Appendix 20.2: London Resort Greenhouse Gas Calculation Inputs

General project inputs

Error! Reference source not found.~~Table 1~~ provides an overview of inputs and benchmarks used in order to assess GHG emissions associated with the baseline scenario.

Table 1 Inputs into the baseline scenario GHG emissions calculations

Land use type	Total Area (m^2 NIA)	Occupied Area (m^2 NIA)	CIBSE TM46 building type	Estimated electricity and fossil usage for assessment year (2020) (kWh/m^2/y)	Estimated GHG emissions for assessment year (2020) (tCO_{2e}/y)
Retail, store or showroom	700	700	General retail	115,500	28
Industrial/ manufacturing	11,000	8,200	Workshop	1,763,000	376
Light industrial	7,400	5,500	Workshop	1,182,500	252
Storage	48,600	33,700	Storage facility	6,571,500	1,406
Offices	1,300	1,300	General office	279,500	62
Total	**69,100**	**49,400**	**N/A**	**9,912,000**	**2,124**

Table 2~~Table 2~~ provides an overview of construction of the Proposed Development by year.

Table 2 Calculation area schedule and phase timing

Based on the Schedule of Accommodation, December 2020 (Document Reference: 7.3).

Year built		2022	2023	2024	2025	2026	2027	2028	2029	Total m^2
Visitor Centre and Staff Training Facility	m^2	5~~48.17~~56.84	5~~48.17~~56.84	5~~48.17~~56.84						16~~44.5~~70.53
The London Resort Academy~~Galley Hill Resource Centre~~	m^2	~~912.83~~2,457.83	2,457.83~~91 2.83~~	2,457.83~~91 2.83~~						~~2738.5~~7,373.50
Staff Accommodation	m^2	~~22,812.514~~2,178	42,178~~22,8 12.51~~	42,178~~22,8 12.51~~						~~68,437.51~~26,534
London Resort Plaza	m^2	~~7,486.67~~5,352.67	5,352.67~~7,4 86.67~~	5,352.67~~7,4 86.67~~						~~22,460.01~~6,058
The London Resort Boulevard	m^2	5,674.33	5,674.33	5,674.33						17,023
The London Resort Boulevard (RDE External Seating)	m^2	393	393	393						1,179
The London Resort Boulevard (Circulation & Landscape)	m^2	1,452.66	1,452.66	1,452.66						4,358
~~The London Resort Market, Node 1 and Node 2~~	~~m^2~~	~~12,363.33~~	~~12,363.33~~	~~12,363.33~~						~~37,090.0~~
eSports Coliseum	m^2	6,252.16~~5,9 74.51~~	6,252.16~~5,9 74.51~~	6,252.16~~5,9 74.51~~						~~1,7923.51~~8,756.50
The Conferention Centre	m^2	3,3~~51~~0.00	3,3~~51~~0.00	3,3~~51~~0.00						10,050~~9,9 30.0~~
The London Resort Passenger Terminal	m^2	~~137.17~~3,312.67	3,312.67~~13 7.17~~	3,312.67~~13 7.17~~						~~411.5~~9,938
The London Resort Ebbsfleet International Terminal	m^2	1,377.17	1,377.17	1,377.17						4,131.5
The London Resort Ferry Terminal	m^2	2,~~596.67~~958.33	2, 958.33~~596. 67~~	2, 958.33~~596. 67~~						~~7,790.08~~8,875
London Resort Port	m^2	8,136.66	8,136.66	8,136.66						24,410
The London Resort Tilbury Terminal	m^2	~~829.51~~3,666.67	3,666.67~~82 9.51~~	3,666.67~~82 9.51~~						~~2,488.5~~11,000
Car park 1: London Resort Visitors	m^2	~~23,233.33~~2,465	32,465~~23,2 33.33~~	32,465~~23,2 33.33~~						~~69,700.09~~7,395
Car park 2: London Resort Visitors	m^2	~~23,225.00~~2,456.67	32,456.67~~2 3,225.00~~	32,456.67~~2 3,225.00~~						~~69,675.09~~7,370
Car park 3: London Resort Visitors	m^2	32,456.67~~2 3,225.00~~	32,456.67~~2 3,225.00~~	32,456.67~~2 3,225.00~~						97,370~~69, 675.0~~
Car park 4: Tilbury	m^2	~~23,233.33~~27,266.67	27,266.67~~2 3,233.33~~	27,266.67~~2 3,233.33~~						~~69,700.08~~1,800
Car park 5: Staff	m^2	~~4,645.00~~5,281	5,281~~4,645. 00~~	5,281~~4,645. 00~~						~~13,935.01~~5,843
Car park 6: London Resort VIP Car Park	m^2	~~929.00~~1,371	1,371~~929.0 0~~	1,371~~929.0 0~~						~~2,787.04~~113

