PROPERTY

CLIMATE CHANGE

OUR OBJECTIVES

The pace of global heating is increasing, and there is little dispute that action needs to be taken to quickly prevent runaway climate change and the catastrophic impacts that would have on our buildings, communities and wider society.

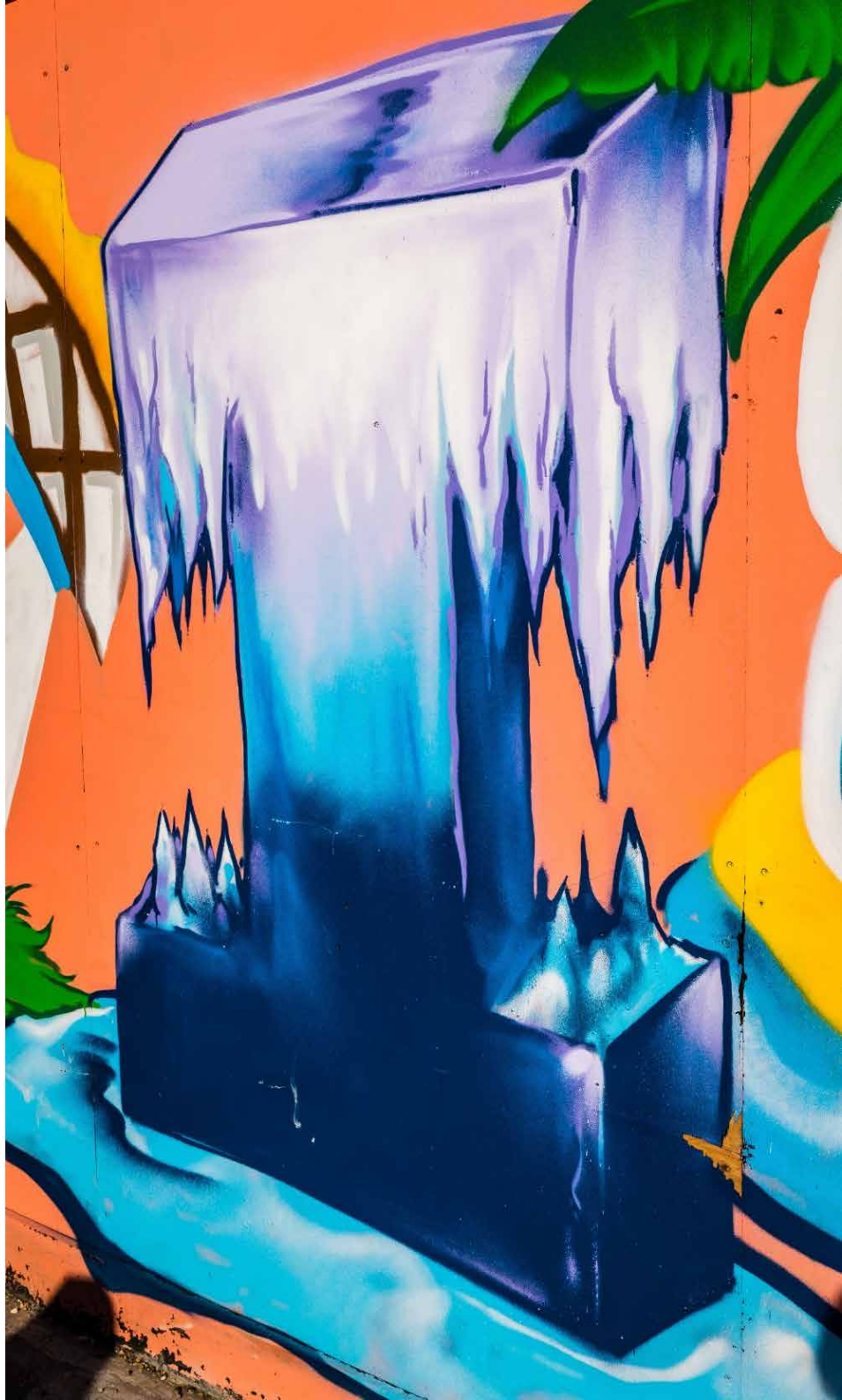
Reducing greenhouse gas (GHG) emissions through design, construction and in operation is therefore a priority for us, as is ensuring our assets are resilient and adaptable to a changing climate.

GHG EMISSIONS

Objective: To reduce GHG emissions across our value chain, through the consideration of emissions during construction, our own operations and the activities of our tenants in our assets, and through the reporting of actual emissions on an annual basis.

RESILIENCE & ADAPTATION

Objective: To ensure our assets and infrastructure are resilient and where necessary, adaptable in the face of a changing climate and potential increases in events such as flooding and overheating.



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CLIMATE CHANGE

GHG EMISSIONS

Our objective is to reduce GHG emissions across our value chain, through the consideration of emissions during construction, our own operations and the activities of our tenants in our assets, and through the reporting of actual emissions on an annual basis.

Over the past couple of years, we have worked with experts to understand the GHG emissions resulting from our developments during construction, and we are continuing to identify ways to reduce our impact during operation with the development of our Pathway to Zero Carbon. Ensuring our energy delivery and carbon strategies remain relevant against a backdrop of a rapidly decarbonising energy system and emerging policy is essential to ensuring that our buildings, systems and infrastructure do not become obsolete or pose climate-related risks during their lifetime.

