

*Mat01: Environmental Impacts
from Construction Products*

Linden Hill, 35 Wilson Road

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Record of Revisions

Revision	Reason for Issue	Issue Date	Prepared By	Reviewed By	Authorised By
01	Client Review	02/12/2025	Antonia Matthews	Hamad Yoonus	Areti Makantasi
02	Final version	12/12/2025	Antonia Matthews	Hamad Yoonus	Areti Makantasi

Executive Summary

This BREEAM Mat01 Environmental impacts from construction products report has been prepared by JLL's Sustainable Asset Services team for the proposed development at 35 Wilson Road, Liverpool, UK.

The scheme involves the new construction of a warehouse at Huyton Business Park on the outskirts of Liverpool, and is being assessed against BREEAM UK New Construction Version 6.1.

Compliance with the requirements of BREEAM UKNC Version 6.1 Mat01 Environmental impacts from construction products – Building life cycle assessment (LCA) has been assessed under the following criteria for industrial building type:

The comparison of the proposed design with the BREEAM benchmark during concept design was completed using One Click LCA IMPACT Compliant tool, and the options appraisal was completed using One Click LCA for BREEAM UK tool.

The Mat01/02 Results Submission Tool have been submitted to BRE before planning permission was submitted.

This report presents the outcomes of the building life cycle assessment during concept design to demonstrate compliance with Mat01 comparison with the BREEAM LCA benchmark and options appraisal.

The LCA concluded that the environmental performance of the proposed design achieved:

- 0.60 credits: Superstructure comparison with the BREEAM benchmark
- 2.67 credits: Superstructure options appraisal
- 1 credit: Substructure and hard landscaping options appraisal
- 1 exemplary credit: Core building services options appraisal

The total credit score achieved for Mat 01 during concept design is 4 + Exemplar credit.

Assessment Criteria & Scope

Assessment Criteria

Compliance with the requirements of BREEAM UKNC Version 6.1 Mat01 Environmental impacts from construction products – Building life cycle assessment (LCA) has been assessed under the following criteria for industrial building type:

Up to six credits – Superstructure

Comparison with the BREEAM LCA benchmark during Concept Design

1. During the Concept Design, demonstrate the environmental performance of the building as follows:
 - a. Carry out a building LCA on the superstructure design using either the BREEAM Simplified Building LCA tool or an IMPACT Compliant LCA tool according to the methodology.
 - b. Submit the Mat 01/02 Results Submission Tool to BRE at the end of Concept Design, and before planning permission is applied for.

Option appraisal during Concept Design

2. For office, industrial and retail building types, achieve criterion
3. During Concept Design, identify opportunities for reducing environmental impacts as follows:
 - a. Carry out building LCA options appraisal of 2 to 4 significantly different superstructure design options (applicable to the Concept Design stage, see Methodology).
 - b. Use a building LCA tool that is recognised by BREEAM (as suitable for assessing superstructure during Concept Design) according to the methodology (see Methodology).
 - c. For each design option, fulfil the same functional requirements specified by the client and all statutory requirements (to ensure functional equivalency).
 - d. Integrate the LCA options appraisal activity within the wider design decision-making process. Record this in an options appraisal summary document.
 - e. Record the following in the Mat 01/02 Results Submission Tool: The differences between the design options; the design option selected by the client to be progressed beyond Concept Design; the reasons for selecting it and the reasons for not selecting the other design options.
 - f. Submit the Mat 01/02 Results Submission Tool to BRE at the end of Concept Design, and before planning permission is applied for (that includes external material or product specifications).

One credit – Substructure and hard landscaping options appraisal during Concept Design

6. Criteria 2 and 3 are achieved.
7. During Concept Design identify opportunities for reducing environmental impacts as follows:
 - a. Carry out building LCA options appraisal of a combined total of at least six significantly different substructure or hard landscaping design options (at least two shall be substructure and at least two shall be hard landscaping).
 - b. Using a building LCA tool that is recognised by BREEAM (as suitable for assessing substructure and hard landscaping during Concept Design) according to the methodology (see Methodology).
 - c. As criteria 3.c to 3.f.

Exemplary level criteria

One credit – Core building services options appraisal during Concept Design

8. Criteria 2 to 3 are achieved.
9. During Concept Design identify opportunities for reducing environmental impacts as follows:
 - a. Carry out building LCA options appraisal of at least 3 significantly different core building services design options.
 - b. Use a building LCA tool that is recognised by BREEAM (as suitable for assessing core building services during Concept Design) according to the methodology (see Methodology).
 - c. As criteria 3.c to 3.f.

Scope

The comparison of the proposed design with the BREEAM benchmark during concept design was completed using One Click LCA IMPACT Compliant tool, and the options appraisal was completed using One Click LCA for BREEAM UK tool.

The proposed development will be predominantly comprised of a large warehouse area with internal 3-storey office areas. The office areas include a reception, WCs and open plan office areas. Attached to the main building is a 2-storey transport office. The gross internal floor area of the proposed development is 21,110 m².