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Year built		2022	2023	2024	2025	2026	2027	2028	2029	Total m²
Car park 7: Ebbsfleet International Station	m²	9,764.00	9,764.00	9,764.00						29,292.0
The London Resort Hotel	m²	~~16,069.24~~2 9,802.12	29,802.12~~1 6,069.24~~	29,802.12~~1 6,069.24~~						~~48,207.78~~ 9,406.35
Water park	m²	4,111.67	4,111.67	4,111.67						12,335
The Paramount Hotel	m²	24,613.8~~54~~	24,613.8~~54~~	24,613.8~~54~~						73,841.5~~4~~
Hotel 3	m²	16,570.2~~67~~	16,570.2~~67~~	16,570.2~~67~~						49,710.~~77 8~~
Hotel 4: Boutique Hotel	m²	9,392.31	9,392.31	9,392.31						28,176.9~~2~~
Administration Offices: BoH1	m²	1,453.67	1,453.67	1,453.67						4,361.0
Administration Offices: Adjacent Gate 1	m²	344.00	344.00	344.00						1,032.0
~~Node 1 Entrance~~	~~m²~~	~~3,726.67~~	~~3,726.67~~	~~3,726.67~~						~~11,180.0~~ 15.1.1
Node 2 Food Market	m²	~~3,860.00~~2,0 00	2,000~~3,860. 00~~	2,000~~3,860. 00~~						~~11,580.06~~, 000
Node 2 The Market (Circulation & Landscape)	m²	1,873.33	1,873.33	1,873.33						5,620
Gate 1 Payline	m²	~~2,593.33~~3,0 59.67	3,059.67~~2,5 93.33~~	3,059.67~~2,5 93.33~~						~~7,780.09~~,1 79
Gate 2 Payline	m²	2,725	2,725	2,725						8,175
Node 2 3 Bridge link	m²	1,983.33	1,983.33	1,983.33						5,950
Back of House: Gate 1	m²	7,533.33	7,533.33	7,533.33						22,600
Services	m²	105.33	105.33	105.33						316
~~City Hall and Operations Building: Gate 1 Node 3~~	~~m²~~	~~923.00~~	~~923.00~~	~~923.00~~						~~2,769.0~~
~~Administration Offices: Within Gate 2~~	~~m²~~						~~275.00~~	~~275.00~~	~~275.00~~	~~825.0~~
~~Wardrobe and Employee Services~~	~~m²~~	~~1,023.33~~	~~1,023.33~~	~~1,023.33~~						~~3,070.0~~
~~Wardrobe and Employee Services: Within Gate 1~~	~~m²~~	~~246.67~~	~~246.67~~	~~246.67~~						~~740.0~~
~~Wardrobe and Employee Services: Within Gate 2~~	~~m²~~						~~123.33~~	~~123.33~~	~~123.33~~	~~370.0~~
~~Central Kitchen and Food Warehouse~~	~~m²~~	~~800.00~~	~~800.00~~	~~800.00~~						~~2,400.0~~
~~Staff Canteen and Kitchen: BoH1~~	~~m²~~	~~250.00~~	~~250.00~~	~~250.00~~						~~750.0~~
~~Staff Canteen and Kitchen: Gate 1~~	~~m²~~	~~250.00~~	~~250.00~~	~~250.00~~						~~750.0~~
~~Staff Canteen and Kitchen: Gate 2~~	~~m²~~	~~166.67~~	~~166.67~~	~~166.67~~						~~500.0~~
~~Entertainment and Costumes: Within Gate 1~~	~~m²~~						~~653.33~~	~~653.33~~	~~653.33~~	~~1,960.0~~
~~Services~~	~~m²~~	~~105.33~~	~~105.33~~	~~105.33~~						~~316.0~~
~~Medical Centre~~	~~m²~~	~~100.67~~	~~100.67~~	~~100.67~~						~~302.0~~
~~Security and Crisis Control Centre (SCCC): Node 3~~	~~m²~~	~~60.67~~	~~60.67~~	~~60.67~~						~~182.0~~
Fire Station	m²	133.33	133.33	133.33						400~~.0~~
Helipad	m²	134.67	134.67	134.67						404
~~Maintenance Building and Vehicle Maintenance: BoH1~~	~~m²~~	~~3,798.33~~	~~3,798.33~~	~~3,798.33~~						~~11,395.0~~
~~Landscape Services: Within Gate 1~~	~~m²~~	~~333.33~~	~~333.33~~	~~333.33~~						~~1,000.0~~
~~Landscape Services: Within Gate 2~~	~~m²~~						~~166.67~~	~~166.67~~	~~166.67~~	~~500.0~~
~~Warehouse and Storage: BoH~~	~~m²~~	~~1,661.67~~	~~1,661.67~~	~~1,661.67~~						~~4,985.0~~
~~Warehouse and Storage: Park Adjacent~~	~~m²~~	~~441.67~~	~~441.67~~	~~441.67~~						~~1,325.0~~
~~Main Security Control and Crisis Room~~	~~m²~~	~~441.67~~	~~441.67~~	~~441.67~~						~~1,325.0~~

