0	183.15	0	0	0				183.15		366	Floor slabs	Stable Blo	1.1.3.Lowe	30	0	0	0	false	false	Plastic-bas	Plastic me	P7	7
A1-A3	Plastic vap	990	m2	183.15	183.15	0.1	201.47	0	183.15	0	0	0				183.15		366	Floor slabs		2.3.Roofs	30	0	0	0	false	false	Plastic-bas	Plastic me	P7	7
A1-A3	Self levelli	990	m2	27720	27720	0.13	31323.6	0	27720	0	0	0			27720			16625	Floor slabs	Stable Blo	1.1.3.Lowe	30	0	0	0	false	false	Cement/m	Mortar (ma	P2	4
A1-A3	Glass woo	990	m2	7425	6534	0.08	8019	0	7425	891	0	0.1					7425	13474	Floor slabs		2.3.Roofs	As building	12	0	0	false	false	Landfilling	Glass woo	P3	7
A1-A3	Oriented s	990	m2	9058.5	181.17	0.17	10571.27	8877.33	181.17	0	0	0				9058.5		9280	Floor slabs		2.3.Roofs	30	0	98	0	false	false	Wood inci	Oriented s	P5	6
A1-A3	PVC based	990	m2	1386	1386	0.1	1524.6	0	1386	0	0	0				1386		1830	Floor slabs		2.3.Roofs	30	0	0	0	false	false	Plastic-bas	Plastic me	P7	7
A1-A3	Fibre cem	1368	m2	19069.92	19069.92	0.05	20023.42	0	19069.92	0	0	0			19069.92			25302	Floor slabs	Stable Blo	2.3.Roofs	30			0	false	false	Concrete c	Fibre cem	P2	6
A1-A3	Plastic vap	1663	m2	307.66	307.66	0.1	338.42	0	307.66	0	0	0				307.66		615	Floor slabs		3.2.Floor f	30	0	0	0	false	false	Plastic-bas	Plastic me	P7	7
A1-A3	Massive w	1663	m2	20971.73	209.72	0.18	24725.67	20762.01	209.72	0	0	0				20971.73		15913	Floor slabs		3.2.Floor f	As building	0	99	0	false	false	Wood inci	Plain wooc	P5	6
A1-A3	Ready-mix	1686.55	m2	202386	200362.1	0.04	210481.4	0	202386	2023.86	0	0.0067			202386			10703	Floor slabs	Stable Blo	2.2.Upper	As building	1	0	0	false	false	Concrete c	Ready-mix	P2	3
A1-A3	Self levelli	1686.55	m2	47223.4	47223.4	0.13	53362.44	0	47223.4	0	0	0			47223.4			28322	Floor slabs	Stable Blo	2.2.Upper	30	0	0	0	false	false	Cement/m	Mortar (ma	P2	4
A1-A3	Hollow cor	1686.55	m2	625710.1	619453	0	625710.1	0	625710.1	6257.1	0	0.054			625710.1			85004	Floor slabs	Stable Blo	2.2.Upper	As building	1	0	0	false	false	Rebar sep	Concrete s	P2	3
A1-A3	Glass woo	1686.55	m2	6746.2	3811.6	0.08	7285.9	33.73	6712.47	2900.87	0	0					6746.2	0	Floor slabs	Stable Blo	2.2.Upper	As building	43	0.5	0	false	false	Landfilling	Acoustic ir	P3	7
A1-A3	Reinforcer	3744.14	kg	3744.14	374.41	0.048	3925.73	0	3744.14	3369.73	0	0.12	100					2146	Floor slabs	Stable Blo	2.2.Upper	As building	90	0	0	false	false	Steel recy	Reinforcer	P4	5
A1-A3	Reinforcer	8856	kg	8856	885.6	0.048	9285.52	0	8856	7970.4	0	0.29	100					5077	Floor slabs	House, Or	1.1.3.Lowe	As building	90	0	0	false	false	Steel recy	Reinforcer	P4	5
A1-A3	Reinforcer	9396	kg	9396	-8456.4	0.048	9851.71	0	9396	8456.4	9396	0.31	100					5386	Floor slabs	Main Hous	1.1.3.Lowe	As building	90	0	100	false	false	Steel recy	Reinforcer	P4	5
