MAYOR OF LONDON

London Plan Guidance

Circular Economy Statements

March 2022

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London Plan policy	Policy D3: optimising site capacity through the design-led approach; Policy SI 7: reducing waste and supporting the circular economy (CE); and Policy SI 2: minimising greenhouse gas emissions. This London Plan Guidance (LPG) should be read in conjunction with London Plan Policy SI 2: minimising greenhouse gas emissions and the Whole Life-Cycle Carbon Assessments LPG.
Planning application type	London Plan 2021 Policy SI 7(B) requires applications that are referred to the Mayor[1] to promote CE outcomes, and to aim to be net-zero-waste. All applications for referable development (outline, detailed and/or hybrid applications) are required to submit a CE statement. Local planning authorities may require CE statements for other development in local Plans or other Development Plan Documents.
Who is this guidance for?	Planning authorities, applicants, developers, architects, designers, consultants, engineers, contractors, building owners, operators and facilities managers.
Submitting CE statements	CE statements should be submitted at each stage to the GLA at: circulareconomystatements@london.gov.uk with an email subject line: Circular Economy statement for [insert planning reference].

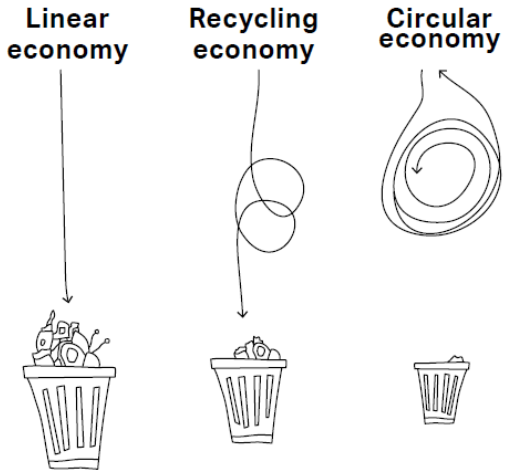
[1] As defined in the Town and Country Planning (Mayor of London) Order 2008. See www.london.gov.uk/what-we-do/planning/planning-applications-and-decisions/what-powers-does-mayor-have-planning-applications for more details.

1. About this document

1.1. What is the circular economy?

1.1.1. London Plan Policy SI 7 defines a circular economy (CE) 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 move away from the current linear economic model, where materials are mined, manufactured, used and thrown away, as shown in Figure 1.

Figure 1: CE model, compared to the linear and recycling economies



FROM TAKE • MAKE • USE • DISCARD TO RE-MAKE • USE-AGAIN

Diagram courtesy of Circular Flanders

1.1.2. To demonstrate how this will be achieved, applicants are required to submit a CE statement.

1.1.3. This guidance explains how to prepare a CE statement to comply with Policy SI 7, including the information that must be submitted under Policy SI 7(B). It also includes guidance on how the design of new buildings, and prioritising the reuse and retrofit of existing structures, can promote CE outcomes.[2] Further, London Plan Policy D3 requires all development to aim for high sustainability standards, and to take into account the principles of the circular economy.

1.1.4. How these concepts relate to the built environment is further explored in the Design for a Circular Economy Primer; and further information on applying

[2] The London Plan 2021 defines reuse as the:
'operation or process of checking, cleaning or repairing materials that have been discarded and are waste so that they can be used again for their original purpose as non-waste without any other pre-processing.'

Recycling is defined in the London Plan as involving:
'the reprocessing of waste, either into the same product or a different one. Many non-hazardous wastes such as paper, glass, cardboard, plastics and metals can be recycled. Hazardous wastes such as solvents can also be recycled by specialist companies, or by in-house equipment'.

CE principles to developments and good practice examples can be found on the CE wiki.[3]

1.1.5. This section of the London Plan Guidance (LPG) sets out how CE principles, the concept of building in layers and appropriate design approaches should inform referable applications.

1.2 Relationship to other London Plan Guidance

1.2.1. There is a close relationship between this guidance and the Whole Life-Cycle Carbon (WLC) LPG, which should be addressed as follows:[4]

- the same Bill of Materials should be used for CE and WLC assessments
- the promotion of CE outcomes should also reduce the WLC of the development (modules A-C of BS EN 15978), or provide additional benefits beyond the development's life (module D)[5]
- the end-of-life scenarios developed through the CE statement process should be used to inform the assumptions made in the WLC assessment (see sections 4.7.9 to 4.7.11 and 4.7.14)
- design decisions should be informed by the principles and results of both studies
- the CE statement should cross-reference relevant parts of other documents submitted as part of the planning application.[6]

[3] London Circular Economy Statements LPG - Additional resources - Designing Buildings
Circular economy case studies - Designing Buildings

[4] London Plan Policy SI 2(F) requires WLC assessments to be submitted as part of referable planning applications.

[5] BS EN 15978 and the RICS PS set out four stages in the life of a typical project, described as life-cycle modules:

- Module A1 – A5 (Product sourcing and construction stage)
- Module B1 – B7 (Use stage)
- Module C1 – C4 (End of life stage)
- Module D (Benefits and loads beyond the system boundary)

Refer to section 2.5 of the WLC assessment guidance for further information on the life-cycle modules.

[6] Such as the WLC assessment; Site Waste and Operational Waste Management (OWM) plans or similar; Design and Access Statements; Energy Statements; and other environmental or sustainability statements.

2. Applying the circular economy principles

2.1. Circular Economy principles

2.1.1. The six circular economy (CE) principles, which should be a fundamental part of the building design process, are:[7]

1. building in layers – ensuring that different parts of the building are accessible and can be maintained and replaced where necessary
2. designing out waste – ensuring that waste reduction is planned in from project inception to completion, including consideration of standardised components, modular build, and reuse of secondary products and materials
3. designing for longevity
4. designing for adaptability or flexibility
5. designing for disassembly
6. using systems, elements or materials that can be reused and recycled.

2.1.2. The principles support the application of the waste hierarchy[8] in that avoiding or reducing waste is prioritised.

2.2. Building in layers framework

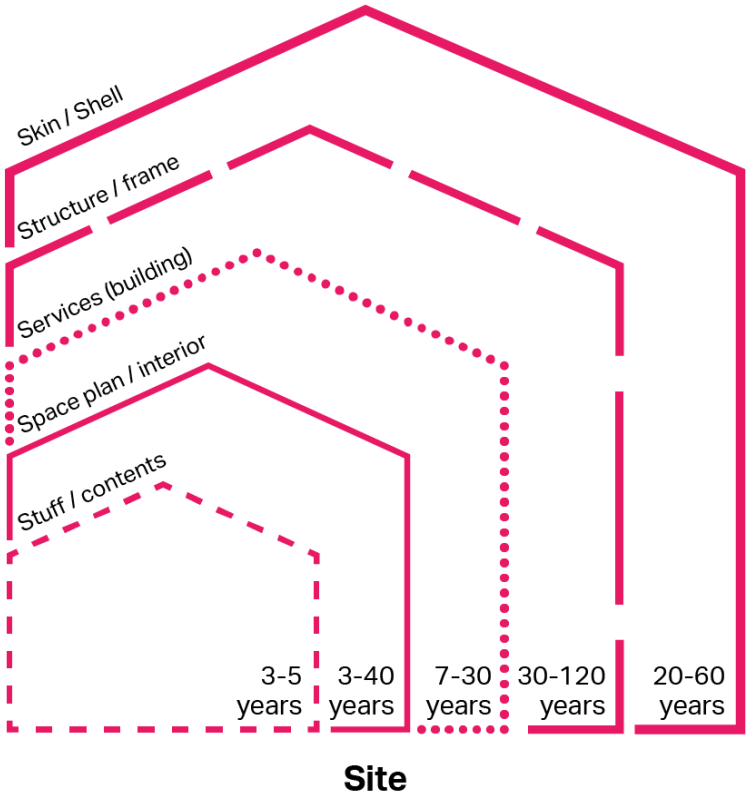
2.2.1. A useful way to understand a building or development is in terms of 'layers', where each layer has its own life cycle, life span, and relevant CE design approaches (see sections 2.3 to 2.5) and solutions as shown in Figure 2 below.[9]

2.2.2. To support reuse and recycling, the different layers should be independent, accessible and removable whilst maintaining their value, where possible. This is especially important for layers that may need more frequent replacement, such as building services and internal fit-outs.