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Year built		2022	2023	2024	2025	2026	2027	2028	2029	Total m^2
~~Warehouse and Storage: Gate 1~~	~~m^2~~	~~33.33~~	~~33.33~~	~~33.33~~						~~100.0~~
~~Warehouse and Storage: Gate 2~~	~~m^2~~						~~29.33~~	~~29.33~~	~~29.33~~	~~88.0~~
Waste Recycling Centre	m^2	1,333.33	1,333.33	1,333.33						4,000.0
~~Tilbury Logistics Centre~~	~~m^2~~	~~1,333.33~~	~~1,333.33~~	~~1,333.33~~						~~4,000.0~~
Water Treatment Facility	m^2	~~39.51~~1,666.67	1,666.67~~39.51~~	1,666.67~~39.51~~						~~118.5~~5,000
Energy centre	m^2	400	400	400						1,200
BoH sports ground	m^2	4,466.67	4,466.67	4,466.67						13,400
BoH Bamber Pitt	m^2	1,133.33	1,133.33	1,133.33						4,000
Freestanding retail pavillions	m^2	1,133.33	1,133.33	1,133.33						3,400
Back of House: Gate 2	m^2	557	557	557						1,671
~~Grey Water Recycling Centre and Pump Room~~	~~m^2~~	~~566.67~~	~~566.67~~	~~566.67~~						~~1,700.0~~
~~RNLI Lifeboat Station~~	~~m^2~~	~~106.33~~	~~106.33~~	~~106.33~~						~~319.0~~

Embodied carbon (construction GHG emission) inputs

Table 3~~Table 3~~ summarises the material embodied carbon benchmarks used for each building associated with the Proposed Development.

Table 3 Material embodied carbon benchmarks and low, med, high scenario assumptions.

+/- 15% variation to show benchmark sensitivities at this early stage.

Schedule typologies	Embodied carbon benchmarks (RICS, 2012)	*Low*	Medium	*High*	Unit
		~~*-15% Buro Happold's past project experience (15% reduction)*~~	RICS (2012) and WRAP (2017) benchmarks	*+15%*	
Visitor Centre and Staff Training Facility	Public Assembly	*364.65*	**429**	*493.35*	$kgCO_2e/m^2$
The London Resort Academy~~Galley Hill Resource Centre~~	Low Rise Offices (1-4 storey offices)	*786.25*	**925**	*1063.75*	$kgCO_2e/m^2$
Staff Accommodation	Low Rise Apartment (3-5 storey building)	*467.5*	**550**	*632.5*	$kgCO_2e/m^2$
London Resort Plaza	Public Assembly	*364.65*	**429**	*493.35*	$kgCO_2e/m^2$
The London Resort Boulevard	Public Assembly	*364.65*	**429**	*493.35*	$kgCO_2e/m^2$
The London Resort Boulevard (RDE External Seating)	Public Assembly	*364.65*	**429**	*493.35*	$kgCO_2e/m^2$
The London Resort Boulevard (Circulation & Landscape)	Public Assembly	*364.65*	**429**	*493.35*	$kgCO_2e/m^2$
~~The London Resort Market, Node 1 and Node 2~~	~~Leisure Park (cinema, bowling, restaurant, amusements)~~	~~*799*~~	~~**940**~~	~~*1081*~~	~~$kgCO_2e/m^2$~~
eSports Coliseum	Leisure Park (cinema, bowling, restaurant, amusements)	*799*	**940**	*1081*	$kgCO_2e/m^2$
The Conferention Centre	Public Assembly	*364.65*	**429**	*493.35*	$kgCO_2e/m^2$
The London Resort Passenger Terminal	Warehousing/ logistics	*348.5*	**410**	*471.5*	$kgCO_2e/m^2$
The London Resort Ebbsfleet International Terminal	Warehousing/ logistics	*348.5*	**410**	*471.5*	$kgCO_2e/m^2$
The London Resort Ferry Terminal	Warehousing/ logistics	*348.5*	**410**	*471.5*	$kgCO_2e/m^2$
London Resort Port	Warehousing/ logistics	*348.5*	**410**	*471.5*	$kgCO_2e/m^2$
The London Resort Tilbury Terminal	Warehousing/ logistics	*348.5*	**410**	*471.5*	$kgCO_2e/m^2$
Car park 1: London Resort Visitors	Parking	*232.9*	**274**	*315.1*	$kgCO_2e/m^2$