The external hard landscaping areas include car parking areas, pedestrian paths and a service yard. The service yard includes trailer parking, level access bays and dock leveller bays.

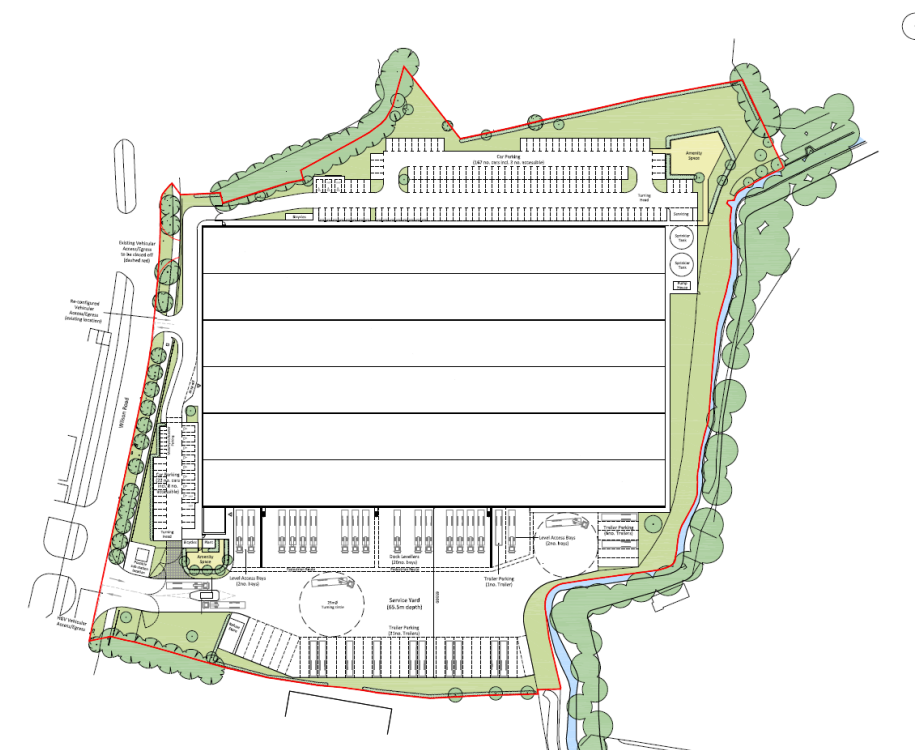


Figure 1: Proposed Site Plan

The elements detailed in the tables below are considered in scope for this assessment and are present in either or both the proposed design and options.

Table 1: Proposed Building Design Superstructure Scope

Level 1 Group element	Level 2 element	Level 3 Sub-element	Included
2. Superstructure	1. Frame	1. Steel frames	✓
		2. Space decks	✗
		3. Concrete casings to steel frames	✗
		4. Concrete frames	✗
		5. Timber frames	✗
		6. Other frame systems	✗
	2. Upper floors	1. Floors	✓
	3. Roof	1. Roof structure	✓
		2. Roof coverings	✓
		3. Specialist roof systems	✗
		5. Rooflights, skylights and openings	✓
	4. Stairs and ramps	1. Stair or ramp structures	✓
	5. External walls	1. External enclosing walls above ground floor level	✓
		2. External enclosing walls below ground level	✗
		3. Solar or rain screening	✓
	6. Windows and external doors	1. External windows	✓

Table 2: Proposed Building Design Substructure and Hard Landscaping Scope

Level 1 Group element	Level 2 element	Level 3 Sub-element	Included
1. Substructure	1. Substructure	1. Standard foundations	✓
		2. Specialist foundation systems	✗
		3. Lowest floor construction	✓
8. External works	2. Roads, paths and pavings	1. Roads, paths and pavings	✓
		2. Special surfacings and pavings	✗

Table 3: Proposed Building Design Core Building Services Scope

Level 1 Group element	Level 2 element	Level 3 Sub-element	Included
5. Services	5. Heat source	1. Heat source	✓
	6. Space heating and Air-conditioning	1. Central heating	✓
		2. Local heating	✗
		3. Central cooling	✓
		4. Local cooling	✗
		5. Central heating and cooling	✗
		6. Local heating and cooling	✗
		7. Central air-conditioning	✗
		8. Local air-conditioning	✗
	7. Ventilation	1. Central ventilation	✓
		2. Local ventilation	✓
		3. Smoke extract or control	✗
	9. Fuel installations and systems	1. Fuel storage	✗
		2. Fuel distribution systems	✗