A1-A3	Reinforcer	26730	kg	26730	2673	0.048	28026.41	0	26730	24057	0	0.87	100					15323	Floor slabs	Stable Blo	1.1.3.Lowe	As building	90	0	0	false	false	Steel recy	Reinforcer	P4	5
A1-A3	Reinforcer	28140	kg	28140	2814	0.048	29504.79	0	28140	25326	0	0.91	100					16131	Floor slabs	Stable Blo	2.1. Frame	As building	90	0	0	false	false	Steel recy	Reinforcer	P4	5
A1-A3	Ready-mix	345240	kg	345240	338335.2	0.04	359049.6	0	345240	6904.8	0	0.023			345240			18257	Floor slabs	Stable Blo	2.1. Frame	As building	2	0	0	false	false	Concrete c	Ready-mix	P2	3
A1-A3	Wooden e	57	m2	2196.77	2196.77	0	2196.77	0	2196.77	0	0	0				2196.77		4285	Internal wa	House, Or	2.8.Interna	30	0	0	0	false	false	Wood-con	Wood and	P8	8
A1-A3	Planed tim	76.21	m2	3136.8	31.37	0.18	3698.29	3105.44	31.37	0	0	0				3136.8		5105	Internal wa	Quantity a	2.7.1.Wall	As building	0	99	0	false	false	Wood inci	Plain wooc	P5	6
A1-A3	Wooden e	84	m2	3237.35	3237.35	0	3237.35	0	3237.35	0	0	0				3237.35		6315	Internal wa	Main Hous	2.8.Interna	30	0	0	0	false	false	Wood-con	Wood and	P8	8
A1-A3	Water-bor	115.74	kg	115.74	115.74	0.1	127.31	0	115.74	0	0	0					115.74	536	Internal wa	For both si	3.Internal	15	0	0	0	false	false	Landfilling	Paints, coa	P7	9
A1-A3	Waterborn	124.075	kg	124.08	124.08	0.1	136.48	0	124.08	0	0	0					124.08	0	Internal wa	Pour mur i	2.7.Interna	10	0	0	0	false	false	Landfilling	Paints, coa	P7	9
A1-A3	Water-bor	176.023	kg	176.02	176.02	0.1	193.63	0	176.02	0	0	0					176.02	815	Internal wa	For both si	2.7.1.Wall	15	0	0	0	false	false	Landfilling	Paints, coa	P7	9
A1-A3	Planed tim	206.6	m2	8503.66	85.04	0.18	10025.81	8418.62	85.04	0	0	0				8503.66		13838	Internal wa	Quantity a	2.7.Interna	As building	0	99	0	false	false	Wood inci	Plain wooc	P5	6

A1-A3	Waterborn	238.636	kg	238.64	238.64	0.1	262.5	0	238.64	0	0	0					238.64	0	Internal wa	Pour mur i	2.7.Interna		10	0	0	0	false	false	Landfilling	Paints, coa	P7	9
A1-A3	Water-bor	248.094	kg	248.09	248.09	0.1	272.9	0	248.09	0	0	0					248.09	1149	Internal wa	For both si	3.Internal t		15	0	0	0	false	false	Landfilling	Paints, coa	P7	9
A1-A3	Gypsum p	432	m2	4818.69	4664.49	0.13	5421.02	0	4818.69	154.2	0	0.002	100					994	Internal wa		3.Internal t		30	3.2	0	0	false	false	Gypsum re	Regular gy	P232	9
A1-A3	Water-bor	477.166	kg	477.17	477.17	0.1	524.88	0	477.17	0	0	0					477.17	2210	Internal wa	For both si	2.7.Interna		15	0	0	0	false	false	Landfilling	Paints, coa	P7	9
A1-A3	Glass woo	580.79	m2	1451.98	1277.74	0.08	1568.13	0	1451.98	174.24	0	0.02					1451.98	2635	Internal wa	Quantity a	2.7.1.Wall	As building	12	0	0	0	false	false	Landfilling	Glass woo	P3	7
A1-A3	Gypsum p	657	m2	7328.42	7093.91	0.13	8244.47	0	7328.42	234.51	0	0.003	100					1511	Internal wa		2.7.1.Wall		30	3.2	0	0	false	false	Gypsum re	Regular gy	P232	9
