# BUILDING LIFE CYCLE ASSESSMENT – CONCEPT DESIGN STAGE



### UNITS 18-20 PLOT B, WINDRUSH

### CANMOOR

Issued by: Nick Gorrie

Engineering Services Consultancy Ltd Griffin House, 19 Ludgate Hill, Birmingham, B3 1DW T: 0121 214 8998 www.escuk.com

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CANMOOR

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### ENGINEERING SERVICES CONSULTANCY LTD

Griffin House, 19 Ludgate Hill, Birmingham, B3 1DW

Tel: 0121 214 8998

Email: info@escuk.com

Web: www.escuk.com



01217588966

T:



E: elspeth.wightman@escuk.com Engineering Services Consultancy Ltd

Griffin House, 19 Ludgate Hill, Birmingham, B3 1DW T: 0121 214 8998 www.escuk.com

VERSION	ISSUE DATE	AUTHOR	REVIEWED BY
CD1	02 February 2024	Elspeth Wightman	Nick Gorrie

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# INTRODUCTION

Engineering Services Consultancy Ltd (ESC) has been appointed to carry out a building life cycle assessment (LCA) for Units 18-20 Plot B, Windrush. The main purpose of the building LCA is to achieve the BREEAM UK NC V6.1 Mat 01 credits at the concept design stage.

This report has been compiled at the concept stage (RIBA Stage 2), prior to the submission of the planning application.

The building LCA is to be reviewed and updated at technical design stage (RIBA Stage 4).

This report outlines the baseline building LCA for the:

- Superstructure
- Substructure
- Hard landscaping

An options appraisal has also been carried out for the:

- Superstructure
- Substructure
- Hard landscaping

This report makes recommendations following the concept design stage options appraisal which should be evaluated by the design team and incorporated into the design where feasible.

The options appraisal is to be reviewed and updated at technical design stage (RIBA Stage 4).

One Click LCA has been used as the recognised tool to demonstrate compliance.

The building LCA has been produced by Nick Gorrie who has received training on the building LCA tool; has undertaken multiple different LCAs for paying customers in the last two years and is able to interpret construction documentation.



# **BREEAM NC V6.1 MAT 01 REQUIREMENTS**

# **RIBA STAGE 2 CONCEPT DESIGN**

Seven credits and three exemplary credits are available in this issue. Some credits require preceding criteria to be fulfilled first.

In order to have the opportunity to achieve all credits, a recognised LCA tool must be used.

### **UP TO FOUR CREDITS – SUPERSTRUCTURE**

- 1) During the concept stage, demonstrate the environmental performance of the building as follows:
  - a. Carry out a building LCA on the superstructure of the building using an IMPACT compliant LCA tool.
  - b. Submit the Mat 01 results to the BRE at the end of the concept design stage (RIBA Stage 2) and before planning permission is applied for.

### **OPTIONS APPRAISAL DURING CONCEPT DESIGN**

- 2) Item 1) must be achieved. During the concept design stage (RIBA Stage 2) identify opportunities for reducing environmental impacts as follows:
  - a. Carry out building LCA options of 2-4 significantly different superstructure design options using a recognised LCA tool. Each design option must fulfil the same functional requirements as the proposed superstructure.
  - b. Integrate the LCA options appraisal assessment within the wider design decision-making process and record this in an options appraisal summary document.
  - c. Record the differences between the design options, the option selected by the client and the reasons for selecting it and the reasons for not-selecting other options. Submit the Mat 01 results to the BRE at the end of the concept design stage (RIBA Stage 2) and before planning permission is applied for.

### **ONE CREDIT – SUBSTRUCTURE & HARD LANDSCAPING**

- **3)** Items 1) and 2) must be achieved. During the concept design stage (RIBA Stage 2) identify opportunities for reducing environmental impacts as follows:
  - a. Carry out building LCA options of at least 6 significantly different substructure or hard landscaping design options using a recognised LCA tool. Each design option must fulfil the same functional requirements as the proposed superstructure.
  - b. Integrate the LCA options appraisal assessment within the wider design decision-making process and record this in an options appraisal summary document.
  - c. Record the differences between the design options, the option selected by the client and the reasons for selecting it and the reasons for not-selecting other options. Submit the Mat 01 results to the BRE at the end of the concept design stage (RIBA Stage 2) and before planning permission is applied for.



