

1.3 Resulting site-wide CO₂ emissions

The Lean, Clean and Green analysis results have been collated in the format required for the planning submission as outlined in the Energy Planning “GLA guidance on preparing energy assessments” (March 2016).

Masterplan CO₂ emissions

Figure 1—2, Table 1-2, Figure 1—3 and Table 1-3 shows that across residential and non-residential elements of the masterplan as a whole, a 38% carbon reduction is expected for domestic and 31% for non-domestic. These figures have been generated using Part L 2013 carbon factors for Phases 1-3 and future carbon factors for the other phases (namely, Part L 2022 for Phase 4-5 and Part L 2025 for Phase 6-12) .

The graph shows the savings from energy efficiency (Be Lean), connection to the ENGIE heat network for phases 1-3 and a site-wide heat network for other phases (Be Clean) as well as solar PV on site (Be Green). It also outlines that the resulting 62% of site wide carbon emissions will need to be offset in line with GLA zero carbon policy.

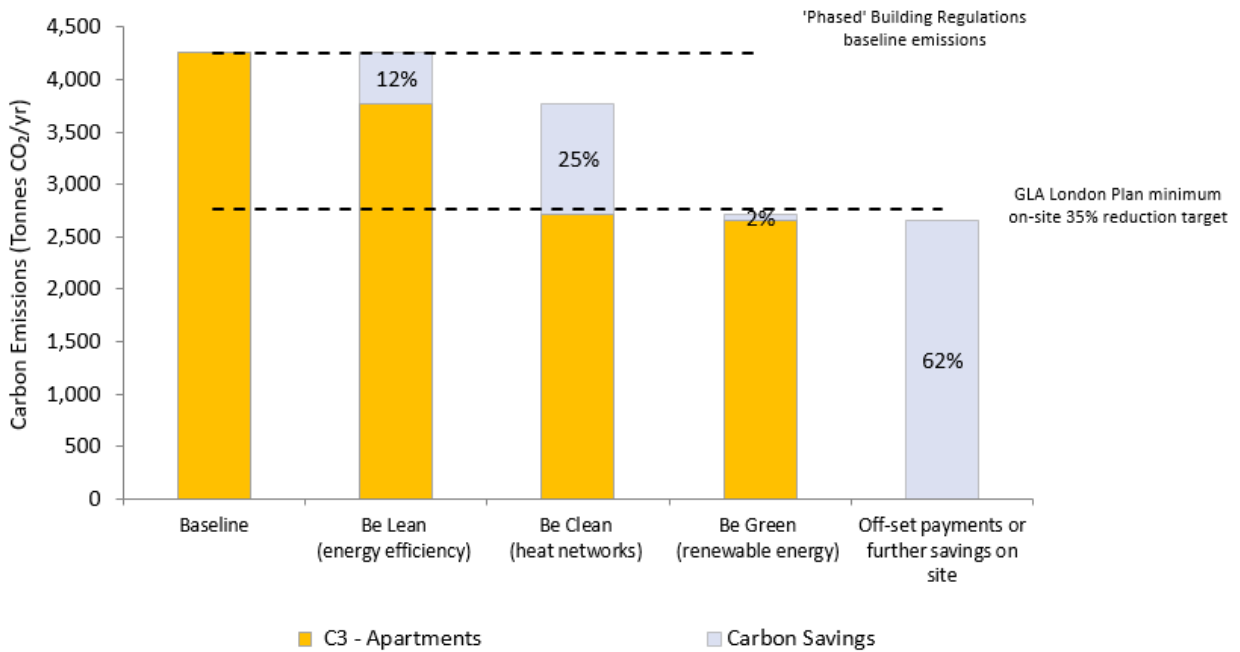


Figure 1—2 Phase 1 & Masterplan Residential carbon emissions through the energy hierarchy using the Part L 2013 for Phase 1 and BRE predicted carbon factors, phased with plot RMAs

Table 1-2 Phase 1 & Masterplan residential CO₂ emissions at each stage of the Energy Hierarchy and offset requirements

	CO ₂ emissions for domestic buildings (Tonnes CO ₂ per annum)	
	Regulated	Unregulated
Baseline: 'Phased' Building Regulations Part L Compliant Development	4,258	3,591
After energy demand reduction	3,764	3,591
After heat network (Heat pumps)	2,719	3,591
After Renewable energy	2,650	3,591
	Regulated CO ₂ savings	
	(Tonnes CO ₂ per annum)	(%)
Savings from energy demand reduction	494	12%
Savings from heat network / CHP / Heat pumps	1,045	25%
Savings from renewable energy	69	2%
Cumulative on site savings	1,608	38%
Annual Savings from off-set payment	2,650	62%
	(Tonnes CO ₂)	Cash-in-lieu contribution
Cumulative savings for off-set payment (30 years)	79,500	£4,769,970

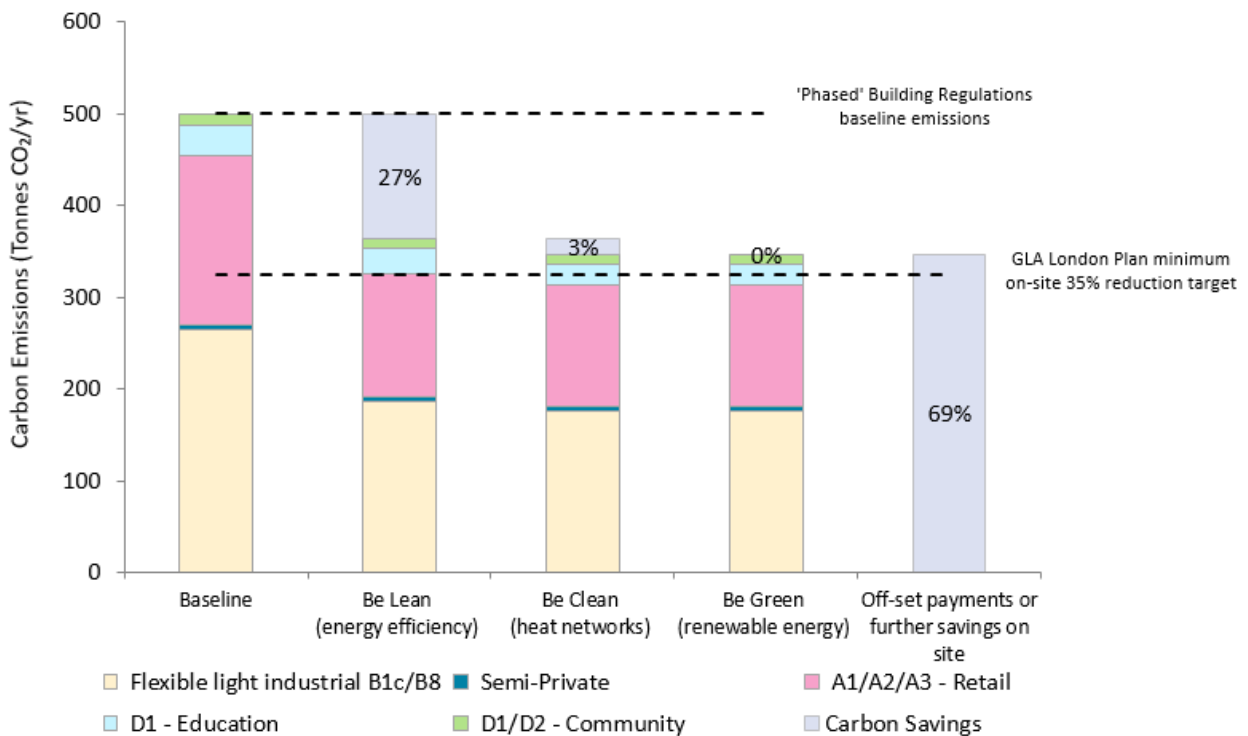


Figure 1—3 Phase 1 & Masterplan non-domestic carbon emissions through the energy hierarchy using the Part L 2013 for Phase 1 and BRE predicted carbon factors, phased with plot RMAs

Table 1-3 Phase 1 & Masterplan non-domestic CO₂ emissions at each stage of the Energy Hierarchy and offset requirements

	CO ₂ emissions for non-domestic buildings (Tonnes CO ₂ per annum)	
	Regulated	Unregulated
Baseline: 'Phased' Building Regulations Part L Compliant Development	500	156
After energy demand reduction	364	156
After heat network (Heat pumps)	347	156
After Renewable energy	347	156
	Regulated CO ₂ savings	
	(Tonnes CO ₂ per annum)	(%)
Savings from energy demand reduction	136	27%
Savings from heat network / CHP / Heat pumps	17	3%
Savings from renewable energy	0	0%
Cumulative on site savings	153	31%
Annual Savings from off-set payment	347	69%
	(Tonnes CO ₂)	Cash-in-lieu contribution
Cumulative savings for off-set payment (30 years)	10,409	£624,537

Table 1-4 Phase 1 & Masterplan domestic and non-domestic CO₂ emissions at each stage of the Energy Hierarchy and offset requirements

	Total regulated emissions (Tonnes CO ₂ /year)	CO ₂ savings (Tonnes CO ₂ /year)	Percentage saving (%)
Baseline	4,759	-	-
Be lean	4,128	631	13%
Be clean	3,066	1,062	22%
Be green	2,997	69	1%
		CO ₂ savings off-set (Tonnes CO ₂)	Cash-in-lieu contribution
Off-Set		89,908	£5,394,507

Figure 1—4 shows a breakdown of the quantum of emissions by carbon factor used and the resulting percentage on-site savings. The later phases of development, present higher percentage on-site savings as the decarbonisation of the electricity grid occurs. This accounts for 36% savings for phases 1-3 using Part L 2013 carbon factors, 34% for phases under 2022 carbon factors and 38% for phases under 2025 carbon factors).

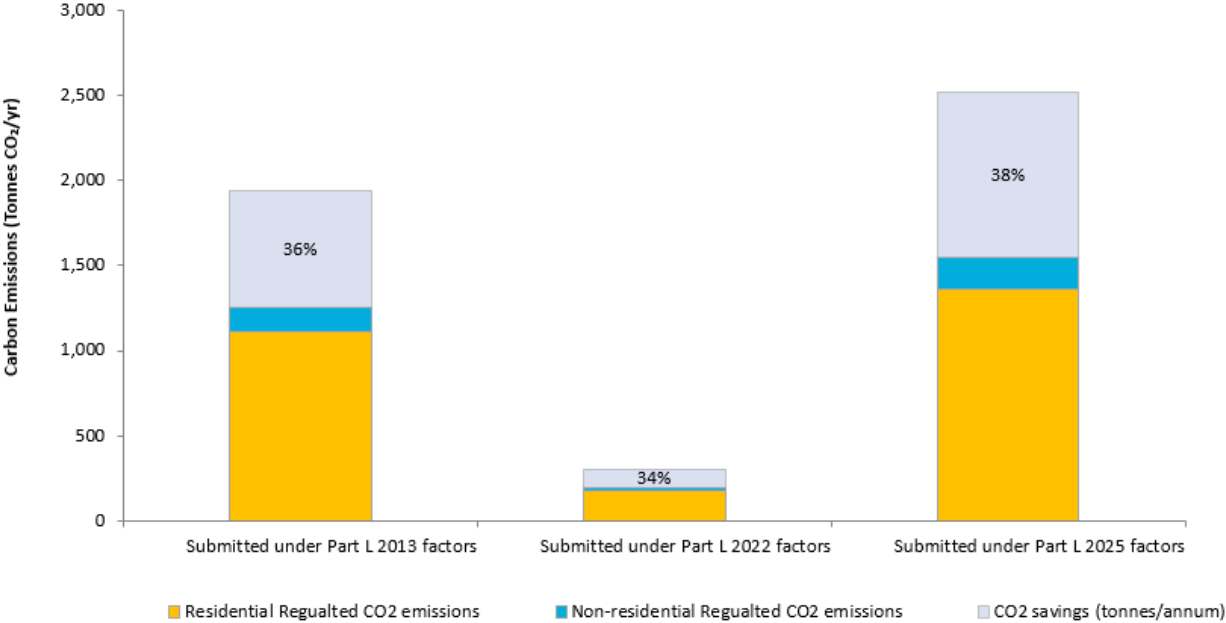


Figure 1—4 Regulated carbon reductions by carbon factor used

This will result overall in a required offset of either ~89,908 tonnes of CO₂ or ~£5,395,000 as a cash in lieu payment as part of the S106 agreement.

Phase 1 (detailed) CO₂ emissions

Figure 1—5 and Table 1-5 shows the carbon savings across residential and non-residential elements for Phase 1 detailed application only. A 39% carbon reduction is expected using Part L 2013 carbon factors.

The graph shows the savings from energy efficiency (Lean), connection to the ENGIE heat network (Clean), as well as solar PV on site (Green). It also outlines that the resulting 61% of carbon emissions will need to be offset in line with GLA zero carbon policy.

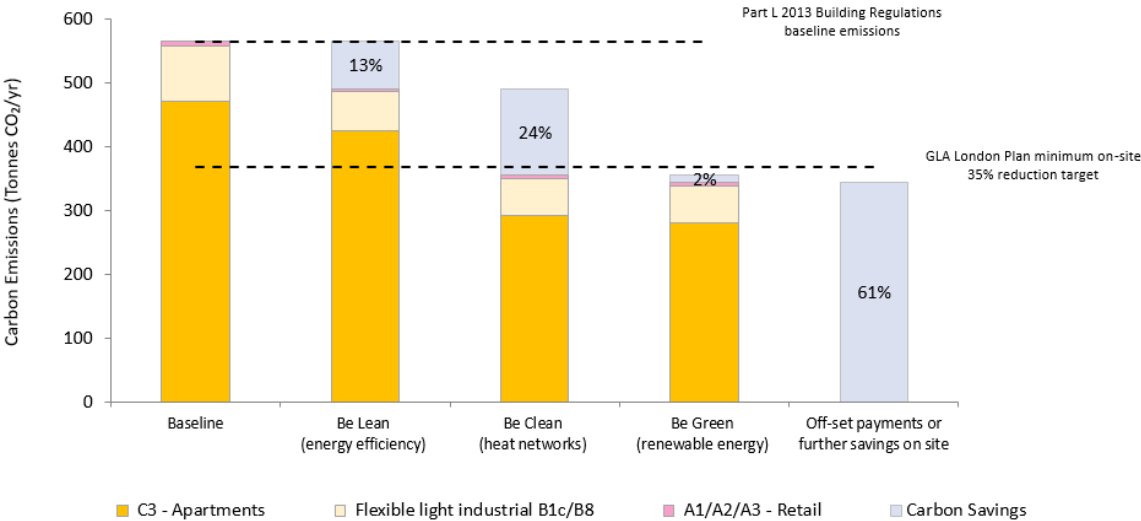


Figure 1—5 Phase 1 detailed carbon emissions through the energy hierarchy using the Part L 2013 for Phase 1 detailed elements

Table 1-5 Phase 1 detailed CO₂ emissions at each stage of the Energy Hierarchy and offset requirements

	CO ₂ emissions for domestic buildings (Tonnes CO ₂ per annum)	
	Regulated	Unregulated
Baseline: 'Phased' Building Regulations Part L Compliant Development	566	601
After energy demand reduction	492	601
After heat network (Heat pumps)	356	601
After Renewable energy	343	601
	Regulated CO ₂ savings	
	(Tonnes CO ₂ per annum)	(%)
Savings from energy demand reduction	74	13%
Savings from heat network / CHP / Heat pumps	135	24%
Savings from renewable energy	13	2%
Cumulative on site savings	223	39%
Annual Savings from off-set payment	343	61%
	(Tonnes CO ₂)	Cash-in-lieu contribution
Cumulative savings for off-set payment (30 years)	10,292	£617,535

As per the GLA guidelines, both Part L 2013 and SAP 10 carbon factors have been shown for the detailed elements. Figure 1—6 shows that the clean and green case do not meet the baseline by ~250 tonnes per annum. As a result of the SAP 10 reduced electricity emission factors, the CHP and gas boiler existing heat network does not show any carbon savings compared to a gas boiler. Therefore as a result it is proposed that Part L 2013 factors are used to judge the carbon emission in order to prioritise connection to the existing heat network.

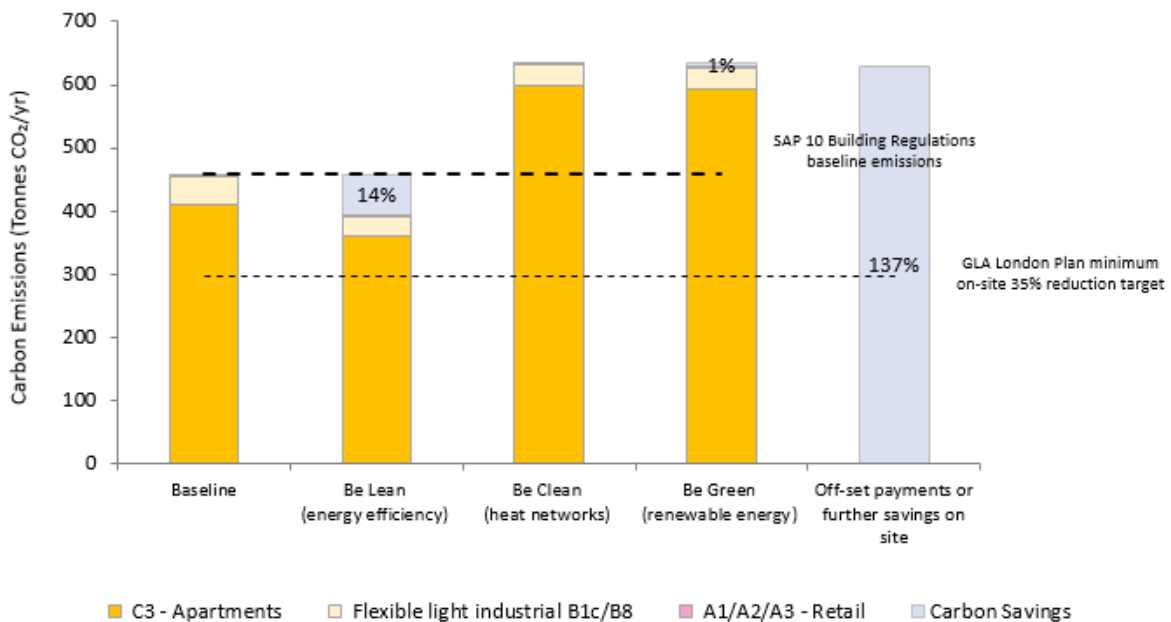


Figure 1—6 Phase 1 detailed carbon emissions through the energy hierarchy using the SAP 10 for Phase 1 detailed elements

1.4 Development planning commitments

The applicant is committed to providing an exemplar sustainable development and has considered all elements of energy and sustainability through the proposal.

This has been highlighted throughout this report, which outlines the energy strategy in line with the GLA energy hierarchy, how overheating risk has been reduced, cooling demands minimised, how BREEAM 'Very Good' will be achieved and other sustainability measures across the masterplan.

The following are headline commitments that the development will achieve with the proposed strategies considering energy and CO₂.

1.4.1 Energy and CO₂

Key energy and CO₂ commitments are as follows:

- Buildings will be specified with high energy efficiency fabric and services measures, thereby reducing the energy demand through passive measures as much as possible within viability;
- 'Reasonable endeavours' will be used to review and connect to the Excel DHN. The technical and commercial details of the connection are yet to be finalised and agreed.
- Future phases outline a transition plan away from CHP-only to a heat pump dominated heat network on-site. It is therefore proposed that the detailed design of the future energy systems and heat provision of the site is a reserved matter for phases 4-12. The energy review panel will review the design and studies required to facilitate long term carbon savings for the site as a whole.
- Site-wide regulated CO₂ emissions will be reduced by at least 35% for residential units and non-residential units as compared to GLA Baseline, using energy efficiency measures, connection to an off-site heat network for phases 1-3 and to an on-site energy centre with heat pumps for phases 4-12, as well as solar PV. A cash-in-lieu payment and/or retrofit schemes identified in the local area will be made to offset the difference between the savings achieved on-site and the target set by the Zero Carbon Homes Policy of the Greater London Authority.
- The design and specification will reduce overheating risk in highest risk areas using the CIBSE Tm59 methodology whilst balancing daylighting and energy demand reduction requirements.
- Non-residential elements will achieve BREEAM 'Very Good' certification under New Construction Shell and Core 2018, with the aspiration of achieving 'Excellent'.

1.4.2 Proposed for review at Reserved Matters Applications

Many matters are reserved within the outline elements of the masterplan design. It is therefore proposed that the following elements are conditioned to be reviewed that the Reserved Matters Applications (RMAs):

1. The level of energy efficiency (% lean reduction) achievable, on a plot by plot basis, against those outlined in Table 7-4. This will consider viability, any updates to Part L regulations and carbon factors in force at the time.
2. The technical feasibility and commercial viability of connection to ENGIE's Excel heat network for Phases 1 to 3 will be undertaken. If a connection is not possible due to technical feasibility or commercial viability, on-site boilers will be provided.

- 2.1 If an ENGIE connection is found to not be feasible or viable, connection to the on-site energy centre, or equivalent, will be reviewed in line with the RMA application for the energy centre.
3. For plots within Phases 4-12 the carbon intensity of delivered heat of will be reviewed. The provision of heat production, associated infrastructure and expected operation of energy systems will be developed in order to provide a carbon intensity do delivered heat of ≤ 0.160 kg CO₂/kWh at the point of use.
 4. Details of the Energy Centre and Site Wide Heat Network including specification, location and design of the building, location of associated infrastructure, timing of delivery and method of connection to the on-site energy centre; and
 5. The Solar PV allocation and output will be reviewed on a plot by plot basis, against those outlined in
 6. Table 9-2. This will consider detailed roof deign including lift overruns, external amenity terraces and plant/servicing requirements.
 7. Identify the levels of anticipated regulated carbon dioxide emissions associated with Phases 2-3 using the calculation methodology described in the document GLA's Energy Assessment Guidance Greater London Authority guidance on preparing energy assessments as part of planning applications (October 2018). Where it is anticipated that any particular Plot is predicted not to achieve levels which are at least 35% below Building Regulations 2010 Approved Document: Conservation of fuel and power L1A and L2A (2013 Edition), it will also be identified how the shortfall in reduction is intended to be made up in later Plots, so as to ensure that such target will be met for the Development as a whole (and for the avoidance of doubt, where Plots reduce the anticipated carbon dioxide emission levels beyond the 35% target this shall be treated as a credit against other Plots);
 - 7.1 Phases 4-12 will be considered the same however using Approved Document: Part L at the time of the RMA application;
 8. The resulting regulated carbon dioxide emissions associated to the plot will be calculated at the time of RMA and be offset through an in lieu payment or through an identified offset scheme within the borough.
 9. The 'Energy Panel' consisting of the Developer, London Borough of Newham, the GLA and the heat network provider will review the energy strategy as it progresses. The panel's role would be to review the energy strategy post occupancy and consider the energy options of future phases with clarity on the grid carbon factors, allowing for the best approach to achieve the delivered heat of ≤ 0.160 kg CO₂/kWh at the point of use. The Panel will convene at each RMA, see Figure 1—7

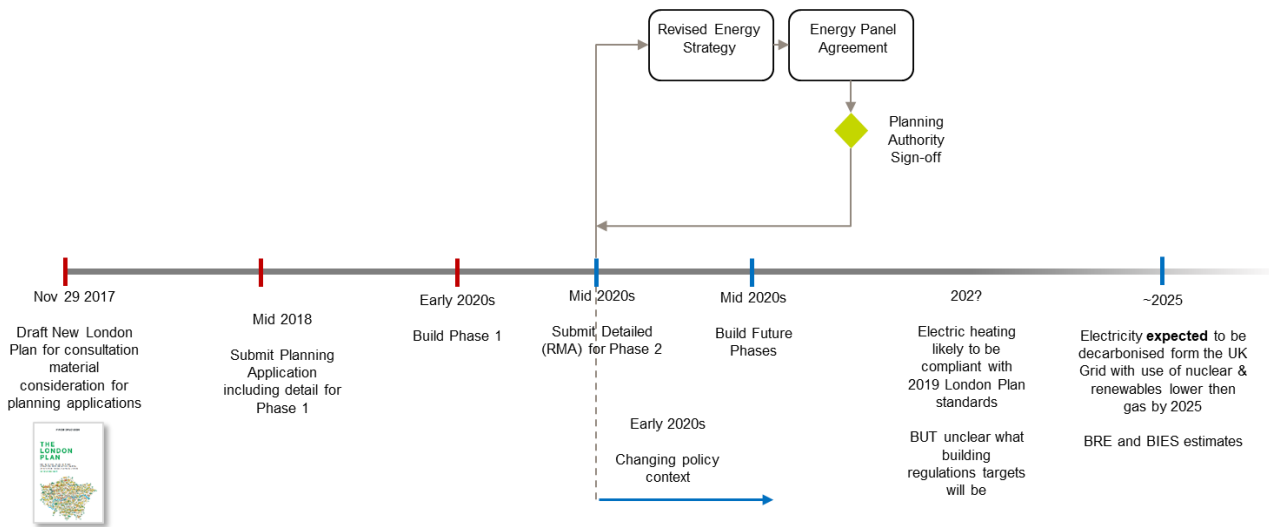


Figure 1—7 Energy review panel proposal process

10. Rentable or commercial floorspace will outline how it aims to achieve a BREEAM 'Very Good' New Construction Shell and Core under the latest BREEAM version, at the time, as a minimum. It will also be outlined if BREEAM 'Excellent' New Construction Shell and Core can be achieved and if so the strategy to do so.
11. Overheating risk will be reviewed and reduced within reasonable bounds, using industry best practice standards (currently CIBSE TM59 methodology and CIBSE TM49 baseline and future weather files) available at the time. Analysis and measures will focusing on areas of high solar gain as identified in Figure 12—10.