As a member of the UK Green Building Council (UKGBC), in 2019 we supported the publication of *"Net Zero Caron Buildings: A Framework Definition"* and over the past two years, we have applied it to investigate how our forthcoming building plots at Wembley Park could achieve Net Zero Carbon status through design, procurement, construction and operation.

We have identified key considerations that will help us to reduce the impact of our construction activities on GHG emissions and will continue our work in this area over the coming years. We are working on a Zero Carbon Roadmap which will include a detailed zero-carbon target and trajectory covering construction and operational emissions.

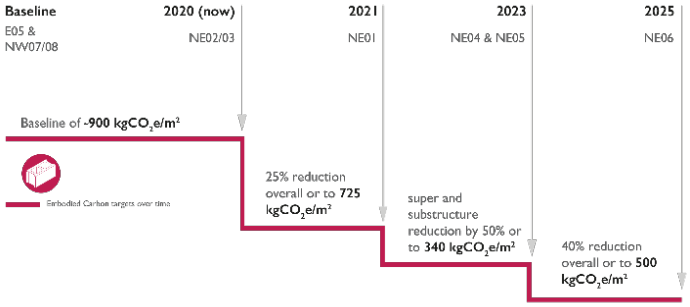
This will then be updated on a regular basis to take into account technological improvements and innovations that we may not have initially considered, in order to progress our path to zero carbon in the most efficient way we can. We have targets on data coverage for accurate GHG emission reporting and on operational and embodied carbon. 90% data coverage by floor area. 500kgCO2e/m2 intensity embodied carbon target for all residential assets by 2025.

Operational targets are still being benchmarked.

EMBODIED EMISSIONS

As we reduce our operational impacts, emissions as a result of our construction activities become proportionally more significant; we have taken steps to understand these impacts and are now working with our design and construction teams to actively reduce them.

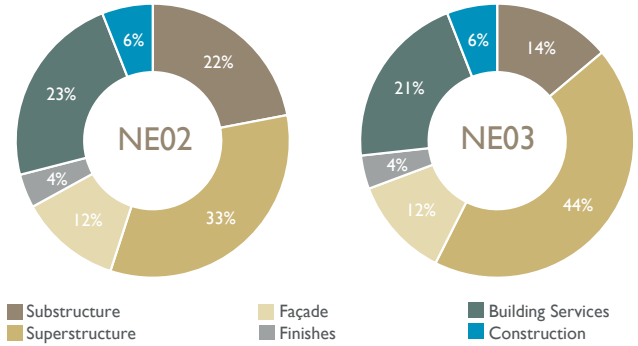
We have carried out an assessment of embodied carbon of our recently completed residential building, NW07/08 Landsby. This was closely followed by an assessment of E05 The Robinson, which was of a slightly different design and at the construction stage. Our assessments are carried out in accordance with guidance from RICS; having a standard industry approach helps when comparing performance and benchmarking, and since the publication of the Professional Statement Whole Life Carbon Assessment for the Built Environment in 2017, this has rapidly become the preferred approach within the sector. As a result of this piece of work and comparison of other industry benchmarks such as those identified by the London Energy Transformation Initiative (LETI), we have developed reduction targets for our future projects in design from late 2021 and are currently working towards achieving these goals. We have also identified a trajectory for the reduction of embodied carbon across our five-year pipeline for our next phase of development at Wembley Park, the North East Lands set out below. e are currently reviewing and optimising designs for our first plots in this phase, NE02 and NE03.



optimising designs for our first plots

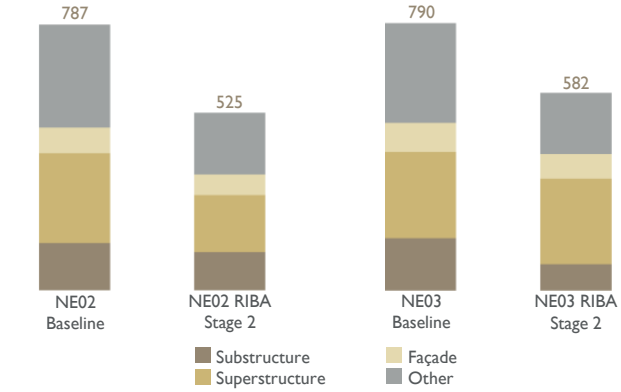
Our GHG Inventory, available on our website, includes an assessment of embodied emissions associated with construction works completed in the reporting year, for each life-cycle stage and for which we have reliable data. However, our current inventory does not yet present the progress we are making in reducing our embodied emissions, as these assets are still to be completed.

RIBA Stage 2 Embodied Carbon by Building Element



RIBA Stage 2 Embodied Carbon Reductions over Baseline

$kgCO_2e/m^2$



EXPLANATORY NOTES:

All GHG emissions are measured in units of carbon dioxide equivalent (CO2e).

OPERATIONAL EMISSIONS

Our most significant operational emissions are as a result of energy consumption in our buildings, both within our operational control, and indirectly as a result of the activities of our tenants.