# **RIBA STAGE 4 TECHNICAL DESIGN**

### **UP TO AN ADDITIONAL TWO CREDITS - SUPERSTRUCTURE**

- **4)** During the technical design stage, demonstrate the environmental performance of the building as follows:
  - a. Carry out a building LCA on the superstructure of the building using an IMPACT compliant LCA tool.
  - b. Submit the Mat 01 results to the BRE at the end of the technical design stage (RIBA Stage 4).

### OPTIONS APPRAISAL DURING TECHNICAL DESIGN

- 5) During the technical design stage (RIBA Stage 4) identify opportunities for reducing environmental impacts as follows:
  - a. Carry out building LCA options of 2-3 significantly different superstructure design options using a recognised LCA tool. Each design option must fulfil the same functional requirements as the proposed superstructure.
  - b. Integrate the LCA options appraisal assessment within the wider design decision-making process and update the options appraisal summary document.
  - c. Record the differences between the design options, the option selected by the client and the reasons for selecting it and the reasons for not-selecting other options. Submit the Mat 01 results to the BRE at the end of the technical design stage (RIBA Stage 4) and before planning permission is applied for.

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### **EXEMPLARY CRITERIA**

### **EXEMPLARY CRITERIA – ONE CREDIT – CORE BUILDING SERVICES**

- 6) Items 1) and 4) must be achieved. During the concept design stage (RIBA Stage 2) identify opportunities for reducing environmental impacts as follows:
  - a. Carry out building LCA options of at least 3 significantly different core building services design options using a recognised LCA tool. Each design option must fulfil the same functional requirements as the proposed superstructure.
  - b. Integrate the LCA options appraisal assessment within the wider design decision-making process and record this in an options appraisal summary document.
  - c. Record the differences between the design options, the option selected by the client and the reasons for selecting it and the reasons for not-selecting other options. Submit the Mat 01 results to the BRE at the end of the concept design stage (RIBA Stage 2) and before planning permission is applied for.

### EXEMPLARY CRITERIA – ONE CREDIT – THIRD PARTY VERIFICATION

7) Items 1) to 3) must be achieved. A suitably qualified third party verifies the building LCA work and produces a report describing how they have checked that the building LCA work accurately represents the design under consideration during the concept stage (RIBA Stage 2) and the technical design stage (RIBA Stage 4).



# LCA TOOL

One Click LCA is the tool being used to undertake the LCA to demonstrate compliance with the Mat 01 credits. The BRE has awarded One Click LCA with 100% quality score.

One Click LCA has also been verified by the BRE as IMPACT compliant.

The LCA has been carried out by Elspeth Wightman and reviewed by Nick Gorrie, who has successfully completed One Click LCA's training on how to achieve building LCA and EPD credits for BREEAM UK NC V6.



Nick Gorrie has received training on the building LCA tool; has undertaken multiple different LCAs for paying customers in the last two years and is able to interpret construction documentation.

The following documents have been used to build the LCA model in the OneClick LCA software:

- Various drawings from Hale Architecture
  - o 23052 PL-1003\_00 Proposed Site Plan-A1
  - 23052 PL-1004\_00 Proposed Hard and Soft Landscape-A1
  - 23052 PL-1100\_00 Units 18 to 20 Proposed Ground Floor GA Plan-A1
  - 23052 PL-1101\_00 Units 18 to 20 Proposed First Floor Office GA Plan-A1
- Canmoor Developments Limited Cost Plan 240119 Budget Cost Estimate Nr 2 -Plot B, Windrush Estate, Witney
- Units 18-20 UKNC2018\_Mat0102\_ResultsSubmissionTool\_V2.2
- BREEAM\_UK\_NC\_2018\_and\_V6\_Wat01\_Calculator\_v2.3



# COMPARISONWITHTHEBREEAMLCABENCHMARK DURING CONCEPT DESIGN

### SUBSTRUCTURE BASELINE – IMPACT COMPLIANT LCA TOOL

MAT01\_CD\_SUPERS\_B

The One Click LCA for *BREEAM UK IMPACT*-compliant tool has been used to compare the building against the benchmark.