2 Introduction

2.1 Development description

This Energy and Sustainability statement has been prepared on behalf of Silvertown Homes Limited and GLA Land and Property (the applicant) in support of a “hybrid planning application”. Phase 1 and the river wall proposals will be submitted in full detailed application and all other phases will be submitted part outline (with all matters reserved). Figure 2—1 shows the location of the proposed plot in the context of the wider area.

Hybrid planning application comprising:

12. Detailed planning application for Phase 1 with works to include: The proposed demolition of existing buildings and structures, the erection of buildings, including tall buildings, comprising: 460 residential Units (Use Class C3), 3,417 sqm (GEA) of flexible employment floorspace (Use Classes B1b, B1c, B2 (restricted) and B8); 162 sqm (GEA) of flexible retail floorspace (Use Classes A1-A4); a new/altered access road from Dock Road/North Woolwich Road; new streets, open spaces, landscaping and public realm; car, motorcycle and bicycle parking spaces and servicing spaces; and other works incidental to the proposed development.
13. Outline planning application (all matters reserved) for the phased delivery of the balance of the site for the proposed demolition of existing buildings and structures; the erection of buildings, including tall buildings, comprising: a new local centre; a primary school (Use Class D1); residential and older person units (Use Class C3); flexible employment floorspace (Use Classes B1b, B1c, B2 (restricted) and B8); flexible employment floorspace (Use Classes B1c, B2 and B8); flexible retail floorspace (Use Classes A1-A4); community and leisure floorspace (Use Classes D1 and D2); the construction of a new flood defence wall and delivery of ecological habitat adjacent to the River Thames and associated infrastructure; streets, open spaces, landscaping and public realm (including new park and SINC improvements); car, motorcycle and bicycle parking spaces and servicing spaces; utilities including energy centre and electricity substations; and other works incidental to the proposed development.

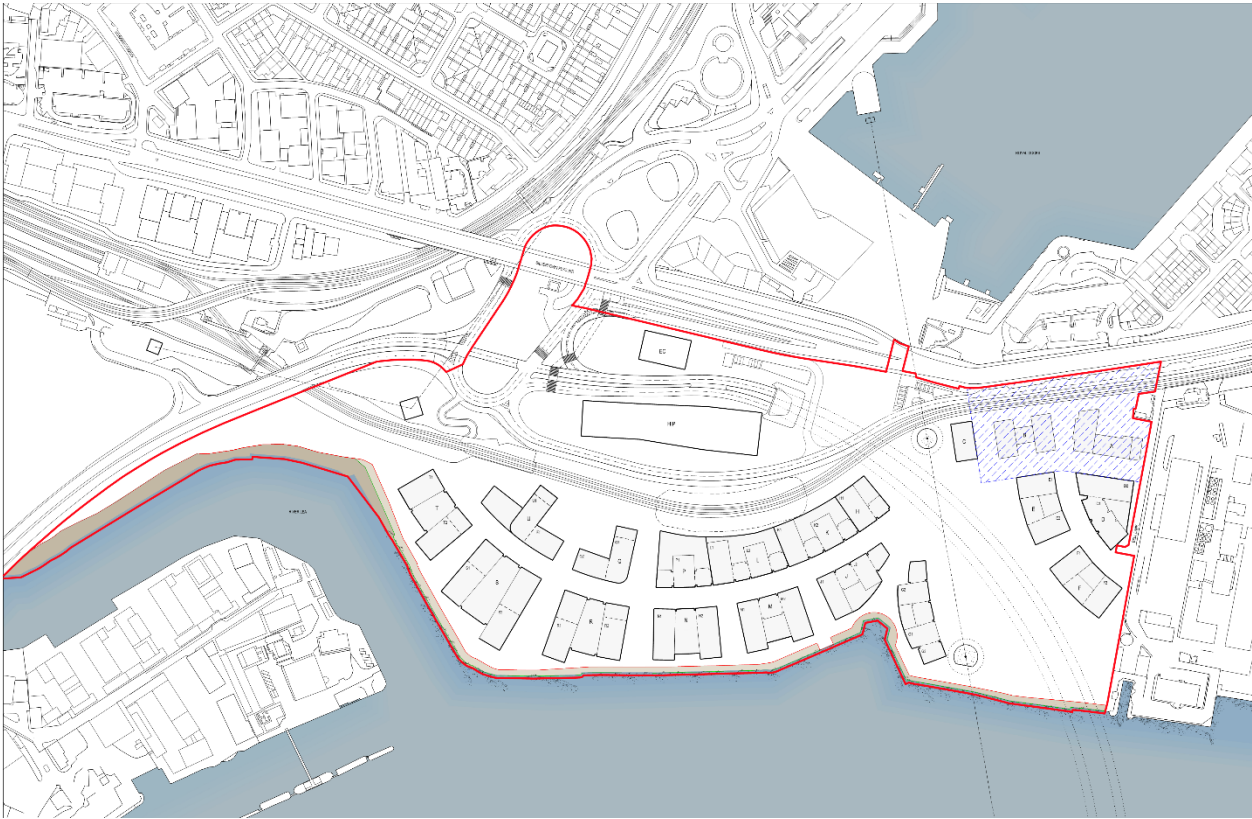


Figure 2—1 The proposed site and red line boundary and the Phase 01 Detailed Application elements

3 Policy requirements

3.1 Overview

Strategic planning in London is a shared responsibility of the Mayor of London, London Boroughs and the Corporation of the City of London. The London Plan is the spatial development strategy for London, produced by the Greater London Authority on behalf of the Mayor of London. Every London Borough Local Plan must be in general conformity with the London Plan. The development is located in the London Borough of Newham and as such is subject to their planning policy and guidance. For sustainability, a key guidance document is the London Borough of Newham Local Plan, as illustrated in Figure 3—1.

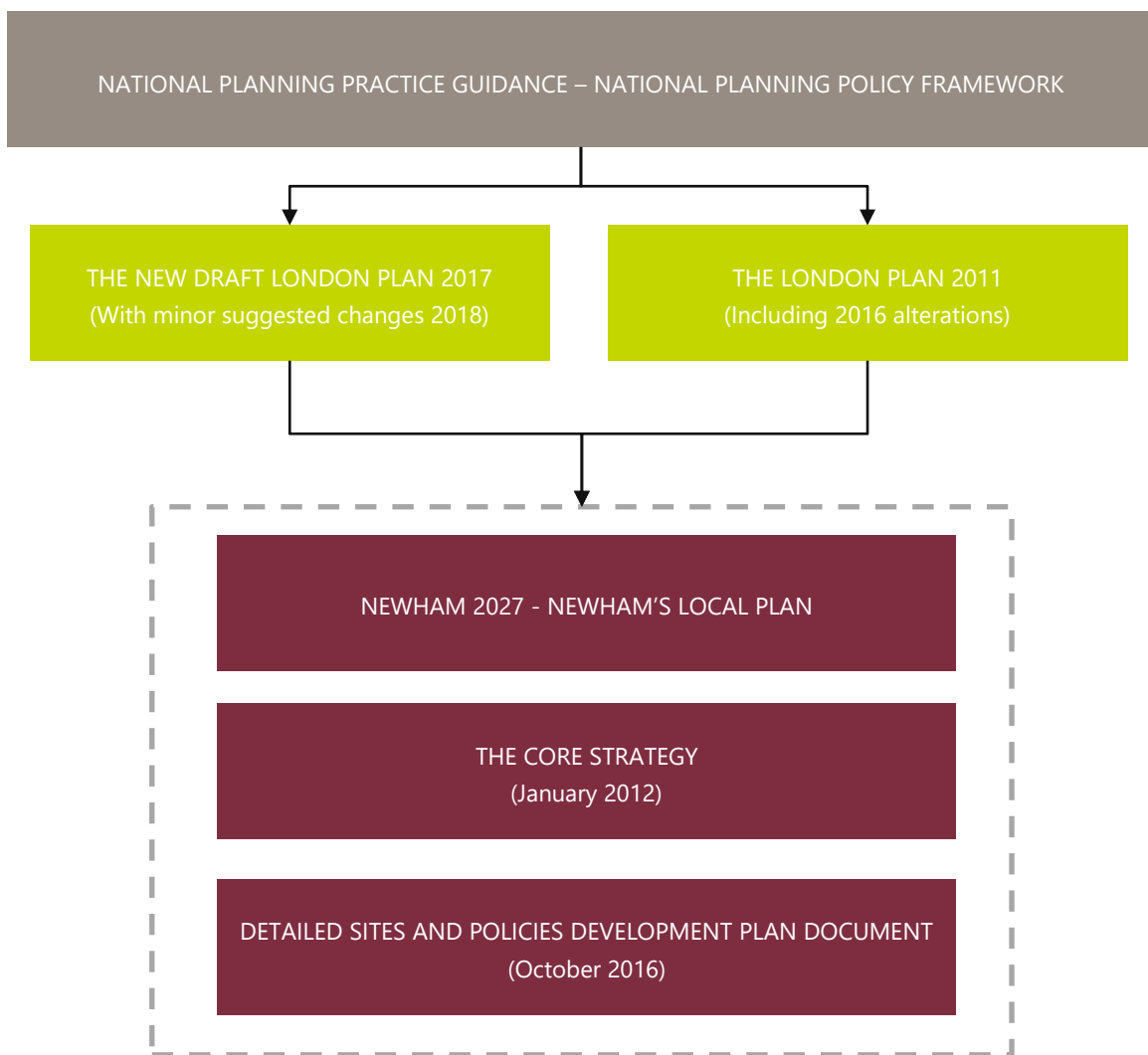


Figure 3—1 - Summary of planning policy framework of the GLA and London Borough of Newham

3.2 National Energy Policy and Guidance

3.2.1 National Planning Policy Framework (NPPF) July 2018

The National Planning Policy Framework (NPPF) (July 2018) underlines the importance of local authorities contributing towards improving and protecting the environment. The legislation points towards the need to focus on the enhancement of biodiversity, minimising waste and pollution, and mitigation/adaptation to climate change.

3.2.2 Climate Change Act

The Climate Change Act 2008 established a legally binding target to reduce the UK's greenhouse gas emissions by at least 80% below 1990 levels by 2050. To drive progress and set the UK on a pathway towards this target, the Act introduced a system of carbon budgets which provide legally binding limits on the amount of emissions that may be produced in successive five-year periods, beginning in 2008.

The first three carbon budgets were set in law in May 2009 and require emissions to be reduced by at least 34% below base year levels in 2020. The fourth carbon budget, covering the period 2023–27, was set in law in June 2011 and requires emissions to be reduced by 50% below 1990 levels.

The Committee on Climate Change (CCC) proposals for the Fifth Carbon Budget were published in November 2015, recommending a budget on a cost-effective path to the 2050 target. The CCC proposed the budget should be set at 1,765 MtCO_{2e} for 2028-2032 which would equate to a 57% reduction in emissions compared to 1990 levels. The UK Government agreed the fifth Carbon Budget at 1,725 MtCO_{2e}, passing the Carbon Budget Order 2016 in July 2016.

In its June 2017 progress report to Parliament, the CCC observed that effective new strategies and policies were urgently needed to ensure emissions continue to fall in line with the commitments agreed by Parliament.¹

3.2.3 Building Regulations Part L: Conservation of Fuel & Power

The Building Regulations Part L governs the conservation of fuel and power in both new construction and refurbishment of the UK building stock. Compliance with Building Regulations is a regulatory requirement for all new developments, and carbon emissions of a development comparative to compliance with Part L is the key performance indicator for many carbon targets, including those set out in the Code for Sustainable Homes and the London Plan. The current version of the Approved Document Part L1A for new dwellings was published in 2013 and came into force in April 2014. The 2013 Regulations introduce a new requirement to meet the Target Fabric Energy Efficiency (TFEE), which is a baseline measure of the energy required to heat a new home, before energy supply options are considered.

¹ <https://researchbriefings.parliament.uk/ResearchBriefing/Summary/CBP-7555>

3.3 Regional London policy and guidance

A draft new London Plan was published by the Mayor for consultation in December 2017. The consultation period ended on Friday 2 March. On 13 August 2018 the Mayor published a version of the draft Plan that includes his minor suggested changes. These suggested changes have been prepared following a review of consultation responses and consist of clarifications, corrections and factual updates to the draft Plan. This plan will go through an examination in public before it is fully brought into force; however the new policies are a material considered within this application. As a result, many of the new London Plan policies have been taken into account for this application energy strategy. Details of how the new policies will be enforced or reported upon is unclear as the GLA has not released an updated version of the GLA's guidance for preparing energy statements (March 2016). Therefore, the spirit of these draft London Plan policies has been followed and reporting procedures have been proposed within this application. Please refer to the following sections for details on the new London Plan policies considered for this application.

3.3.1 London Plan (2016)

The London Plan (March 2016) requires the following energy and wider sustainability requirements to be met. Further detail on the required energy assessment methodology is also provided in the London Plan energy planning guidance.

Policy 5.2 - Minimising CO₂ Emissions

Domestic buildings:

- 2013 – 2016. Meet 35 percent improvement over Part L 2013.
- 2016 – 2019. Zero Carbon as per Part L 2013 (as of Oct 1st 2016)

Non-Domestic buildings:

- 2013 – 2016. Meet 35 percent improvement over Part L 2013.
- 2016 – 2019. Meet 35 percent improvement to continue over Part L 2013 – originally this was to align with the next set of Building regulations however these have been delayed and as such this target will continue until such time.

Policy 5.3 – Sustainable design and construction

- B. Development proposals should demonstrate that sustainable design standards are integral to the proposal, including its construction and operation, and ensure that they are considered at the beginning of the design process.
- C. Major development proposals should meet the minimum standards outlined in the Mayor's supplementary planning guidance and this should be clearly demonstrated within a design and access statement. The standards include measures to achieve other policies in this Plan and the following sustainable design principles:
 - a. Minimising CO₂ emissions across the site, including the building and services (e.g. heating/cooling)
 - b. Avoiding internal overheating and contributing to the urban heat island effect
 - c. Efficient use of natural resources (including water), including making the most of natural systems both within and around buildings
 - d. Minimising pollution (including noise, air and urban runoff)
 - e. Minimising the generation of waste and maximising reuse or recycling avoiding impacts from natural hazards (including flooding)
 - f. Avoiding impacts from natural hazards (including flooding)
 - g. Ensuring developments are comfortable and secure for users, including avoiding the creation of adverse local climatic conditions
 - h. Securing sustainable procurement of materials, using local supplies where feasible, and

- i. Promoting and protecting biodiversity and green infrastructure.

Policy 5.6 - Decentralised energy in development proposals.

- A. Developments should evaluate the feasibility of combined heat and power (CHP) systems. Where a new such system is appropriate this should include opportunities to extend the system beyond the site boundary to adjacent sites.
- B. Major development proposals should select energy systems in accordance with the following hierarchy:
 - a. Connection to existing heating or cooling networks;
 - b. Site wide CHP network;
 - c. Communal heating and cooling;

Policy 5.7 Renewable Energy

- B. Major development proposals should provide a reduction in expected CO₂ emissions through the use of on-site renewable energy generation.

Policy 5.9 Overheating and Cooling

- C. Major development proposals should reduce potential overheating and reliance on air conditioning systems (see section 12 of this report).

Policy 5.15 Water Use and Supplies

- D. Major developments to incorporate water saving measures and equipment
 - a. incorporating water saving measures and equipment
 - b. designing residential development so that mains water consumption would meet a target of 105 litres or less per head per day

3.3.3 New Draft London plan (2017) with minor suggested changes (2018)

The New Draft London plan (2017) with minor suggested changes (2018) outlines several new stretching policies. The relevant ones to this strategy have been outlined below. The spirit of these policies has been followed where possible. Reference to how these have been applied are outlined in each section of the corresponding energy hierarchy.

Policy S12 - Minimising greenhouse gas emissions

- A. Major development should be net zero-carbon. This means reducing greenhouse gas emissions in operation, and minimising both annual and peak energy demand in accordance with the following energy hierarchy:
1. be lean: use less energy and manage demand during construction and operation.
 2. be clean: exploit local energy resources (such as secondary heat) and supply energy efficiently and cleanly. Development in Heat Network Priority Areas should follow the heating hierarchy in Policy S13 Energy infrastructure.
 3. be green: generate, store and use renewable energy on-site.
 - 3A. be seen: monitor, verify and report on energy performance.
- B. Major development proposals should include a detailed energy strategy to demonstrate how the zero-carbon target will be met within the framework of the energy hierarchy.
- C. A minimum on-site reduction of at least 35 per cent beyond Building Regulations* is required for major developments. Residential development should achieve 10 per cent, and non-residential development should achieve 15 per cent through energy efficiency measures. Where it is clearly demonstrated that the zero-carbon target cannot be fully achieved on-site, any shortfall should be provided, in agreement with the borough; either:
1. through a cash in lieu contribution to the borough's carbon offset fund, or
 2. off-site provided that an alternative proposal is identified and delivery is certain.

*Building Regulations 2013. If these are updated, the policy threshold will be reviewed

Policy S13 - Energy Infrastructure

- D. Major development proposals within Heat Network Priority Areas should have a communal low-temperature heating system
1. the heat source for the communal heating system should be selected in accordance with the following heating hierarchy:
 - a. connect to local existing or planned heat networks
 - b. use zero-emission or local secondary heat sources (in conjunction with heat pump, if required,)
 - c. use low-emission combined heat and power (CHP) (only where there is a case for CHP to enable the delivery of an area-wide heat network)
 - d. use ultra-low NOx gas boilers.
 2. CHP and ultra-low NOx gas boiler communal or district heating systems should be designed to ensure that they meet the requirements of policy S11 (A).
 3. where a heat network is planned but not yet in existence the development should be designed for connection at a later date.

3.3.4 Newham 2027 - Newham's Local Plan

Newham's Local Plan has two key parts that are relevant to the development. These are the Core strategy brought into force in 2012 and the Detailed Sites and Policies Development Plan brought into force in 2016. The relevant policies and considerations are outlined in the section below.

The Core Strategy (January 2012)

Policy SC1 Climate Change

Development will respond to a changing climate through the following mitigation and adaptation measures:

1. Major developments (residential) will be required to be assessed against the Code for Sustainable Homes. It will be expected that development achieve Level 4 of the Code as minimum (or the equivalent level of any subsequently adopted national standard on sustainable design and construction);
2. Major developments (non-residential) will be required to be assessed against the Building Research Establishment Environmental Assessment Method (BREEAM). It will be expected that development achieve 'Very Good' as minimum (or the equivalent level of any subsequently adopted national standard on sustainable design and construction);
3. Maximising the efficient use of energy through passive solar design and meeting the requirements of Policy SC2;
4. Reusing and recycling waste arising from demolition and construction, and utilising materials produced and/or sourced locally;
5. Incorporating sustainable urban drainage systems in line with the London Plan drainage hierarchy, and PPS25 Practice Guide, and incorporating water efficiency measures to achieve a consumption target of 105 l/p/d;
6. Incorporating living roofs which provide benefits for sustainable urban drainage, biodiversity and the microclimate;
7. Encouraging the take-up of opportunities to improve resource efficiency in existing homes and buildings through retrofitting subject to the sensitivities identified in Policy SP5;
8. Greening the borough through landscaping, tree planting and provision of natural environments and increased greenspace connectivity; and
9. Improving environments through soil improvement and the sustainable remediation of contaminated land.

Policy SC2 Energy

Carbon emissions from new and existing development will be reduced by the following measures:

1. Requiring that all new residential development is built in line with the London Plan and Building Regulations to reach zero carbon by 2016 (or any subsequently adopted national standard on energy and low carbon design);
2. Requiring that all new non-residential development is built in line with the London Plan and Building Regulations to reach zero carbon by 2019 (or any subsequently adopted national standard on energy and low carbon design);
3. Connections to, or provision for connection to, decentralised heat networks (See Policy INF4);
4. Incorporating on site renewable energy generation in line with the requirements of the London Plan, and other innovative technologies to reduce carbon emissions; and
5. Encouraging the take-up of opportunities to reduce carbon emissions from existing homes and other buildings through retrofitting subject to the sensitivities identified in Policy SP5.

INF4 Local Heat and Power Networks

The Council supports the development and expansion of community and district heating and cooling networks within existing and new development areas and therefore:

1. Applications for development of network infrastructure and related apparatus will normally be granted, subject to compliance with other relevant development plan policies and appropriate mitigation of environmental and local amenity considerations, including noise, pedestrian and vehicular traffic and appearance;
2. Applications for major combined heat and power (CHP) and renewable energy developments must demonstrate how the design has made provision for connection to existing or future community or district heating and cooling networks. The local planning authority will seek where practicable to secure planning agreements to ensure that such connections are implemented;
3. The use of innovative energy technologies to reduce fossil fuel use, make use of sewage waste and other waste currently processed in the borough, and reduce CO2 emissions, will be encouraged in order to increase energy security and contribute to low carbon and waste processing development targets; and
4. Applications for major development in the vicinity of an existing or a planned district heat network or other heat distribution network, should provide for connection to that network. If that connection is not feasible at the time the development is implemented, then the development should ensure that a future connection can be made.

Detailed Sites and Policies Development Plan Document (October 2016)

Policy SC5 – Maximising Sustainable Design

7. Development should achieve at least the following standards, or the equivalent level of any replacement schemes:

Table H

	New Build	Refurbishment
Non-residential	BREEAM UK New Construction rating of 'very good' for all new-build development over 500sq.m GIA; an increase from BREEAM UK New Construction rating 'very good' to 'excellent' for all new-build major development;	BREEAM UK Non-Domestic Refurbishment and Fit-Out rating of 'excellent' for all major development involving the refurbishment or change of use of existing buildings.
Residential	Refer to SC2 and Policies 5.2 and 5.3 of the London Plan (2016)	BREEAM UK Domestic Refurbishment/Non-Domestic Refurbishment and Fit-Out rating of 'excellent' for all major development involving the refurbishment or change of use of existing buildings.