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Schedule typologies	Embodied carbon benchmarks (RICS, 2012)	*Low*	Medium	*High*	Unit
		~~-15%Buro Happold's past project experience (15% reduction)~~	RICS (2012) and WRAP (2017) benchmarks	*+15%*	
Car park 2: London Resort Visitors	Parking	*232.9*	**274**	*315.1*	$kgCO_2e/m^2$
Car park 3: London Resort Visitors	Parking	*232.9*	**274**	*315.1*	$kgCO_2e/m^2$
Car park 4: Tilbury	Parking	*232.9*	**274**	*315.1*	$kgCO_2e/m^2$
Car park 5: Staff	Parking	*232.9*	**274**	*315.1*	$kgCO_2e/m^2$
Car park 6: London Resort VIP Car Park	Parking	*232.9*	**274**	*315.1*	$kgCO_2e/m^2$
Car park 7: Ebbsfleet International Station	Parking	*232.9*	**274**	*315.1*	$kgCO_2e/m^2$
The London Resort Hotel	Resort Hotel	*782*	**920**	*1058*	$kgCO_2e/m^2$
Water park	Swimming pool centre	*777.75*	**915**	*1,052.25*	$kgCO_2e/m^2$
The Paramount Hotel	Resort Hotel	*782*	**920**	*1058*	$kgCO_2e/m^2$
Hotel 3	Resort Hotel	*782*	**920**	*1058*	$kgCO_2e/m^2$
Hotel 4: Boutique Hotel	Resort Hotel	*782*	**920**	*1058*	$kgCO_2e/m^2$
Administration Offices: BoH1	Low Rise Offices (1-4 storey offices)	*786.25*	**925**	*1063.75*	$kgCO_2e/m^2$
~~Administration Offices: Adjacent Gate 1~~	~~Low Rise Offices (1-4 storey offices)~~	~~*786.25*~~	~~**925**~~	~~*1063.75*~~	~~$kgCO_2e/m^2$~~
~~Node 1 Entrance~~	~~Public Assembly~~	~~*364.65*~~	~~**429**~~	~~*493.35*~~	~~$kgCO_2e/m^2$~~
Node 2 Food Market	Food and beverage retail (restaurants, cafes)	*556.75*	**655**	*753.25*	$kgCO_2e/m^2$
Node 2 The Market (Circulation & Landscape)	Food and beverage retail (restaurants, cafes)	*556.75*	**655**	*753.25*	$kgCO_2e/m^2$
Gate 1 Payline	Public Assembly	*364.65*	**429**	*493.35*	$kgCO_2e/m^2$
Gate 2 Payline	Public Assembly	*364.65*	**429**	*493.35*	$kgCO_2e/m^2$
Node 2 3 Bridge link	Bridges and structures	*1,419.075*	**1,669.5**	*1,1919.925*	$kgCO_2e/m^2$
Back of House: Gate 1	Other/ industrial/ utilities / specialist uses	*463.25*	**545**	*626.75*	$kgCO_2e/m^2$
Services	Other/ industrial/ utilities / specialist uses	*463.25*	**545**	*626.75*	$kgCO_2e/m^2$
~~City Hall and Operations Building: Gate 1 Node 3~~	~~Low Rise Offices (1-4 storey offices)~~	~~*786.25*~~	~~**925**~~	~~*1063.75*~~	~~$kgCO_2e/m^2$~~
~~Administration Offices: Within Gate 2~~	~~Low Rise Offices (1-4 storey offices)~~	~~*786.25*~~	~~**925**~~	~~*1063.75*~~	~~$kgCO_2e/m^2$~~
~~Wardrobe and Employee Services~~	~~Gate 1 Payline~~	~~*Public Assembly*~~	~~**364.65**~~	~~*429*~~	~~493.35~~
~~Wardrobe and Employee Services: Within Gate 1~~	~~Public Assembly~~	~~*364.65*~~	~~**429**~~	~~*493.35*~~	~~$kgCO_2e/m^2$~~
~~Wardrobe and Employee Services: Within Gate 2~~	~~Public Assembly~~	~~*364.65*~~	~~**429**~~	~~*493.35*~~	~~$kgCO_2e/m^2$~~
~~Central Kitchen and Food Warehouse~~	~~Large light industrial/ factory units~~	~~*442*~~	~~**520**~~	~~*598*~~	~~$kgCO_2e/m^2$~~
~~Staff Canteen and Kitchen: BoH1~~	~~Food and beverage retail (restaurants, cafes)~~	~~*556.75*~~	~~**655**~~	~~*753.25*~~	~~$kgCO_2e/m^2$~~
~~Staff Canteen and Kitchen: Gate 1~~	~~Food and beverage retail (restaurants, cafes)~~	~~*556.75*~~	~~**655**~~	~~*753.25*~~	~~$kgCO_2e/m^2$~~
~~Staff Canteen and Kitchen: Gate 2~~	~~Food and beverage retail (restaurants, cafes)~~	~~*556.75*~~	~~**655**~~	~~*753.25*~~	~~$kgCO_2e/m^2$~~
	~~Warehousing/ logistics~~	~~*348.5*~~	~~**410**~~	~~*471.5*~~	~~$kgCO_2e/m^2$~~
~~Services~~	~~Warehousing/ logistics~~	~~*348.5*~~	~~**410**~~	~~*471.5*~~	~~$kgCO_2e/m^2$~~
~~Medical Centre~~	~~Health centre/ surgery~~	~~*522.75*~~	~~**615**~~	~~*707.25*~~	~~$kgCO_2e/m^2$~~
~~Security and Crisis Control Centre (SCCC): Node 3~~	~~Low Rise Offices (1-4 storey offices)~~	~~*786.25*~~	~~**925**~~	~~*1063.75*~~	~~$kgCO_2e/m^2$~~
Fire Station	Emergency services	*824.5*	**970**	*1115.5*	$kgCO_2e/m^2$
Helipad	Highways	*3,604*	**4,240**	*4,876*	$kgCO_2e/m^2$