Options Appraisal During Concept Design

Superstructure

Table 4: Superstructure options appraisal

Option	Elements affected	Reason for choosing/not choosing this option
1 (Baseline) ■ Steel frame: Structural steel with 60% recycled content ■ Façade: Steel clad sandwich panels with PIR core ■ Part of office façade: aluminium framed glazed curtain walling from ground floor to third floor. ■ Windows and rooflights: Aluminium frame double glazing ■ Ready-mix concrete with 0% fly ash in cement for upper floor slabs and stairs ■ Reinforcement steel with 97% recycled content for upper floor slabs and stairs ■ Roof structure: Steel frame with 60% recycled content ■ Pitched roof: Steel clad sandwich panels with PIR core ■ Flat roof (transport office): Bitumen roof with EPS insulation	N/A	Chosen option
2 Cast in-situ reinforced concrete upper floor slabs and stairs to have 25% GGBS cement replacement.	Frame	Not chosen – Other While introducing GGBS as a cement replacement reduces the embodied carbon, this decreases the strength gain and increases the construction timeframe.
3 Replace the cast in-situ concrete upper floor slabs with precast hollowcore concrete slabs.	Roof	Not chosen – Other Cast in-situ concrete slabs are preferred for improved design flexibility. Precast concrete slabs reduce flexibility and the ability to form holes, increasing the criticality of the upfront design freeze.
4 Replace the steel sandwich panels with PIR core with an aluminium rainscreen system with stone wool insulation and steel inner lining.	External walls	Not chosen – Life cycle costs too high The rainscreen cladding system option has higher upfront embodied carbon and takes longer to install compared to the steel sandwich panels.

Substructure and Hard Landscaping

Table 5: Substructure and Hard Landscaping options appraisal

Option	Elements affected	Reason for choosing/not choosing this option
1 (Substructure baseline) ■ Reinforced concrete pile caps with 0% cement replacement. ■ Reinforced concrete cast in-situ ground floor slab with 0% cement replacement. PIR insulation. ■ All reinforcement steel has 97% recycled content. ■ Aggregate sub-base (0% recycled)	N/A	Chosen Option
2 (Hard Landscaping baseline) ■ Aggregate sub-base (0% recycled) ■ General asphalt for roads and car park ■ Cast in-situ reinforced concrete with 0% cement replacement for the service yard. Reinforcement steel with 97% recycled content. ■ Concrete pavers for the pedestrian paths	N/A	Not chosen – Life cycle costs too high Clay pavers have lower embodied carbon and are more durable and aesthetically pleasing than the concrete pavers.
3 All in-situ concrete to have 25% GGBS cement replacement.	Substructure	Not chosen – Other GGBS has not been added to concrete due to its delayed strength gain in the initial curing period, which can compromise structural performance.
4 Replace reinforced concrete pile caps with steel core piling.	Substructure	Not chosen – Other RC pile caps are considered to be more practical than steel piles for this site.
5 Replace the virgin aggregate with recycled aggregate.	Hard landscaping	Not chosen – Other While recycled aggregates have reduced embodied carbon compared to virgin aggregates, it can be difficult to source large quantities of recycled aggregates.
6 Replace the pedestrian path concrete pavers with clay pavers.	Hard landscaping	Chosen Option Clay pavers have lower embodied carbon and are more durable and aesthetically pleasing than the concrete pavers.

Core Building Services

Table 6: Core Building Services options appraisal

Option	Elements affected	Reason for choosing/not choosing this option
1 (Core building services baseline) ■ Office heating: Air-to-water heat pump with low temperature hot water (LTHW) radiators ■ Office comfort cooling: VRF system with cassettes ■ Office ventilation: MVHR with plate heat exchanger ■ Local WC extract fans ■ Warehouse destratification fans	N/A	Chosen option
2 Replace the LTHW radiators with underfloor heating to operate with the same air-to-water heat pump.	Core building services	Not chosen – Life cycle costs too high Underfloor heating has higher embodied carbon than radiators.
3 Replace the MVHR plate heat exchanger for an MVHR with rotary heat exchanger.	Core building services	Not chosen – Other A plate heat exchanger for heat recovery is more suitable for the size of the office in the warehouse than the rotary heat exchanger option. Rotary heat exchangers are typically more suited for areas that require higher air volumes.

Credits Achieved

Table 7 below details the number of credits achieved for the Mat01 Environmental impacts from construction products – Building life cycle assessment (LCA) of Linden Hill during concept design stage.

Table 7: Credits achieved during concept design

Credit	Number of Credits Achieved
Comparison with BREEAM LCA benchmark (Industrial)	0.60
Superstructure options appraisal	2.67
Substructure and hard landscaping options appraisal	1
Core building services options appraisal	1
Total	4 + Exemplary



JLL

30 Warwick Street
London
W1B 5NH

Antonia Matthews
Sustainability Engineer, Sustainable Asset Services
Antonia.Matthews@jll.com

Hamad Yoonus
Associate Engineer, Sustainable Asset Services
+44 (0) 7873 624939
Hamad.Yoonus@jll.com

Areti Makantasi
Director, Sustainable Asset Services
Areti.Makantasi@jll.com

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