The superstructure base-build has been modelled within the software. The building material inputs for the superstructure using the IMPACT compliant tool can be seen in Appendix A.

### RESULTS

The Mat 01 Results Submission Tool confirms that the building achieves **0.7 credits** for the superstructure comparison with the BREEAM benchmark.

Sup	juperstructure - Comparison with the BREEAM benchmark										
A con	npleted 'Mat01_CD_SuperS_B' da	ta file shall	be saved in	the same folder a	s this file.						
Desig	n option	Option data file link	m2 net internal area	2 net BRE EN ecopoints/m2 net internal area (60 year study period) ternal ea							
ID	Name	_		2.1 Frame	2.2 Upper floors	2.3 Roof	2.4 Stairs and ramps	2.5 External walls	2.6 Windows and external doors	2.7 Internal walls and partitions	Total
B1	Mat01_CD_SuperS_B	Link	5072	1.47	0.20	0.25	0.01	0.18	0.00	Not in scope	2.12
Resul	Result from tool (BRE EN ecopoints / m2 NIA): 2.12										
Bencl	Benchmark value for this building type (BRE EN ecopoints / m2 NIA): 2.18										
Perce	ercentage better than benchmark: 2.7%										
Credi	redits awarded: 0.70										



# SUPERSTRUCTURE OPTION APPRAISAL DURING CONCEPT DESIGN

### SUPERSTRUCTURE BASELINE – ONECLICK LCA TOOL

MAT01\_CD\_SUPERS\_OPT1

In order to complete the *Mat 01 Results Submission Tool* Option 1 is equivalent to the Basebuild design, however this has been remodelled using the OneClick LCA database.

The superstructure base-build has been modelled within the software. The building material inputs for the superstructure using OneClick LCA can be seen in Appendix A.

### **SUPERSTRUCTURE DESIGN OPTION 1**

MAT01\_CD\_SUPERS\_OPT2

### CHANGE

Ba	aseline	Alternative		
Up	oper Floor	Upper Floor		
•	<b>Structural steel profiles</b> , generic, 20% recycled (columns and beams of for the upper floors only) <b>Assumed 45 kg/m</b> <sup>2</sup> for upper floor GIA	•	<b>Structural steel profiles</b> , generic, 20% recycled (columns and beams of for the upper floors only) <b>Assumed 25kg/m<sup>2</sup></b> for upper floor GIA	
•	<b>Galvanized profiled steel decking</b> , for composite floor slabs/decks, 0.9 mm sheet thickness	•	Hollow core concrete slabs - Assumed 250mm thick, C30/37, 0% recycled binders in cement	
•	Steel mesh reinforcement for concrete	•	Flooring screed - 50mm thick, C20/25,	
•	<b>Concrete</b> – C32/40, CEM I, 0% recycled binders, 150mm thick	<ul> <li>CEM I 0% Cement Replacement</li> <li>Assumed NO Raised access service runs can be allowed for screed detailing)</li> </ul>	CEM I 0% Cement Replacement Assumed NO Raised access floor (as	
•	Raised access floor		screed detailing)	

Material Option	Tonnes CO₂e	Difference (Tonnes CO₂e)	Lowest CO₂e
Baseline	1,383		×
Alternative	1,271	- 112	$\checkmark$