4 Area Schedule and development overview

4.1 Summary of Development

The following sections outline the proposed areas and use types that sit within each element of the application. Section 5 outlines how this corresponds to energy modelling undertaken.

4.1.1 Phase 1 only (detailed)

- 460 residential units
- 3,417sqm (GEA) of flexible employment floorspace (Classes B1b, B1c, B2 (restricted) and B8)
- 162 sqm (GEA) of flexible retail floorspace (Classes A1 to A4)
- 49 car parking spaces
- 867 cycle parking spaces
- 4,070 sqm of private amenity space (e.g. balconies, private roof terraces)
- 2,596 sqm semi-private communal amenity space (e.g. podium deck, communal roof terraces)
- 3,056 sqm public realm (e.g. riverside walk, park, DLR Piazza, pedestrianised areas)
- 458 sqm public realm
- Max 21 storeys height (77.6 max AOD)

- 3,262 sqm (GIA) of flexible employment floorspace (Classes B1b, B1c, B2 (restricted) and B8)
- 153 sqm (GIA) of flexible retail floorspace (Classes A1 to A4)

4.1.2 Phases 2 to 12 only (outline)

- 4,540 residential units
- 15,000 sqm (GEA) of flexible employment floorspace (Classes B1b, B1c, B2 and B8)
- 1,024 sqm (GEA) of flexible employment floorspace (Classes B1b, B1c, B2 (restricted) and B8)
- 7,206 sqm (GEA) of flexible retail floorspace (Classes A1 to A4)
- 7,055 sqm (GEA) of community and leisure floorspace (Classes D1 and D2)
- 480 car parking spaces (including 23 permanent spaces for Phase 1)
- 8,945 cycle parking spaces

- 32,230 sqm of private amenity space (e.g. balconies, private roof terraces)
- 22,190 sqm semi-private communal amenity space (e.g. podium deck, communal roof terraces)
- 80,207 sqm public realm (e.g. riverside walk, park, DLR Piazza, pedestrianised areas)
- Max 26 storeys height (97.90 max AOD)

- 14,250 sqm (GIA) of flexible employment floorspace (Classes B1b, B1c, B2 and B8)
- 973 sqm (GIA) of flexible employment floorspace (Classes B1b, B1c, B2 (restricted) and B8)
- 6,846 sqm (GIA) of flexible retail floorspace (Classes A1 to A4)
- 6,702 sqm (GIA) of community and leisure floorspace (Classes D1 and D2)

Total across the masterplan

- 5,000 residential units
- 15,000 sqm (GEA) of flexible employment floorspace (Classes B1b, B1c, B2 and B8)
- 4,441 sqm (GEA) of flexible employment floorspace (Classes B1b, B1c, B2 (restricted) and B8)
- 7,368 sqm (GEA) of flexible retail floorspace (Classes A1 to A4)
- 7,055 sqm (GEA) of community and leisure floorspace (Classes D1 and D2)
- 529 car parking spaces
- 9,812 cycle parking spaces
- 36,300 sqm of private amenity space (e.g. balconies, private roof terraces)
- 24,786 sqm semi-private amenity space (e.g. podium deck, communal roof terraces) 83,236 sqm public realm (e.g. riverside walk, park, DLR Piazza, pedestrianised areas)
- 21,649 sqm of enhanced habitat, SINC and intertidal habitat along the river wall
- Max 26 storeys height (97.90 max AOD)

- 14,250 sqm (GIA) of flexible employment floorspace (Classes B1b, B1c, B2 and B8)
- 4,235 sqm (GIA) of flexible employment floorspace (Classes B1b, B1c, B2 (restricted) and B8)
- 7,000 sqm (GIA) of flexible retail floorspace (Classes A1 to A4)
- 6,702 sqm (GIA) of community and leisure floorspace (Classes D1 and D2)

4.2 Development Phasing

Table 4-1 outlines the proposed development phasing, the number of units and the expected construction to operation dates. This phasing has been used to calculate the predicted carbon emissions of the development, by evaluating the corresponding carbon factors to use within the calculations. Table 4-1 also outlines the carbon factors of fuels used for each phase. Further detail on these factors is provided below.

Table 4-1 Development phasing by block and expected operational date

Phase	Plot/Blocks	Start on Site	Complete	Carbon factor to use
Phase 1 (460 units)	A & B	May 2020	June 2022	Part L 2013
Phase 2 (589 units)	D & E	Feb 2021	May 2023	Part L 2013
Phase 3 (481 units)	C & F	Dec 2021	April 2024	Part L 2013
Phase 4 (320 units)	G	Sept 2022	Sept 2024	2022 (SAP16 CONSP:07)
Phase 5 (336 units)	J & H	July 2023	July 2025	2022 (SAP16 CONSP:07)
Phase 6 (397 units)	M & K	June 2024	April 2026	2025 (SAP16 CONSP:07)
Phase 7 (493 units)	N & L	April 2025	July 2027	2025 (SAP16 CONSP:07)
Phase 8 (526 units)	R	Feb 2026	May 2028	2025 (SAP16 CONSP:07)
Phase 9 (480 units)	U, Q & P	Jan 2027	April 2029	2025 (SAP16 CONSP:07)
Phase 10 (542 units)	S	Jan 2028	May 2030	2025 (SAP16 CONSP:07)
Phase 11 (376 units & School)	T	April 2029	Feb 2031	2025 (SAP16 CONSP:07)
Phase 12 (Industrial)	-	Nov 2029	Nov 2030	2025 (SAP16 CONSP:07)

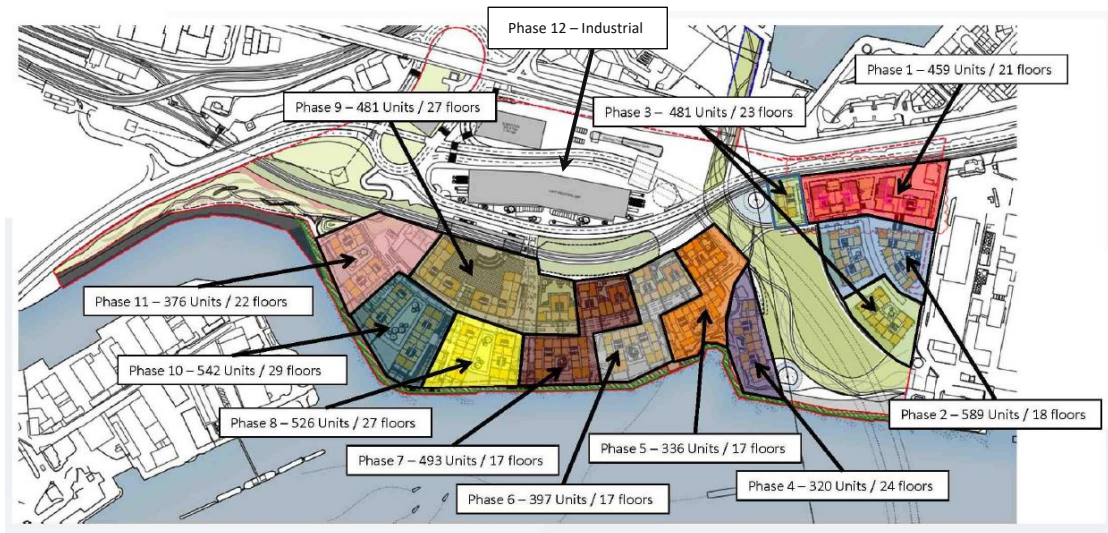


Figure 4—1 Development phasing with proposed residential unit numbers

4.3 Expected grid decarbonisation with phasing

A recent government consultation was undertaken by Department for Business, Energy & Industrial Strategy (BEIS) on proposals to amend the Standard Assessment Procedure (SAP). This was referred to as SAP 2016 Consultation and it closed on January 27th 2017. This proposed reductions to the fuel emission factors (or carbon factors) for all fuel types. The consultation has been published by BEIS, however the technical content behind the consultation has been put together by the Building Research Establishment (BRE).

The BRE developed a series of supplementary consultation papers. These papers formed the evidence base for the propose changes to SAP. The updated carbon factors proposed for this iteration and also future projects are detailed in the supplementary consultation paper CONSP: 07 CO2-and-PE-factors.

Based on the consultation, ‘SAP 10’ was released on the 24th July 2018. However these changes have not yet been enacted into Building Regulations Approved Document Part L therefore they do not form part of Building Regulations. Part L 2013 is still the Approved Document to use for new developments.

The fuel emission factors as provided in SAP 10 are shown in Figure 4—2. Also provided are the emission factors of Building Regulations Part L 2013 and the projected emission factors, as provided in SAP 2016 CONSP:07.

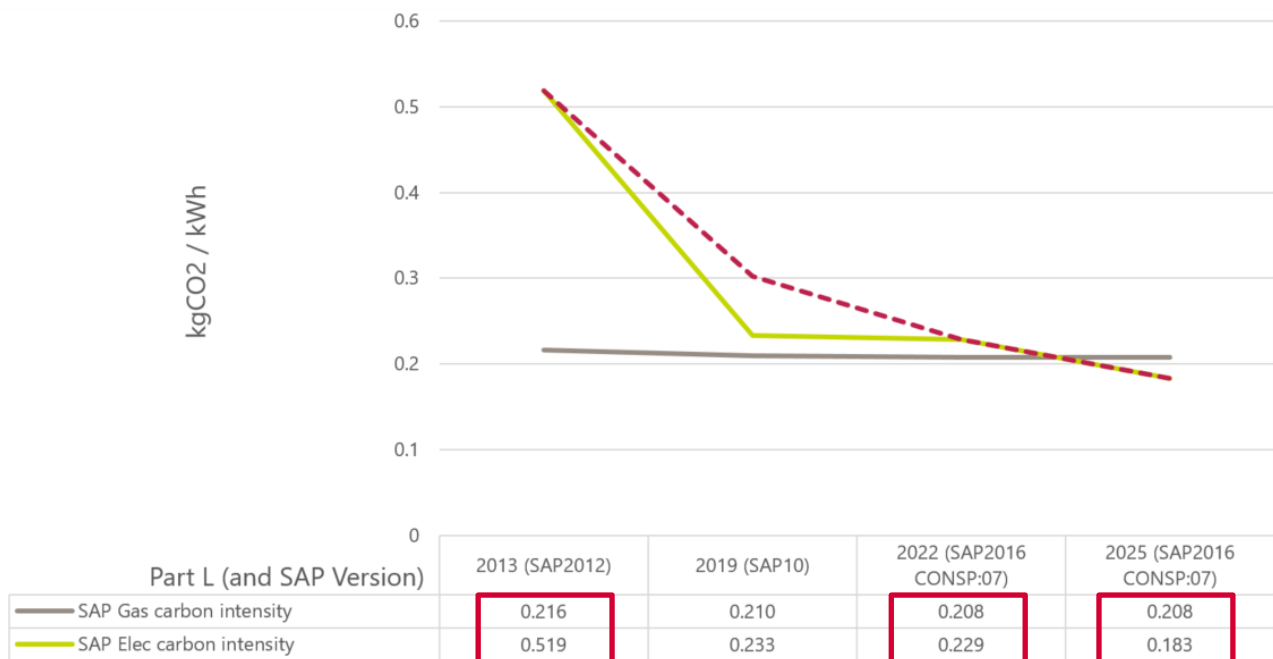


Figure 4—2 Assumed Part L carbon intensity of fuels current and future Part L and SAP years

Highlighted are the carbon factors used for the emissions prediction. Building Part L 2013 factors have been used for Phases 1-3, as these are in force now. 2022 and 2025 factors have been used for future phases as these are the expected carbon factors that will be in force at the time of the RMAs for those future phases.

5 Energy Methodology

This section describes the energy strategy and methodology for assessment for the development. This document has been outlined to align with the GLA guidance on preparing energy assessments March 2016. Since the drafting and development of the planning strategy, the GLA released an update to this document. The GLA’s Energy Assessment Guidance Greater London Authority guidance on preparing energy assessments as part of planning applications (October 2018) was released shortly before submitting this statement. As a result elements outlined have been included where possible.

The report has however been drafted to pre-empt this guidance and many of the elements have been outlined to align with the New draft London Plan Policies. This includes CO₂ emissions for the residential and non-residential, which are reported in a combined format. The CO₂ emissions reduction strategy follows a ‘lean, clean, green’ approach as illustrated in Figure 5—1.

Sections 6 and 10 identify the CO₂ emissions associated with the proposed development after each stage of the energy hierarchy. Regulated emissions are provided; emissions associated with uses not covered by Building Regulations are also separately reported, i.e. unregulated energy uses for the whole site. SAP and BRUKL reports can be found in the Appendices of this document.

5.1 Energy Hierarchy Methodology

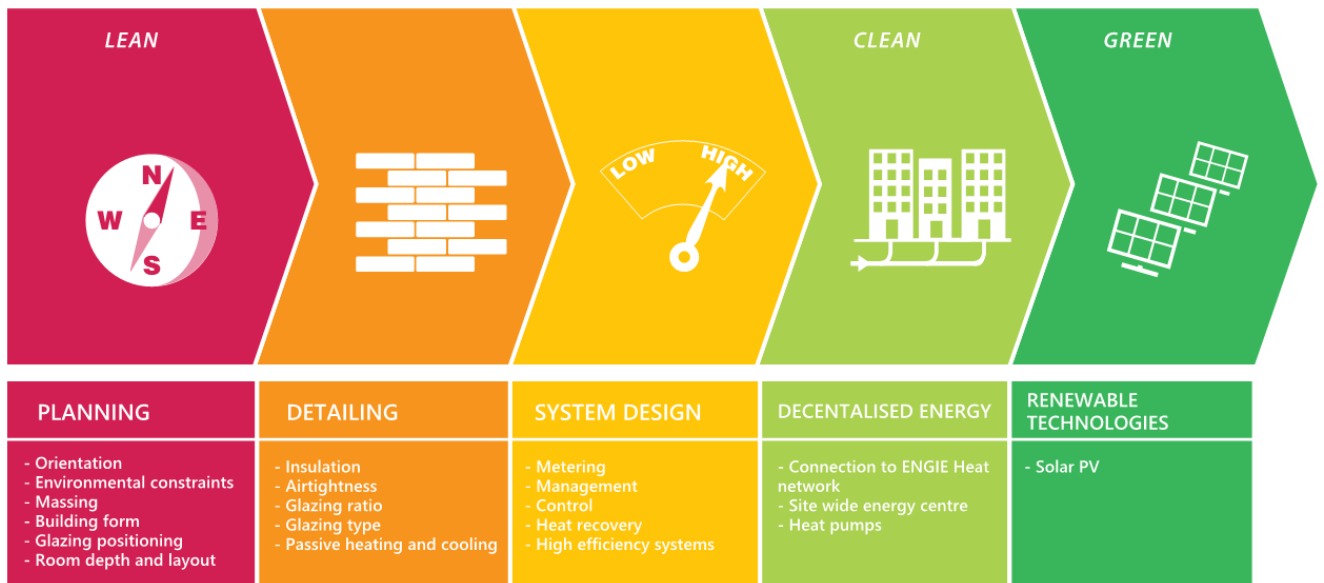


Figure 5—1 The GLA energy hierarchy and measures to be implemented through design

The following report sections explain the inputs outlined in Table 5-1 and the expected site wide impact of each stage.

Table 5-1 Summary of modelling assumptions through the energy hierarchy

	Model assumptions and inclusions
Baseline – Building Regulations Compliant Development	Baseline Target Emission Rate (TER) is provided by the notional building generated by the software, with the following features: <ul style="list-style-type: none"> - Building fabric and air tightness as required to meet Part L 2013 compliance - Energy efficiency measures as required to achieve Part L 2013 compliance - Heat generation via individual gas boilers - No cooling systems in residential - Localised cooling in non-residential buildings
Lean - Energy efficiency measures applied	Improved energy efficient model, with the following features: <ul style="list-style-type: none"> - Improved building fabric and air tightness improvements over notional or assumed existing - Energy efficiency measures applied - Heat generation via gas boilers – communal per building type - Localised cooling in non-residential buildings
Clean - Connecting to efficient decentralised energy sources	Improved model, with the following features: <ul style="list-style-type: none"> - Improved building fabric and air tightness - Energy efficiency measures applied - Connection to the ENGIE Heat Network for phases 1-3 from an existing CHP and boilers - Heat generation via on-site energy centre with Heat pumps and gas boilers for Phases 4-12
Green - Renewable Energy Technologies	Improved model, with the following features: <ul style="list-style-type: none"> - Improved building fabric and air tightness - Energy efficiency measures applied - Connection to the ENGIE Heat Network for phases 1-3 from an existing CHP and boilers - Heat generation via on-site energy centre with Heat pumps and gas boilers for Phases 4-12 - Solar PV panels across all building types on feasible roofs

The cooling hierarchy strategy is addressed as part of the ‘Overheating’ section of this report.

5.2 Detailed and Outline modelling

Energy and overheating modelling has been undertaken only for the detailed elements of the application. This includes Plots A and B in Phase 1 of the development. The spaces and typologies modelled are as follows:

- Residential dwellings (Class C3)
- Retail units (Classes A1 to A4)
- General Industrial (Classes B1b, B1c, B2 (restricted) and B8)
- Community space (Class D2)
- Gym facility (Class D2)
- Crèche (Class D1)

Benchmarked energy demands have been taken from this detailed energy modelling and extrapolated across the masterplan use classes. This has been applied on a Net Internal Area (NIA) basis for residential and Gross Internal Area (GIA) basis for non-residential. Figure 5—2 shows the indicative locations and expanse of the non-residential uses across the masterplan. It is assumed at this point of the process that the same specifications and assumptions made for Phase 1 also apply to outline elements.

These will be reviewed at RMA and updated is applicable. Lean energy demand figures have been used to calculate the Clean and Green emissions. Carbon emissions have been calculated based upon district heating efficiencies and impact of renewable energy systems, using the carbon factors outlined in Table 4-1.

It is assumed at this point of the process that the same specifications and assumptions made for Phase 1 also apply to outline elements. These will be reviewed at RMA and updated is applicable.

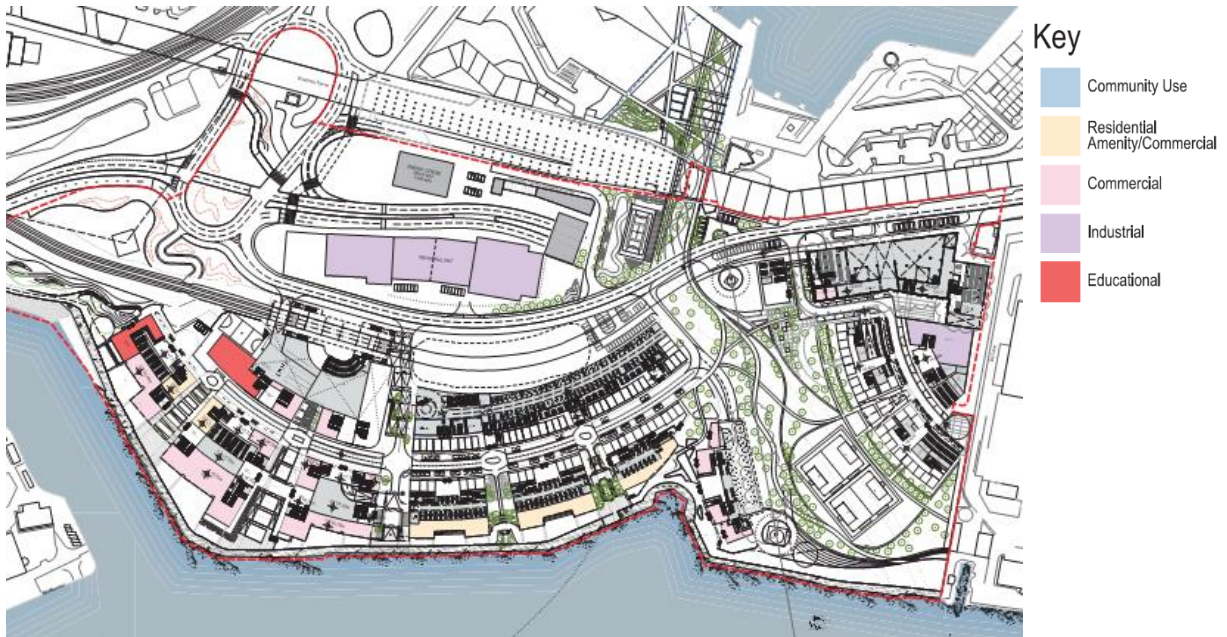


Figure 5—2 Ground floor layouts shows indicative locations and breathe of non-residential floor space

6 Energy: Baseline demand and CO₂ emissions

Baseline energy demands have been estimated in line with the methodology set out in section 5. Models have been created based on specific block geometry and systems, in line with the GLA's guidance for preparing energy statements.

6.1 Residential Elements

6.1.1 Regulated Emissions

A sample of 43 dwellings have been modelled in Block A and B in Phase 1 detailed elements. These have been selected to be representative of the majority of the buildings' dwellings. Figure 6—1 shows the 3D geometry of the dwellings modelled (in blue) and shading devices and balconies (in orange).

Modelling has been undertaken using the Elmhurst Designer SAP 2012 accredited software to test compliance with Building Regulations Part L 2013. The models have been used to provide Target Emission Rate (TER) and Dwelling Emission Rate (DER) for Baseline, Lean and Clean scenarios. Baseline energy demands use the notional outputs provided by the software as per the methodology outlined in Table 5-1.

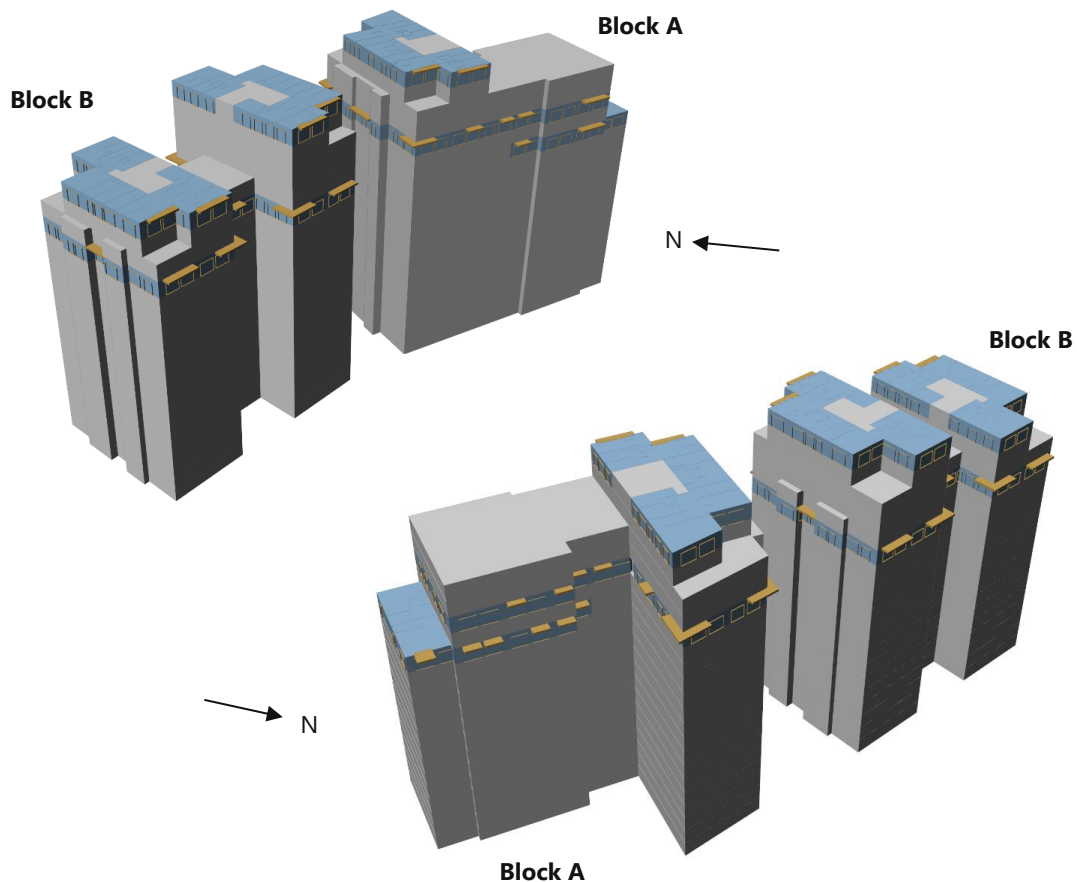


Figure 6—1 Computer models used for residential energy analysis

Detailed energy modelling has been carried out to show compliance with Building Regulations with lean measures alone and this is outlined in Section 6.4.