Although the majority of our assets by Gross Asset Value (GAV) are residential, we operate a wide selection of asset types, including retail, office and leisure. These all have different emission profiles and pose unique challenges in reducing emissions.

BUILDING EMISSION TARGETS

Part L of Building Regulations sets a Dwelling Emission Rate (DER) for residential development and a Building Emission Rate (BER) for non-residential development and we have committed to delivering a minimum 35% improvement over this level across all our developments.

One of our greatest challenges is the disconnect between design and as built performance, a complicated relationship that we are beginning to unpick through improved metering and monitoring.

The 'Performance Gap' is well-known but poorly understood phenomenon that affects the majority of new buildings, where actual consumption can differ significantly from the anticipated performance at design stage, and from the performance stated on an Energy Performance Certificate (EPC).

There are several explanations for this, some of which relate to energy consumption and others that result in differences in emissions. Clearly, differences in energy consumption will also affect overall emissions, so we have set separate targets for the energy performance of our new development which are outlined in our 'Resource Efficiency' section.

EMISSION FACTORS

Whilst gas emission intensities have remained at a similar level over time, the last decade has seen significant decarbonisation of the electricity grid. For reporting purposes, our GHG Data Management Procedures require us to apply the most representative emission factors that are available to us.

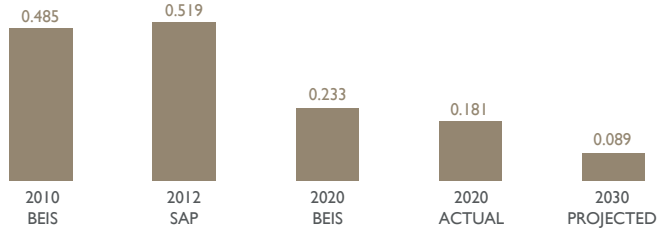
In the absence of real-time emissions data, UK grid electricity and gas emission factors published by the Department for Business, Environment and Industrial Strategy (BEIS) on an annual basis for corporate reporting are widely recognised as the most reliable data source for these emission factors. These figures are updated based on the actual, measured emissions relating to the generation of energy, based on the average UK fuel mix for the year two-years prior (for example, 2020 emission factors are based on actual data from 2018), and are the emission factors that we apply to actual, measured energy consumption in our buildings.

For design purposes, Part L sets out the minimum standards for energy efficiency and GHG emissions for new construction and major refurbishments in the built environment. The calculation procedure adopted applies emission factors that are set in the Standard Assessment Procedure (SAP) methodology, which was last updated in 2012 (based on 2010 data).

Whilst an update to the calculation methodology was expected in 2016, and then in 2020, we are still awaiting an updated assessment procedure, so compliance with Part L and with our planning obligations still uses the 2010 emission factors. This has unintended consequences where technologies are used that either consume or displace electricity; technologies such as gas CHP, which consume gas and displace electricity, are favored when in practice, those savings are not realised.

Different Grid Electricity Carbon Factors

$kgCO_2e/kWh$



In our 'Sustainable Infrastructure' section we discuss in detail the benefits of heat networks, but also some of the constraints we have in generating that heat cleanly; this remains one of our biggest unresolved challenges at Wembley Park, and for many other large developments where infrastructure was planned and agreed several years ago. Our heat networks were designed with gas CHP as the primary heat generation method in order to achieve a minimum 35% improvement over Part L; this method generates both heat and electricity on site, and historically, when grid electricity was generated from less clean sources, this resulted in a significant net CO2e reduction. As the grid has become cleaner, this no longer the case, and within a few years, more CO2e will be emitted than compared, for example, with a conventional gas boiler.

In the short-term, if our energy consumption stays the same, we expect reduced emissions from our electricity supplies, but increased emissions as a result of heat generated via our CHP heat network. This demonstrates the importance of understanding operational emissions over the life of a technology and is something we are now modelling to inform the development of our Pathway to Zero Carbon.

OTHER OPERATIONAL EMISSION SOURCES

In addition to energy use in our buildings, we also consider emissions arising from our Wembley Park estate vehicle fleet, the removal of waste; and the supply and removal of water. These emissions are small compared with energy consumed in our buildings but also represent other environmental impacts.

Furthermore, this year we have increased our reporting to include data on the operations of our tenants. Whilst their emissions are largely dependent on their activities and the efficiency of their operations, there is an element of performance that relates to how our buildings have been designed and constructed, so collecting this data will help us to understand whole-building performance and allow us to improve our ability to benchmark our performance against design data in the future. We have not benchmarked our assets against industry benchmarks in 2020 or 2021 due to COVID restrictions and abnormal usage patterns across all of our asset types, and it is our view that this would not tell us anything useful.

As more data is produced and published specific to 2021 and beyond we will look to retrospectively benchmark our performance to see if this provides any other useful performance insights.