# **SUPERSTRUCTURE DESIGN OPTION 2**

### MAT01\_CD\_SUPERS\_OPT3

### CHANGE

Baseline			Alternative		
Up	oper Floor	Upper Floor			
•	<b>Structural steel profiles</b> , generic, 20% recycled (columns and beams of for the upper floors only) Assumed 45 kg/m <sup>2</sup> for upper floor GIA	•	<b>Glue laminated timber (Glulam)</b> - Assumed 100 kg/m <sup>2</sup> for upper floor GIA, NB: FSC certified timber, and a detailed disassembly plan made, to promote		
•	Galvanized profiled steel decking, for		reuse at end of building life		
	composite floor slabs/decks, 0.9 mm sheet thickness	•	<b>200mm joists</b> - Assumed 1.8m of joists per m <sup>2</sup>		
•	Steel mesh reinforcement for concrete	•	22mm chipboard - Assumed 14.57		
•	Concrete – C32/40, CEM I, 0% recycled		kg/m²		
	binders, 150mm thick	•	Soffit lining/fire protection:		
•	Raised access floor	i) ii)	2 x Gypsum plasterboard, fire resistant, 12.5 mm 200mm of Rock wool/mineral wool insulation, Fire resistance class = A		
		•	No raised access floor needed		

Material Option	Tonnes CO₂e	Difference (Tonnes CO₂e)	Lowest CO₂e
Baseline	1,383		×
Alternative	1,234	- 149	$\checkmark$



# **SUPERSTRUCTURE DESIGN OPTION 3**

### MAT01\_CD\_SUPERS\_OPT4

### CHANGE

Baseline		Alternative		
St	eel Frame	Timber Frames		
•	<b>Structural steel profiles,</b> generic, 20% recycled (Hot rolled)	•	Glue laminated timber (Glulam) - Assumed 70 kg/m <sup>2</sup> for ground floor GIA,	
•	Structural hollow steel Generic 20% (Cold rolled)		NB: FSC certified timber, and a detailed disassembly plan made, to promote reuse at end of building life	
Up	oper Floor	Upper Floor		
•	<b>Structural steel profiles</b> , generic, 20% recycled (columns and beams of for the upper floors only) Assumed 45 kg/m <sup>2</sup> for upper floor GIA	•	<b>Glue laminated timber (Glulam)</b> - Assumed 100 kg/m <sup>2</sup> for upper floor GIA <b>200mm joists</b> - Assumed 1.8m of joists per m <sup>2</sup>	
•	<b>Galvanized profiled steel decking</b> , for composite floor slabs/decks, 0.9 mm sheet thickness	•	22mm chipboard - Assumed 14.57 kg/m <sup>2</sup>	
•	Steel mesh reinforcement for concrete	•	Sofit lining/fire protection:	
•	<b>Concrete</b> – C32/40, CEM I, 0% recycled binders, 150mm thick	<ul> <li>i) 2 x Gypsum plasterboard, resistant, 12.5 mm</li> <li>ii) 200mm of Rock wool/mine insulation, Fire resistance of</li> </ul>	2 x Gypsum plasterboard, fire resistant, 12.5 mm	
•	Raised access floor		insulation, Fire resistance class = A	
		•	No raised access floor needed	

Material Option	Tonnes CO₂e	Difference (Tonnes CO₂e)	Lowest CO₂e
Baseline	1,383		×
Alternative	683	-700	$\checkmark$



# SUBSTRUCTURE OPTION APPRAISAL DURING CONCEPT DESIGN

### SUBSTRUCTURE BASELINE

### MAT01\_CD\_SUBS\_HL\_OPT1

The substructure base-build has been modelled within the software. The building material inputs can be seen in Appendix A.

### **SUBSTRUCTURE DESIGN OPTION 2**

### MAT01\_CD\_SUBS\_HL\_OPT3

### CHANGE

Baseline	Alternative		
Lowest Floor Construction	Lowest Floor Construction		
<ul> <li>Concrete - Assumptions: C32/40, CEM I, 0% recycled binders</li> </ul>	<ul> <li>Concrete - Assumptions: C32/40, CEM I, 0% recycled binders, 15% thinner ground floor slab</li> </ul>		

Material Option	Tonnes CO₂e	Difference (Tonnes CO₂e)	Lowest CO <sub>2</sub> e
Baseline	384		×
Alternative	340	-44.0	$\checkmark$



### **SUBSTRUCTURE DESIGN OPTION 2**

### MAT01\_CD\_SUBS\_HL\_OPT4

### CHANGE

Baseline			Alternative		
Standard Foundations			Standard Foundations		
•	<b>Concrete</b> - Assumptions: C32/40, CEM I, 0% recycled binders	•	<b>Concrete</b> - Reduced Foundations Size Due to Structural Timber Lighter Loads (circa 20% saving)		
•		•	Steel reinforcement		