6.1.2 Unregulated Emissions

Residential unregulated emissions from energy consumption such as electrical appliance usage and cooking have been estimated using the SAP methodology as outlined in Appendix L of The Government's Standard Assessment Procedure for Energy Rating of Dwellings, SAP 2012. They are based on floor area and are assumed not to change between each stage of the energy hierarchy.

6.2 Non-residential elements

6.2.1 Regulated Emissions

The Retail, Industrial and community areas have been modelled using IES 2017 version 3.0.0 using apacheSIM Part L 2013 compliance. The models were used in order to produce an estimate of the non-domestic energy demands and CO2 emissions.

The models have been generated using service specifications driven by guidance documents; 2013 Non-Domestic Building Services Compliance Guide, CIBSE Guide A: Environmental Design 2015, CIBSE AM11, CIBSE TM46, and BSRIA Rules of Thumb (2003). Baseline energy demands and carbon emissions use Notional building parameters as outlined in Part L2A 2013.

Retail units

The two retail units present within the ground floor of Block B have been modelled. These represent typical Shell and Core spaces. The retail units have been modelled with MVHR for ventilation and Fan Coil units providing heating and cooling. Heating will be provided from a communal heating source (boiler for Lean/Baseline modelling) and cooling from a standalone air cooled chiller for each unit. Domestic Hot Water is also provided by the centralised heating source.

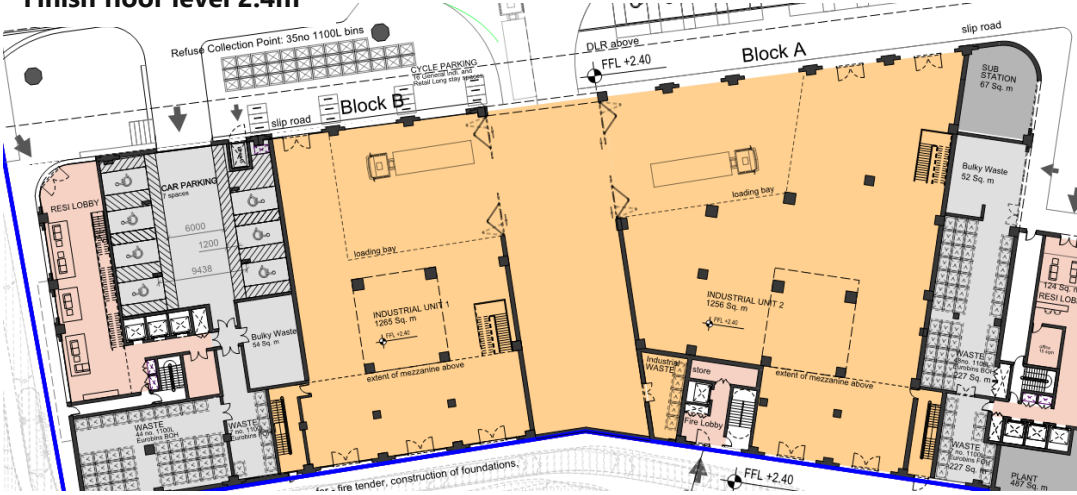
Community, Crèche and Gym spaces

The community space, crèche and gym present within phase 1 have been modelled. These are situated on the podium level of both plots and are accessible only to residents. For this reason, they form part of the residential amenity space and do not sit under an application use class. They have been modelled to understand the energy and carbon performance of similar space uses for the rest of the masterplan. They are serviced in the same manner as the retail units, however with a centralised cooling system.

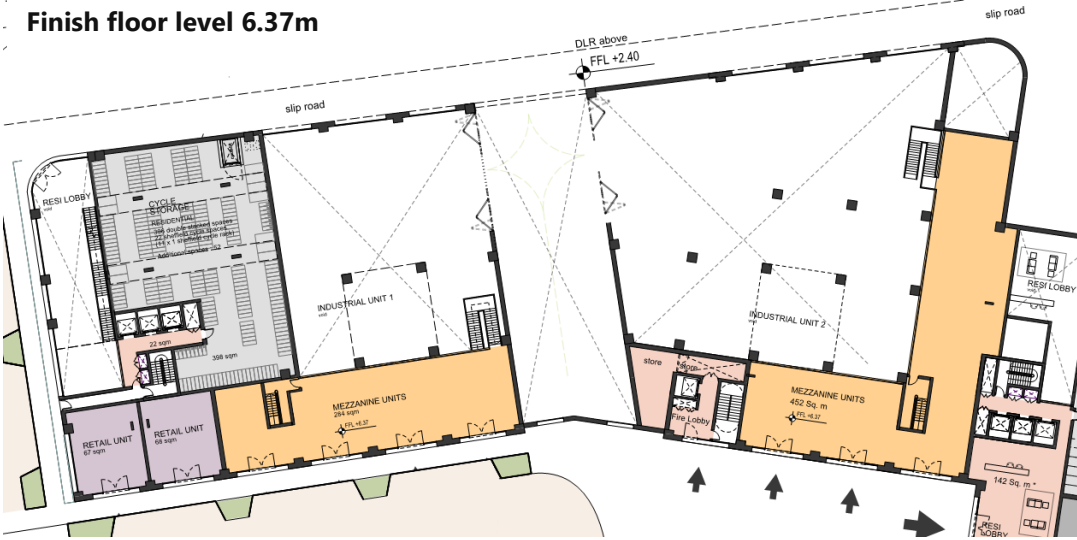
Industrial units

The Industrial spaces span both plots A and B at lower ground to ground level and include mezzanine areas. It is unclear who the tenant may be and the nature of their business. As a result, it is unclear which areas within the space will require servicing (heating and cooling). It has therefore been assumed that the loading bay areas at finish floor level (FFL) 2.4m, in Figure 5—2, are not serviced and open to the atmosphere. Whereas the mezzanines at FFL 6.37m are serviced and considered as Industrial office spaces.

Finish floor level 2.4m



Finish floor level 6.37m



Finish floor level 11.27m



Figure 6—2 Floor layouts for the Industrial loading bays and the mezzanine areas

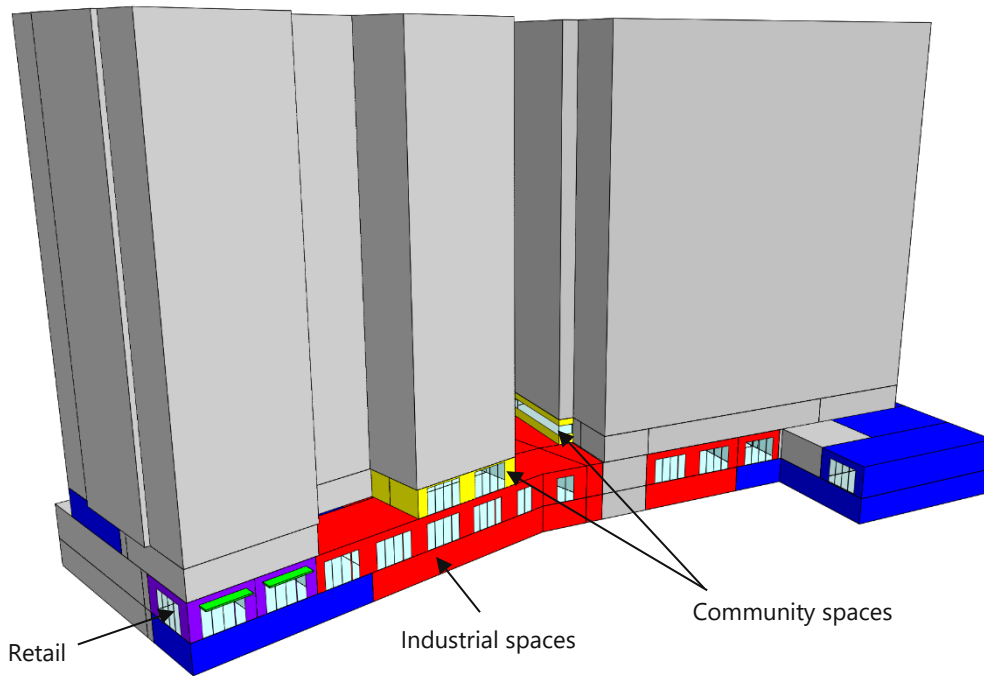


Figure 6—3 Non-residential model used for Part L modelling

6.2.2 Unregulated emissions

Non-residential unregulated emissions from energy consumption such as small plug loads, plant and process loads have been estimated based on the ‘equipment’ demands from the Part L2A BRUKL reports.

6.3 Baseline predicted energy demand

The table below summarises the baseline energy demand of the buildings in the masterplan.

Table 6-1 Predicted site wide baseline energy demand

Typology	Baseline energy demand (MWh/year)						
	NIA (m ²)	Space Heating	Hot water	Lighting electricity	Auxiliary electricity	Cooling electricity	Unregulated electricity
A1/A2/A3 - Retail	7,000	61.3	12.5	391.2	132.8	75.2	599.3
B2/B8/B1a - Industrial	18,485	70.4	86.7	715.3	98.4	63.9	877.6
Semi-Private	789	6.1	1.7	12.0	9.2	3.1	24.3
C3 - Apartments	327,435	7,033	8,761	1,404	321	-	1,725
D1/D2 - Community	2,655	20.4	5.8	40.6	30.8	10.6	82.0
D1 - Education	4,047	31.1	8.8	61.8	47.0	16.1	125.0
Total	360,410	7,223	8,876	2,625	639	169	3,433

6.4 Baseline predicted CO₂ emissions

The table below summarises the predicted baseline carbon dioxide emissions of the buildings in the masterplan.

Table 6-2 Predicted detailed phase 1 baseline CO₂ emissions

	Detailed Phase 1	
	Baseline Regulated CO ₂ Emissions	
Typology	kg CO ₂ /m ² /year	Tonnes CO ₂ /year
A1/A2/A3 - Retail	46.9	7.2
B2/B8/B1a - Industrial	26.7	87.0
C3 - Apartments	14.4	471.7
Total	15.6	565.8

Table 6-3 Predicted detailed phase 1 & masterplan Baseline CO₂ emissions

	Phase 1 & Masterplan	
	Baseline Regulated CO ₂ Emissions	
Typology	kg CO ₂ /m ² /year	Tonnes CO ₂ /year
A1/A2/A3 - Retail	26.3	184.1
B2/B8/B1a - Industrial	14.3	264.4
Semi-Private	7.9	6.2
C3 - Apartments	13.0	4,258.5
D1/D2 - Community	8.4	22.3
D1 - Education	7.9	32.0
Total		4,767.5

As outlined in section 5.2, benchmarked energy demands have been taken from this detailed energy modelling of phase 1 and extrapolated across the masterplan use classes on an m² basis. This has been applied on a Net Internal Area (NIA) basis for residential and Gross Internal Area (GIA) basis for non-residential. Lean energy demand figures have been used to calculate the Clean and Green emissions. Carbon emissions have been calculated based upon district heating efficiencies and impact of renewable energy systems, using the carbon factors outlined in Table 4-1.

It is assumed at this point of the process that the same specifications and assumptions made for Phase 1 also apply to outline elements. These will be reviewed at RMA and updated is applicable.

7 Energy: Demand Reduction - 'Lean'

This section outlines the strategic demand reduction and energy efficiency measures integrated in the development and their impacts on energy demand and CO₂ reductions. The values provided are indicative fabric and services specifications that will be reviewed throughout the design process to ensure Part L compliance is met.

The new build elements have been designed to meet the New Draft London Plan energy efficiency requirements from Policy S12 - Minimising greenhouse gas emissions. This requires lean reductions of 10% for residential and 15% for non-residential beyond Part L 2013.

7.1 Lean fabric and systems improvements

This section discusses the design measures that will be incorporated into the detailed design of the development to ensure that all residential buildings will be designed to meet the New London Plan energy efficiency requirements from Policy S12 - Minimising greenhouse gas emissions.

Several fabric and services improvements have been proposed to provide a pathway to compliance with Policy S12. The key dwelling specifications are summarised in Table 7-1 and the non-residential specifications in Table 7-2.

Table 7-1 required fabric specifications to meet Building Regulations and planning Lean requirements

Element	Elemental facade requirements	Part L Notional input values	Part L Limiting input values
Ground floor U-value (W/m ² K)	0.16 W/m ² K (above non-residential spaces)	0.13 W/m ² K	0.25 W/m ² K
Roof U-value (W/m ² K)	0.16 W/m ² K	0.13 W/m ² K	0.2 W/m ² K
External wall U-value (W/m ² k)	0.16 W/m ² K	0.18 W/m ² K	0.3 W/m ² K
Party / Corridor wall U-value (W W/m ² K)	0.0 W/m ² K	0.0 W/m ² K	0.0 W/m ² K
Openable Glazing U-value (W/m ² K)	1.4 W/m ² K for double glazing 1.0 W/m ² K for triple glazing	1.4 W/m ² K	2.0 W/m ² K
Party Walls	0.0 W/m ² K	0.0 W/m ² K	0.0 W/m ² K
Thermal Bridging	Default $\gamma=0.15$	Reference values	Default $\gamma=0.15$
Air permeability (@ 50 Pa)	3 m ³ /m ² /hour (all units to be tested post construction)	5 m ³ /m ² /hour	10 m ³ /m ² /hour
Glazing g-value	0.5 for lower floors 0.3 for top floors	0.63	-
Ventilation type	MVHR	Natural ventilation with extract fans	-
Boiler Efficiency	95%	89.5% (SEDBUK)	88%
Cooling EER	Not included	N/A	N/A

Table 7-2 Non-residential building energy modelling input values

Element	Retail	Industrial spaces	Community
Fabric	2013 regs compliant U values: Wall 0.18 W/m ² k Floor 0.16 W/m ² k Glazing 1.4 W/m ² k G value 0.4 Air tightness 3 m ³ /m ² /hour		
Heating	FCUs supplied by communal Gas Boiler 95% eff SFP – 0.3 W/l/s		
Cooling	FCUs supplied by Air Cooled Chillers EER – 3.5/SEER – 4.5		
Ventilation	Vent heat rec: 70% eff, SPF - 1.6 W/l/s		
Lighting	Lamp - 85 lm/W Display – 60 lm/W Photoelectric dimming	Lamp - 90 lm/W Photoelectric dimming Absence detection in all spaces, presence detection in stores	Lamp - 90 lm/W Photoelectric dimming Absence detection in all spaces, presence detection in toilets

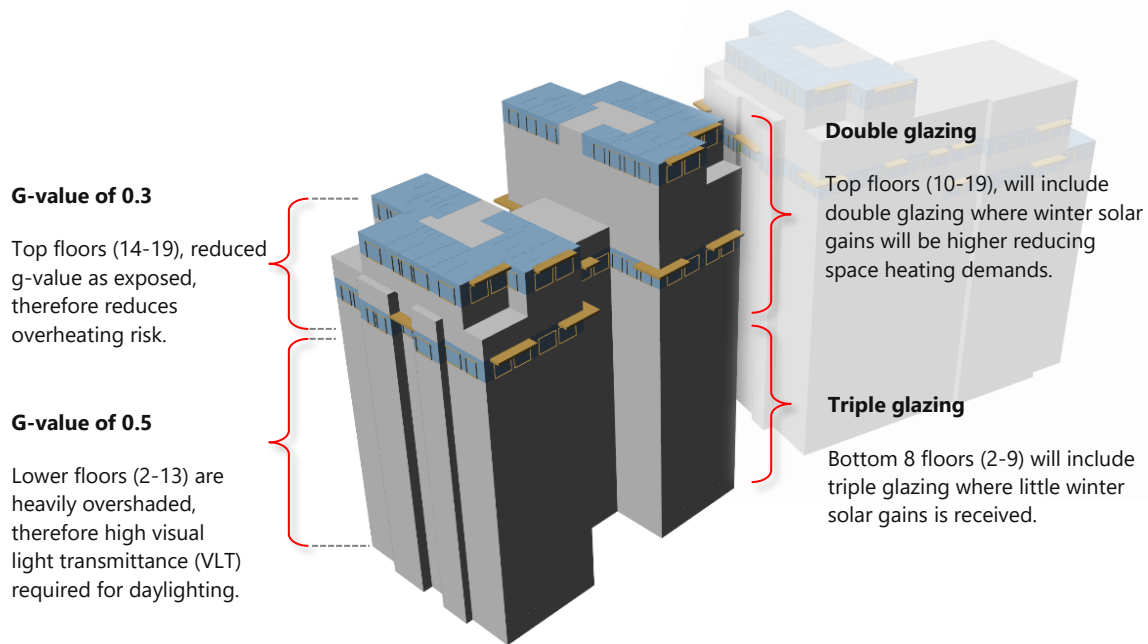
7.1.1 Glazing design and specification

The design and specification of glazing have major impacts on both the energy consumption, overheating risk and access to daylight in dwellings. The proposed design is aimed at optimising these three elements by adopting different solutions across levels and orientations. In particular, different glazing areas, U-values, g-values and shading elements have been used depending on the dwelling exposure.

Glazing areas have been minimised along the South elevation, in order to avoid excessive exposure to sunlight, which might lead to high overheating risk. Where glazing area could not be further reduced, shading elements have been used to reduce exposure to direct sunlight, either through balconies, or additional canopies above windows along the South and South-West façade.

In addition, top floors are less over-shaded by surrounding buildings and, therefore, more exposed and at risk of overheating. In order to reduce this risk, it is proposed that windows on top floors (from level 14 upwards) have a low g-value of 0.3. Conversely, lower floors are more over-shaded and daylight access will, therefore, be critical. For this reason, it is proposed that visual light transmittance is maximised on lower floors and a higher g-value of 0.5 is used. This also allows for floors where overheating risk is low to maximise harnessing of winter sunlight and reduce heating consumption, which is a key contributor to the dwellings’ carbon emissions.

In order to further enhance energy efficiency and meet the targets of the New London Plan energy efficiency requirements from Policy S12, it is also proposed that triple glazing is specified for 8 of the total residential floors. In particular, triple glazing is to be used in the lower floors, which are characterised by lower exposure to sunlight during winter, and where, therefore, higher fabric performance is needed to reduce space heating requirements.



* Residential units start on floor 2

7.1.2 Thermal envelope and air tightness

Building insulation will be designed to exceed the permitted limiting fabric values proposed by the Part L 2013 Regulations (see Table 7-1 for residential units and Table 7-2 for non-residential units). Wall insulation has been maximised within reasonable bounds to meet fire regulations for tall buildings.

Heat losses will be further reduced through increased air-tightness. The design team are targeting an air permeability of 3 m³/m².hr rather than the typical 5 m³/m².hr at 50Pa. This level of infiltration is a significant improvement and is achievable through advanced construction techniques and attention to detail and a rigorous air permeability testing regime.

7.1.3 Ventilation

The ventilation strategy for residential units is based on centralised Mechanical Ventilation with Heat Recovery (MVHR) systems, with a boost setting, together with openable windows to meet the purge ventilation requirements of Part F.

The MVHR units in residential units will recycle heat from the dwellings as fresh air is brought in, and will include a summer bypass function. The MVHR systems will provide continuous background ventilation, and create an improved acoustic environment compared to natural ventilation. The MVHR units also include NO_x filters.

Non-residential plots will use both centralised Mechanical Extract Ventilation (MEV) and MVHR systems for varying space types. Unoccupied spaces such as toilets and bin stores will require mechanical extract; occupied spaces, such as offices, retail and stores will be provided with fresh air and extract with an efficient heat recovery system. Industrial areas will be provided with dedicated Air Handling Units (AHUs) to meet the high air change rates required for such spaces.

7.1.4 Internal and communal lighting

To minimise energy consumption from lighting within residential areas, the number of light fittings will be minimised whilst specifying 100% low energy lighting (compact fluorescent lights or LEDs) with appropriate controls. The design may include smart controls for residential units that enable all lights and non-essential appliances to be switched off from a single switch located by the front door, thereby avoiding lights and appliances being left on during the night or periods of non-occupancy. For communal lighting, time switches, presence detection and daylight sensors will be installed and low energy lighting will be specified.

Retail and industrial units will also require LED lights thought out as part of the tenant fit out, apart from display lighting, to reduce energy demand and cooling demand, with a Luminous efficacy of 90-100 lm/W.

7.2 Lean’ predicted energy demand

7.3 ‘Lean’ CO₂ emissions

Table 7-3 Predicted site wide lean energy demand

Typology	Lean energy demand (MWh/year)						
	NIA (m ²)	Space Heating	Hot water	Lighting electricity	Auxiliary electricity	Cooling electricity	Unregulated electricity
A1/A2/A3 - Retail	7,000	62.8	13.6	211.7	153.5	59.6	424.8
B2/B8/B1a - Industrial	18,485	37.5	80.8	455.8	119.3	38.9	614.0
Semi-Private	789	4.6	1.8	8.2	10.4	2.0	20.6
C3 - Apartments	327,435	4,758	9,475	1,400	543	-	1,943
D1/D2 - Community	2,655	15.4	6.0	27.6	34.9	6.7	69.3
D1 - Education	4,047	23.5	9.1	42.0	53.2	10.3	105.6
Total	360,410	4,902	9,586	2,145	915	117	3,177

7.4 ‘Lean’ CO₂ emissions

The series of above-described passive and active measures implemented in the building provide a 13.1% reduction in CO₂ emissions compared with the Part L 2013 baseline scheme.

Table 7-4 Predicted detailed phase 1 lean CO₂ emissions

Typology	Detailed Phase 1				
	Baseline Regulated CO ₂ Emissions		Lean Regulated CO ₂ Emissions		
	kg CO ₂ /m ² /year	Tonnes CO ₂ /year	kg CO ₂ /m ² /year	Tonnes CO ₂ /year	% improvement over Baseline
A1/A2/A3 - Retail	46.9	7.2	34.0	5.2	27.6%
B2/B8/B1a - Industrial	26.7	87.0	18.7	61.0	29.9%
C3 - Apartments	14.4	471.7	13.0	425.3	9.8%
Total	15.6	565.8	13.6	491.6	13.1%

Table 7-5 Predicted detailed phase 1 & masterplan Lean CO₂ emissions

	Phase 1 & Masterplan				
	Baseline Regulated CO ₂ Emissions		Lean Regulated CO ₂ Emissions		
Typology	kg CO ₂ /m ² /year	Tonnes CO ₂ /year	kg CO ₂ /m ² /year	Tonnes CO ₂ /year	% improvement over Baseline
A1/A2/A3 - Retail	26.3	184.1	19.3	135.3	26.5%
B2/B8/B1a - Industrial	14.3	264.4	10.0	185.7	29.7%
Semi-Private	7.9	6.2	6.5	5.2	17.3%
C3 - Apartments	13.0	4258.5	11.5	3764.1	11.6%
D1/D2 - Community	8.4	22.3	7.0	18.5	17.2%
D1 - Education	7.9	32.0	6.5	26.5	17.3%
Total		4767.5		4135.3	13.3%

8 Energy: local energy resources to supply energy efficiently and cleanly - 'Clean'

8.1 Overview

In relation to 'clean' approaches, Policy 5.6 of the current London Plan energy hierarchy sets out that major development proposals should in the first instance explore connection to existing heating or cooling networks (i.e. off-site), prior to any on-site solutions. If an off-site network is not available then on-site measures need to be considered. The Draft New London Plan also maintains this hierarchy. For this reason, connection to the local ExCel Energy centre, operated by ENGIE has been explored. Evidence of correspondence with ENGIE is included within Appendix D.