A1-A3	Gypsum p	657	m2	7328.42	7093.91	0.13	8244.47	0	7328.42	234.51	0	0.003	100					1511	Internal wa		2.7.1.Wall		30	3.2	0	0	false	false	Gypsum re	Regular gy	P232	9
A1-A3	Water-bor	742.674	kg	742.67	742.67	0.1	816.94	0	742.67	0	0	0					742.67	3440	Internal wa	For both si	2.7.Interna		15	0	0	0	false	false	Landfilling	Paints, coa	P7	9
A1-A3	Wooden e	891	m2	34339.03	34339.03	0	34339.03	0	34339.03	0	0	0				34339.03		66984	Internal wa	Stable Blo	2.8.Interna		30	0	0	0	false	false	Wood-con	Wood and	P8	8
A1-A3	Concrete r	899.15	m2	0	0	0.05	0	0	0	0	0	0			0			0	Internal wa		2.7.Interna	As building	0	0	0	0	false	false	Concrete c	Concrete r	P2	3
A1-A3	Gypsum p	926	m2	10328.94	9998.42	0.13	11620.06	0	10328.94	330.53	0	0.0043	100					2130	Internal wa		3.Internal t		30	3.2	0	0	false	false	Gypsum re	Regular gy	P232	9
A1-A3	Gypsum b	926	m2	8956.27	6717.2	0.13	10075.81	0	8956.27	2239.07	0	0.034	100					2130	Internal wa		2.7.Interna		30	25	0	0	false	false	Gypsum re	Regular gy	P232	9
A1-A3	Mineral mo	926	m2	20835	20835	0.13	23543.55	0	20835	0	0	0			20835			11663	Internal wa		2.7.Interna		30	0	0	0	false	false	Cement/m	Mortar (ma	P2	4
A1-A3	Glass woo	1574.4	m2	3936	3463.68	0.08	4250.88	0	3936	472.32	0	0.054					3936	7143	Internal wa	Quantity a	2.7.Interna	As building	12	0	0	0	false	false	Landfilling	Glass woo	P3	7
A1-A3	Concrete r	1729.35	m2	0	0	0.05	0	0	0	0	0	0			0			0	Internal wa		2.7.Interna	As building	0	0	0	0	false	false	Concrete c	Concrete r	P2	3
A1-A3	Gypsum p	1781	m2	19865.92	19230.21	0.13	22349.16	0	19865.92	635.71	0	0.0083	100					4096	Internal wa		2.7.Interna		30	3.2	0	0	false	false	Gypsum re	Regular gy	P232	9
A1-A3	Gypsum p	1781	m2	19865.92	19230.21	0.13	22349.16	0	19865.92	635.71	0	0.0083	100					4096	Internal wa		2.7.Interna		30	3.2	0	0	false	false	Gypsum re	Regular gy	P232	9
A1-A3	Gypsum b	1781	m2	17225.83	12919.37	0.13	19379.06	0	17225.83	4306.46	0	0.064	100					4096	Internal wa		2.7.Interna		30	25	0	0	false	false	Gypsum re	Regular gy	P232	9
A1-A3	Mineral mo	1781	m2	40072.5	40072.5	0.13	45281.93	0	40072.5	0	0	0			40072.5			22431	Internal wa		2.7.Interna		30	0	0	0	false	false	Cement/m	Mortar (ma	P2	4
A1-A3	Gypsum p	2772	m2	30919.9	29930.46	0.13	34784.89	0	30919.9	989.44	0	0.013	100					6376	Internal wa		2.7.Interna		30	3.2	0	0	false	false	Gypsum re	Regular gy	P232	9
A1-A3	Mortar for	13890	kg	13890	13890	0.13	15695.7	0	13890	0	0	0			13890			7775	Internal wa	On estime	2.7.Interna		30	0	0	0	false	false	Cement/m	Mortar (ma	P2	4
A1-A3	Mortar for	26715	kg	26715	26715	0.13	30187.95	0	26715	0	0	0			26715			14954	Internal wa	On estime	2.7.Interna		30	0	0	0	false	false	Cement/m	Mortar (ma	P2	4
A1-A3	One storey	4	unit	526	0	0.18	620.15	526	0	0	0	0				526		0	Other stru	House, Or	2.4.1.Stair	As building	0	100	0		false	false	Wood inci	Plain wooc	P5	6