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Schedule typologies	Embodied carbon benchmarks (RICS, 2012)	*Low*	Medium	*High*	Unit
		-15%~~Buro Happold's past project experience (15% reduction)~~	RICS (2012) and WRAP (2017) benchmarks	*+15%*	
~~Maintenance Building and Vehicle Maintenance: BoH1~~	~~Other/ industrial/ utilities / specialist uses~~	*~~463.25~~*	**~~545~~**	*~~626.75~~*	~~$kgCO_2e/m^2$~~
~~Landscape Services: Within Gate 1~~	~~Warehousing/ logistics~~	*~~348.5~~*	**~~410~~**	*~~471.5~~*	~~$kgCO_2e/m^2$~~
~~Landscape Services: Within Gate 2~~	~~Warehousing/ logistics~~	*~~348.5~~*	**~~410~~**	*~~471.5~~*	~~$kgCO_2e/m^2$~~
~~Warehouse and Storage: BoH~~	~~Warehousing/ logistics~~	*~~348.5~~*	**~~410~~**	*~~471.5~~*	~~$kgCO_2e/m^2$~~
~~Warehouse and Storage: Park Adjacent~~	~~Warehousing/ logistics~~	*~~348.5~~*	**~~410~~**	*~~471.5~~*	~~$kgCO_2e/m^2$~~
~~Main Security Control and Crisis Room~~	~~Low Rise Offices (1-4 storey offices)~~	*~~786.25~~*	**~~925~~**	*~~1063.75~~*	~~$kgCO_2e/m^2$~~
~~Warehouse and Storage: Gate 1~~	~~Warehousing/ logistics~~	*~~348.5~~*	**~~410~~**	*~~471.5~~*	~~$kgCO_2e/m^2$~~
~~Warehouse and Storage: Gate 2~~	~~Warehousing/ logistics~~	*~~348.5~~*	**~~410~~**	*~~471.5~~*	~~$kgCO_2e/m^2$~~
Waste Recycling Centre	Depot/ open storage	*348.5*	**410**	*471.5*	$kgCO_2e/m^2$
~~Tilbury Logistics Centre~~	~~Warehousing/ logistics~~	*~~348.5~~*	**~~410~~**	*~~471.5~~*	~~$kgCO_2e/m^2$~~
Water Treatment Facility	Other/ industrial/ utilities / specialist uses	*463.25*	**545**	*626.75*	$kgCO_2e/m^2$
Energy centre	Other/ industrial/ utilities / specialist uses	*463.25*	**545**	*626.75*	$kgCO_2e/m^2$
BoH sports ground	Sports/leisure centre (no swimming pool)	*769.25*	**905**	*1,040.75*	$kgCO_2e/m^2$
BoH Bamber Pitt	Warehousing/logistics	*348.5*	**410**	*471.5*	$kgCO_2e/m^2$
Freestanding retail pavilions	Highstreet/District retail centre	*637.5*	**750**	*862.5*	$kgCO_2e/m^2$
Back of House: Gate 2	Other/ industrial/ utilities / specialist uses	*463.25*	**545**	*626.75*	$kgCO_2e/m^2$
~~Grey Water Recycling Centre and Pump Room~~	~~Other/ industrial/ utilities / specialist uses~~	*~~463.25~~*	**~~545~~**	*~~626.75~~*	~~$kgCO_2e/m^2$~~
~~RNLI Lifeboat Station~~	~~Communal dwelling (nursing home, hall of residence)~~	*~~450.5~~*	**~~530~~**	*~~609.5~~*	~~$kgCO_2e/m^2$~~

Table 4~~Table 4~~ summarises the hard landscaping embodied carbon assumptions made for the Proposed Development.

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Table 4 Hard landscaping embodied carbon assumptions

Hard landscaping area (m2)	Carbon factor (Green Guide - Asphalt (85mm) over prepared sub-base) (kgco2/m2)	Carbon (kgco2e)	Carbon (tco2e)
344,780	45	15,515,100	15,515

Table 5~~Table 5~~ provides a summary of assumptions made for the transport, construction, use and demolition embodied carbon stages.

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Table 5 Transport, construction, use and demolition embodied carbon benchmarks.

	Year	Low~~Low~~	~~Medium~~Medium	~~High~~High	Unit	Reference
Construction Processes (A5)	0	~~13,000 14,000~~30.34 ~~15,000~~			$kgCO_2$/~~£M Project Value~~m2 (GFA)	OneClick LCA Average site impacts - temperate climate (North)~~BRE SMARTWaste KPI from RICS 2017 draft professional statement~~
Construction Transport (A4)	0	2%~~2,441~~	~~2,910~~4%	~~3,379~~6%	% of Product Stage (A1-A3) embodied carbon~~$kgCO_2$/£M Project Value~~	Approximated from ~~BH past project monitored data~~LETI Embodied Carbon Primer (2020) Fig 5.2
In-Use, including maintenance, repair, refurbishment and replacement (B1-B5)	15 onwards	30%	45%	60%	% of Product Stage (A1-A3) embodied carbon	Medium scenario is based on typical whole life carbon split for a commercial office building (LETI Embodied Carbon Primer, 2020).
End-of-life, including demolition (C1-C4)	0 and end of life	6%~~3~~	~~3.5~~6%	~~4~~6%	% of Product Stage (A1-A3) embodied carbon~~$kgCO_2$/£m~~	Approximated from LETI Embodied Carbon Primer (2020) Fig 5.2~~RICS 2017 draft professional statement~~

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Land use change assumptions and inputs

Table 6~~Table 6~~ provides a summary of the land use change assumptions made for the baseline scenario.