Material Option	Tonnes CO₂e	Difference (Tonnes CO <sub>2</sub> e)	Lowest CO <sub>2</sub> e
Baseline	384		×
Alternative	369	-15	$\checkmark$



# HARD LANDSCAPING OPTION APPRAISAL DURING CONCEPT DESIGN

# HARD LANDSCAPING BASELINE

### MAT01\_CD\_SUBS\_HL\_OPT2

The hard landscaping base-build has been modelled within the software. The building material inputs can be seen in Appendix A.

# HARD LANDSCAPING DESIGN OPTION 1

### MAT01\_CD\_SUBS\_HL\_OPT5

### CHANGE

Bas	seline	Alte	ernative
Tar	mac	Pav	ing
550	)mm build up of:	550	mm build up of:
•	350mm crushed aggregate sub-base	Bloo	ck Paver
٠	70mm AC 32	•	350mm crushed aggregate sub-base
•	60mm AC20 and	•	60mm AC 20
٠	40mm surface course	٠	50mm sand bedding
		•	80mm block paver

Material Option	Tonnes CO₂e	Difference (Tonnes CO₂e)	Lowest CO <sub>2</sub> e
Baseline	273		×
Alternative	260	-13	$\checkmark$



# HARD LANDSCAPING DESIGN OPTION 2

### MAT01\_CD\_SUBS\_HL\_OPT6

### CHANGE

Bas	seline	Alternative
Tar	mac	Paving
550	mm build up of:	550mm build up of:
•	350mm crushed aggregate sub-base	Block Paver
•	70mm AC 32	<ul> <li>330mm crushed aggregate sub-base</li> </ul>
•	60mm AC20 and	• 60mm AC20
•	40mm surface course	<ul> <li>50mm sand bedding</li> </ul>
		100mm open grid paver (with 40% openness)

Material Option	Tonnes CO₂e	Difference (Tonnes CO₂e)	Lowest CO₂e
Baseline	273		×
Alternative	257	-16	$\checkmark$



# **BREEAM NC V6 MAT 01 CREDITS**

The Mat 01 Results Submission Tool has been completed and confirms that a total of **4 credits** can be awarded at the **concept design stage**, as follows:

- BREEAM benchmark comparison = 0.7 credits
- Superstructure options appraisal = 2.67 credits
- Substructure and hard landscaping options appraisal = 1 credit

In addition to this it is expected that the following will also be undertaken:

- Third party verification of the LCA model & report at concept stage = 1 exemplary credit
- Alignment of the LCA and the LCC at concept stage = 1 exemplary credit

Therefore, a total of 4 credits have been achieved and it is anticipated that a further 2 exemplary credits will also be achievable.

		CO₂e Tonnes	CO₂e per m²/yr	Difference Tonnes	Difference %	Result
	Baseline	1383	4.54	-	-	-
Superstructure	Design Option 1	1271	4.18	-112.00	-8.10	$\checkmark$
Superstructure	Design Option 2	1234	4.06	-149.00	-10.77	$\checkmark$
	Design Option 3	683	2.24	-700.00	-50.61	$\checkmark$
	Baseline	384	1.26	-	-	-
Substructure	Design Option 1	340	1.12	-44.00	-11.46	$\checkmark$
	Design Option 2	369	1.21	-15.00	-3.91	$\checkmark$
Llord	Baseline	273	0.9	-	-	-
	Design Option 1	260	0.85	-13.00	-4.76	$\checkmark$
Landscaping	Design Option 2	257	0.84	-16.00	-5.86	$\checkmark$

Engineering Services Consultancy Ltd

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# **APPENDIX A**

Main > ESS0416 Plot B Windrush Units 18-20 LCA > Mat01\_CD\_SuperS\_Opt1 > LCA for BREEAM UK > Input data : Building materials