2.2.3. CE design approaches will be applicable to each layer depending on its function and expected lifespan.

[7] Paragraph 3.3.10 of the London Plan.
[8] The waste hierarchy is described in DEFRA (2011) Guidance on applying the Waste Hierarchy.
[9] See Frank Duffy's 'Shearing Layers' concept described in Brand, S. (1994), *How Buildings Learn*.

Figure 2: Building layers and their indicative lifespans[10]



2.2.4. A standard list of layers is defined in Table 1 below, with reference to the Royal Institute of Chartered Surveyors (RICS) New Rules of Measurement (NRM) (2012)[11] building elements where relevant. The NRM building elements form the basis of CE statement reporting, particularly from outline application stage in the Bill of Materials.

Table 1: Building layer summary and equivalent building element/RICS reference

Building layer	Summary and constituent elements	RICS reference
Site	The geographical location, context, external works, earth works and landscaping.	NRM 8 – External works
Skin/shell e.g. façade	The layer keeping out water, wind, heat, cold, direct sunlight and noise. Includes exterior surfaces such as the roof, siding, sheathing and windows. This layer includes the façade (front or face of a building). This layer often has biggest impact on long-term durability, occupant comfort and building-energy performance.	NRM 2.3, 2.5, 2.6 – Superstructure (roofs, external walls, windows and external doors)

[10] The lifespans in Figure 2 are for illustration purposes and will be specific to each development.
[11] The RICS New Rules of Measurement 2012 classification system is a standard set of measurement rules and essential guidance for the cost management of construction projects and maintenance works.

Building layer	Summary and constituent elements	RICS reference
Structure/ structural frame/ superstructure	Load-bearing elements above plinth including roof-supporting structure. Generally, it is the longest-lasting building element. Insulation and services may be embedded here.	NRM 2.1, 2.2 and 2.4 and 7 – Frame, upper floors, stairs and ramps, work to existing building
Substructure	Excavations, foundations, basements and ground floors.	NRM 1 Substructure
Services (building)	Installations to ensure comfort, practicality, accessibility and safety, including plumbing, heating, cooling, ventilation and electrics. Distribution systems can be hard to change.	NRM 5 Services (MEP)
Space/space plan/interior/ interior space	The layout, internal walls and partitions, ceilings, floors, surface finishes, fixtures, doors, fitted furniture. Changeable without changing structure, services or skin.	NRM 2.7, 2.8 and NRM 3 (Finishes, superstructure – internal walls and partitions, internal doors)
Stuff/contents	Anything that could fall if the building was turned upside down. Not permanent, easily movable, most frequently changed by occupant, e.g., appliances, lamps, electronics, furniture, art.	Fittings, furnishings and equipment
Construction materials	Any temporary installations/works/materials, packaging and equipment.	NRM 0

2.3. Circular Economy design approaches

2.3.1. CE design approaches are set out in section 2.4 for sites that have buildings on site; and section 2.5 for sites that do not. These approaches support the implementation of the six CE principles. The design approaches should inform the initial land-use planning and design stage.

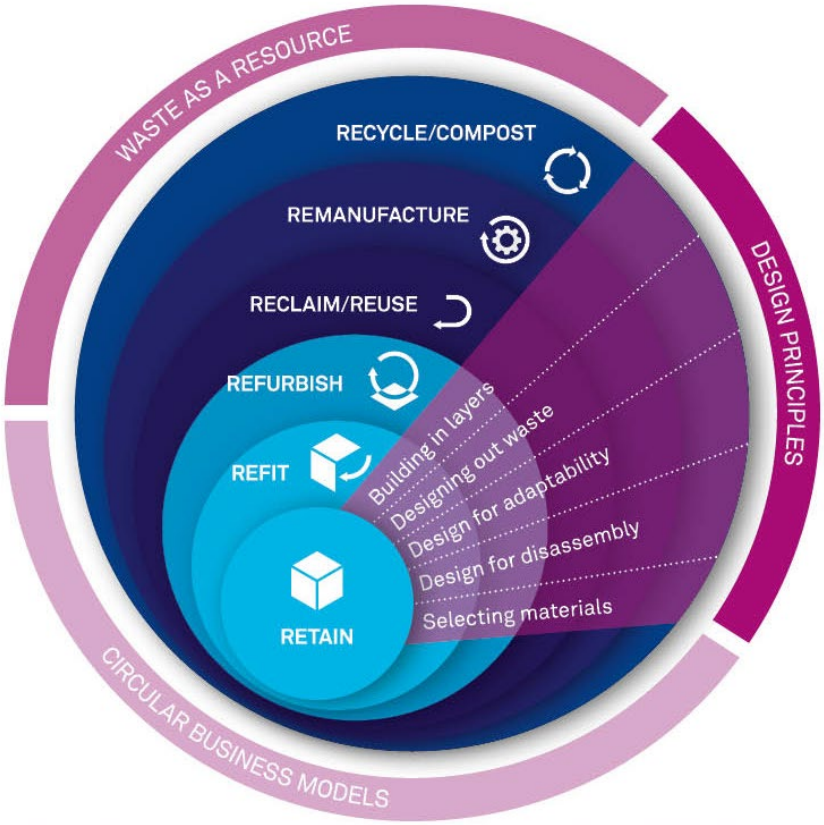
2.3.2. CE design approaches are not mutually exclusive. Multiple approaches are expected to be adopted for each project, development aspect, layers or uses, particularly for larger developments.

2.3.3. CE principles and design approaches should be applied to the whole development, including external spaces and structures and internal ancillary spaces.

2.3.4. Figure 3 sets out a hierarchy for building approaches that maximises the use of existing materials. Diminishing returns are gained by moving through the hierarchy outwards, working through refurbishment and reuse through to the least preferable option of recycling materials produced by the building or

demolition process. This provides an overall strategy for the redevelopment of buildings, with retention as the starting point. The decision trees in the following sections (Figures 4 and 5) expand on this, setting out a hierarchy of CE design approaches for development.

Figure 3: CE hierarchy for building approaches (from London Plan Policy D3 Figure 3.2)