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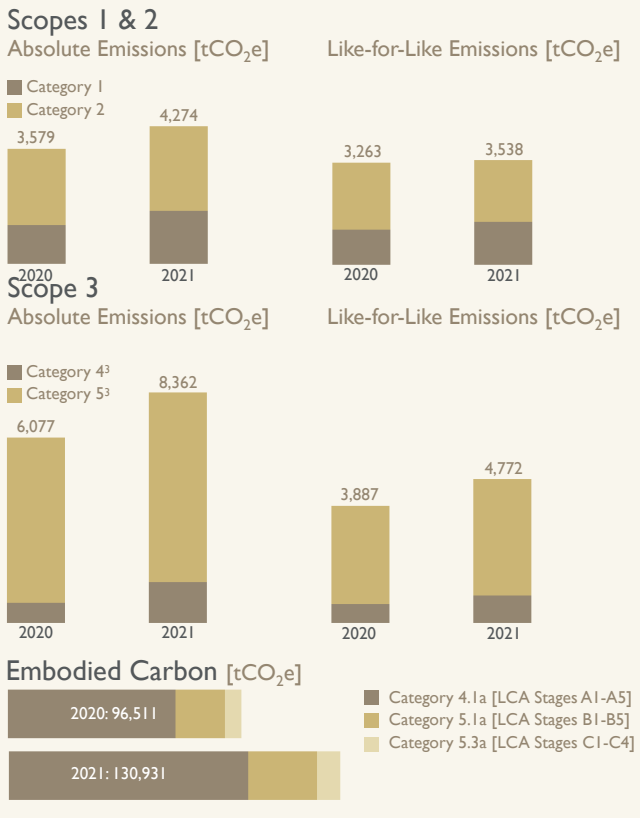
CLIMATE CHANGE

GHG EMISSION REPORTING

Our Sustainability Policy and Objectives commit to achieving performance beyond compliance and minimum requirements, and to measure and disclose ourperformance in a transparent way. Alongside our 2021 Sustainability Report, this 2021 GHG Inventory demonstrates how we are progressing our Climate Change and Resource Efficiency objectives.

Our GHG management procedures reflect our current material emission sources and follow best-practice in relation to data collection, aggregation and monitoring. Our approach follows the principals set out in ISO 14064 and we have sought external verification to ISAE 3410: Assurance engagements on greenhouse gas statements, to ensure that our data is credible and trustworthy. We adopt an 'operational control' approach, whereby our Scope / Category 1 and Scope/ Category 2 emissions reflect emissions that we have a direct operational responsibility for. This includes energy consumption within assets that we either own or operate, on behalf of ourself or others, either directly, or via management companies that we appoint and manage. We also include occupier emissions where these cannot be separated out from total building emissions. Our Scope 3 (Category 3 – 6) emissions include those from activities that are up- and down-stream of our main operations, but over which we have operational influence, or occur as a result of our operational activities. The categories of emissions we report are explored in more detail on the following pages and contained in our GHG Inventory Document available on our website.

2021 GHG SUMMARY

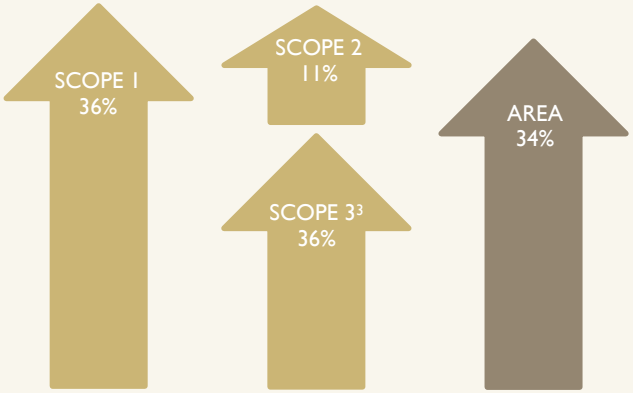


Scope 1 Emissions
1,649 tCO_2e
[2020: 1,216 tCO_2e]

Scope 2 Emissions
2,625 tCO_2e
[2020: 2,363 tCO_2e]

Scope 3 Emissions
139,293 tCO_2e
[2020: 102,588 tCO_2e]

GAV Area[2]
4.92 km^2
[2020: 3.70 km^2]



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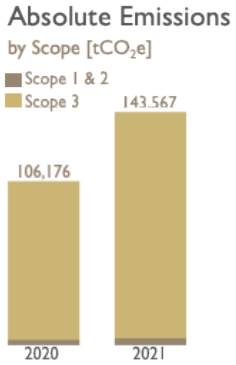
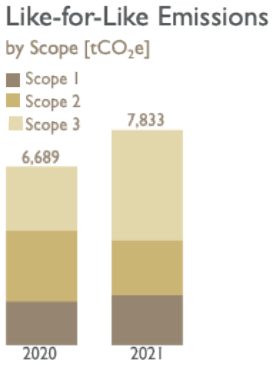
CLIMATE CHANGE

GHG EMISSION REPORTING

We have been measuring our GHG emissions since 2013, this year extending the scope of sources we consider and increasing our data coverage. This will enable us to better understand our direct and indirect impacts on GHG emissions and climate change, supporting the development of reduction targets.