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Table 6 Land use change inputs and assumptions for the baseline scenario

Habitat type	Area (hectares)	Carbon factor (tco2/hectare/yr)	Carbon sequestration (tco2/yr)
Urban - amenity grassland	4	1.025	4.10
Cropland - cereal crops	0.16	-2.47	-0.40
Urban - development land, sealed surface	97.03	0	0
Grassland - floodplain wetland mosaic (CFGM)	13.88	2	27.76
Intertidal sediment - Littoral mud	9.6	2	19.2
Grassland - lowland calcareous grassland	1.03	1.025	1.06
Grassland - lowland calcareous grassland	1.74	1.025	1.78
Grassland - lowland calcareous grassland	3.68	1.025	3.77
Woodland and forest - lowland mixed deciduous woodland	20.27	6	121.62
Heathland and scrub - mixed scrub	96.65	2	193.30
Grassland - modified grassland	12.57	1.025	12.88
Grassland - modified grassland	64.37	1.025	65.98
Grassland - modified grassland	0.45	1.025	0.46
Urban - open mosaic habitats on previously developed land	10.23	2	20.46
Grassland - other neutral grassland	1.97	1.025	2.02
Woodland and forest - other woodland, broadleaf	4.35	6	26.10
Lakes - ponds (non-priority habitat)	1.57	0	0
Lakes - ponds (priority habitat)	6.65	0	0
Wetland - reedbeds	30.86	2	61.72
Sparsely vegetated land - ruderal/ephemeral	0.73	1.025	0.75
Coastal saltmarsh – saltmarshes and saline reedbeds	8.43	2	16.86
Urban - vacant/derelict land/bare ground	7.32	0	0

Table 7~~Table 7~~ provides a summary of the land use change inputs relating to habitat creation for the Proposed Development.

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Table 7 Land use change inputs relating to habitat creation for the Proposed Development

Habitat type	Area (hectares)	Carbon factor (tco2/hectare/yr)	Carbon sequestration (tco2/yr)
Urban - brown roof	1.33	1.025	1.36
Urban - developed land; sealed surface	82.73	0	0
Urban - extensive green roof	2.06	1.025	2.11
Urban - amenity grassland	40	1.025	41
Heathland and shrub - mixed scrub	8.14	2	16.28
Grassland - modified grassland	0.03	1.025	0.03
Urban - open mosaic habitats on previously developed land	1	2	2
Grassland - other neutral grassland	14.38	1.025	14.74
Woodland and forest - other woodland; broadleaved	3.88	6	23.28
Lakes - ponds (non-priority habitat)	1.02	0	0
Wetland - reedbeds	7.53	2	15.06
Coastal saltmarshes and saline reedbeds	3	2	6
Lakes - temporary lakes, ponds and pools	0.35	0	0
Urban - vacant/ derelict land/ bare ground	0.79	0	0

Table 8~~Table 8~~ provides a summary of the land use change inputs relating to habitat enhancement for the Proposed Development.

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Table 8 Land use change inputs relating to habitat enhancement for the Proposed Development

Habitat type	Area (hectares)	Carbon factor (tco2/hectare/yr)	Carbon sequestration (tco2/yr)
Grassland - lowland calcareous grassland	0.06	1.025	0.06
Grassland - lowland calcareous grassland	0.02	1.025	0.02
Heathland and scrub - mixed scrub	28.26	2	56.52
Grassland - modified grassland	2.81	1.025	2.88
Grassland - modified grassland	13.77	1.025	14.11
Urban - open mosaic habitats on previously developed land	0.03	2	0.06
Lakes - ponds (priority habitat)	0.07	0	0
Wetland - reedbeds	17.01	2	34.02
Coastal saltmarsh - marshes and saline reedbeds	7.07	5.54	39.17

Operational energy GHG emission calculation inputs

For operational energy calculations, refer to the Energy Strategy (Appendix 20.3).

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Operational transport emissions assumptions and inputs

Table 9~~Table 9~~ provides a summary of the inputs and assumptions that were made when calculating GHG emissions from baseline car journeys. The 'average car' 'petrol' carbon factor was selected as the worst-case scenario from the BEIS carbon factors. A distance of 31.87km was used as this is the average distance for business trips by car according to the Department for Transport National Travel Survey 2019.

Table 9 Inputs for baseline transport emissions associated with car journeys

	Trips	Distance (km)	Total distance (km)	GHG emissions factor (kg co2e/km)	GHG emissions (kg co2e)	GHG emissions (t co2e)
Arrivals	777,632	31.87	24,783,138	0.1734	4,297,396	4,297
Departures	759,467	31.87	24,204,222	0.1734	4,197,012	4,197

Table 10~~Table 10~~ provides a summary of the inputs and assumptions that were made when calculating GHG emissions from baseline OVG journeys. The 50% laden diesel truck carbon factor was selected from the BEIS carbon factors. A distance of 180km was used as this is the furthest distance for the south east region, therefore representing a reasonable average distance travelled.