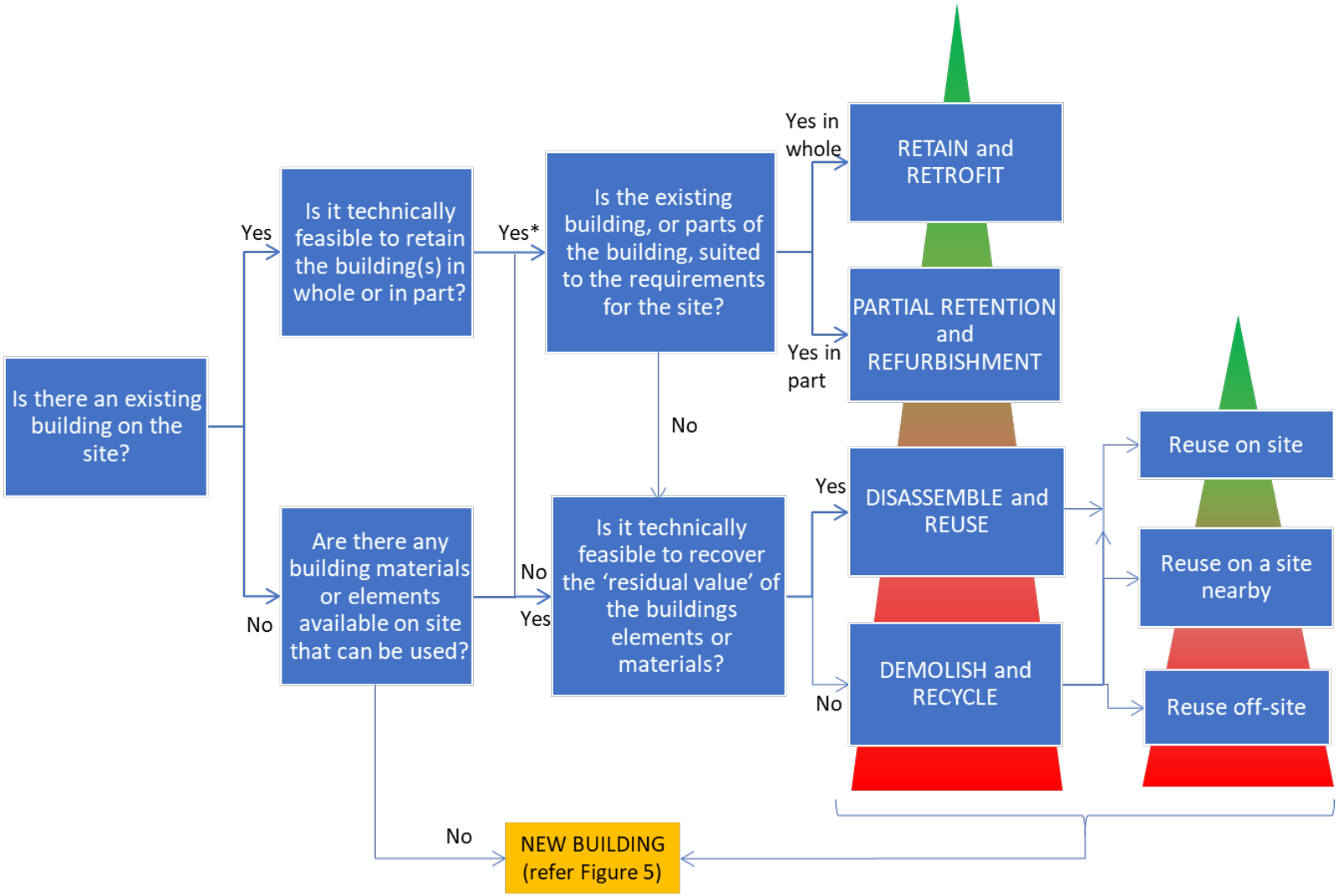


Source: Building Revolutions (2016), David Cheshire, RIBA Publishing ©

2.4. Circular Economy design approaches for existing buildings

2.4.1. The decision tree (Figure 4) should be followed to inform the design process for the development from the outset. It should be informed by the pre-redevelopment and pre-demolition audits where possible (see section 4.6 for more information) and WLC assessment, with the outcomes from these aligning.

Figure 4: Decision tree for design approaches for existing structures/buildings



* With exceptions, refer to paragraph 2.4.4 below.

Table 2: CE design approaches for existing structures

Existing structures approaches	Definition
Retain and retrofit	The vast majority of the building's fabric is retained, with the building refurbished for the same or new uses through restoring, refinishing and future-proofing. This also encompasses retrofitting, where new technology or features are added to existing buildings to make them more efficient and to reduce their environmental impacts.
Partial retention and refurbishment	Significant quantities of carbon-heavy aspects of the building are retained in place, such as the floors and substructure, with replacement of some elements of the building, such as walls or roofing. More significant refurbishment can involve adding floors or extensions.
Disassemble and reuse	Disassemble sections of a building and enable their direct reuse ideally on the site or, where this is not possible, off site (with nearby sites preferred). This approach also includes careful selective deconstruction of the building and material types i.e. taking apart each layer and material type as much as possible, minimising damage to parts and maintaining their value, and then reusing those elements and materials. If reuse is not possible, materials may be carefully and selectively separated for processing and recycling into new elements, materials and objects.
Demolish and recycle	Traditional demolition, with elements and materials processed into new elements, materials and objects for use on the site or on another site.

2.4.2. To follow the approach set out in Figure 3 (London Plan Policy D3 Figure 3.2), retaining existing built structures totally or partially should be prioritised before considering substantial demolition, as this is typically the lowest-carbon option.

2.4.3. The CE statement should set out the justification for whichever of the four approaches set out in Table 4, above, is being proposed for the development.[12] Proposals that are further down the hierarchy will require more detailed and compelling justification.

2.4.4. There may be other planning reasons that necessitate the demolition or retention of existing buildings, such as heritage considerations, which the process set out in Figure 4 cannot and does not override.

[12] This should go into the relevant 'circular economy design approaches' table, with further explanation in the pre-demolition audit.

2.4.5. When assessing whether existing buildings are suited to the requirements for the site, applicants should robustly explore the options for retaining existing buildings (either wholly or in part). Where disassembly or demolition is proposed, applicants should set out how the options for retaining and reconstructing existing buildings have been explored and discounted; and show that the proposed scheme would be a more environmentally sustainable development.

2.4.6. Local planning authorities should be involved in this process from an early stage, along with other stakeholders. A dialogue is strongly encouraged early on between CE statement authors and local planning authorities on the retention or demolition of existing buildings, and making the best use of land.

2.5. Circular Economy design approaches for new developments

2.5.1. All developments should be designed so that buildings can be adapted to extend their life. They should also be designed so they can be deconstructed and reconstructed to allow components and materials to be salvaged for reuse or recycling, whilst maintaining their economic and environmental value.

2.5.2. The appropriate design approach for new buildings and infrastructure, or new additions to existing buildings, should be informed by the decision tree in Figure 5 and the seven CE design approaches in Table 3. The decision tree should be applied for each aspect of a proposal.

Figure 5: Decision tree for design approaches for new buildings, infrastructure and layers over the lifetime of development

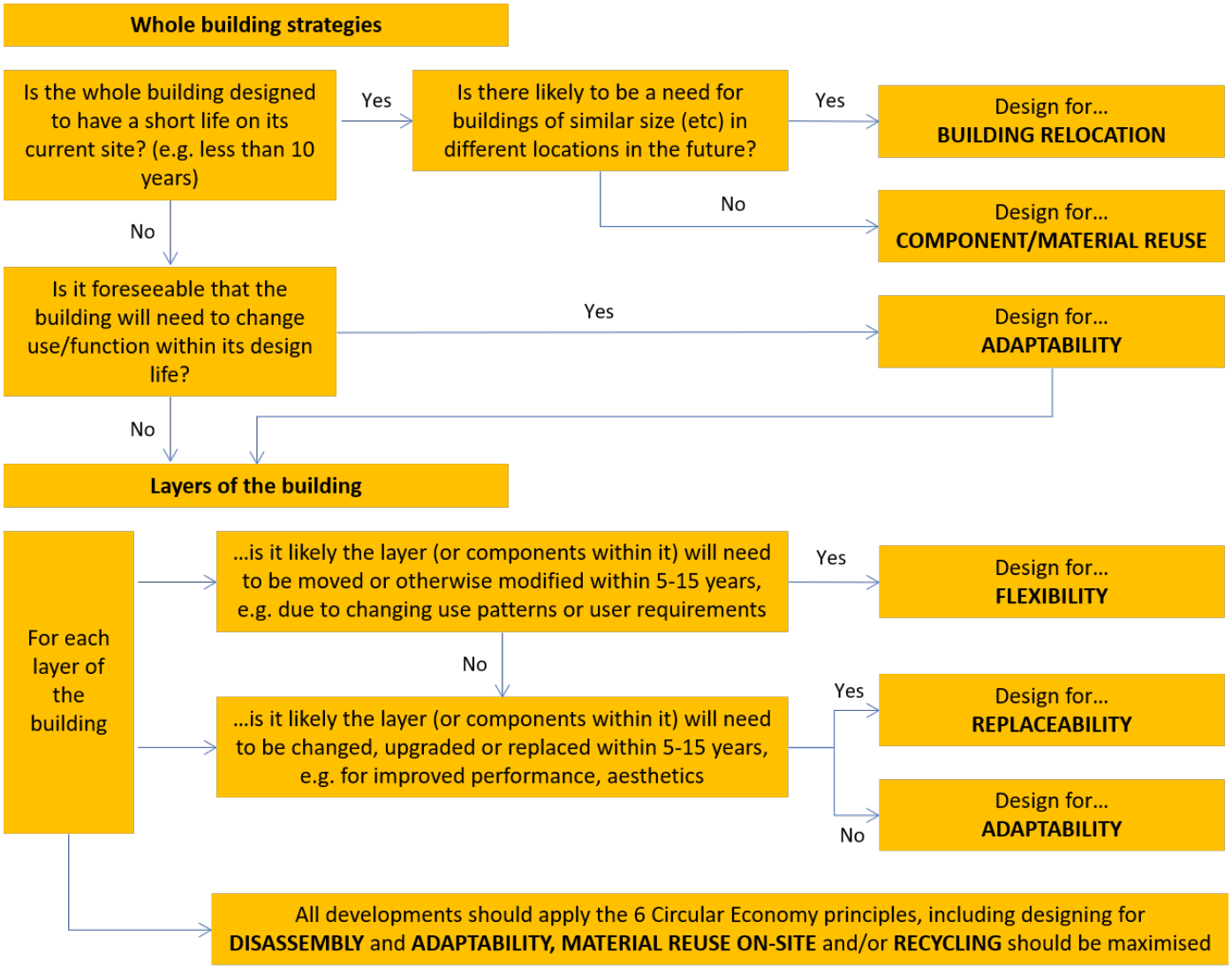


Table 3: CE design approaches for new buildings and definitions

New building CE design approaches	Definition
Building relocation	Designing to allow the whole building to be used on a different site, either by moving as a whole or disassembling into large modules.
Component or material reuse	The use of a product in its original form with minimal reprocessing. Preparation for reuse involves checking, cleaning or repairing materials so that they can be used again for their original purpose. Materials can be reused as a whole; redeployed as modules; or reused as a kit of parts on one or more different sites.
Adaptability	A building that has been designed with thought of how it might be easily altered to prolong its life, for instance by alteration, addition, or contraction, to suit new uses or patterns of use.[13] Often used interchangeably with flexibility; however, it relates more to building structural changes.
Flexibility	A building that has been designed to allow easy rearrangement of its internal fit-out and arrangement to suit the changing needs of occupants.[14] Often relates to floorplates rather than structural changes (see **Adaptability**).
Replaceability	Designing to facilitate easy removal and upgrade, and ideally to be reused, remanufactured or recycled on a part-by-part basis.
Disassembly	Designed to allow the building and its components to be taken apart with minimal damage to facilitate reuse or recycling. If designed well, it should be possible to replace any component.
Longevity	Designing to avoid a premature end of life for all components through considering maintenance and durability.