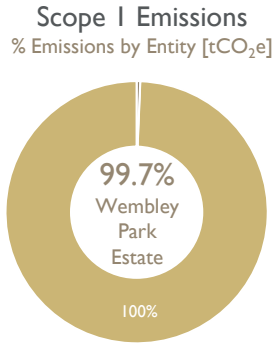
In 2020, we revisited our GHG management procedures to ensure that they reflect our current material emission sources and follow best-practice in relation to data collection, aggregation and monitoring. Our approach follows the principals set out in ISO 14064 and we have sought external verification to ISAE 3410: Assurance engagements on greenhouse gas statements, to ensure that our data is credible and trustworthy. We adopt an 'operational control' approach, whereby our Scope /Category 1 and Scope/ Category 2 emissions reflect emissions that we have a direct operational responsibility for. This includes energy consumption within assets that we either own or operate, on behalf of ourself or others, either directly, or via management companies that we appoint and manage. We also include occupier emissions where these cannot be separated out from total building emissions. Our Scope 3 (Category 3 – 6) emissions include those from activities that are up-and down-stream of our main operations, but over which we have operational influence, or occur as a result of our operational activities. The categories of emissions we report are explored in more detail on the following pages.

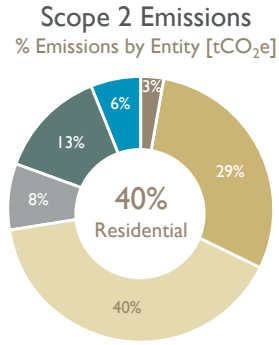


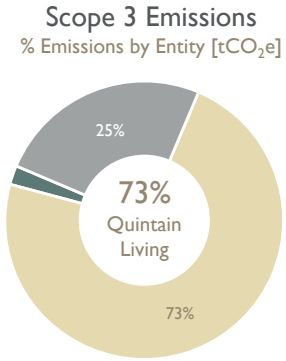


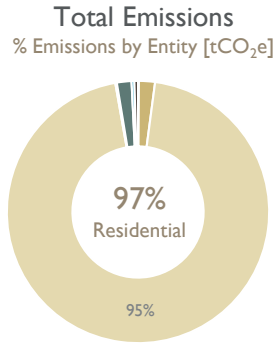
A. Absolute GHG Emissions by Scope and by Entity

	2021				2020 (Restated)[1]			
	Scope 1 [tCO_2e]	Scope 2 [tCO_2e]	Scope 3 [tCO_2e]	Annualised Area m^2	Scope 1 [tCO_2e]	Scope 2 [tCO_2e]	Scope 3 [tCO_2e]	Annualised Area m^2
TOTAL	1,649	2,625	139,293	381,806	1,216	2,363	102,597	381,806
Corporate Offices	5	81	31	2,645	8	89	23	2,645
Wembley Park Estate	1,644	769	581	132,575	1,208	684	329	132,575
Quintain Living	N/A	1,059	101,106	164,714	N/A	742	99,711	164,714
Wembley Park Residential	N/A	208	34,571	13,680	N/A	174	49	13,680
Wembley Park Retail	N/A	341	2,396	44,203	N/A	343	1,939	44,203
Wembley Park Commercial	N/A	168	46	15,814	N/A	331	61	15,814
Wembley Park Leisure	N/A	N/A	562	8,175	N/A	N/A	486	8,175









B. Like for Like GHG Emissions by Scope and by Entity

	2021			2020 (Restated)[1]		
	Scope 1 [tCO_2e]	Scope 2 [tCO_2e]	Scope 3 [tCO_2e]	Scope 1 [tCO_2e]	Scope 2 [tCO_2e]	Scope 3 [tCO_2e]
TOTAL	1,638	1,900	4,295	1,195	2,068	3,426
Corporate Offices	1,638	47	18	0,N/A	54	14
Wembley Park Estate	N/A	630	441	N/A	628	264
Quintain Living	N/A	522	1,719	N/A	549	1,411
Wembley Park Residential	N/A	208	79	N/A	174	48
Wembley Park Retail	N/A	326	1,933	N/A	331	1,628
Wembley Park Commercial	N/A	168	46	N/A	331	61

LfL reduction over 2020

17%

EXPLANATORY NOTES:

2019 and 2020 figures have been restated to reflect adjusted reporting boundaries and include portions of previously missing data. Some previously estimated data has been updated to reflect actual data that has become available since the publication of our Annual Report & Accounts. Annualised Area is a metric used to reflect the partial year operation of assets (for example, where they are completed and become standing assets within the reporting year. This differs depending on the specific GHG emission generating activity, but in the above table represents the total asset area covered by Scope 1, Scope 2 and Scope 3 data.

For full details of the calculation methodology, exclusions, and data sources relating to the data in this table, refer to the Methodology section of the GHG Inventory available on our website.

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BASE-YEAR RECALCULATION

In 2020, we carried out a full evaluation of our base-year emissions and recalculated our base-year taking into account our significant divestments and new emission sources. There have been some minor changes in 2021, mostly reflecting the movement of assets and data between scopes, and where data is available for the first time in 2021 for an asset that was part of the base year GHG Inventory, this has been used to estimate bas-year emissions in accordance with out procedures.

Emissions from our downstream leased assets are now a significant part of our GHG Inventory, where previously they were not measured. The most significant inclusion however is emissions relating to embodied carbon at the three main life-cycle stages.

Table E sets out our original base-year, as well as our adjusted base-year taking into account the factors described above.