Table 10 Inputs for baseline transport emissions associated with OGV journeys

	Trips	Distance (km)	Total distance (km)	GHG emissions factor (kg co2e/km)	GHG emissions (kg co2e)	GHG emissions (t co2e)
Arrivals	65,524	180	11,794,232	0.8302	9,791,572	9,792
Departures	61,631	180	11,093,585	0.8302	9,209,894	9,210

Table 11~~Table 11~~ provides a summary of the inputs and assumptions that were made when calculating GHG emissions from car journeys for the Proposed Development. The 'average car' 'petrol' carbon factor was selected as the worst-case scenario from the BEIS carbon factors. Distances and trip numbers were provided by the transport consultants.

Table 11 Inputs for operational transport emissions associated with car journeys for the Proposed Development

2025				
Arrivals	**Departures**	**Total distance (km)**	**GHG emissions factor (kg CO2e/km)**	**GHG emissions (kg CO2e)**
1,683,141	1,683,141	235,590,596	0.1743	41,063,441
2029				
Arrivals	**Departures**	**Total distance (km)**	**GHG emissions factor (kg CO2e/km)**	**GHG emissions (kg CO2e)**
2,363,383	2,363,383	368,073,037	0.1743	64,155,130
2038				
Arrivals	**Departures**	**Total distance (km)**	**GHG emissions factor (kg co2e/km)**	**GHG emissions (kg CO2e)**
3,333,627	3,333,627	496,256,431	0.1743	86,497,496

Table 12~~Table 12~~ provides a summary of the inputs and assumptions that were made when calculating GHG emissions from baseline coach journeys for the Proposed Development. The 'coach' carbon factor was selected from the BEIS carbon factors. The number of passengers is based on the typical size of a coach, taken from Johnsons Coaches.

Table 12 Inputs for operational transport emissions associated with coach journeys for the Proposed Development

2025						
	Trips	**Total distance (km)**	**GHG emissions factor (passenger.km)**	**Coach typical capacity**	**Emissions factor (by vehicle)**	**GHG emissions (kg CO2e)**
Arrivals	36,500	7,701,500	0.02732	49	1.33868	10,309,844
Departures	36,500	7,701,500	0.02732	49	1.33868	10,309,844
2029						
	Trips	**Total distance (km)**	**GHG emissions factor (passenger.km)**	**Coach typical capacity**	**Emissions factor (by vehicle)**	**GHG emissions (kg CO2e)**
Arrivals	36,500	7,701,500	0.02732	49	1.33868	10,309,844
Departures	36,500	7,701,500	0.02732	49	1.33868	10,309,844
2038						
	Trips	**Total distance (km)**	**GHG emissions factor (passenger.km)**	**Coach typical capacity**	**Emissions factor (by vehicle)**	**GHG emissions (kg CO2e)**
Arrivals	36,500	7,701,500	0.02732	49	1.33868	10,309,844
Departures	36,500	7,701,500	0.02732	49	1.33868	10,309,844

15.1.2 Table 13~~Table 13~~ provides a summary of the inputs and assumptions that were made when calculating GHG emissions from the electric shuttle bus for the Proposed Development. Due to the fact that there isn't a BEIS emissions factor available for electric buses, the emissions factor for electric van 'class III (1.74 to 3.5 tonnes) has been used as the closest alternative.

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Table 13 Inputs for operational transport emissions associated with the electric shuttle bus for the Proposed Development

2025							
	Frequency/ hour (85th percentile day)	**Operating hours (8am-11pm)**	**Total journeys**	**Distance per journey (km)**	**Total distance (km)**	**Emissions Factor for Class III Electric Van (kg CO2e/ passenger.km)**	**GHG emissions (kgCO2e)**
Ebbsfleet station	9	15	135	1.5	203	0.07755	15.70
Ferry terminal (south of river)	6	15	90	0.8	72	0.07755	5.58
Total							21
2029							
	Frequency/ hour (85th percentile day)	**Operating hours (8am-11pm)**	**Total journeys**	**Distance per journey (km)**	**Total distance (km)**	**Emissions Factor for Class III Electric Van (kg CO2e/ passenger.km)**	**GHG emissions (kgCO2e)**
Ebbsfleet station	11	15	165	1.5	248	0.07755	19.19
Ferry terminal (south of river)	8	15	120	0.8	96	0.07755	7.44
Total							27
2038							
	Frequency/ hour (85th percentile day)	**Operating hours (8am-11pm)**	**Total journeys**	**Distance per journey (km)**	**Total distance (km)**	**Emissions Factor for Class III Electric Van (kg CO2e/ passenger.km)**	**GHG emissions (kgCO2e)**
Ebbsfleet station	16	15	240	1.5	360	0.07755	27.92
Ferry terminal (south of river)	12	15	180	0.8	144	0.07755	11.17
Total							39

15.1.3 Table 14~~Table 14~~ provides a summary of the inputs and assumptions that were made when calculating GHG emissions from bus journeys for the Proposed Development. The relevant BEIS emissions factor has been applied to the number of trips expected ('average local bus').