[13] Addis and Schouten (2004), *Design for deconstruction: Principles of design to facilitate reuse and recycling*
[14] Addis and Schouten (2004), *Design for deconstruction: Principles of design to facilitate reuse and recycling*

3. Circular Economy statement process

3.1. Requirements for Circular Economy statements

3.1.1. Planning applicants for proposals referred to the Mayor are required to submit a Circular Economy (CE) statement at the following stages:

- pre-application (where relevant)
- planning application submission (both outline and detailed)
- post-construction (i.e. upon commencement of RIBA Stage 6 and prior to the building being handed over, if applicable. Generally, it would be expected that the assessment would be received no more than three months post-construction).

3.1.2. Tables 4 and 5 outline the information required at each planning stage and the approaches recommended for pioneering CE statements (see sections 3.4 and 4). The Application Flowchart in Appendix 1 sets out the information and actions required at each stage of the planning process, and the roles and responsibilities of different stakeholders.

3.1.3. The CE statement must include two parts: a written report and the CE template spreadsheet.

3.1.4. Early collaboration between the people outlined in Table 4 can support CE outcomes being achieved and embedded. Compiling the required information is likely to need at least one workshop during the pre-application phase of the development between the people outlined in Table 4. Applicants are encouraged to set out how the CE workshop has informed the design of the development.

Table 4: People to involve at different stages

Requirement by application stage	Pre-application (suggested)	Outline application[15]	Full application/ reserved matters[16]	Post-construction
RIBA stages	0 – 2	0 – 2	2 – 3	4 – 7
Critical people to involve	• Planner • Developer • Design Team • Sustainability adviser	• Planner • Developer • Design Team • Sustainability adviser	• Developer • Design Team • Sustainability adviser	• Developer • Design Team • Contractor • Sub-contractors • Suppliers • Facility Manager • Waste operators
Other people to involve (desirable)	Construction Adviser or Contractor	Construction Adviser or Contractor	• Subcontractors • Suppliers • Facility Manager	Occupants/tenants

[15] Also applicable to the outline and detailed part of hybrid applications.
[16] Also applicable to the outline and detailed part of hybrid applications.

Table 5: Minimum submission requirements at different stages

Requirement by application stage	Pre-application (suggested)	Outline application [17]	Full application / reserved matters [18]	Post-construction	Evidence in CES template spreadsheet
RIBA stages	0 – 2	0 – 2	2 – 3	4 – 7	N/A
CE targets (see section 4.2)	Encouraged	Yes	Yes	Yes (Performance reported)	Yes
CE design approaches (see sections 2.3 – 2.5 and 4.3)	Yes	Yes	Yes	N/A	Yes
CE design principles (see sections 2.1, 4.4 – 4.5)	Yes	No	No	No	Yes
CE design principles by building layer (see sections 4.5)	No	Yes	Yes	No	Yes
Pre-redevelopment audit (see section 4.6)[19]	Encouraged	Yes	Yes	N/A	No
Pre-demolition audit (see section 4.6)	Encouraged	Yes	Yes	N/A	No
Bill of materials (including calculations – see section 4.7)	No	Yes (Estimated)	Yes (Estimated)	Yes (Actual)	Yes

[17] Also applicable to the outline and detailed part of hybrid applications.
[18] Also applicable to the outline and detailed part of hybrid applications.
[19] Example of supporting evidence. Detailed technical studies or calculations underpinning the CE statement should be submitted as appendices at each stage. Further supporting evidence may be requested depending on the project to support the applicant's CE statement. This list is not exhaustive; the applicant should use their judgement as to what supporting information will be necessary to undertake an informed assessment of the CE statement.

Requirement by application stage	Pre-application (suggested)	Outline application [17]	Full application / reserved matters [18]	Post-construction	Evidence in CES template spreadsheet
RIBA stages	0 – 2	0 – 2	2 – 3	4 – 7	N/A
End of life strategy (see section 4.7)	No	No	Yes	Encouraged	No[20]
Operational waste management plan (see section 4.8)	No	No	Yes	Encouraged	No
Recycling and waste reporting (see section 4.9)	No	Yes (Estimated)	Yes (Estimated)	Yes (Actual)	Yes
Lessons learnt and key achievements (see section 4.10)	N/A	N/A	N/A	Yes	Yes

Outline, reserved matters, and hybrid applications

3.1.5. All building elements should be included in the CE statement. Less information will be available for outline planning applications and information may be high-level, with gaps (for example, specific materials and products may not be known). However, it is expected that information on certain materials will be available at outline stage, for example, based on experience from previous schemes, and to estimate costs. Applicants are expected to provide as much information as possible to ensure CE principles and targets are embedded early in the design process. Particularly important to include at outline stage are building layers or elements (see section 2.2) that are likely to be decided early on (for example site, structure and skin/shell) and which have the longest lifespans or will be changed less frequently.

3.1.6. A condition should be attached to an approval of a referable outline planning permission, securing the submission of a CE statement with each reserved matters application. Applications for reserved matters should review and address the information provided at outline stage and update any default values used as far as possible.

[20] The End of Life strategy should be submitted in a separate written report. However, the Bill of Materials includes information that is relevant to the End of Life Strategy (for example, on designing for disassembly and end of life scenarios by material type).

Roles and responsibilities

3.1.7. At planning application stage, it should be confirmed who will be providing the information at post-construction stage. Prior to planning permission being granted, it is the applicant's responsibility to ensure that the relevant people are aware of their responsibilities to provide information at different stages, and to ensure that the information is provided at each stage. Planning applicants should pass on the previous assessments to the developer and their contractors to allow for a smooth transition of responsibility. After planning permission is granted, it is the developer's responsibility to ensure that the correct information is provided at each stage (for example, at post-construction stage).

3.2. What should Circular Economy statements contain?

3.2.1. The CE statement consists of a written report and a spreadsheet, with the relevant tab(s) filled in at each stage.[21] Each tab contains a number of tables where information should be recorded.

3.2.2. Applicants should also submit an accompanying written narrative for aspects not captured in the spreadsheet (such as calculations, studies or other supporting evidence); or, where an achievement is not adequately captured by quantitative metrics, the applicant should highlight the achievement within the CE statement written report, explaining:

- how it reflects the objectives of London Plan 2021 policies relating to the CE (D3, SI 2 and SI 7)
- any other benefits, for example to occupants, neighbourhoods, and local authorities. These may be qualitative or quantitative but will need to be backed up by evidence (for example reports, calculations, or specification documents). Early engagement with stakeholders, ideally at pre-application stage, is encouraged, for example with boroughs (who may need to seek input from wider teams e.g., waste, design, environmental health), to ensure that the proposed benefits align with wider strategies or objectives.

3.2.3. Where the application consists of multiple buildings, and/or where different CE design approaches are being adopted or different targets are being set, this should be reflected in the Project Details table (number of use types, and floor area by use class/type must be provided). The spreadsheet should include details on different CE design approaches being adopted for different building parts, for example in the CE Design Approaches table in the phase/area/type column. The written report should explain the different approaches being adopted for different buildings or aspects, with reference to a site plan.

3.2.4. Any changes in design following the submission should be accounted for in the post-construction CE statement.

3.2.5. Appendix 2 sets out how the information required by different tables in the CE statement spreadsheet aligns with the requirements of Policy SI 7(B).

[21] Circular Economy Statement template spreadsheet

3.3. How should Circular Economy statements be submitted?

3.3.1. The CE statement should be submitted at each stage to the GLA at: circulareconomystatements@london.gov.uk. The subject line of the email should read: Circular Economy statement for [insert planning reference].