We have then provided a direct comparison with our recalculated base-year, taking into account only the assets and emission categories that are included in that total. This results in an 11% increase in Scope 1 emissions; a 44% reduction in Scope 2 emissions; and a 37% reduction in Scope 3 emissions.

The table also breaks down the 2013/14 base-year and the recalculated base-year by GHG Inventory Category to allow a comparison with our 2021 GHG Inventory figures.

DATA QUALITY

All GHG assessments – unless obtained through the direct measurement of gases released at source – are estimates.

The quality of our reporting is determined by the quality of our input data, the treatment of that data, the proportion of the overall data within scope that is available and the level of certainty we have that the activity data and emission factors we are applying are accurate.

Our GHG Policy and Data Management Procedures set out how our data is obtained and treated in order to generate our GHG Inventory, and there are several measures used that provide indications of completeness and data quality.

DATA COVERAGE

To account for missing data, we provide a coverage figure which gives an indication of the percentage of data that we have been able to obtain in each GHG Category based on floor area. Floor area isn't a perfect metric - not all supplies relate to a specific area (for example those that supply the public realm); and floor area is not a reliable indicator for the proportion of activity data and emissions that are missing, but it is the most consistently available data available to us.

Whilst we do estimate some data, this is only in specific circumstances, such as where we are missing a small portion of data across the year and we have sufficiently robust actual data from which to make an educated estimate.

Our target is to continue to improve our data collection to achieve a coverage level of 90% of data by Gross Internal Area across all emission sources. Despite reductions in data coverage for some of our downstream leased assets, our overall coverage has improved across each emission scope in 2021. Our most significant improvement is in the coverage of embodied emissions has increased from 66% of construction completed in 2021 to 89.3% of construction completed in 2021. This reflects our focus on the embodied carbon associated with our residential assets, which form the bulk of construction going forward.

UNCERTAINTY

On completion of the GHG Inventory, an assessment of uncertainty in our GHG Inventory is made by applying an uncertainty interval to each source of activity and emission factor data based on the quality of the data.

Our Methodology section outlines our approach, as well as the sources of activity and emission factor data applied to our GHG Inventory and reported in this report, along with the uncertainty interval applied to that data and the calculation procedure we have adopted that results in the aggregated uncertainty levels in Table F.

Based on the uncertainty estimates, we have also provided an upper and lower limit of potential emissions by emission source, as well as an aggregated total for all emissions.

Note that the more data included in the assessment, the lower the overall uncertainty level becomes; aggregated totals reflect this and are not a sum of the reported sub-category totals.

Our Category 1 emissions are a 'Good' representation of the emissions in this category; gas supplies from national grids show a small level of variation in emissions, and emission factors are therefore generally reliable. Our activity data is also of good quality, the majority based on actual meter reads or apportioned from actual meter reads.

Vehicle emissions are based on fuel card consumption, which is deemed to be of good quality.

Our Category 2 emissions are deemed to be a 'Fair' representation of the emissions in this category; unlike gas from national grids, grid electricity fluctuates significantly depending on when it is consumed, and we do not have that level of granularity on our data, or the actual emissions associated with the electricity we consume.

This is typical of the market, and we do not envisage any improvements on this score in the medium-term, until electricity consumption and associated emissions are reported more accurately by suppliers. In our base-year, there were no heat supplies across our portfolio, in either Category 2 or Category 5.

INSIGHTS

DATA COVERAGE TARGET

Our data coverage target requires that we achieve at least 90% data coverage by Scope by 2025. By obtaining additional Scope 3 data points, we managed to exceed this target in the 2021 reporting year and are now working towards meeting this target across all individual emission categories, whilst maintaining the same high level of existing data collection.

Scope 1	Scope 2	Scope 3
100%	99.6%	92.3%
[2020: 100%]	[2020: 99.1%]	[2020: 85.8%]

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E. Comparison of 2021 GHG Inventory with Base-Year and Recalculated Base-Year by Scope and Entity

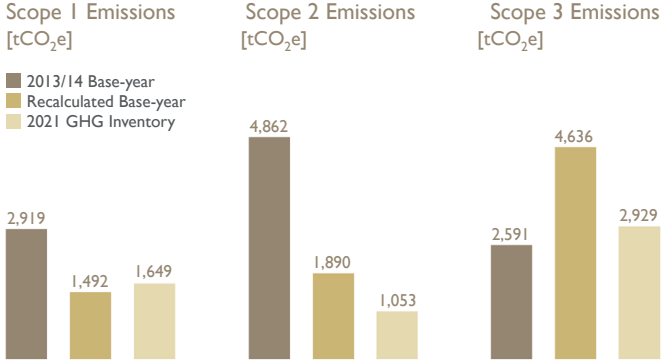
	2013/14 Base-Year			Recalculated Base-Year			2021 Direct Comparison with Base-Year		
	Scope 1 [tCO_2e]	Scope 2 [tCO_2e]	Scope 3 [tCO_2e]	Scope 1 [tCO_2e]	Scope 2 [tCO_2e]	Scope 3 [tCO_2e]	Scope 1 [tCO_2e]	Scope 2 [tCO_2e]	Scope 3 [tCO_2e]
TOTAL	2,919	4,862	2,591	1,492[8]	1,890	4,636	1,649	1,053	2,929
Corporate	40	166	109	21	120	89[9]	5	47	18
Wembley Park Estate	2,078	1,953	863	1,468	1,139	534	1,644	674	541
Quintain Living	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Wembley Park Residential	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2
Wembley Park Retail	N/A	N/A[1]	Not Available	N/A	630	588	N/A	333	1,805
Wembley Park Commercial	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1
Wembley Park Leisure	N/A	N/A	Not Available	N/A	N/A	1,422	N/A	N/A	562
iQ Property Partnership (50%)	547	1,311	233	Removed	Removed	Removed	N/A	N/A	N/A
Other Assets	77	653	1,247	Removed	Removed	Removed	N/A	N/A	N/A
Assets Sold in Reporting Year	177	779	139	Removed	Removed	Removed	N/A	N/A	N/A