The ExCel energy centre has some inherent risk associated to connection, namely that it is gas engine CHP led as well as constraints around peak plant provision and pipe sizing. This section outlines a phased approach to the site wide energy strategy that looks to overcome these risks whilst also providing long-term carbon savings for the site.

8.2 Policy constraints

It is intended that the application will be a hybrid application with multi phases over 10-15 year build out, allowing for Reserved Matters Applications (RMA). The energy strategy for the proposed development has been planned following the Draft New London Plan (2017) with minor suggested changes (2018). Policy SI3 Energy infrastructure ranks "connect to local existing or planned heat networks" highest in the hierarchy. As a result, this option has been explored as first priority, see 8.3.

Additionally Policy SI2 Minimising greenhouse gas emissions outlines that developments should meet zero carbon requirements. The existing local heat network in the area is CHP-led. As a result of the updates in the Standard Assessment Procedure (SAP 10) carbon intensity of fuels, CHP engines do not provide carbon savings compared to a communal gas boiler. Heat pumps will be required within the heating mix to provide carbon savings against SAP 10 and future carbon factors.

These two policies have created a challenge, as they require connecting to an existing network whilst showing long-term carbon savings on site. The following sections outline the work undertaken and the proposed approach to the planning submission and conditions to meet both Policies.

8.3 Explored connection to existing heat network

The Excel energy centre and district heat network was identified as an existing network within the area, see Figure 8—1. Connection options have been explored with ENGIE, who run the system with a 40-year concession.

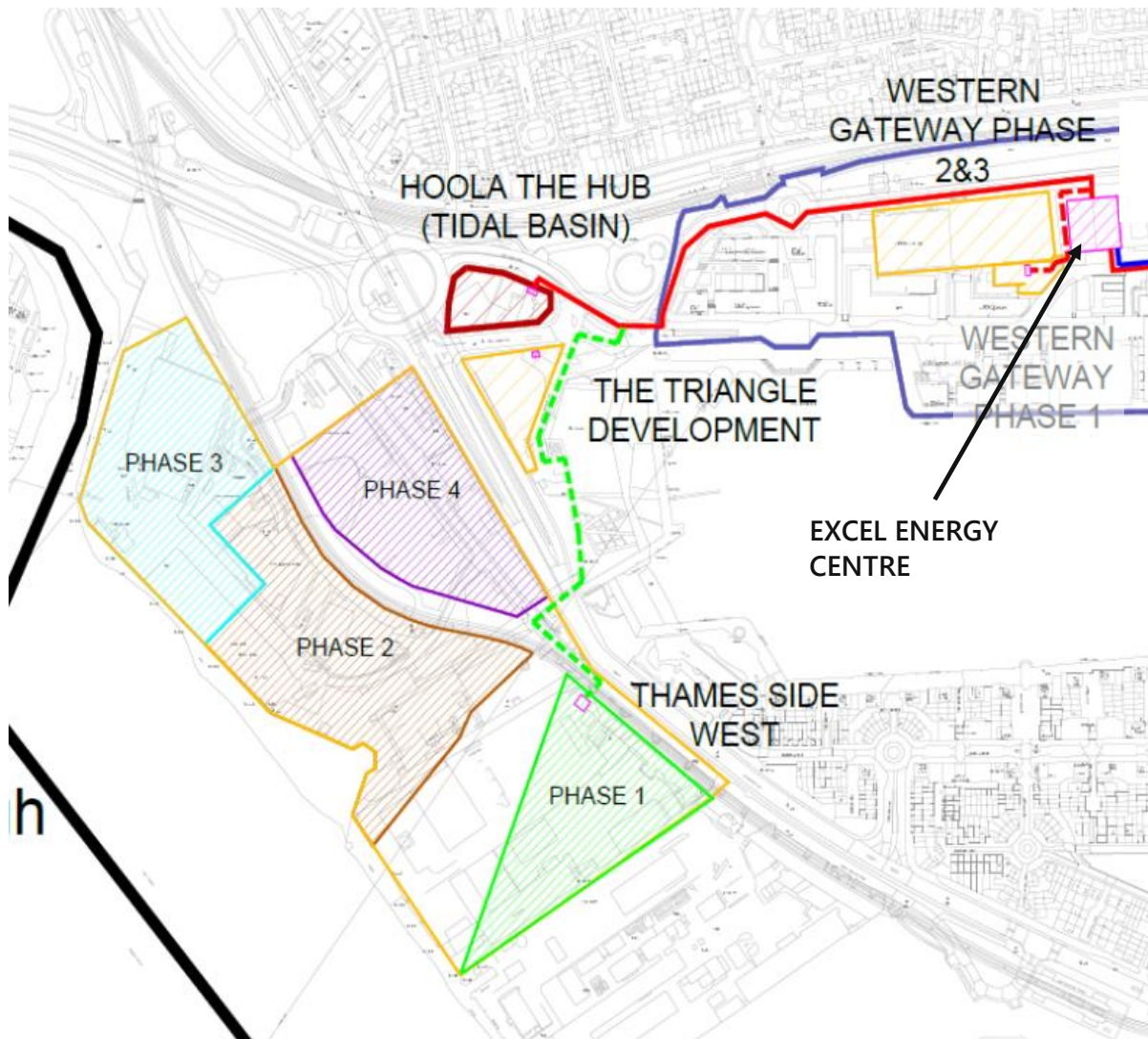


Figure 8—1 Excel Energy centre and district heat network map – with connection options to the Thameside West site (shown in heat phases)

Technical risks and challenges

Through exploration between the applicant and ENGIE, a few key risks for the existing DHN to provide heat to the full TSW site have been identified. These are as follows:

1. **CHP-led** – The current heat network has a CHP engine as a ‘Low carbon asset’ with no plan or space provision to add additional heat pumps or other into the mix. As a result, this system does not provide carbon savings with the SAP 10 carbon factors, over a GLA baseline gas boiler.
2. **Network pipe sizing** – The district heat network pipe is currently sized at DN300mm internal diameter at the further point, Hoola building. This pipe size is not large enough to provide the peak heat demand for the whole Thameside West masterplan at full build out, calculated to be 18MW.
3. **Peak boiler plant** – Finally, the peak boiler plant capacity within the Excel energy centre is not sufficient to meet the peak heat demand of the site at full build out. The energy centre could be expanded to meet this demand, however there are no plans or permission to do this currently.

As a result of these challenges, the latest proposal for the site is to connect the existing heat network to Heat Phase 1 (development phases 1-3) only. Heat phases 2-4 (development phases 4-12) would then be served by an on-site energy centre. Through several discussions with ENGIE it is understood that CHP will be required within the energy mix of any heat network connection upon commercial grounds.

As a result, it is proposed that Phase 1 is provided with a CHP-led connection; however, the longer term on-site energy centre will be led by heat pumps. This on-site energy centre will provide long-term carbon savings for the site and could provide low carbon heat for Phase 1 if required when the CHP comes to the end of life.

Table 8-1 Indicative development and corresponding heat phasing

Development Phase	Expected heat on date	Heating Phase
1	2022	1
2	2023	
3	2024	
4	2024	2
5	2025	
6	2026	
7	2027	3
8	2028	
9	2029	
10	2030	4
11	2031	

8.4 Proposed site plant phasing strategy

Figure 8—2 outlines the current proposed energy centre approach as well as the plant within each one. It is proposed that heat Phase 1 (development phases 1-3) connect to the Excel heat network. However if the connection is found to not be technically feasible or financially viable, it is proposed that these phases utilise standalone boiler systems. Current space planning has been undertaken on the assumption that standalone boilers will be required for development Phases 1 to 3 as a result.

This is considered the worst-case scenario and the connection to ENGIE's heat network will continue to be explored. A further detailed investigation by ENGIE will need to be undertaken to ensure the pipe routing and sizing is technical feasible. If the connection to development phases 1-3 is found to be technically feasible and commercial terms are agreed then it is expected that the connection will occur.

It is proposed that 'Reasonable endeavours' will be made for connection to the ENGIE network. Investigation into connection to the network will continue prior to material start on site of development phase 1. It is proposed that this investigation is written into the planning conditions. If it is found not to be feasible or viable then standalone boilers will be required prior to the on-site energy centre being delivered. The on-site energy centre is expected to be delivered for occupation of development phase 4, circa. Q4 2024.

It is proposed that the on-site energy centre will include heat pumps (ground source currently assumed) and peaking / backup gas boilers. The on-site energy centre would serve the rest of the site, shown as development phases 4-11 on the map. As the energy centre sits within the outline permission the full details and design of the systems are yet to be finalised. It is proposed that this is reviewed and agreed as part of the RMA application of the energy centre. The performance and technology application would also be reviewed by the proposed Energy Panel, see section 11.2 for more details, to ensure the best solution is proposed at the time of building (mid 2020s).

Figure 8—2 outlines the proposed on-site district heat network (DHN) in red. It also shows a potential connection route between to the two elements/strategies. The connection would be investigated further if technically and operationally feasible to connect Phases 1-3 and the on-site energy centre. This would be reviewed if:

- Phases 1-3 do not connect to the ENGIE heat network; or
- If the on-site energy centre was to be owned and operated by ENGIE.

Both of which need to be investigated further before confirming.

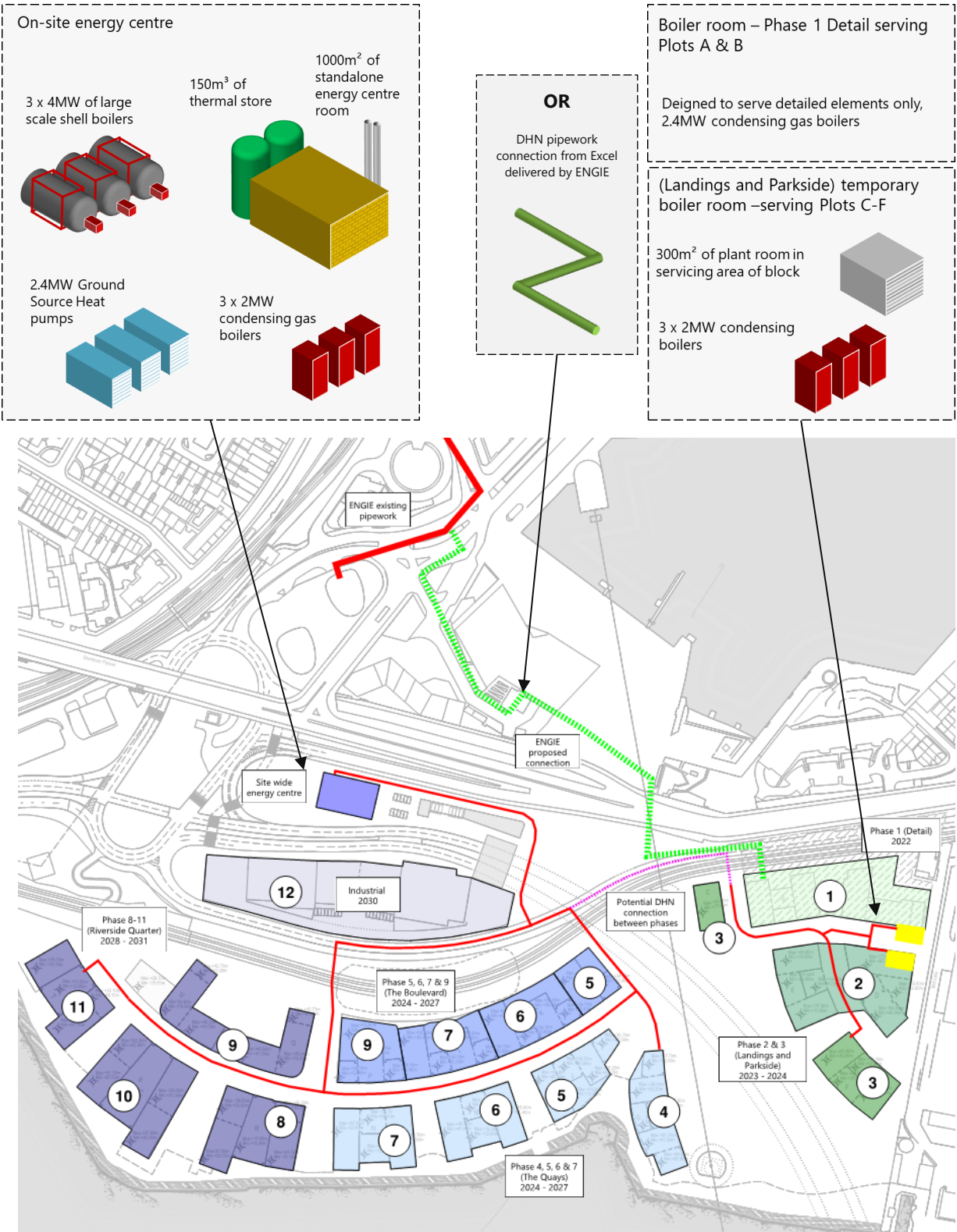


Figure 8—2 Plant room and plant phasing strategy – shown against development phases

8.5 ENGIE Heat network expected performance

It is proposed that heating Phase 1 will connect to the ENGIE district heat network. As a result the performance and operation of this system has been investigated. A site visit was undertaken by BuroHappold to review the plant as energy centre.

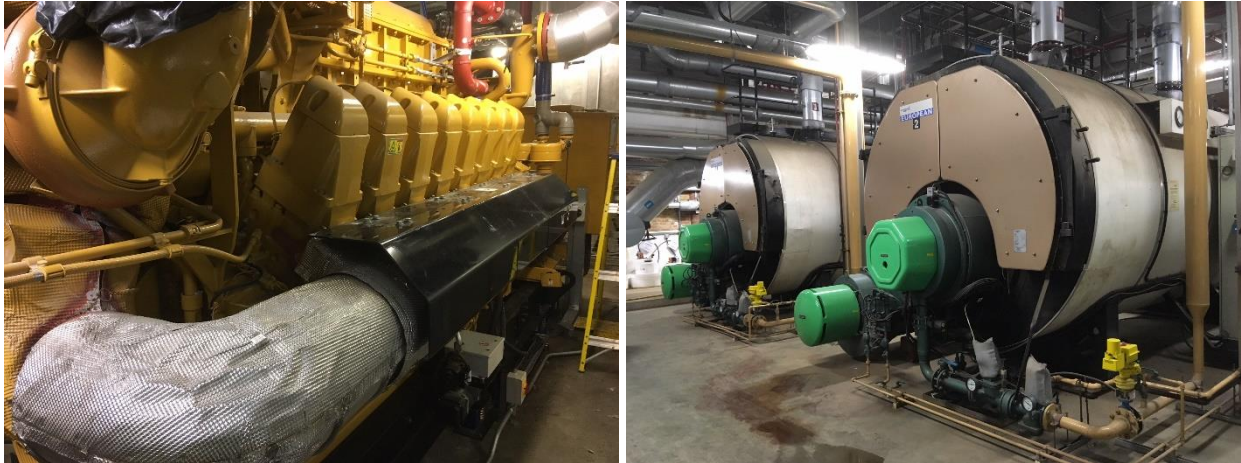


Figure 8—3 Photos of the Excel CHP engine and gas boilers from a site visit

Heating demands for the development have been provided to ENGIE. Based upon those they have provided the expected performance of the existing system within the Excel energy centre. The plant operation and resulting carbon factors of heat are outlined in Table 8-2. The Full Consumer Services includes losses up to the HIU of a dwelling and the Bulk supply includes losses up to the plate heat exchanger within non-residential areas. These figures have been used in the Clean emissions figures for development Phase 1-3, see Table 8-2 for these figures.

Table 8-2 Expected plant performance and carbon factors of heat using Part L 2013 figures for the Excel energy centre (provide by ENGIE)

Heat Split	Full Consumer Services	Bulk Supply	Units	Notes
Proportion of heat from gas boilers	20.0%	20.0%		Operational Assumption
Proportion of heat from CHP	80.0%	80.0%		Operational Assumption
Heat losses (% of heat generated)				
Primary Heat losses % of heat generated	5.0%	5.0%		Assumption
Secondary Heat losses % of heat supplied to secondary network	15.0%	0.0%		Assumption
Total Heat losses % of heat generated	19.3%	5.0%		Total loss from generator to customer meter
Distribution loss factor	1.238	1.053		Required input to SAP = 1/(1-%heat loss)
Generator and network efficiencies				
Energy Centre Gas Boiler Efficiency	82.00%	82.00%		Real operational data
Energy Centre CHP Thermal Efficiency	37.53%	37.53%		
Energy Centre CHP Electrical Efficiency	37.03%	37.03%		Based on HHV values
Parasitic electricity factor	0.010	0.010		
Carbon emission factors				
Mains Gas	0.216	0.216	kgCO ₂ /kWh	Part L 2013 SAP 2012 - This is to be used until SAP 2016 comes along
Grid Supplied Electricity	0.519	0.519	kgCO ₂ /kWh	Part L 2013 SAP 2012 - This is to be used until SAP 2016 comes along
Grid Displaced Electricity	-0.519	-0.519	kgCO ₂ /kWh	Part L 2013 SAP 2012 - This is to be used until SAP 2016 comes along
Total Emission Factor per Unit of Heat (kgCO₂/kWh)	0.135	0.114	kgCO₂/kWh	

8.6 Boiler rooms serving Plot A-F

If a connection to the ENGIE heat network is found to not be technically feasible or commercial terms cannot be agreed prior to material start on site, standalone boiler rooms are proposed for Phases 1 to 3. This section outlines the current design assumptions for these plant rooms.

It is proposed that Phase 1 is standalone, therefore another plantroom within the Landings and Parkside will be required. This is proposed to be located in Block D/E. The indicative locations of these are shown in Figure 8—4.

A preliminary layout has been set out assuming ground level access. This is indicative and will be subject to detailed design based on the plot, location and structural columns present. This has been outlined in Figure 8—5.

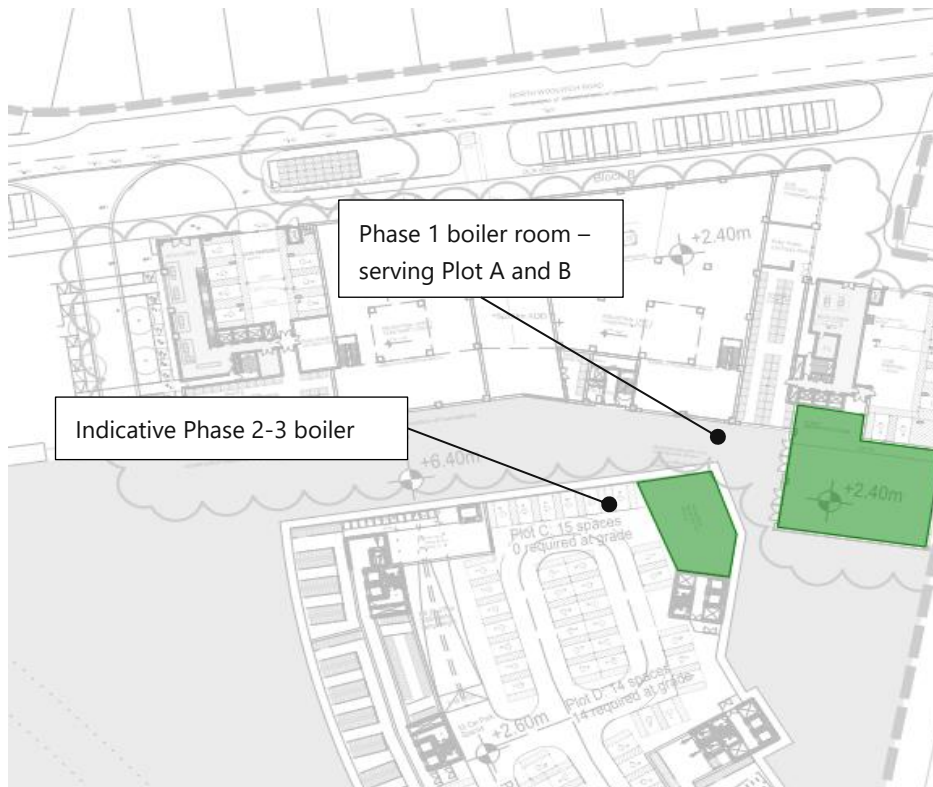


Figure 8—4 Proposed locations for the Phase 1 boiler room and phases 2-3 boiler room

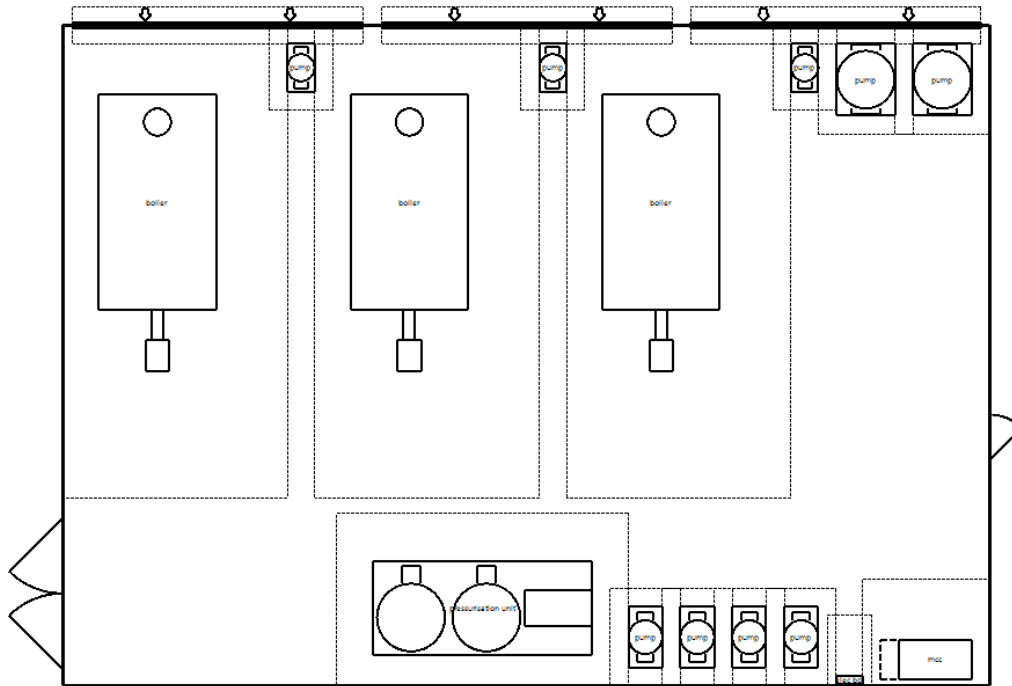


Figure 8—5 Indicative boiler room layout

Contents of boiler room

The energy centre shall include:

- 3 No. 2000 kW boilers (n+1)
- Pumps
- Ancillary equipment
- Water treatment + pressurisation
- Gas booster
- Control panels for kit
- Exhaust flue

Boiler room requirements

- **Location** – it is proposed that the boiler room is located in either development plot E or D. These have been chosen as they are understood to be within Phase 2 of the development. Plot E is considered tallest and therefore this location would be most technically feasible for flue position and emissions dispersion.
- **Dimensions and size** – a boiler room space of ~200m² should be allowed for, with a current layout requiring a 16.5m x 12m x 4m [WxLxH] sized room. Minimum 1m clearance height required internally. Minimum 4m internal height will be required for plant replacement and maintenance.
- **Arrangement of plant** is subject to detailed design and should be coordinated with the structural grid.