3.3.2. Post-construction CE statements and any associated evidence should be submitted upon commencement of RIBA Stage 6; and prior to the building being handed over and occupied, if applicable. Generally, it would be expected that the CE statement would be received three months post-construction and prior to the final occupation of the development. Details on how this can be secured are provided in section 5, below.

3.4. Level of ambition

3.4.1. CE statements, or elements of the statement, can be submitted as compliant or pioneering. To demonstrate the promotion of CE outcomes in line with Policy SI 7, all CE statements should aim to set out best practice, rather than recording business-as-usual activities.

3.4.2. A compliant CE statement is one that meets the requirements set out in Policy SI 7 and the requirements of this guidance.

3.4.3. To encourage innovation, and maximise the economic and environmental value of materials, developers are encouraged to go beyond the 'compliant' standard and demonstrate a 'pioneering' level of commitment to the CE by:

- showing **depth** – for example, by:
  - exceeding the minimum policy requirements, or going above and beyond standard practice by setting higher targets than required by policy, including for building layers or elements[22]
  - using innovative and creative techniques to refurbish and repurpose all existing buildings and structures on site
  - including innovative and creative measures to reuse all or nearly all materials on-site
  - investing in and testing experimental and innovative design approaches for building layers and elements
- showing **breadth** – for example, by setting additional targets (for example, by providing separate targets for reuse and recycling, and for on-site and/or local and off-site reuse), demonstrating that a broad range of measures have been investigated.

3.4.4. 'Pioneering' statements should look beyond the technical challenges and analyse structural and other issues to be addressed to achieve significant CE goals. The use of circular business models as part of the construction

[22] Best practice examples can be found on the CE wiki (see footnote 3).

and operation of the development, such as 'product as a service,'[23] are also strongly encouraged.

3.4.5. More detail on the options for pioneering statements for relevant elements of CE statements are provided in section 4.

[23] As noted in the Mayor's Designing for a Circular Economy Primer, instead of an occupier owning carpets, for example, the carpets could be owned by the manufacturer and the occupier pays a rent for their use. The manufacturer would have an incentive to make the carpets last as long as possible and then recycle them.

4. Elements of Circular Economy statements

4.1 Overview

4.1.1. This section sets out what information needs to be submitted in each of the tables in the Circular Economy (CE) statement template spreadsheet. The requirements below demonstrate how to meet Policy SI 7(B).

4.2. Circular Economy targets

4.2.1. For all applications, applicants should complete the 'CE targets and commitments' table in the CE statement template spreadsheet in the relevant application stage tab.

4.2.2. In the table, applicants should outline the targets that they are committing to.[24] The London Plan Policy SI 7(A) targets should be set as a minimum level of compliance with that part of the policy. Applicants should provide an explanation for the target that they are committing to and how they intend to meet these targets and monitor performance, including the metrics to be used.

4.2.3. Policy SI 7 requires the management of excavation waste to be focused on-site or within local projects. Where partial or complete demolition is proposed, the materials already on-site should be reviewed for their potential retention and inclusion into the proposed scheme before off-site options are considered. To maximise the potential for the reuse of materials on-site, an area for the potential processing and storing of these materials should be identified on or close to the development site.

4.2.4. After on-site opportunities have been exhausted, applicants should refer to the London Waste Map[25] to consider opportunities for using local sites to manage materials and waste. Sourcing materials locally is also encouraged, particularly for reprocessed materials, to meet the Mayor's 100 per cent net waste self-sufficiency target by 2026[26] and to comply with Policy SI 10.[27]

Options for pioneering

4.2.5. For pioneering statements, targets by each building layer or element (see section 2.2) could be provided at pre-application, outline, and full application stages.

4.2.6. Applicants are encouraged to go further than the London Plan Policy SI 7(A) targets, where possible – for example, by committing to percentages for reused materials on-site; separating reused and recycled targets; and

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[24] All waste streams should be reported in tonnes, and targets should be presented as a percentage by weight/tonnes. BREEAM Wst 01 credits expect reporting of the percentage of waste diverted by volume. Depending upon the waste stream type, this will not equate to the same percentage by tonnage. The BREEAM New Construction 2018 methodology (see point 4) shows the difference in metrics. Applicants that are targeting BREEAM Wst 01 credits are encouraged to demonstrate consistency in reporting.

[25] London Waste Map

[26] London Plan 2021 Policy SI 8: Waste capacity and net waste self-sufficiency

[27] London Plan 2021 Policy SI 10: Aggregates notes '…the best option is the use of local materials where feasible'.

committing to higher targets than that required by policy, for example, for recycled content.

4.3. Circular Economy design approaches

4.3.1. The six CE principles, and the decision tree in Figures 4 and 5, should inform the design of the development and be used to determine the design approaches adopted (see sections 2.3 to 2.5 for further details).

4.3.2. At pre-application, outline and full application stages, applicants should complete the CE design approaches table in the relevant tab of the CE statement template spreadsheet. Applicants should confirm which of the CE design approaches listed in the table are being adopted for the existing building and new development, and provide an explanation for the approach chosen.

4.3.3. Applicants should set out where they are retaining and refurbishing a building that might otherwise be demolished.

4.3.4. Where adaptability is selected as a design approach, information should be submitted showing how the building can be adapted for different uses.

4.4. Circular Economy design principles

4.4.1. At pre-application stage, applicants should demonstrate in the ‘circular economy principles’ table the CE principles that will be adopted (see section 2.1), with reasons explained.

4.4.2. Applicants should outline how the proposal will design out waste (in terms of how waste materials will be reduced, treated as a resource, and managed) at each module stage (see footnote 5 for further details on life-cycle modules).

4.5. Circular Economy design principles by building layer

4.5.1. For all applications, applicants should complete the ‘circular economy design principles by building layer’ table.

4.5.2. Multiple CE design approaches will often be needed for each building layer or element.

4.5.3. This table should align with the two tables above – for example, if a commitment is shown to designing for replaceability, this should be reflected in this table, highlighting the building layers or elements that will be designed for replaceability. The metrics to be used to quantify or monitor performance should be included.

4.6. Pre-redevelopment audit and pre-demolition audit

4.6.1. Pre-redevelopment and pre-demolition audits are important tools to establish whether building components can be reclaimed and how any demolition materials will be managed.

Pre-redevelopment audit

4.6.2. A pre-redevelopment audit is a tool for understanding whether existing buildings, structures and materials can be retained, refurbished, or incorporated into the new development.[28] The audit should be carried out early on (at pre-application stage) and should inform the design.

4.6.3. If there are existing buildings on a site, a third-party, independently verified or peer-reviewed pre-redevelopment audit is strongly encouraged, including analysis that fully explores options for retaining existing structures, materials and the fabric of existing buildings into the new development; and the potential to refurbish buildings before considering substantial demolition.

4.6.4. Applicants should complete and submit a pre-redevelopment audit as supporting evidence to their CE statements, where a robust in-depth assessment has not already been completed.

4.6.5. Applicants should outline in a pre-redevelopment audit an explanation of the existing buildings on the site and brief description of state of their repair. Details should include: the building's age, key materials, photos of typical internal spaces and facades, and site plans.

Pre-demolition audit

4.6.6. A pre-demolition audit is a detailed inventory of the materials in the building that will need to be managed upon demolition.

4.6.7. At pre-application stage, applicants are strongly encouraged to submit an independent pre-demolition audit with all applications where demolition is proposed, as supporting evidence to their CE statement.

4.6.8. If substantial demolition is proposed, the pre-demolition audit should include the following core information:

- An explanation as to why it is proposed that the building(s) be demolished. Applicants should explain the different considerations for developing the site. This should go beyond simply saying that the buildings are of 'low quality'. Justification for demolition should be provided, in line with the approach set out in sections 2.4.3 to 2.4.5, above. An assessment of carbon impacts should be highlighted and, where relevant, the WLC assessment should be cross-referenced. It should be explained how any negative impacts resulting from demolition, such as the loss of embodied carbon in existing buildings, would be mitigated and offset.
- A summary of the key components and materials present in the existing buildings, with an estimate of the quantities and associated embodied carbon and whether they are suitable for reclamation.
- An explanation and drawings that show the extent of the proposed demolition and whether any parts of the building are being considered for retention.

[28] A resource for developing pre-redevelopment audits can be found in Code of Practice: Pre-development audits, BRE, July 2017.

- Opportunities for reuse and recycling either within the proposed development or off-site nearby/locally or further afield.