F. Uncertainty Analysis & GHG Inventory Base-Year Comparisons by Emission Category

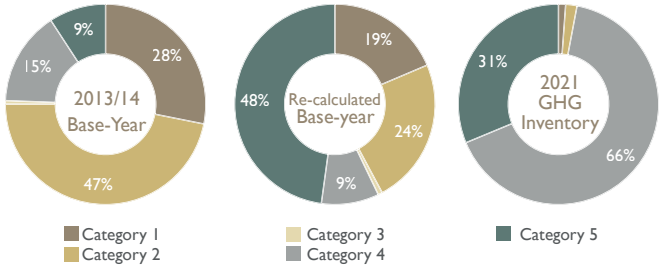
	2013/14 Base-Year	Recalculated Base-Year	2021 GHG Inventory					
	GHG Inventory [tCO_2e]	GHG Inventory [tCO_2e]	GHG Inventory [tCO_2e]	Aggregated Uncertainty	Lower Limit Emissions [tCO_2e]	Upper Limit Emissions [tCO_2e]	Uncertainty Ranking	Coverage %
GHG INVENTORY	10,372	7,962	149,919	+/- 28.6%	106,980	192,858	Fair	93%
CATEGORY 1: DIRECT GHG EMISSIONS	2,919	1,492	1,649	+/- 11.1%	1,465	1,833	Good	100%
1.1 Direct Emissions from Stationary Combustion	2,907	1,476	1,643	+/- 11.2%	1,459	1,827	Good	100%
1.2 Direct Emissions from Mobile Combustion	0	3	6	+/- 15.7%	5	7	Fair	100%
1.4 Direct Fugitive Emissions in Anthropogenic Systems	13	13	N/A	N/A	N/A	N/A	N/A	N/A
CATEGORY 2: INDIRECT GHG EMISSIONS FROM IMPORTED ENERGY	4,862	1,890	2,625	28.9%	1,865	3,384	Fair	99.6%
2.1 Indirect Emissions from Imported Energy - Electricity	4,862	1,890	2,540	29.9%	1781	3,299	Fair	99.6%
2.2 Indirect Emissions from Imported Energy -* Heat	0	0	85	31.6%	58	112	Poor	100%
CATEGORY 3: INDIRECT GHG EMISSIONS FROM TRANSPORTATION	59	56	N/A	N/A	N/A	N/A	N/A	N/A
3.5 Emissions from Business Travel	59	56	N/A	N/A	N/A	N/A	N/A	N/A
CATEGORY 4: INDIRECT GHG EMISSIONS FROM PRODUCTS & SERVICES	1,578	745	94,410	40.7%	55,999	132,821	Poor	96.9%
4.1 Emissions from Purchased Goods & Services[1]	1,290	712	94,398	40.7%	55,987	132,808	Poor	96.4%
4.3 Emissions from the Disposal of Solid and Liquid Waste[2] excludes water	19	33	13	21.2%	10	15	Fair	97.9%
4.4 Emissions from the Use of Assets Leased by the Organisation	268	N/A	N/A	N/A	N/A	N/A	N/A	N/A
CATEGORY 5: INDIRECT EMISSIONS FROM THE USE OF PRODUCTS	954	3,836	44,883	42.5%	25,799	63,967	Poor	89.3%
5.1 Emissions from the Use Stage of the Product[3]	954	0[4]	28,353	60.8%	11,107	45,600	Poor	89.3%
5.2 Emissions from Downstream Leased Assets	N/A	3,836	6,674	18.2%	5,461	7,886	Fair	90.1%
5.3 Emissions from End-of-Life Stage of the Product	N/A	N/A	9,421	85.6%	1,358	17,483	Poor	89.3%

Base-Year Comparison

Total Emissions by GHG Scope



% Total Emissions by GHG Inventory Category



INSIGHTS

OUR CHANGING EMISSION PROFILE

As our business has evolved, so has our emission profile. In our base-year, 2013/14, we owned a broad portfolio of standing assets, located across the UK and in multiple sectors. Over time, we have divested from our non-core operations to focus on the development of Wembley Park. With fewer operational assets, our Scope 1 and Scope 2 emissions reduced dramatically, but are increasing again as more buildings are completed and become standing assets. At the same time our Scope 3 emissions, particularly those in categories 4 and 5 associated with embodied emissions, have increased significantly and are now our predominant emission source.