#### Mat01\_CD\_SuperS\_Opt1 Building materials Energy consumption, annual Water consumption, annual Construction site operations Emissions and removals Building area T Country Data source Upstream CO2e Unit Standard Material Type Filter: Filter: Filter: Filter: \* Filter: \* Filter: \* Filter: \* Filter: + Ŧ Ŧ Ŧ Fill in the material consumptions by material type. You may fill in all materials lumped together, or on separate rows for example by type of structure. Unless instructed otherwise, use gross amounts (incl. losses). Materials can be added in any section. Material s Completeness (%) and plausibility checker (-) 1. Foundations and substructure - out of scope - Add to scope 2. Vertical structures and facade A840 Tonnes CO2e - 61 % External walls and facade 🛱 Compare answers - 🛛 Create a group 🕂 Move materials 🕀 Add to compare Start typing or click the arro Resource = Quantity # COze \$ Comment # RICS category (1) Transport, kilometers ③ = 2.5.1.External enclosing Sandwich panel with glasswool insul ? 1218 m2 ¥ 67t - 5% 80 Trailer combination, 40 External wall - Built up Sandwich panel with stone wool i ? 🖸 2510 m2 v 128t - 9% External wall - Composite E 2.5.1.External enclosing 80 Trailer combination, 40 Create a group 4 Move materials 4 Add to compare Columns and load-bearing vertical structures Compare answers -Start typing or click the arro Resource # Quantity © CO26 0 Comment 0 RICS category ③ Transport, kilometers (9 # Serv 110 Trailer combination, 40 As bu 2.1. Frame Structural steel profiles, generic, ? 202950 kg ¥ 518t - 37% Steel frame - hot rolled 45100 kg ~ 2.1.1.Steel frames Structural hollow steel sections (H ? 126t - 9% Steel frame - cold rtolled 110 Trailer combination, 40 As bu Internal walls and non-bearing structures 🔁 Compare answers -+ Move materials Add to con Create a group Start typing or click the arro 3. Horizontal structures: beams, floors and roofs A91 Tonnes CO2e - 36 % Floor slabs, ceilings, roofing decks, beams and roof ≓ Compare answers 🗸 🚦 Create a group 🕀 Move materials 🕀 Add to compare Start typing or click the arro Resource 0 COze = RICS category (2) Transport, kilometers ③ = Quantity = Comment 0 Structural steel profiles, generic, ? 25290 kg 🗸 65t - 5% Upper Floor Structural Steel 2.2.Upper floor 110 Trailer combination, 40 E Trailer combination, 40 Profiled steel decking for compo ? 562 m2 ¥ 18t - 1% Upper floor - Metal deck 2.2.1 Eloors 110 2.2.1 Floors Reinforcement steel mesh (rebar), 1? 1697 24 kg 🗸 1.31.0.1% Unner floor - Reinforcement 110 Trailer combination, 40 E 2.2.Upper floor Concrete mixer truck Ready-mix concrete, normal strength ? Upper floor - Concrete 84.3 m3 ¥ 27t - 2% 60 3.2.2.Raised acce Trailer combination, 40 Raised access floor pedestals, for ? 1168.96 kg v 4.5t - 0.3% Raised access floor feet 110 E Raised access flooring panels, chip ? 562 m2 ¥ 68t - 5% Raised access floor panels 3.2.2 Raised access 110 Trailer combination, 40 2.3 Roofs Trailer combination, 40 Sandwich panel with glasswool insul ? 4781 m2 ¥ 2641 . 19% Roof 80 E Corrugated rooflight GRP sheets, 5. ? 2.3.5 Rooflights Trailer combination, 40 80 478 m2 ¥ 43t - 3% Rooflights

4. Other structures and materials a 52 Tonnes CO2e - 4 %



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	ipare answers • 🖬 create a	group + more n		ompare			
Start typing or click the arro							
Resource \$	Quantity #	CO2e 0	Comment 0		RICS category (1)	Transport, kilometers ③ 0	Ser
Precast concrete staircase, 2 fligh ?	63529 kg 🗸	121 - 0.9%	Precast Stair		2.4.Stairs and ramps	60 Trailer combination, 40	As
Windows and doors Compare answ	vers - Create a group 🝕	Move materials	Add to compare				
Start typing or click the arro							
Resource 0	Quantity =	COze :	Comment 0		RICS category (2)	Transport, kilometers	® ¢
Aluminium frame window, double glaz ?	305 m2 🗸	40t - 3%	Window		2.6.Windows and ext	emal 130 Trailer combin	nation, 4
Finishes and coverings Z Compare a	nswers - Create a group	+ Move materials	Add to compare				
Aain > ESS0416 Plot B Windrush	Units 18-20 LCA > Mat01_C	D_SubS_HL_Op	t1 > LCA for BREE	EAM UK > In	put data : Building m	naterials	
Mat01_CD_SubS_HI	Opt1						