- **Capacity** - the energy centre will be designed to accommodate heat loads for the proposed development which included development plots C-F. It is proposed that 6MW of boiler plant along with associated ancillary plant will be required. It is expected that this boiler room will be decommissioned and the boilers moved to the on-site energy centre, in order to reduce the total number of plant rooms across site and reduce capital expenditure.
- **Ventilation** – There must be sufficient access to fresh air supply to the energy centre for internal combustion and exhaust ventilation air. At least one of the wall should be located on an external frontage, louvered to allow for free air movement.
- **Access** – the boiler room must be accessible for installation and maintenance purposes. This should include heavy vehicle access for equipment loading/off-loading. Access should be via the external walled area with 1m clearance height. The external wall could be demountable/hinged or internal access through the car park/back of house spaces.

8.7 On-site energy centre design and expected performance

8.7.1 Overview

As previously mentioned, an onsite energy centre will be required in order to house heat pump and gas boiler plant to meet the demands of the later phases of the development.

A heat network will be required around the development to provide distribution of heat to buildings. Possible network routing is shown in Figure 8—6. Adoption of the site wide energy centre serving phases 4 to 12 is expected and commercial arrangements will need to be in place in order to facilitate the connection of heat networks as indicated in the dashed orange line.

The on-site energy centre is to be located to the North of the development site area, as shown in Figure 8—6. Based on indicative plant selection and layout, an energy centre area in the region of 1000m² has been provided. A preliminary layout has been set out within the area provided by the architect in Figure 8—9, to confirm that sufficient space has been allowed for the energy centre.

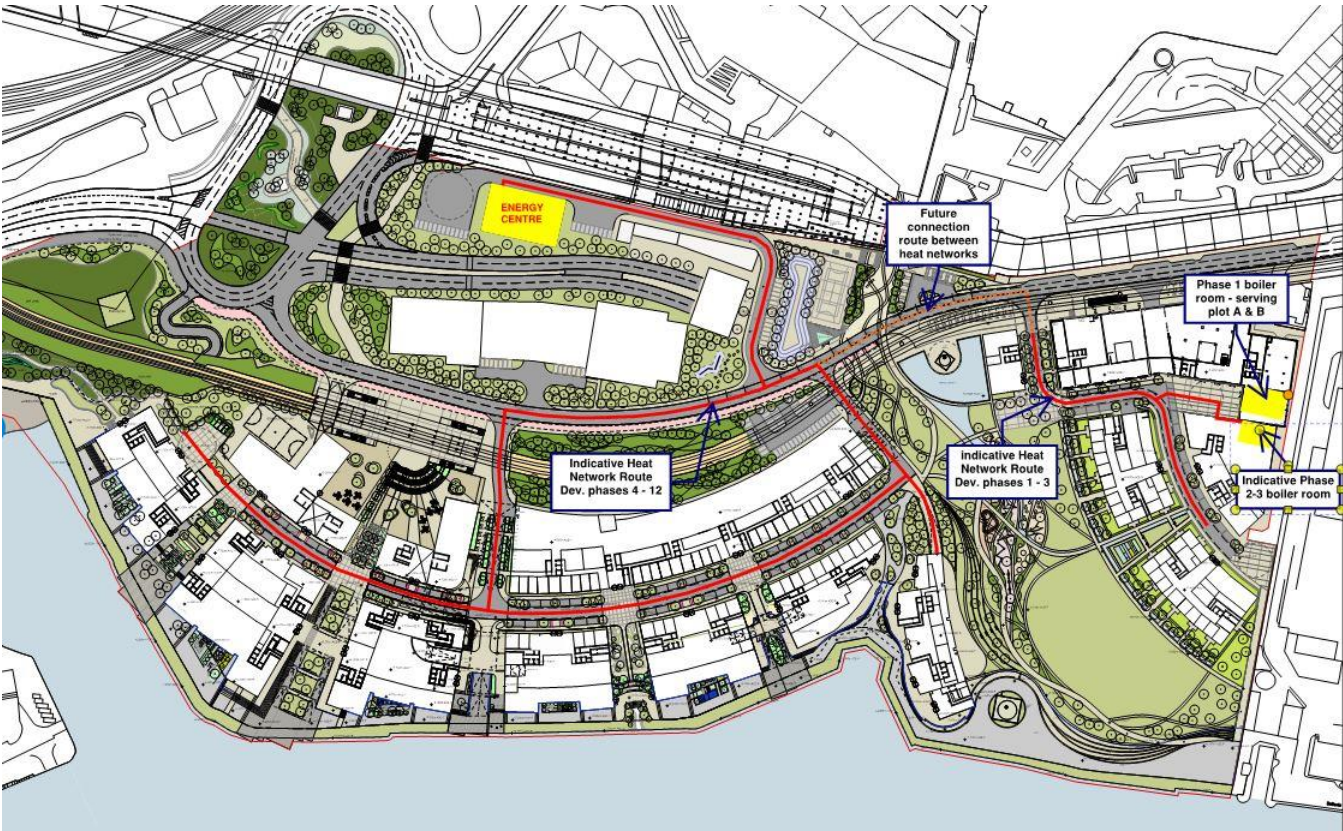


Figure 8—6 Energy Centre Location and indicative heat network routing

8.7.2 Annual loads

The total annual load is estimated at ~12.7 GWh at full build out. Energy modelling software EnergyPro has been used to create energy profiles, analyse the heat demand data and the potential energy centre operation. This has been undertaken to select the optimum heat pump capacity. The heat load duration curve is presented in Figure 8—7.

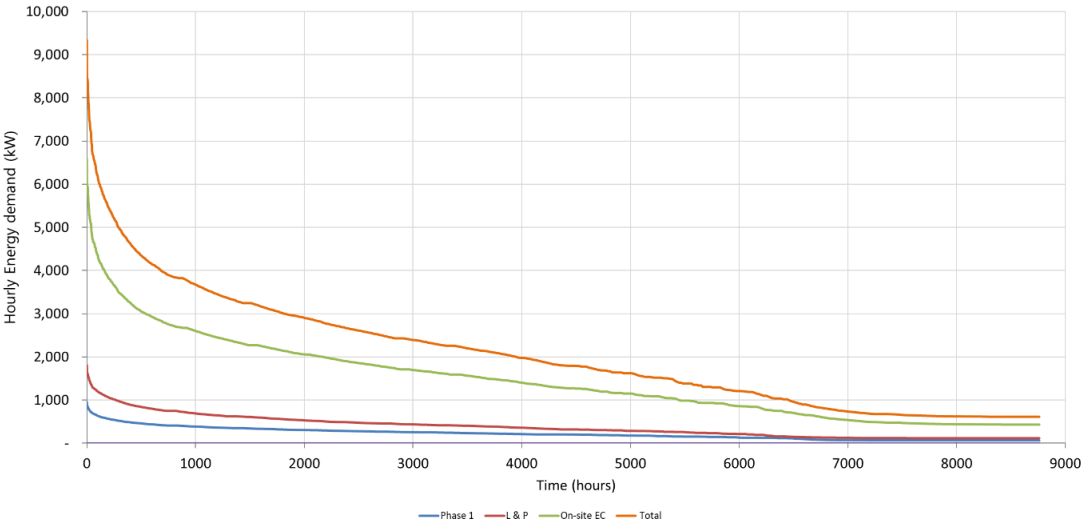


Figure 8—7 Load duration for Phase 1, L&P, Onsite EC and Total

8.7.3 Energy centre design and predicted operation

The energy centre has been designed to provide both peak capacity and also to meet the annual heat demand. The Energy Centre will contain 6 no. 0.3MW heat pumps sized to meet the summer baseload and provide the required annual heat fraction for residential carbon reductions.

Figure 8—9 provides an indicative annual heat demand profile for hourly averaged peak values, this shows the profile for all typologies in the development. It shows that the daily summer baseload is approximately 1.6 - 2 MW.

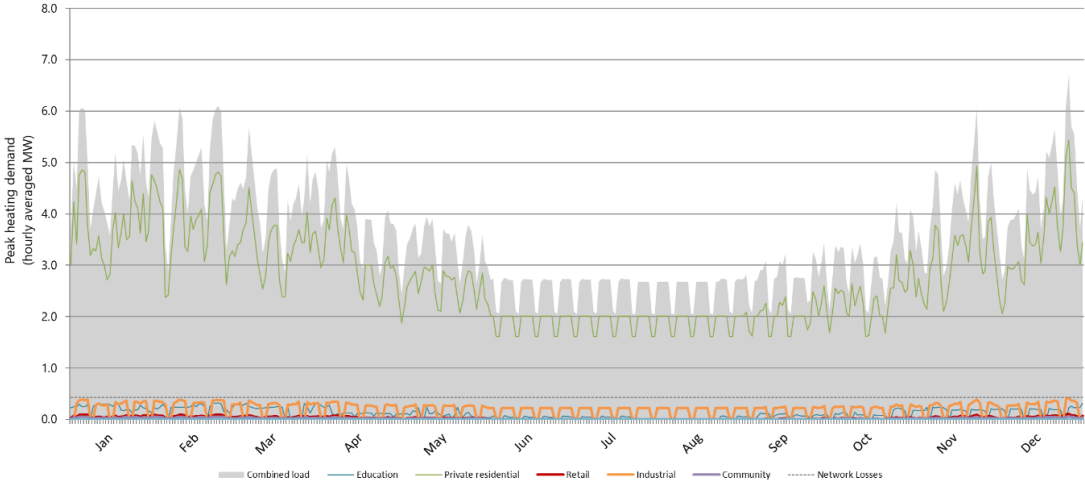


Figure 8—8 Indicative annual load profile for full build out

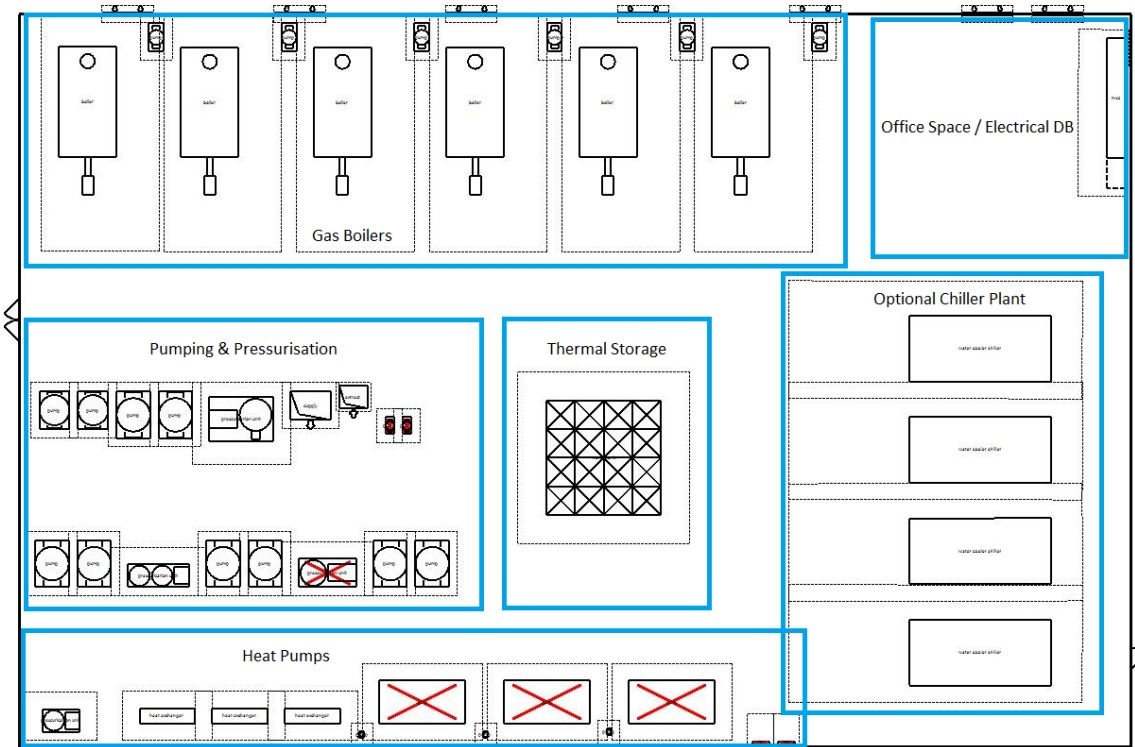


Figure 8—9 Indicative energy centre layout (1000m²)

8.7.4 Contents of Energy Centre

The energy centre shall include:

- 6 No. 0.3 MW Heat pumps (n+1)
- 6 No. 3 MW boilers (n+1)
- Min 100m³ thermal storage
- System Pumps
- Ancillary equipment
- Water treatment + pressurisation
- Gas booster equipment
- Office and welfare facilities
- Control panels for kit
- Exhaust flue

8.7.5 Energy Centre requirements

- **Timing** – the main energy centre structure should be operational before the fourth development phase, 2024. Plant shall gradually be operational as further development phases come online.
- **Capacity** - the energy centre will be designed to accommodate heat loads for the proposed development, which includes development phases 1 to 3. Around 3MW of heat pump and 18MW of boiler plant along with associated ancillary plant will be required. Space for chilled water plant has been made although no cooling requirement has currently been included in the energy strategy.
- **Arrangement of plant** is subject to detailed design and should be coordinated with the structural grid.
- **Thermal store** installation is a physically tall element and can require external installation or sinking within the EC depending on volume and height. 2no. 75m³ thermal stores are proposed at dimensions of 3.5m diameter x 7m tall with a 3m clearance for maintenance. These however could be located externally to reduce the height of the building.
- **Free height** – Minimum 3m clearance height required internally for heating and cooling plant. Minimum 10m height required for the energy centre with thermal storage internally. If these are located externally, minimum 8m height required for the energy centre.
- **Flues** – a flue stack must be provided for exhaust gases from combustion processes that meets minimum height requirements for plume dispersion. Typically exhaust should be 3m above the highest point in relation to the surrounding buildings.
- **Ventilation** – There must be sufficient access to fresh air supply to the energy centre for internal combustion and cooling of equipment and exhaust of ventilation air. As the energy centre is located at ground level this will be a louvered grill area.

- **Air quality** – exhaust from energy centre equipment must meet minimum air quality standards – dispersion modelling will be required to prove this compliance to policy requirements. Initial modelling has been carried out and is outlined in the Air Quality chapter.
- **Access** – the energy centre must be accessible for installation and maintenance purposes. This should include heavy vehicle access for equipment loading/off-loading. Access should be via the roundabout with a minimum 3m clearance height. Access facilities should allow for the manoeuvring of equipment of approx. outer dimensions [WxHxL] 2.5x2.5x8m and of mass ~12,000kg.

8.8 Ground and water energy sources – spatial requirements

In order to drive the heat pump plant located within the main energy centre, a source of energy is required in the from the ground to feed into the heat pumps. Energy can be taken from the ground via either an open or closed loop system. More detailed modelling and investigation is required to determine whether an open or closed loop system should be installed within the development. In the case of an open loop system it will be necessary to determine the “yield” or flow rate that can be achieved from extracting water from potential underground aquifers. This requires a detailed hydrological survey of the area and pilot wells to be drilled.

In the case of a closed loop system it will be necessary to undertake further investigation to determine the availability of heat from the ground and the number of boreholes required. Initial calculations suggest that a total of 150 boreholes at ~200m depth would be needed at full build out within the development to meet peak loads.

8.8.1 Ground array

Open loop systems

When operating in heating mode, Ground Water Source Heat Pumps (GWSHP) pump groundwater from one or more wells at an abstraction point to provide energy for a heat pump system. Open loop systems generate water flow through a circuit that requires discharge which is the key difference with closed loop systems. In heating mode, the water for discharge shall be cooler than the originally abstracted groundwater.

GWSHP's require around 100m separation between the abstraction and discharge points. In order to meet the heating demand at full build out around 8 abstraction and 8 disarrange wells would be required.

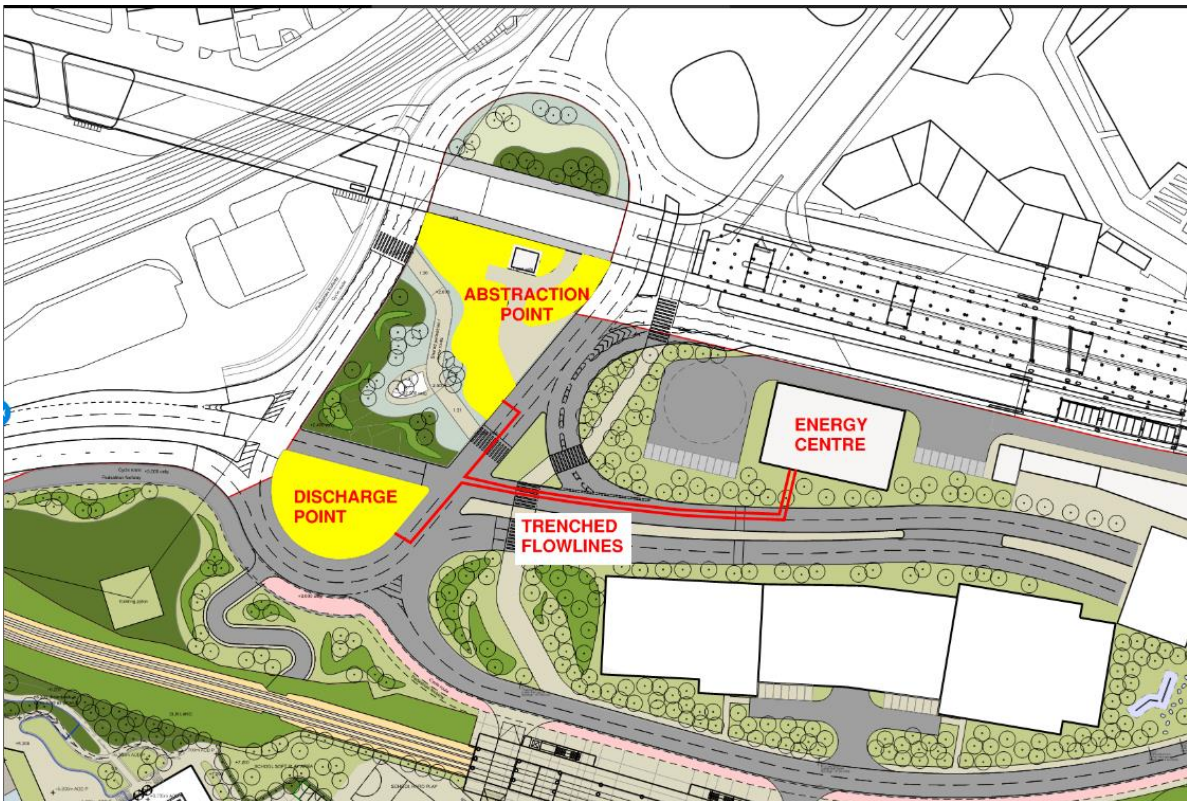


Figure 8-8 Indicative open loop well location and connection to energy centre

8.8.2 Closed loop systems

A closed loop ground source heat pump (CLGSHP) system hydraulically separate the circulating fluid within the system from the ground. Heat is transferred from the ground to the circulating fluid via the casing that forms the borehole. A borehole array would be required for to extract heat from the ground.

In the case of proceeding with a closed loop system, a borehole field will be required. A candidate location for the borehole field is within the roundabout area located to the North east of the development. This location offers close proximity to the energy centre, minimising capital costs for flowlines as well as a lowering operational costs for pumping power.

Around 150 closed loop boreholes at 200m depth with a minimum 5m spacing would be required.

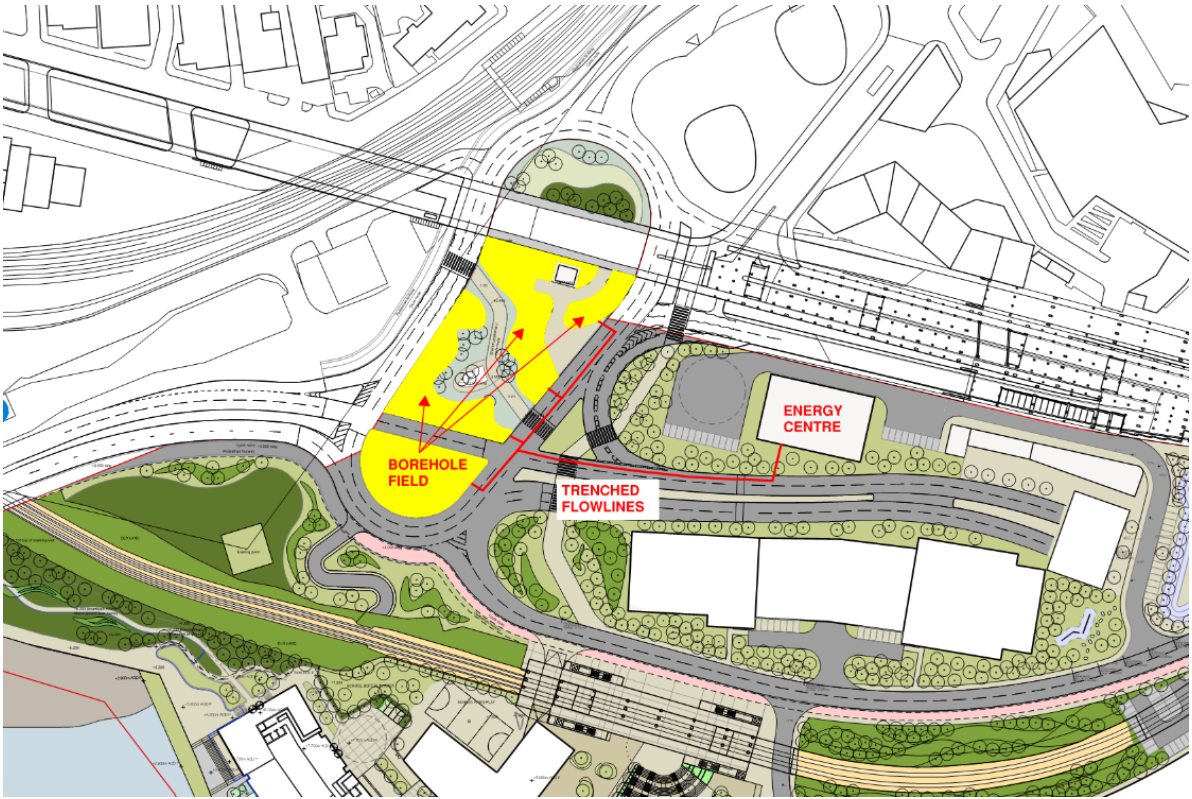
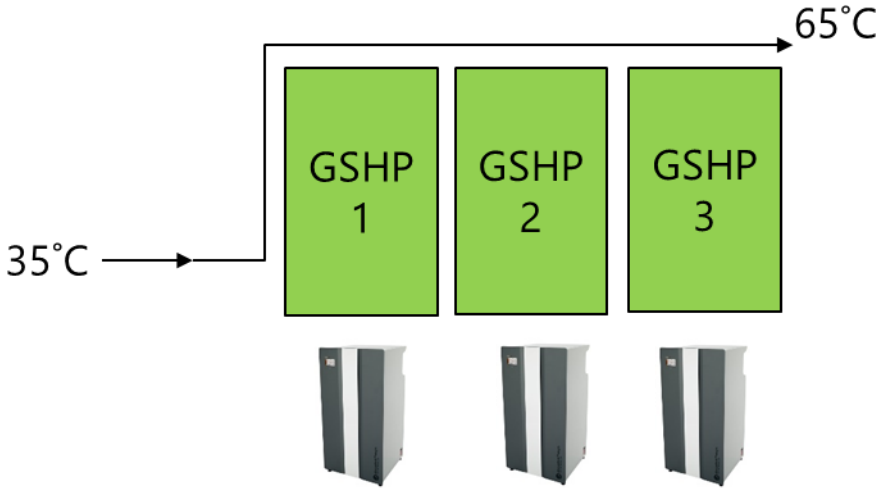
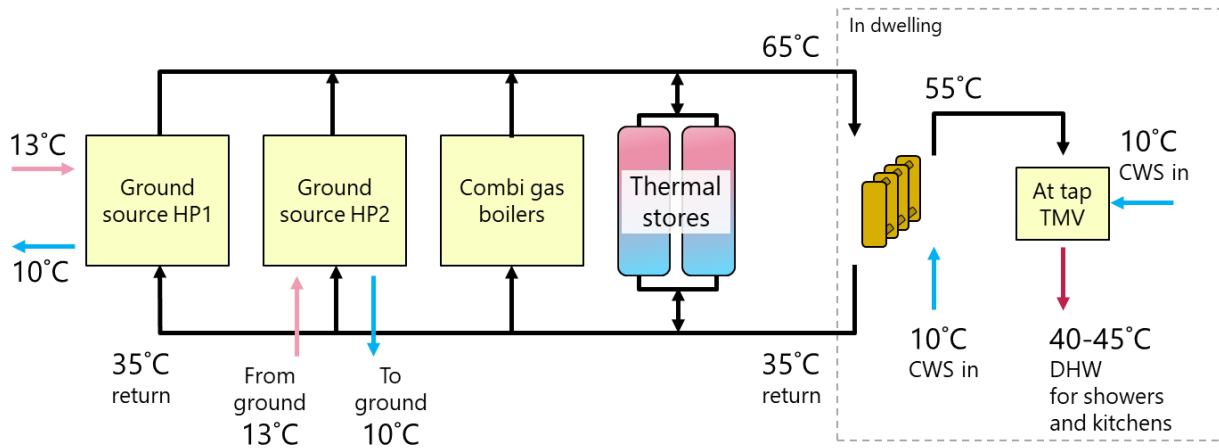


Figure 8-9 Geothermal array location – around 150 boreholes would be required

8.9 Ground Source Heat pumps operational strategy

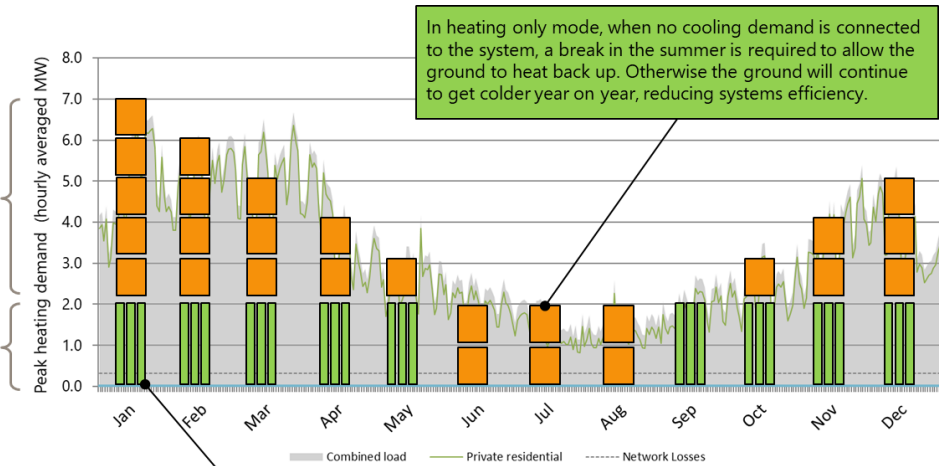
In order to improve efficiencies a technique of boosting heat within the heat pumps involves cascading the heat lift as illustrated below.