4.6.9. Where possible, the following best practice information should also be included:

- how the value of existing building elements or materials can be recovered
- the amount of demolition waste (cross-reference the Recycling and Waste reporting table – refer to section 4.9 for further details)
- a schedule of practical and realistic providers who can act as brokers for each of the reclaimed items
- target reuse and reclamation rates.

4.6.10. An audit that simply lists out the likely waste arisings and the routes for treating those waste streams (i.e., crushing and shredding) is not suitable.

4.6.11. The audit should be undertaken by a third-party independent specialist with expertise in reclamation of components and materials and experience in preparing these types of reports.

4.6.12. Applicants should justify reasons for adopting less preferred approaches or moving down the hierarchy of CE design approaches in Figure 3 (London Plan Figure 3.2), and the decision trees in Figures 4 and 5. Refer to sections 2.4.3 to 2.4.5 and 4.6.8 for further information.

4.6.13. In limited circumstances it may be appropriate to secure a pre-demolition audit by condition – for example, where there is limited demolition proposed.

4.7. Bill of Materials

4.7.1. London Plan Policy SI 7 (B)(2) requires CE statements to demonstrate how a development's material demands will be reduced and how building materials, components and products will be disassembled and reused at the end of their life.

4.7.2. Applicants should complete the Bill of Materials table in the CE statement template to demonstrate how material demands have been minimised and on-site reuse and recycling maximised.

4.7.3. Applicants should submit a draft Bill of Materials, based on estimated figures, at outline and full-planning-application stages.

4.7.4. The template will use this information to: automatically calculate the material and waste quantities throughout the building's life cycle; and calculate the intensity of these indices, where relevant, using the gross internal area (GIA). The table has links to the WLC assessment; consistent information should be used for both.

4.7.5. The building weight calculations used in calculating material intensity should be submitted in the written report accompanying the CE statement.

Recycled content

4.7.6. Applicants should identify opportunities for the use of reused or recycled materials; and aim for at least 20 per cent recycled or reused content, by value, for the whole building. This target requires both an estimate of the quantities of materials and the capital cost of that material. Appendix 3 provides an example of the recycled content by value calculation from previous guidance from the Waste and Resources Action Programme (WRAP); applicants may find this useful when calculating reused and recycled content by value in the Bill of Materials table.

4.7.7. In the Bill of Materials table, applicants will be expected to detail how each building element or material type contributes to achieving the recycled content target. When reporting by material type, calculations should focus on those with the highest economic and environmental value. If all materials cannot be accounted for in the calculation, the materials that make up at least 80 per cent of the cost (i.e., 80 per cent by value) should be accounted for.

4.7.8. Reused and recycled content calculations should be submitted as accompanying supporting evidence.

End-of-life scenarios

4.7.9. The Bill of Materials should include assumptions on the end-of-life scenarios for each building element or material. Based on the approaches adopted and how the building and its elements have been designed to facilitate reuse or recycling, an end-of-life scenario should be described. For example, 'assumed 90 per cent reusable', 10 per cent 'business as usual (BAU)'.

4.7.10. For any buildings or elements where, after careful consideration, there is no potential to reuse or recycle, and no specific design changes have been made to influence the recoverability of the materials, then the end-of-life scenario should be assumed to be 'BAU', using the industry average reuse, recycling, other recovery and disposal rates.[29]

4.7.11. The written report element of the CE statement should also set out an end-of-life strategy for the development, including how this will be communicated to future building owners, managers and occupiers; and how the building information will be stored, for example, by using Building Information Modelling or material passporting during the building's life to facilitate disassembly and identify any key challenges. This will support the recovery of components and materials at the end of the life of the building.

Options for pioneering

4.7.12. A Pioneering Bill of Materials could include:

- reused and recycled content by value (percentage)
- additional targets for specific parts of the building(s)

[29] For further information, see section 3.5.4 and table 10 (page 25) of the RICS guidance, Whole life carbon assessment for the built environment (November 2017), or any update. OneClick software uses default end-of-life scenarios.

- separate targets for the minimum amounts of reused materials.

4.7.13. Environmental Product Declarations offer supporting evidence of recycled content, healthy materials, renewable energy used in the manufacturing process, etc.

4.7.14. A pioneering end-of-life strategy could include, for example, a disassembly plan for each building element or layer; or the specification of materials and products that have been specifically designed for disassembly, or are certified as having met circularity criteria such as Cradle to Cradle (C2C) certification.

Post-construction-stage reporting

4.7.15. Post-construction, an update to the Bill of Materials should be provided based on actual materials used. There will need to be engagement with all parties, including interior designers, suppliers and occupants to collate as-built information and compare against the design-stage assessment, confirming whether targets have been met.

4.7.16. At post-construction stage, developers are encouraged to submit an updated end-of-life strategy. In addition to updating the relevant sections of the planning stage submission, it could also include:

- full as-built drawings
- details of how the building can be disassembled (a deconstruction plan)
- manufacturers' warranties, details, and any opportunities to return to manufacturer.

4.8. Operational waste management plan

4.8.1. An operational waste management (OWM) plan should be submitted in the written report/appendix to CE statements to demonstrate that the proposed development will: achieve the relevant targets (depending on the operational activity) set out in London Plan Policy SI 7;[30] and include shared, adequate, flexible, and easily accessible storage space and collection systems, as required by London Plan policies D3, SI 7 and D6. Applicants should also note that both the 65 per cent municipal waste recycling target by 2030 (as required in London Plan Policy SI 7 and London Environment Strategy Policy 7.2.2) and 75 per cent minimum target for business waste recycling by 2030 (as required by London Environment Strategy Policy 7.2.2) may apply depending on the nature of the operations of the building.

4.8.2. At planning application stage, applicants can submit a draft OWM plan, since some waste information may be estimates as the proposed land uses may not be known at this stage – for example, where the final end use is not defined. The OWM plan should demonstrate:

- how much operational and municipal waste the proposed development (resulting from occupants) is expected to generate (where the final land

[30] See London Plan Policy SI 7 (A) parts 3-5.

use is not known, some scenarios for potential land uses should be provided)[31]

- how and where (on-site versus offsite) operational waste will be managed in accordance with the waste hierarchy
- that the proposed development has adequate, flexible, easily accessible and shared storage space and collection systems
- that the proposed development supports the separate collection of dry recyclables (at least card, paper, mixed plastics, metals and glass), food waste and other waste.
- how operational performance will be monitored and reported
- that measures such as consolidated, smart logistics and community-led waste minimisation schemes have been explored.

4.8.3. The Site Waste or Resource Management Plan(s) and OWM plan should refer to relevant aspects of the Recycling and Waste reporting table (see section 4.9) and the estimates provided should align.

Options for pioneering

4.8.4. A pioneering OWM plan could include the following:

- A Reuse, Recycling and Waste plan and summary, which covers the five different stages of recycling and waste management: occupier separation; occupier deposit points and storage; collection method; servicing (removal/on-site treatment method); end destination; and ongoing monitoring (see Tower Hamlets Reuse, Recycle and Waste Supplementary Planning Document p75-76 for a template and p80-83 for an example).
- A Communications Plan detailing how all occupants across the site will be helped to access and use deposit points to reduce, reuse and recycle as much waste as possible. This Communications Plan will include information on how, when and where occupiers should store and deposit recyclables and dispose of waste; what resources and information will be made available (e.g., clear signage, printed and online noticeboards, in-home storage, resident induction); and how the sharing and reuse of materials could be promoted.[32]
- An Operations and Maintenance Plan that outlines how on-site systems will be monitored and maintained during the expected life of the development, including parties responsible for maintenance and

[31] London Plan SI 7 A(4) footnote 163 notes:

'Based on the EU definition of municipal waste being household waste and other waste similar in composition to household waste. This includes business waste collected by local authorities and by the private sector.'

[32] For information on writing Communication Plans, see ReLondon's guidance Making recycling work for people in flats and Toolkit for the Flats Recycling Package (January 2020).

management of the systems, on-site operations and maintenance, and resident engagement.

- Evidence that the different parties are aware of their responsibilities.

Post-construction-stage reporting

4.8.5. At post-construction stage, developers are encouraged to submit a final OWM plan with updated information. This could indicate how the OWM plan will be updated on an ongoing basis and/or how the building owner (if different) has been involved in developing the plan.

4.9. Recycling and waste reporting

4.9.1. London Plan Policy SI 7(B) includes a requirement for CE statements to demonstrate:

- how all materials arising from demolition and remediation works will be reused and/or recycled
- opportunities for managing as much waste as possible on site
- how much waste the proposal is expected to generate
- how and where the waste will be managed in accordance with the waste hierarchy.