A1-A3	Ready-mix	5.027	m3	12064.8	-120.65	0.04	12547.39	0	12064.8	120.65	12064.8	0.0004			12064.8			638	Other stru	Flights of s	2.4.1.Stair	As building	1	0	100		false	false	Concrete c	Ready-mix	P2	3
A1-A3	Ready-mix	5.39	m3	12936	12806.64	0.04	13453.44	0	12936	129.36	0	0.00043			12936			684	Other stru	Flights of s	2.4.Stairs	As building	1	0	0		false	false	Concrete c	Ready-mix	P2	3
A1-A3	Ready-mix	14.49	m3	34776	-347.76	0.04	36167.04	0	34776	347.76	34776	0.0012			34776			1839	Other stru	Cast-in-pla	2.4.1.Stair	As building	1	0	100		false	false	Concrete c	Ready-mix	P2	3
A1-A3	Ready-mix	15.525	m3	37260	36887.4	0.04	38750.4	0	37260	372.6	0	0.0012			37260			1970	Other stru	Cast-in-pla	2.4.Stairs	As building	1	0	0		false	false	Concrete c	Ready-mix	P2	3
A1-A3	Ready-mix	118.23	m2	56750.4	56182.9	0.04	59020.42	0	56750.4	567.5	0	0.0019			56750.4			3001	Other stru		2.2.2.Balc	As building	1	0	0		false	false	Concrete c	Ready-mix	P2	3
A1-A3	Reinforcer	502.74	kg	502.74	-452.47	0.048	527.12	0	502.74	452.47	502.74	0.016	100					288	Other stru	Reinforcen	2.4.1.Stair	As building	90	0	100		false	false	Steel recyc	Reinforcen	P4	5
A1-A3	Reinforcer	538.65	kg	538.65	53.86	0.048	564.77	0	538.65	484.79	0	0.018	100					309	Other stru	Reinforcen	2.4.Stairs	As building	90	0	0		false	false	Steel recyc	Reinforcen	P4	5
A1-A3	Reinforcer	1449	kg	1449	-1304.1	0.048	1519.28	0	1449	1304.1	1449	0.047	100					831	Other stru	Reinforcen	2.4.1.Stair	As building	90	0	100		false	false	Steel recyc	Reinforcen	P4	5
A1-A3	Reinforcer	1552.5	kg	1552.5	155.25	0.048	1627.8	0	1552.5	1397.25	0	0.05	100					890	Other stru	Reinforcen	2.4.Stairs	As building	90	0	0		false	false	Steel recyc	Reinforcen	P4	5
A1-A3	Reinforcer	2837.52	kg	2837.52	283.75	0.048	2975.14	0	2837.52	2553.77	0	0.092	100					1627	Other stru	Reinforcen	2.2.2.Balc	As building	90	0	0		false	false	Steel recyc	Reinforcen	P4	5
A1-A3	Multifuncti	5.2	m2	226.2	226.2	0	226.2	0	226.2	0	0	0	100					659	Windows a	House, Or	2.6.2.Exte		30	0	0	0	false	false	Metal-cont	Metal and	P8	8
A1-A3	Multifuncti	7	m2	304.5	304.5	0	304.5	0	304.5	0	0	0	100					888	Windows a	Main Hous	2.6.2.Exte		30	0	0	0	false	false	Metal-cont	Metal and	P8	8
A1-A3	Multifuncti	20	m2	870	870	0	870	0	870	0	0	0	100					2536	Windows a	Stable Blo	2.6.2.Exte		30	0	0	0	false	false	Metal-cont	Metal and	P8	8
A1-A3	Double gla	108	m2	3315.6	1879.2	0	3315.6	1436.4	1879.2	0	0	0	100					36504	Windows a	House, Or	2.6.Windo		30	0	43.32248	0	false	false	Glass-con	Wooden fr	P8	8
A1-A3	Aluminium	207.86	m2	5044.76	5044.76	0	5044.76	0	5044.76	0	0	0	100					56642	Windows a	Stable Blo	2.6.1.Exte		30	0	0	0	false	false	Glass-con	Aluminium	P8	8
A1-A3	Double gla	209	m2	6416.3	3636.6	0	6416.3	2779.7	3636.6	0	0	0	100					70642	Windows a	Main Hous	2.6.Windo		30	0	43.32248	0	false	false	Glass-con	Wooden fr	P8	8