Major boiler plant provides peak heat demands ~ 40-30% of the annual demand

GSHPs base load heat and sized to run at maximum load for as long as possible (combined with thermal store) ~ 60-70% of the annual demand



Boreholes are buried deep to ensure that diurnal and seasonal air temperature changes do not affect input temperature. Expected that ground temperature maintains at least 13°C all year round. This allows the GSHP to provide 60-65°C output temperatures (avoiding gas top up).

Table 8-3 Energy centre and system design parameters

Phase 1 Energy Centre parameter	Unit
Heat pump output capacity	3no. 1MW
Heat pump flow and return temp C°	35-65 C°
Heat pump annual Seasonal Performance Factor (SPF)	4.0
Thermal Store volume	2 no. 75 m ³
Expected % heat demand from heat pumps	60%
Gas boiler capacity	6 no. 3000 kW
Top up gas boiler Flow and return temp C°	55-68 C°
Gas boiler efficiency	95%
Heat network losses	30%
Pumping energy	3%
Carbon intensity of heat (using Part L 2013 carbon factors)	0.235 kg CO ₂ /kWh
Carbon intensity of heat (using BRE carbon factors 2022)	0.165 kg CO ₂ /kWh
Carbon intensity of heat (using BRE carbon factors 2025)	0.155 kg CO ₂ /kWh

8.10 Transition plan and carbon reporting

As outlined there are two key elements to the heat network strategy:

1. Potential connection of Phases 1-3 to the ENGIE heat network
 - a. CHP led with gas top up boilers
 - b. Carbon intensity of heat 0.135 kg CO₂/kWh using Part L 2013 carbon factors
 - i. 0.114 kg CO₂/kWh for non-residential
2. On-site energy centre for phases 4-12
 - a. Heat pumps with gas top up boilers
 - b. Carbon intensity of heat ~0.16 kg CO₂/kWh using future carbon factors (see Table 7-2)

It is proposed that Phases 1-3 use ‘Reasonable endeavours’ to review and connect to the Excel DHN. The technical and commercial details of the connection are yet to be finalised and agreed. The connection proposal will continue to be reviewed. If connection does occur Part L 2013 carbon factors will need to be used to show carbon savings for this element of the development, as the systems is CHP led. It is proposed that the connection is reviewed through a planning condition or S106 agreement for the detailed phase 1 and through a reserved matter for phases 2 and 3.

Future phases outline a transition plan away from CHP only to a heat pump dominated heat network on-site. This energy centre design and operation is in outline consent. It is therefore proposed that the detailed design of the future energy systems and heat provision of the site is a reserved matter for phases 4-12. The energy review panel will review the design and studies required to facilitate long term carbon savings for the site as a whole.

8.11 ‘Clean’ CO₂ emissions

The table below summarises the reductions in regulated CO₂ emissions derived from the connection to ENGIE Excel heat network for Phases 1-3 and connection to an on-site energy centre with heat pumps for future phases.

Table 8-4 Predicted detailed phase 1 Clean CO₂ emissions

	Detailed Phase 1				
	Baseline Regulated CO ₂ Emissions		Clean Regulated CO ₂ Emissions		
Typology	kg CO ₂ /m ² /year	Tonnes CO ₂ /year	kg CO ₂ /m ² /year	Tonnes CO ₂ /year	% improvement over Baseline
A1/A2/A3 - Retail	46.9	7.2	33.0	5.1	29.8%
B2/B8/B1a - Industrial	26.7	87.0	18.1	59.0	32.1%
C3 - Apartments	14.4	471.7	8.9	292.1	38.1%
Total	15.6	565.8	9.8	356.3	37.0%

Table 8-5 Predicted detailed phase 1 & masterplan Clean CO₂ emissions

Typology	Phase 1 & Masterplan				
	Baseline Regulated CO ₂ Emissions		Clean Regulated CO ₂ Emissions		
	kg CO ₂ /m ² /year	Tonnes CO ₂ /year	kg CO ₂ /m ² /year	Tonnes CO ₂ /year	% improvement over Baseline
A1/A2/A3 - Retail	26.3	184.1	18.7	131.2	28.7%
B2/B8/B1a - Industrial	14.3	264.4	9.6	176.7	33.2%
Semi-Private	7.9	6.2	6.0	4.7	24.6%
C3 - Apartments	13.0	4258.5	8.3	2718.7	36.2%
D1/D2 - Community	8.4	22.3	6.4	17.0	23.7%
D1 - Education	7.9	32.0	6.0	24.1	24.6%
Total		4767.5		3072.5	35.6%

9 Energy: Renewable Energy - 'Green'

9.1 Overview

A feasibility study has been carried out to evaluate the pros and cons of various renewable energy technologies on the masterplan. The most viable 'green' technology identified was solar photovoltaic (PV). The main planning issues to consider with this technology is the visual impact, panel spacing and overshadowing.

Other technologies that would normally be viable for this type of building include solar thermal panels; however, since the development is being assessed under the London Energy Plan, connection to the ENGIE heat network or to a site-wide energy centre have priority over other heating sources. Technologies not deemed feasible for the project include biomass heating due to challenges associated with air quality impacts and also because it conflicts with the heat network connection. Stand-alone or roof mounted wind turbines are not deemed viable due to low energy yields and unreliability.

9.1.1 Site-wide photovoltaic strategy

A site-wide solar exposure study has been conducted across the masterplan to identify solar access to varying solar PV panel orientation and designs. Each roof has been assessed for the most efficient panel orientation and design based upon the localised shading. Only the highest performing locations for energy generation have been chosen.

Figure 9—1 shows the proposed solar PV locations across the masterplan. Indicative lift overruns have been placed on outline elements to understand the potential impacts of localised roof level shading.



Figure 9—1 Indicative site wide and detailed Phase 1 solar PV allocation

Table 9-1 indicative site wide solar PV expected by development Phase

Development Phase	kWh produced per roof (kWh/yr)	kWp per roof	No of panels	Average kWh/kWp
1	25,390	25	99	1026
2	39,381	39	154	1023
3	18,957	19	74	1025
4	-	-	-	-
5	5,351	6	23	931
6	27,939	30	120	931
7	21,564	23	93	927
8	11,788	12	46	1025
9	44,379	45	179	992
10	14,879	15	58	1026
11	10,674	11	42	1017
12	-	-	-	-
Total	220,301	222	888	n/a

Table 9-2 indicative site wide solar PV expected by plot

Plot	kWh produced per roof (kWh/yr)	kWp per roof	No of panels	Spacing (m)	Angle
A	12,575	12.25	49	1.2	30
B	12,815	12.5	50	1.2	30
C	-	-	-	-	-
D	23,985	23.5	94	1.7	30
E	15,396	15	60	1.2	30
F	18,957	18.5	74	1.7	30
G	-	-	-	-	-
H	5,351	5.75	23	1.2	30
I	-	-	-	-	-
J	-	-	-	-	-
K	15,315	16	64	1.2	30
L	5,880	6.5	26	1.2	30
M	12,624	14	56	1.2	30
N	15,683	16.75	67	1.2	30
O	-	-	-	-	-
P	8,487	9.75	39	1.2	30
Q	16,114	15.75	63	1.2	30
R	11,788	11.5	46	1.2	30
S	14,879	14.5	58	1.2	30
T	10,674	10.5	42	1.2	30
U	19,777	19.25	77	1.7	30
V	-	0	0	-	-
Total	220,301	222	888		n/a

Table 9-3 Solar PV modelling inputs and assumptions

Solar PV panel parameter	Input
Panel capacity	0.25 kWp
Panel Type	Monocrystalline
Solar reflectance	80%
Panel conversion efficiency	16%
Inverter efficiency	95%
Cable losses	5%
Area per collector	1.95 m ²

Solar PV on detailed phase 1

From the masterplan analysis, PV panels for the detailed phase 1 have found to be technically feasible based upon the shading analysis. Three arrays are proposed on roofs of Plots A.2, B.1 and B.2. Figure 9—2 below shows the proposed PV installations across the residential roofs.

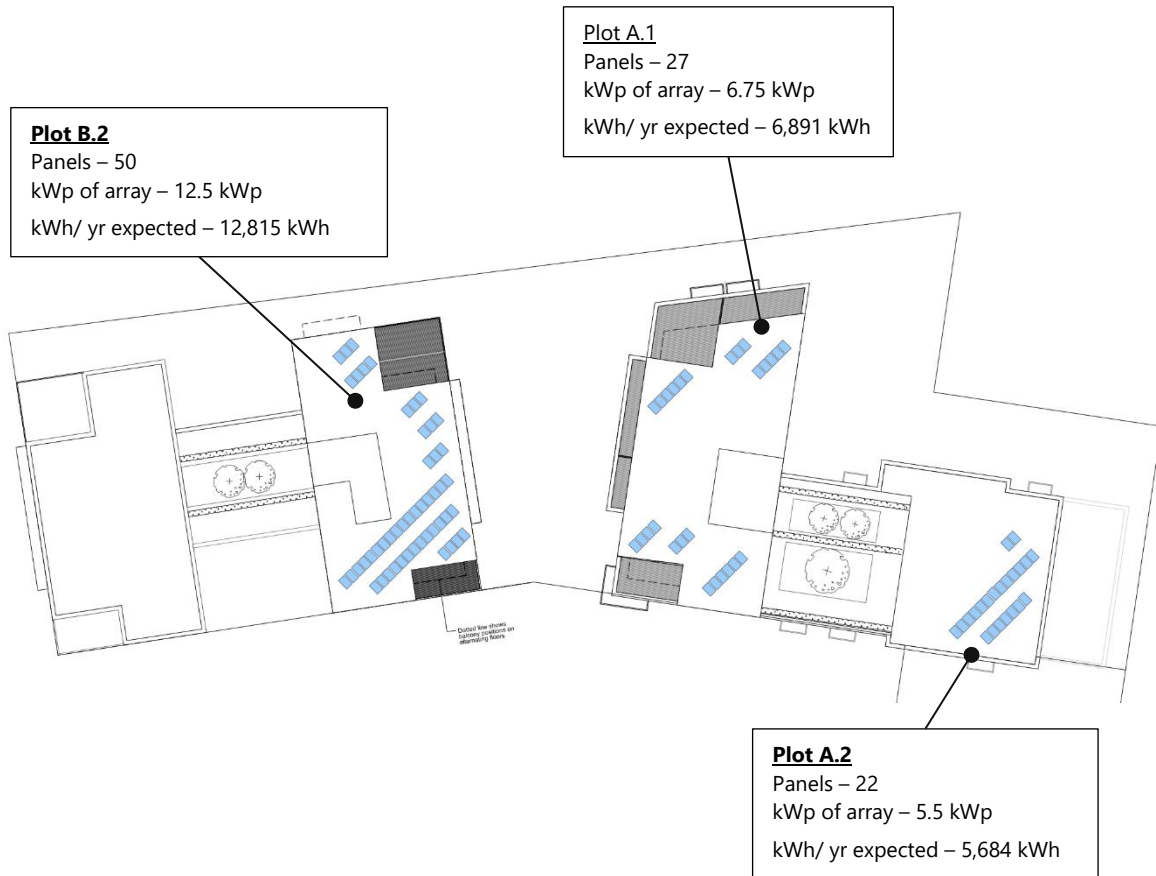


Figure 9—2 Proposed Solar PV areas/arrays for the detailed application elements

The proposed PV installations on residential roofs are summarised in Table 9-4 below.

Table 9-4 Solar PV output expected from detailed phase 1

Residential core	kWh produced per roof (kWh/yr)	kWp per roof	No of panels	Average kWh/kWp	Kg of CO ² offset (part L 2013) (kg/CO ² /yr)	Kg of CO ² offset (SAP 10) (kg/CO ² /yr)
B.1	-	-	-	-		
B.2	12,815	12.5	50	1025	6,651	2,986
A,1	6,891	6.8	27	1021	3,577	1,606
A.2	5,684	5.5	22	1033	2,950	1,324
Total	25,390	25	99		13,178	5,916

9.2 'Green' CO₂ emissions

With the implementation of renewable energy strategies across the masterplan, the following regulated CO₂ emissions are predicted for each building type.

Table 9-5 Predicted detailed phase 1 Green CO₂ emissions

	Detailed Phase 1				
	Green Regulated CO ₂ Emissions		Green Regulated CO ₂ Emissions		
Typology	kg CO ₂ /m ² /year	Tonnes CO ₂ /year	kg CO ₂ /m ² /year	Tonnes CO ₂ /year	% improvement over Baseline
A1/A2/A3 - Retail	46.9	7.2	33.0	5.1	29.8%
B2/B8/B1a - Industrial	26.7	87.0	18.1	59.0	32.1%
C3 - Apartments	14.4	471.7	8.5	279.0	40.9%
Total	15.6	565.8	9.5	343.1	39.4%

Table 9-6 Predicted detailed phase 1 & masterplan Green CO₂ emissions

	Phase 1 & Masterplan				
	Green Regulated CO ₂ Emissions		Green Regulated CO ₂ Emissions		
Typology	kg CO ₂ /m ² /year	Tonnes CO ₂ /year	kg CO ₂ /m ² /year	Tonnes CO ₂ /year	% improvement over Baseline
A1/A2/A3 - Retail	26.3	184.1	18.7	131.2	28.7%
B2/B8/B1a - Industrial	14.3	264.4	9.6	176.7	33.2%
Semi-Private	7.9	6.2	6.0	4.7	24.6%
C3 - Apartments	13.0	4258.5	8.1	2650.0	37.8%
D1/D2 - Community	8.4	22.3	6.4	17.0	23.7%
D1 - Education	7.9	32.0	6.0	24.1	24.6%
Total		4767.5		3003.8	37.0%

10 Energy Hierarchy Conclusions

10.1 Resulting site-wide CO₂ emissions

The Lean, Clean and Green analysis results have been collated in the format required for the planning submission as outlined in the Energy Planning, GLA guidance on preparing energy assessments, March 2016.

Masterplan CO₂ emissions

Figure 10—1, Table 10-1, Figure 10—2 and Table 10-2 shows that across residential and non-residential elements of the masterplan as a whole, a 38% carbon reduction is expected for domestic and 31% for non-domestic. These figures have been generated using Part L 2013 carbon factors for Phases 1-3 and future carbon factors for the other phases (namely, Part L 2022 for Phase 4-5 and Part L 2025 for Phase 6-12) .

The graph shows the savings from energy efficiency (Be Lean), connection to the ENGIE heat network for phases 1-3 and a site-wide heat network for other phases (Be Clean) as well as solar PV on site (Be Green). It also outlines that the resulting 62% of site wide carbon emissions will need to be offset in line with GLA zero carbon policy.

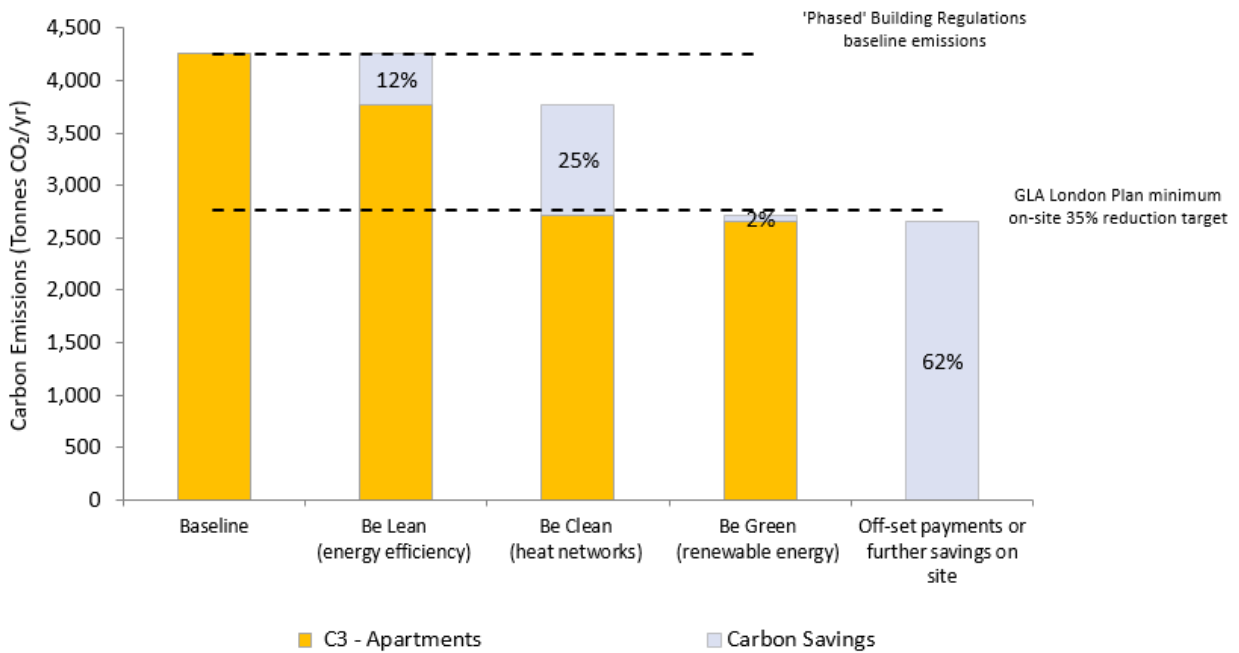


Figure 10—1 Phase 1 & Masterplan Residential carbon emissions through the energy hierarchy using the Part L 2013 for Phase 1 and BRE predicted carbon factors, phased with plot RMAs

Table 10-1 Phase 1 & Masterplan residential CO₂ emissions at each stage of the Energy Hierarchy and offset requirements

	CO ₂ emissions for domestic buildings (Tonnes CO ₂ per annum)	
	Regulated	Unregulated
Baseline: 'Phased' Building Regulations Part L Compliant Development	4,258	3,591
After energy demand reduction	3,764	3,591
After heat network (Heat pumps)	2,719	3,591
After Renewable energy	2,650	3,591
	Regulated CO ₂ savings	
	(Tonnes CO ₂ per annum)	(%)
Savings from energy demand reduction	494	12%
Savings from heat network / CHP / Heat pumps	1,045	25%
Savings from renewable energy	69	2%
Cumulative on site savings	1,608	38%
Annual Savings from off-set payment	2,650	62%
	(Tonnes CO ₂)	Cash-in-lieu contribution
Cumulative savings for off-set payment (30 years)	79,500	£4,769,970

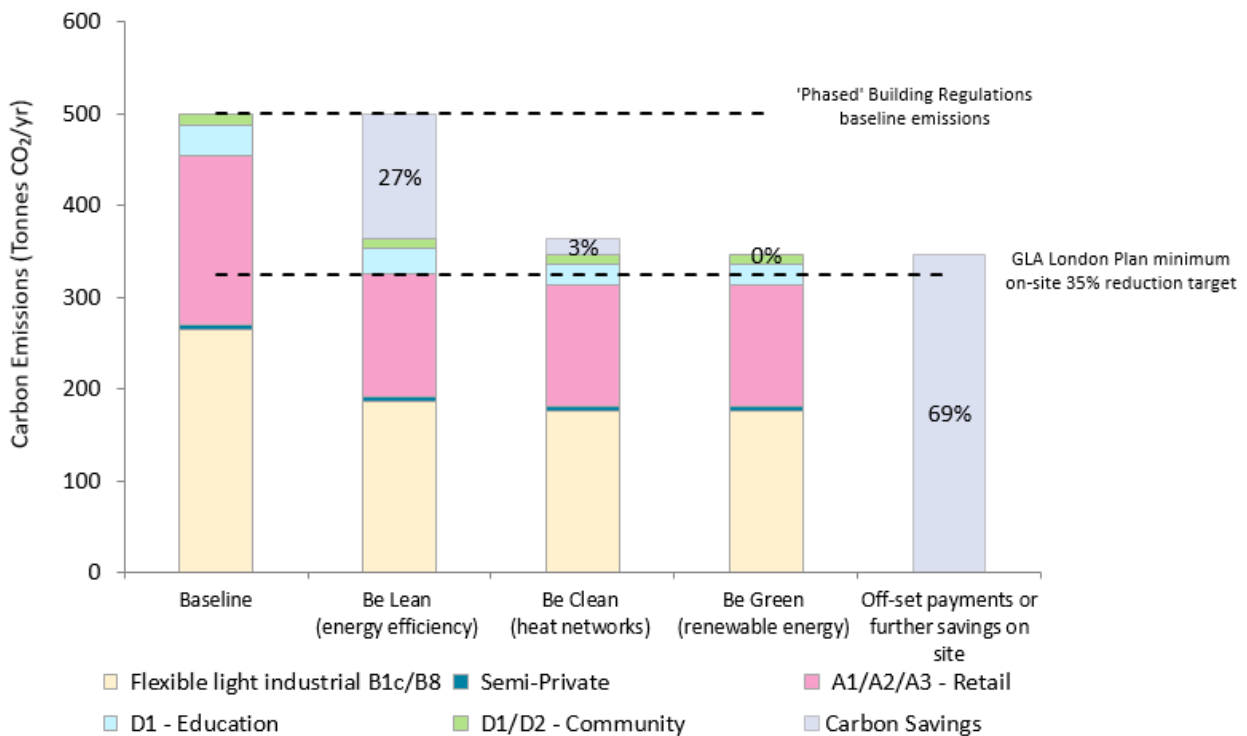


Figure 10—2 Phase 1 & Masterplan non-domestic carbon emissions through the energy hierarchy using the Part L 2013 for Phase 1 and BRE predicted carbon factors, phased with plot RMAs

Table 10-2 Phase 1 & Masterplan non-domestic CO₂ emissions at each stage of the Energy Hierarchy and offset requirements

	CO ₂ emissions for non-domestic buildings (Tonnes CO ₂ per annum)	
	Regulated	Unregulated
Baseline: 'Phased' Building Regulations Part L Compliant Development	500	156
After energy demand reduction	364	156
After heat network (Heat pumps)	347	156
After Renewable energy	347	156
	Regulated CO ₂ savings	
	(Tonnes CO ₂ per annum)	(%)
Savings from energy demand reduction	136	27%
Savings from heat network / CHP / Heat pumps	17	3%
Savings from renewable energy	0	0%
Cumulative on site savings	153	31%
Annual Savings from off-set payment	347	69%
	(Tonnes CO ₂)	Cash-in-lieu contribution
Cumulative savings for off-set payment (30 years)	10,409	£624,537

Table 10-3 Phase 1 & Masterplan domestic and non-domestic CO₂ emissions at each stage of the Energy Hierarchy and offset requirements

	Total regulated emissions (Tonnes CO ₂ /year)	CO ₂ savings (Tonnes CO ₂ /year)	Percentage saving (%)
Baseline	4,759	-	-
Be lean	4,128	631	13%
Be clean	3,066	1,062	22%
Be green	2,997	69	1%
		CO ₂ savings off-set (Tonnes CO ₂)	Cash-in-lieu contribution
Off-Set		89,908	£5,394,507

Figure 1—4 shows a breakdown of the quantum of emissions by carbon factor used and the resulting percentage on-site savings. The later phases of development, present higher percentage on-site savings as the decarbonisation of the electricity grid occurs. This accounts for 36% savings for phases 1-3 using Part L 2013 carbon factors, 34% for phases under 2022 carbon factors and 38% for phases under 2025 carbon factors).