4.9.2. To comply with London Plan Policy SI 7(B), applicants should complete the Recycling and Waste reporting table in the CE statement template at outline and full planning application stages for module stages A to C (refer to footnote 5).

4.9.3. In terms of where waste will be managed, applicants should distinguish between onsite versus offsite.

4.9.4. Where a site is large enough, applicants should set out in the supporting evidence (such as the pre-demolition audit) where waste materials arising will be sorted or treated during each phase to maximise the potential for the reuse of materials on-site. For the use stage (Module B – refer to footnote 5), the location of bin storage should be highlighted.

4.9.5. The Recycling and Waste Reporting table should contain:

- the overall/total amount of non-hazardous/contaminated waste material arising (tonnes) for excavation, demolition and construction (report separately); if contamination is present, indicate the amount
- non-contaminated material reused on-site (percentage), recycled on-site (percentage), reused off site (percentage) and recycled off-site (percentage)
- landfill amount (percentage)
- recovery amount (percentage)

- clearly defined targets that, as a minimum, meet London Plan policy targets:[33]
    - 95 per cent reuse/recycling/recovery of construction and demolition waste
    - 95 per cent beneficial use of excavation waste[34]
    - 65 per cent recycling of municipal waste by 2030.

4.9.6. In line with London Plan Policy SI 7 (paragraph 9.7.10), where there are no reasonable alternative options but to send waste to landfill, applicants are strongly encouraged to submit evidence to the GLA that all receiving waste handling or landfill facilities have the capacity to deal with the waste over the lifetime of the development.[35] This information may be made available through the London Datastore to help plan for future needs.

4.9.7. The reporting of the final destination of all waste streams (beyond the Materials Recycling Facility) should be provided as soon as possible once a contractor has been appointed.[36] If this information is not available at application stage, the local planning authority (LPA) should consider securing this by condition. The table should be updated with the relevant information once the contractors have been appointed.

4.9.8. During construction, applicants should record the source of all waste arising and monitor using a waste management tool (such as SmartWaste). The end-of-life (and next-life) plan for the elements of the building should be provided with a calculation of the percentages of waste that can be reused or recycled at end of life.

4.9.9. At outline and full planning application stages, estimates should be provided for:

- total waste arising for key streams (tonnes) (for demolition/strip-out, it should be the quantities of waste arising during the replacement and repair of parts of the building)
- percentage reuse on-site
- percentage recycled or composted on-site
- percentage reuse off-site

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[33] London Plan Policy SI 7 Reducing waste and supporting the CE.

[34] The stricter definition of 'landfill' post-*Methley Quarry* judgment, and recent changes to the regulatory regime for excavated materials, mean some permitted sites that are defined as 'landfill' by the Environment Agency can be included in the definition of 'beneficial use' by the GLA. The developer should explain in detail why a proposed site may be regarded as 'beneficial' in these circumstances. Every effort should then be made to use the material in other innovative ways, and to find markets for the products produced from it, in accordance with the waste hierarchy, without causing harmful impacts on the natural environment.

[35] The UK Department for Environment, Food & Rural Affairs Waste Duty of Care Code of Practice (2018) states:
'You have a responsibility to take all reasonable steps to ensure that when you transfer waste to another waste holder that the waste is managed correctly throughout its complete journey to disposal or recovery.'

[36] London Plan Policy SI 7 Reducing waste and supporting the CE, paragraph 9.7.5

- percentage recycled or composted off-site
- percentage to landfill
- percentage to recovery
- for demolition/strip-out and construction, description of design measures to reduce the likely waste arising (to be submitted in supporting document).

4.9.10. Estimates should align with the Site Waste or Resource Management Plan(s). The waste arising for key streams (t/m^2 GIA) will be automatically calculated in the template. Applicants should submit excavation waste or cut and fill calculations in the written report/appendix accompanying the CE statement.

Options for pioneering

4.9.11. Applicants are encouraged to go further than meeting the London Plan policy SI 7(A) targets, where possible. For example, by committing to percentages for reused materials on-site, setting higher recycled content targets (for example, above 20 per cent for the whole building and/or for individual layers or elements), separating reused and recycled targets, and committing to higher targets than required by policy.

4.9.12. To evidence pioneering measures, applicants could submit as evidence product Material Circularity Index values and supporting information.[37]

Post-construction-stage reporting

4.9.13. Post-construction, an update to the Recycling and Waste reporting table should be provided based on actual (demolition, construction, excavation, municipal and industrial) materials handled; and actual amounts and destinations for reused and recycled materials, materials sent to landfill, and materials sent to other management (for example, figures from recycling facilities by recycling percentage). The final destinations of all waste streams (beyond the Materials Recycling Facility) should be provided in a supporting document. It should be confirmed that the ultimate receiver of material (for example another site) had capacity to deal with the waste.

[37] The Material Circularity Index gives an indication of the raw material used in a product. The more a product contains recycled or reused materials and the less waste is used the higher the circularity index becomes.

4.10. Lessons learned and key achievements

Post-construction-stage reporting

4.10.1. At post-construction stage, applicants should complete the ‘key achievements’ and ‘lessons learnt’ tables. This should:

- highlight actual performance against quantitative and qualitative targets/commitments
- describe reasons for any differences
- share key learnings that could inform best practice in the future. Lessons learned should include what went well or better than expected, what went wrong, and what could be done differently in the future.

Options for pioneering

4.10.2. Analysis could be included of structural issues that have to be addressed to achieve significant CE goals, and ideas or suggested solutions provided.

5. Monitoring

5.1.1. To enable transparency of information and monitoring, post-construction reports and any appendices will be made available to the public through the London Datastore.

Securing post-construction reports

5.1.2. The submission of a post-construction report should be secured by LPAs either by condition or obligation. As the LPA approves the discharge of conditions and obligations, it is responsible for verifying that reports have been received for referable applications; and for submitting these to the GLA for review.

5.1.3. Suggested wording for securing post-construction monitoring reports is available on the GLA's website.[38] This wording may be adapted over time to improve the submission process and ensure it is robust.

5.1.4. LPAs are free to adapt this wording and/or the mechanisms for securing post-construction monitoring reports, provided that these are always submitted to the GLA for referable applications.

5.1.5. LPAs should check reports to confirm that the minimum information requirements set out in Table 5 (see section 3.1) and Appendix 2 have been met before approving any conditions or obligations.

[38] Circular Economy Statement conditions

Appendix 1: Application flowchart

The below steps represent RIBA Design Stages 0-7

Pre-application stage

Initial pre-application discussions and workshop(s) with design team to agree approaches

Circular Economy (CE) goals, design approaches and draft commitments established

For large-scale multi-phase or masterplan-led schemes, the CE statement should focus on reuse opportunities on-site and across broader area