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Table 14 Inputs for operational transport emissions associated with bus journeys for the Proposed Development

2025							
	Visitor journeys (85th percentile day)	**Staff journeys (85th percentile day)**	**Total journeys (85th percentile day)**	**Distance to furthest point in region (km)**	**Total distance (km)**	**Average Local Bus carbon factor (kg CO2e/ passenger.km)**	**GHG emissions (kgCO2e)**
Thurrock	87	531	618	45	27,810	0.10312	2,867.77
Bexley	191	171	362	22	7,964	0.10312	821.25
Medway	22	87	109	35	3,815	0.10312	393.40
Dartford	186	1,212	1,398	17	23,766	0.10312	2,450.75
Gravesham	150	1,626	1,776	17	30,192	0.10312	3,113.40
Sevenoaks	23	28	51	65	3,315	0.10312	341.84
Total							9,988
2029							
	Visitor journeys (85th percentile day)	**Staff journeys (85th percentile day)**	**Total journeys (85th percentile day)**	**Distance to furthest point in region (km)**	**Total distance (km)**	**Average Local Bus carbon factor (kg CO2e/ passenger.km)**	**GHG emissions (kgCO2e)**
Thurrock	115	762	877	45	39,465	0.10312	4,069.63
Bexley	251	245	496	22	10,912	0.10312	1,125.25
Medway	29	125	154	35	5,390	0.10312	555.82
Dartford	245	1,739	1,984	17	33,728	0.10312	3,478.03
Gravesham	198	2,332	2,530	17	43,010	0.10312	4,435.19
Sevenoaks	31	40	71	65	4,615	0.10312	475.90
Total							14,140
2038							
	Visitor journeys (85th percentile day)	**Staff journeys (85th percentile day)**	**Total journeys (85th percentile day)**	**Distance to furthest point in region (km)**	**Total distance (km)**	**Average Local Bus carbon factor (kg CO2e/ passenger.km)**	**GHG emissions (kgCO2e)**
Thurrock	173	800	973	45	43,785	0.10312	4,515.11
Bexley	379	257	636	22	13,992	0.10312	1,442.86
Medway	44	131	175	35	6,125	0.10312	631.61
Dartford	370	1,826	2,196	17	37,332	0.10312	3,849.68

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Gravesham	298	2,448	2,746	17	46,682	0.10312	4,813.85
Sevenoaks	46	42	88	65	5,720	0.10312	589.85
Total							15,843

Table 15~~Table 15~~ provides a summary of the inputs and assumptions that were made when calculating GHG emissions from baseline ferry journeys for the Proposed Development. The 'average (all passenger)' ferry carbon factor was selected from the BEIS carbon factors. The number of passengers is based on the typical size of a coach, taken from Thames Clipper website.

Table 15 Inputs for operational transport emissions associated with ferry journeys for the Proposed Development

2025							
		Trips	**Total distance (km)**	**GHG emissions factor (passenger.km)**	**Capacity**	**Emissions factor (by vehicle)**	**GHG emissions (kg CO2e)**
London route	Arrivals	9,855	364,635	0.01874	400	7.49600	2,733,304
	Departures	9,855	364,635	0.01874	400	7.49600	2,733,304
Ride and glide	Arrivals	15,330	85,848	0.01874	400	7.49600	643,517
	Departures	15,330	85,848	0.01874	400	7.49600	643,517
2029							
		Trips	**Total distance (km)**	**GHG emissions factor (passenger.km)**	**Capacity**	**Emissions factor (by vehicle)**	**GHG emissions (kg CO2e)**
London route	Arrivals	9,855	364,635	0.01874	400	7.49600	2,733,304
	Departures	9,855	364,635	0.01874	400	7.49600	2,733,304
Ride and glide	Arrivals	15,330	85,848	0.01874	400	7.49600	643,517
	Departures	15,330	85,848	0.01874	400	7.49600	643,517
2038							
		Trips	**Total distance (km)**	**GHG emissions factor (passenger.km)**	**Capacity**	**Emissions factor (by vehicle)**	**GHG emissions (kg CO2e)**
London route	Arrivals	9,855	364,635	0.01874	400	7.49600	2,733,304
	Departures	9,855	364,635	0.01874	400	7.49600	2,733,304
Ride and glide	Arrivals	15,330	85,848	0.01874	400	7.49600	643,517
	Departures	15,330	85,848	0.01874	400	7.49600	643,517

Table 16~~Table 16~~ provides a summary of the inputs and assumptions that were made when calculating GHG emissions from delivery vehicle journeys for the Proposed Development. The 50% laden diesel truck carbon factor was selected from the BEIS carbon factors.~~The 'average (up to 3.5 tonnes)' van carbon factor was selected from the BEIS carbon factors.~~ The assumed distance for each journey was 180km, the furthest distance from the Proposed Development in the south east region.

Table 16 Inputs for operational transport emissions associated with delivery vehicle journeys for the Proposed Development

Year	**Trips**	**Total distance travelled**	**Emissions factor**	**GHG Emissions (kgco2e)**	**GHG Emissions (tco2e)**
2025	9,447	1,700,400	0.8302~~24710~~	~~420,169~~2,823,344	~~420~~2,823
2029	9,447	1,700,400	0.8302~~24710~~	~~420,169~~2,823,344	~~420~~2,823
2039	9,447	1,700,400	0.8302~~24710~~	~~420,169~~2,823,344	~~420~~2,823

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