Dunu	ing materials	inergy consum	puon, annuar	water c	onsumption, annual	CON	struction site ope		inissions an	u terriovaia	building area		
T	Material		Country		Data source		Туре	Upstream	CO2e	Unit	Standard		
Clear	Filter:	•	Filter:	•	Filter:	*	Filter: •	Filter: •	Filter: *	Filter: •	Filter:	*	

🚺 Fill in the material consumptions by material type. You may fill in all materials lumped together, or on separate rows for example by type of structure. Unless instructed otherwise, use gross amounts (incl. losses). Materials can be added in any section. Material selection help.

#### Completeness (%) and plausibility checker (-)

#### 1. Foundations and substructure 🌰 384 Tonnes CO<sub>2</sub>e - 100 %

Materials in the foundations will never be replaced, no matter assessment period length (except for RE2020 and FEC tools). For BREEAM UK Mat 1 IMPACT equivalent provide the data for site excavation fuel use here, choose resource Excavation works.

Foundation, sub-surface, basement and retaining walls 🛱 Compare answers 🗸 🖬 Create a group 🛛 💠 Move materials 🚳 Add to compare

Start typing or click the arro Resource \$ Quantity \$ CO2e 🖨 RICS category ⑦ Transport, kilometers ⑦ 章 Comment \$ Se Ready-mix concrete, normal strength ? 202.5 m3 🗸 65t - 17% Foundations - concrete 1.Substructure 60 Concrete mixer truck P€ Reinforcement steel (rebar), generi ? 20250 kg 🗸 11t - 3% Foundations - Steel 1.1.1.Standard 110 Trailer combination, 40 Pe Ready-mix concrete, normal strength ? 902 m3 🗸 291t - 76% Ground Floor Slab -1.1.3.Lowest floor 60 Concrete mixer truck Pe Reinforcement steel (rebar), generi ? 31570 kg 🗸 17t - 4% Ground Floor Slab - Steel 1.1.3.Lowest floor 110 Trailer combination, 40 Pe



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Material Clear Filter:	v Filte	ntry : *	)	Data source Filter:	v Filter:	v Filter: v	CO2e Unit	5	Standard Filter:
Fill in the material consumptions by mat	erial type. You m	ay fill in all i	materials	lumped together, o	r on separate rov	vs for example by	y type of structure. Unles	s instructed of	therwise, use gross
amounts (incl. losses). Materials can be ad	fed in any section	n. Material	selection	help.					
Completeness (%) and p	lausibility	checke	r (-)						
1. Foundations and substru	ucture								
Materials in the foundations will never be replace tere, choose resource Excavation works.	ed, no matter ass	essment per	riod length	(except for RE2020	and FEC tools). Fo	F BREEAM UK Ma	at 1 IMPACT equivalent pro	vide the data fo	or site excavation fuel use
Foundation, sub-surface, basement and	retaining walls	≓ Comp	are answ	vers - Create	a group 🕂 M	love materials é	Add to compare		
Start typing or click the arro									
2. Vertical structures and fa	acade - out o	f scope - A	dd to so	ODe					
	10000000000000000000000000000000000000								
<ol> <li>Horizontal structures: be</li> </ol>	ams, floor	's and r	oofs	out of scope - Ad	d to scope				
4. Other structures and ma	terials - out	of scope -	Add to s	cope					
4. Other structures and ma	terials - out	of scope -	Add to s	cope					
4. Other structures and ma 5. External areas and site e	terials - <sub>out</sub>	of scope - 1	Add to s	cope 26 - 100 %					
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