CE statement prepared and presented to the LPA and/or the GLA for comments

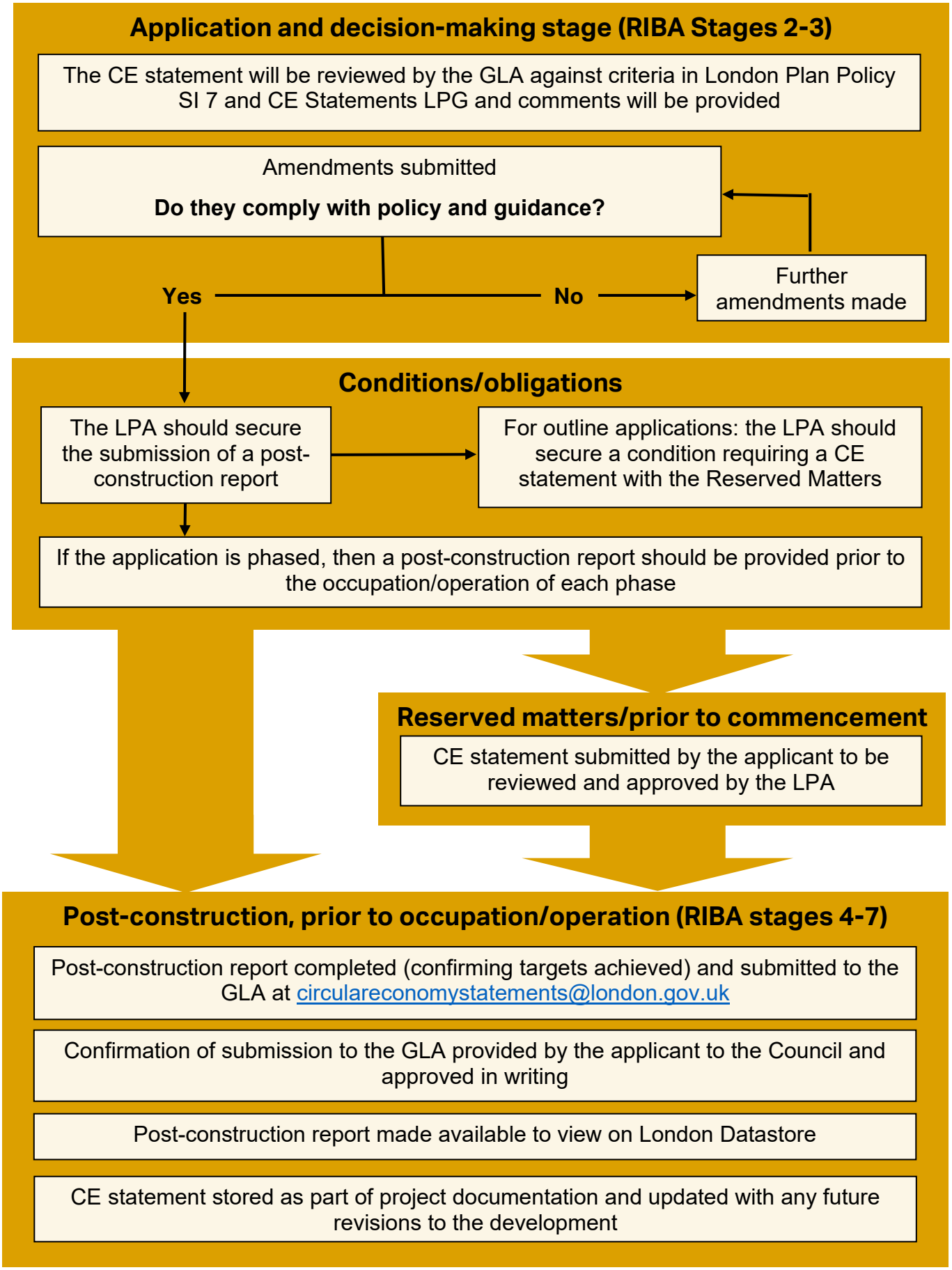
For outline and detailed applications, the information listed in Table 5 (page 17), including the Bill of Materials and Recycling and Waste Reporting tables, will need to be completed in the CE statement

Application submission

Outline (RIBA Stages 0-2), detailed and hybrid applications:

CE statement submitted including Bill of Materials and Recycling and Waste Reporting tables

Applicants provide appendices to support the information in the CE statement


Application and decision-making stage (RIBA Stages 2-3)
The CE statement will be reviewed by the GLA against criteria in London Plan Policy SI 7 and CE Statements LPG and comments will be provided
Amendments submitted
Do they comply with policy and guidance?
Yes
No
Further amendments made
Conditions/obligations
The LPA should secure the submission of a post-construction report
For outline applications: the LPA should secure a condition requiring a CE statement with the Reserved Matters
If the application is phased, then a post-construction report should be provided prior to the occupation/operation of each phase
Reserved matters/prior to commencement
CE statement submitted by the applicant to be reviewed and approved by the LPA
Post-construction, prior to occupation/operation (RIBA stages 4-7)
Post-construction report completed (confirming targets achieved) and submitted to the GLA at circulareconomystatements@london.gov.uk
Confirmation of submission to the GLA provided by the applicant to the Council and approved in writing
Post-construction report made available to view on London Datastore
CE statement stored as part of project documentation and updated with any future revisions to the development

Appendix 2: Essential elements of Circular Economy statements

CE statement requirement from Policy SI 7(B)	How this should be demonstrated
How all materials arising from demolition and remediation works will be reused and/or recycled.	Pre-demolition audit (see section 4.6)* Recycling and waste reporting, targeting 100 per cent reuse or recycling (see section 4.9)
How the proposal's design and construction will reduce material demands and enable building materials, components and products to be disassembled and reused at the end of their useful life.	CE design approaches (see sections 2.3 – 2.5and 4.3) Bill of Materials (see section 4.7) End-of-life strategy (see section 4.7)* CE design principles (see section 2.1 and 4.4) CE design principles by building layer (see section 4.5) CE targets (see section 4.2)
Opportunities for managing as much demolition, excavation, construction, and operation waste as possible on-site.	Pre-demolition audit (see section 4.6)* Bill of Materials targeting recycled and reused content (see section 4.7) Recycling and waste reporting maximising on-site management (see section 4.9)
Adequate and easily accessible storage space and collection systems to support recycling and reuse during operation.	Operational waste management plan (see section 4.8)*
How much waste the demolition, construction and operation phase of the proposal is expected to generate, and how and where the waste will be managed in accordance with the waste hierarchy.	Recycling and waste reporting (see section 4.9) Operational waste management plan (see section 4.8)*
How performance will be monitored and reported, during the demolition, excavation, construction, and operation phases.	CE targets (see section 4.2) Operational waste management plan (see section 4.8)*

* To be submitted in separate written report

Appendix 3: Recycled content by value example calculation

Recycled content by value is a function of the material value of a component, the quantity used and the percentage of the component by mass that is derived from recycled content. Thus, if a material costs £100 per m2 and has 20 per cent recycled content by mass, the recycled content by value of 10m2 would be:

£100 (per m2) x 10 (m2) x 20 per cent = £200

By summing the recycled content by value of all the components of a building and dividing this by the total material value of all the components in the building, it is possible to estimate the total percentage recycled content by value for the building, or for an element (or layer) of the building.

Table 1 and the note below (an extract from previous WRAP guidance[39]) provides an example of how recycled content by value would be calculated for a whole building.

Table 1: Recycled content by value example calculation

Component	Quantity	Material rate (excluding labour)	Material value	Recycled content by mass	Recycled content by value
Bricks	2,000	£250/1000	£500	15%	£75
Dense blocks	50m^2	£8m^2	£400	50%	£200
Plasterboard	50m^2	£2m^2	£100	80%	£80
Insulation	20m^2	£10m^2	£200	80%	£160
Type I fill*	100m3	£10m3	£1,000	100%*	£1000
Other items			£2,000	0%	£0
Total (£)			£4,200		£1,515
Total (%)					36% (£1,515/£4,200)

Note * in this example, the Type I fill used in the project is from reused demolition waste; it is therefore considered to be 100% ‘recycled’ and its costs is taken as being equal to the purchase price of an equivalent quantity of product from the open market. (units and prices are purely illustrative)

[39] Delivering Higher Recycled Content in Construction Projects – Guidance for clients, design teams and contractors (September 2009).

Appendix 4: Analysis of data collected to date for key Circular Economy statement metrics

Table 2 below provides the results of an analysis of the data collected for all Circular Economy (CE) statements submitted up to and including January 2022. The table shows the upper, median and lower quartile figures for all key CE metrics, along with the sample size for each metric. This data can be used for comparison and it is expected that applications will tend towards the median and lower quartile figures in the future.

Table 2. CE statements: valid data from applications reviewed 2020-22

Metric	Measure	Upper quartile	Median	Lower quartile	Sample size
Demolition waste arisings	tonnes/m^2 GIA	0.958	0.480	0.138	48
Excavation waste arisings	tonnes/m^2 GIA	0.770	0.410	0.150	47
Construction waste arisings	tonnes/m^2 GIA	0.113	0.093	0.065	56
Municipal waste	tonnes/m^2 GIA (annum)	0.080	0.031	0.014	31
Foundations	Kg/m^2 for each element	907.73	572.5	222.51	77
Frame	Kg/m^2 for each element	368.89	208.04	92.38	70
Upper floors	Kg/m^2 for each element	702.27	542.33	294.75	72
Roof	Kg/m^2 for each element	77.09	42.37	17.52	63
Fabric	Kg/m^2 for each element	192.48	102.00	42.29	78
Partition	Kg/m^2 for each element	118.37	60.22	18.05	75

Table 3. BREEAM construction waste benchmarks

BREEAM credit

No. of credits	Tonnes/m2
1	≤ 0.110
2	≤ 0.065
3	≤ 0.032
Exemplary	≤ 0.019

Table 4. Home Quality Mark (HQM) construction waste benchmarks

HQM credit allocation

No. of credits	Tonnes/m2
2	≤ 0.085
4	≤ 0.049
6	≤ 0.029
8	≤ 0.019