PROPERTY

CLIMATE CHANGE

RESILIENCE & ADAPTATION

Our objective is to ensure our assets and infrastructure are resilient and where necessary, adaptable in the face of a changing climate and potential increases in events such as flooding and overheating.

Changes to climate and increased weather events linked to climate change in the UK include warmer and wetter winters; hotter and drier summers; and more frequent and intense weather extremes.

RESILIENCE THROUGH DESIGN

Ensuring that our buildings and public realm are resilient in the face of these changes will ensure their longevity and fitness for purpose into the future, so we are planning now for these future scenarios.

In the UK, we can expect warmer and wetter winters; hotter and drier summers; and more frequent and intense weather extremes. This is already having an impact on buildings and infrastructure, so considerations around the materials and methods we use, and the ways in which we design play an integral part in our design process. This will help to reduce our exposure to climate-related financial risks; and for our occupants, will result in a more comfortable environment.

OVERHEATING

All of the UK's ten warmest years on record have occurred since 2002, and heatwaves are now 30 times more likely to happen due to climate change. At the same time, improvements in the insulation of buildings and increased airtightness can mean that during periods of high temperatures, heat is trapped, resulting in overheating.

One of the challenges we have is balancing the need for adequate daylight – which has significant health and wellbeing benefits and is therefore desirable – with allowing in too many solar gains.

Early in the design process, a massing exercise is carried out using award-winning software developed by Buro Happold Engineering. This generates a model that includes all surrounding objects that could contribute to overshadowing the proposed buildings.

A high-level overheating and daylight analysis is then carried out on the massing model, simulating internal daylight and using machine learning algorithms that can predict the overheating risk without detailed modelling; this identifies areas of the façade where it is likely to be challenging to meet overheating and/or daylighting targets, identifying the areas where a specific design response is required. A colour-coded model is produced which highlights areas of the façade which are likely to pose overheating and/ or daylighting challenges, and which allows the design team to make design interventions to reduce the risk of overheating and/or improve daylighting performance.

Measures can include changes to glazing widths and depths; the inclusion and location of balconies to provide shading; the use of special glazing coatings which adjust the quantity of solar gains that are absorbed into the building; and the use of mechanical ventilation with heat recovery to mechanically purge the warm air.

Some of these options have impacts on energy performance, so thermal modelling is also carried out to ensure this also stays within defined parameters.

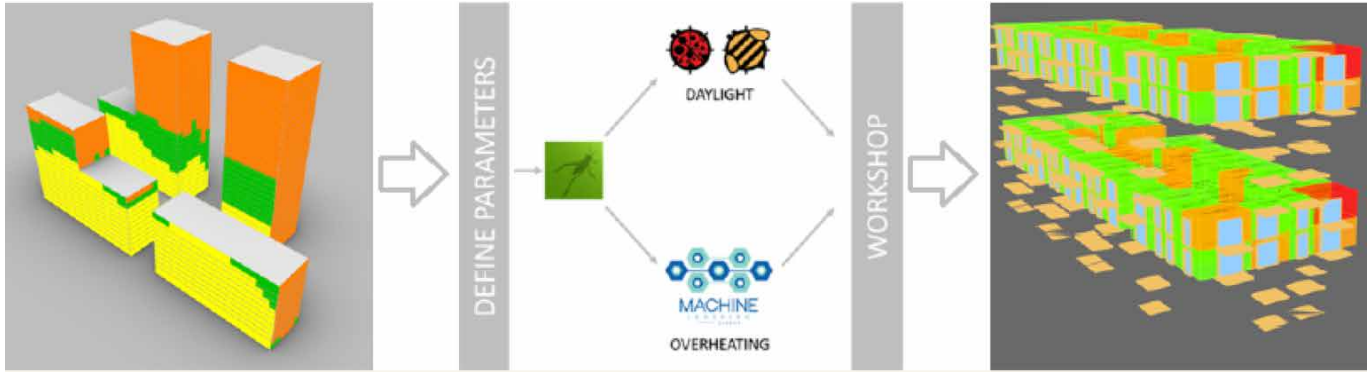
As the design progresses, more detailed analysis is carried out by our design teams, using CIBSE Guide TM52 to ensure that a peak day solar gain of 2.25kWh/m2 is not exceeded.

FLOODING & DROUGHT

Rainfall measurements fluctuate from year to year, but UK climate projections suggest increases in winter rainfall in most parts of the country and significantly drier summers, and although summers will be drier, we can expect less frequent but much more intense summer rainfall, which poses a greater risk of 'flash flooding', because without regular rainfall, the ground becomes dry, and it is then more difficult for rainwater to be absorbed.

Whilst many of the mitigation methods for dealing with severe drought and flooding involve large infrastructure interventions and are outside our scope of influence, we incorporate measures to ensure that our buildings and public realm are not using more water than is necessary and can manage large influxes of rain and stormwater should they occur. Water efficient appliances, drought-resilient planting and natural rainwater and stormwater treatment across our public realm are some of the ways in which we manage this.

Further details of infrastructure measures can be found in the Biodiversity & Natural Capital section of this report.



An assessment optimising daylighting and overheating using parametric analysis and machine learning carried out by our MEP Engineers at Buro Happold for forthcoming Plot NE02