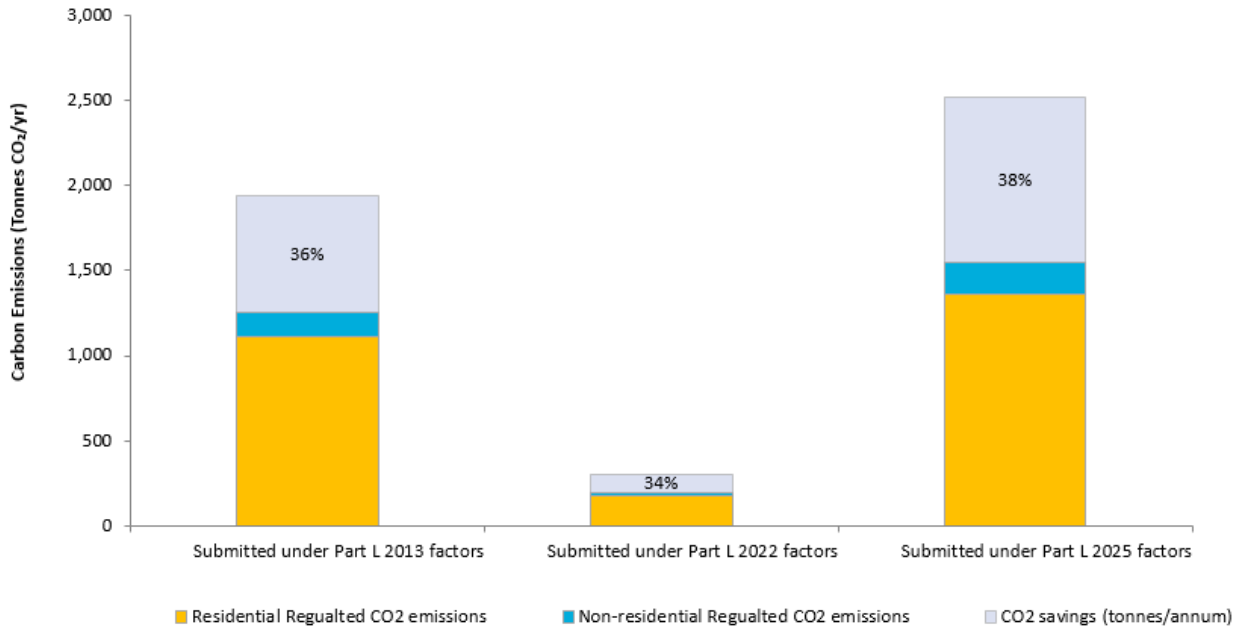


Figure 10—3 Regulated carbon reductions by carbon factor used

This will result overall in a required offset of either ~89,908 tonnes of CO₂ or ~£5,395,000 as a cash in lieu payment as part of the S106 agreement.

Phase 1 (detailed) CO₂ emissions

Figure 10—4 and Table 10-4 shows the carbon savings across residential and non-residential elements for Phase 1 detailed application only. A 39% carbon reduction is expected using Part L 2013 carbon factors.

The graph shows the savings from energy efficiency (Lean), connection to the ENGIE heat network (Clean), as well as solar PV on site (Green). It also outlines that the resulting 61% of carbon emissions will need to be offset in line with GLA zero carbon policy.

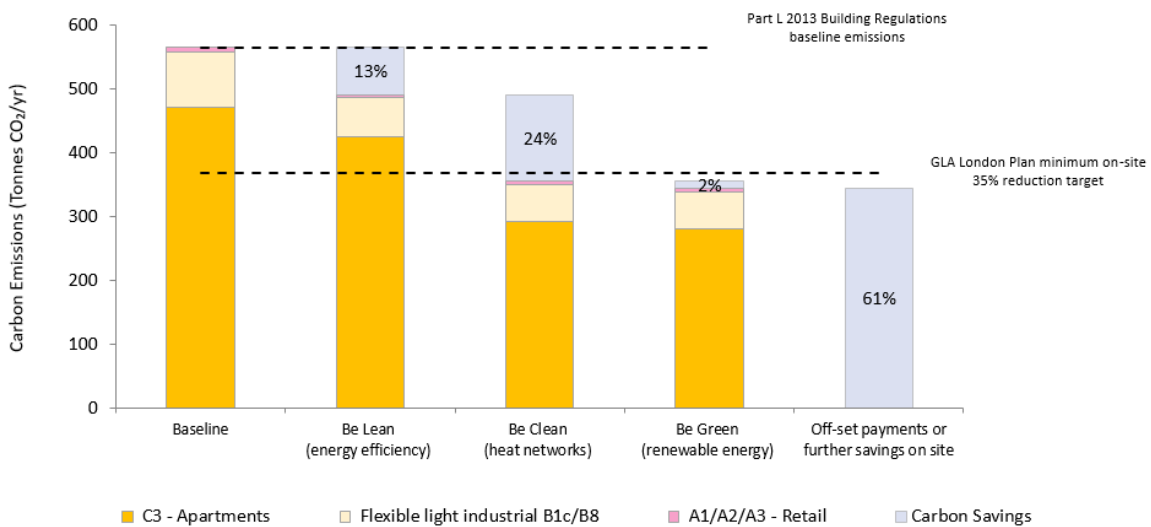


Figure 10—4 Phase 1 detailed carbon emissions through the energy hierarchy using the Part L 2013 for Phase 1 detailed elements

Table 10-4 Phase 1 detailed CO₂ emissions at each stage of the Energy Hierarchy and offset requirements

	CO ₂ emissions for domestic buildings (Tonnes CO ₂ per annum)	
	Regulated	Unregulated
Baseline: 'Phased' Building Regulations Part L Compliant Development	566	601
After energy demand reduction	492	601
After heat network (Heat pumps)	356	601
After Renewable energy	343	601
	Regulated CO ₂ savings	
	(Tonnes CO ₂ per annum)	(%)
Savings from energy demand reduction	74	13%
Savings from heat network / CHP / Heat pumps	135	24%
Savings from renewable energy	13	2%
Cumulative on site savings	223	39%
Annual Savings from off-set payment	343	61%
	(Tonnes CO ₂)	Cash-in-lieu contribution
Cumulative savings for off-set payment (30 years)	10,292	£617,535

As per the GLA guidelines, both Part L 2013 and SAP 10 carbon factors have been shown for the detailed elements. Figure 10—5 shows that the clean and green case do not meet the baseline by ~250 tonnes per annum. As a result of the SAP 10 reduced electricity emission factors, the CHP and gas boiler existing heat network does not show any carbon savings compared to a gas boiler. Therefore as a result it is proposed that Part L 2013 factors are used to judge the carbon emission in order to prioritise connection to the existing heat network.

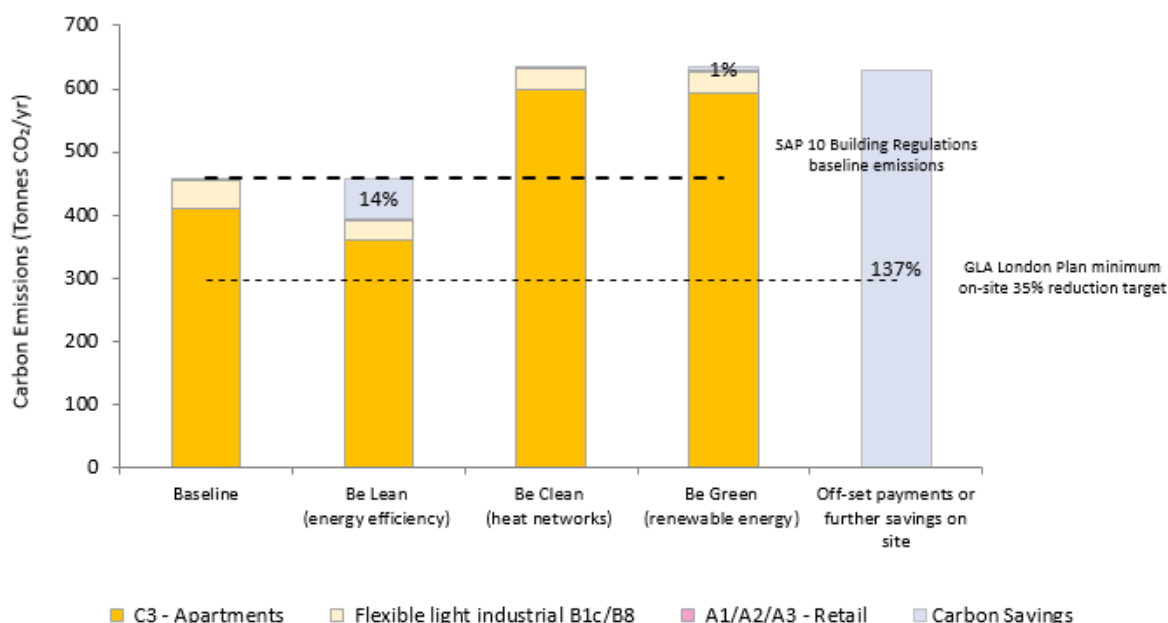


Figure 10—5 Phase 1 detailed carbon emissions through the energy hierarchy using the SAP 10 for Phase 1 detailed elements

11 CO₂ offsetting and Zero Carbon strategy

11.1 Overview

As demonstrated, the applicant has looked to minimise the development CO₂ emissions as much as technically feasible and financially viable on site. The remaining carbon emissions after the proposed 'Lean', 'Clean' and 'Green' measures are to be offset through either: a cash-in-lieu payment to London Borough of Newham; direct CO₂ offsetting through retrofit and refurbishment schemes in the local area; or a combination of both. This is proposed to meet the Zero Carbon homes GLA policy outlined in section 3.3.1.

In line with the GLA Sustainable Design and Construction Supplementary Planning Guidance (April 2014), off-site CO₂ savings projects can be used in place of the cash in lieu payment to offset the remaining development's CO₂ emissions. The SPG reads as follows:

"Boroughs may agree with a developer for the developer to directly offset any shortfall in CO₂ reductions from a scheme by installing a CO₂ saving project off-site. For example, a developer could install photovoltaics on a nearby school. The CIL regulations need to be taken into account when securing these arrangements. The borough should ensure that the off-setting measure provides added value - that is, the measure would be unlikely to be funded through another means. Boroughs should secure off-setting measures through s106 agreements. An assessment should be made by the Council or beneficiary of the off-setting measure so that the off-setting measures either have CO₂ or financial equivalence to the CO₂ saving that would otherwise be required on the development site."

It is therefore proposed that the Applicant offsets a total of 2,967 tonnes/year of CO₂ by means of energy efficiency measures over 30 year asset lifetime or through the full /remaining offset payment requirements. This commitment is proposed to be included within a planning condition or the S106 agreements with a review at the RMA stage of each elements coming forward in the masterplan. The carbon emissions at the time in line with the updated energy strategy will be calculated, agreed with the proposed energy review panel and fixed at RMA stage.

Table 11-1 Expected zero carbon cash in lieu payment quantum for Phase 1 & the masterplan

Element	CO ₂ offset required (1 year)	Cumulative savings for off-set payment (30 years)	Equivalent offset payment to LBN
Phase 1	344	10,325	£619,529
Phase 1 & masterplan	2,967	89,007	£5,340,432

11.2 Energy review panel proposal

It is also proposed that an 'Energy Panel' is set up including the Developer, London Borough of Newham, the GLA and the heat network provider to review the energy strategy as it progresses. The panel's role would be to review the energy strategy post occupancy and consider the energy options of future phases with clarity on the grid carbon factors, allowing for the lowest carbon options to be implemented. The Panel will convene at each RMA (see Figure 11—1).

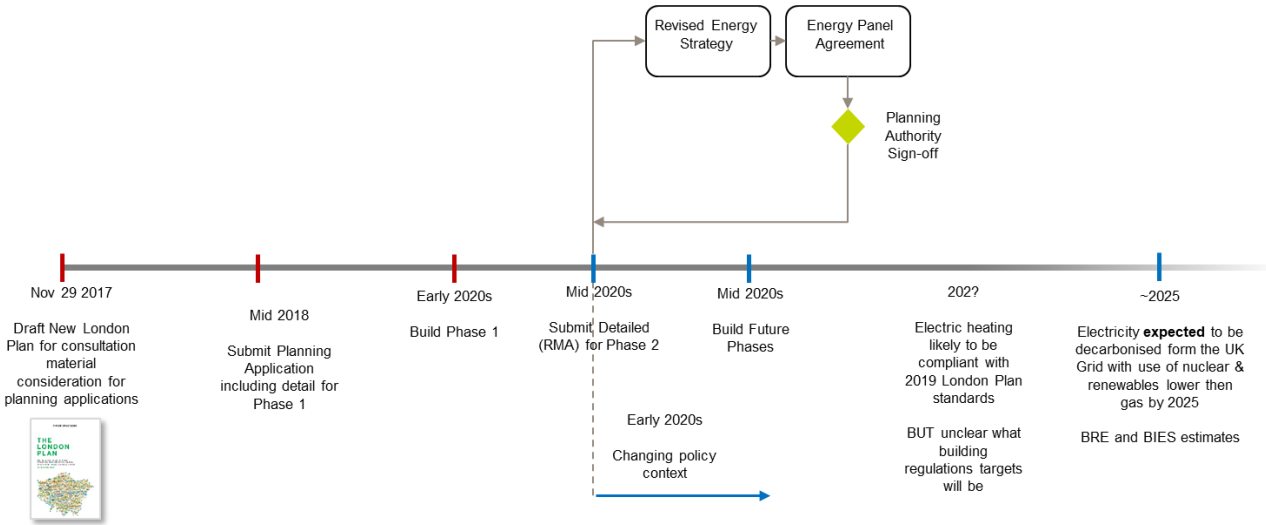


Figure 11—1 Energy review panel proposal process

12 Overheating Strategy

12.1 Overview

This section contains the overheating statement for the project. The London Plan section 5.9 requires that major development proposals demonstrate how the design, materials, construction and operation of the development minimise overheating and also meet its cooling needs. It states that new developments in London should be designed to avoid the need for energy-intensive air conditioning systems as much as possible.

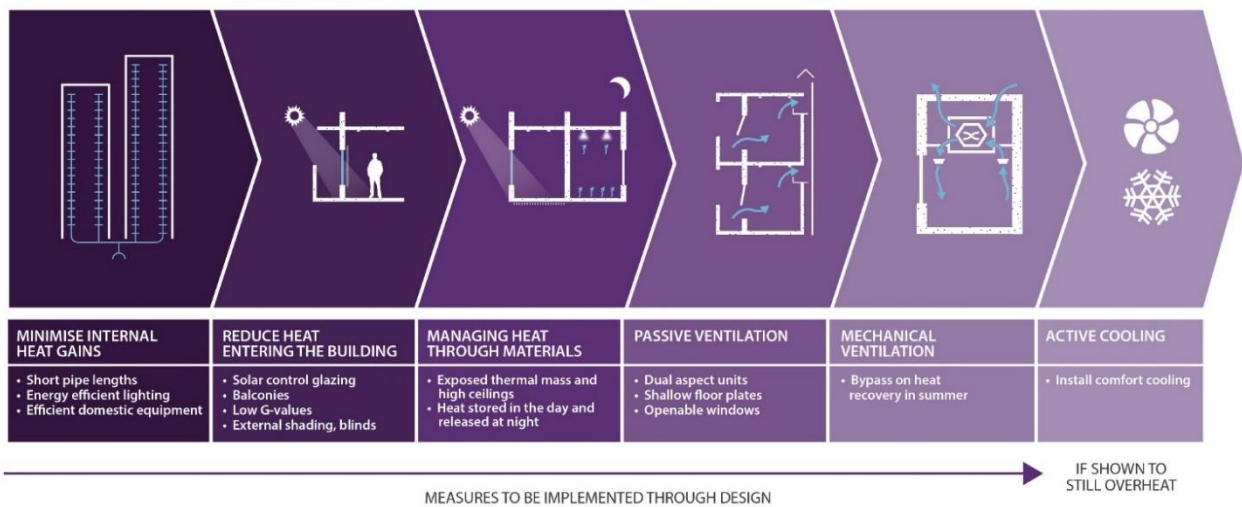


Figure 12—1 The GLA cooling hierarchy and measures to be implemented through design

The development has applied the cooling hierarchy in Policy 5.9 of the London Plan to the new build elements of the application, providing measures to reduce the demand for cooling through the following categories:

1. Minimising internal heat generation through efficient design

Each unit will be in close vicinity of a vertical riser, positioning them as centrally as possible to minimise horizontal pipe runs to minimise heat gains to the spaces. Heating and hot water distribution pipe work will be insulated in accordance with CIBSE Heat Networks: Code of Practice for the UK (CP1) standards.

2. Reducing the amount of heat entering the building in summer

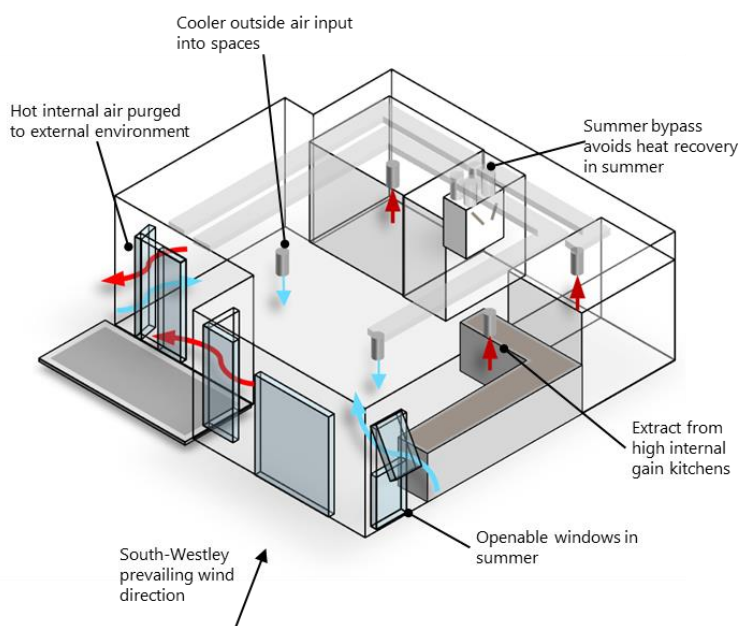
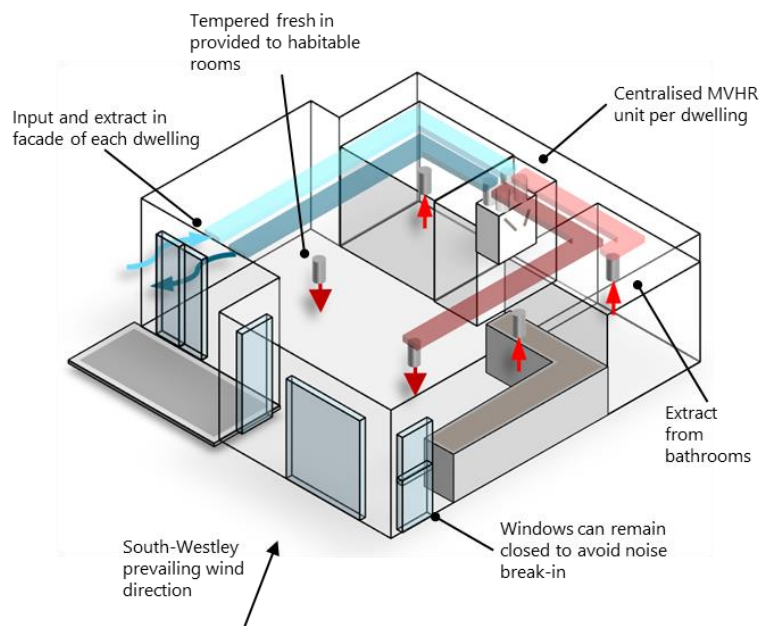
The majority of residential facades incorporate balconies providing passive solar shading; these reduce solar heat gains which can lead to overheating risk, particularly during warm summer periods. Top floors or where balconies are not present, additional horizontal shades have been added to reduce unwanted peak solar gains. In addition, reveals were included in the design to further reduce solar gains, especially where windows are not located underneath the balconies.

3. Natural and mechanical ventilation

Residential units will have opening windows and balcony doors to meet purge ventilation requirements in line with Building Regulations Part F, to aid the removal of occasional high concentrations of pollutants and water vapour as well as to improve thermal comfort. Residents will have the option to use natural ventilation for high levels of ventilation and free cooling. Mechanical ventilation with heat recovery (MVHR) is proposed throughout; the heat recovery system will include a summer by-pass mode to allow for free cooling of the space using external air. MVHR systems will be designed and sized to meet whole unit background ventilation requirements ensuring that window opening is only required for purge scenarios.

Winter

- Mechanical Ventilation with Heat recovery (MVHR) provides fresh air input to bedrooms and living rooms
- Extract from bathrooms and kitchens
- Heat recovered and transferred to incoming air
- Windows do not need to be opened to meet background fresh air requirements
- Noise break-in reduced
- Air quality improved as air is filtered



Summer

- Openable windows for purge excess heat and regulate temperature in peak summer conditions
- 'Bay' elements help provide through ventilation
- Prevailing wind and extract ventilation drives air movement
- Mechanical Ventilation with Heat recovery with summer bypass to avoid heat recovery
- Extract from bathrooms and kitchens
- Cooler outside air provided to living rooms and bedrooms

External noise and air quality considerations

Where facades are most exposed to the existing traffic noise, it is proposed to provide adequate protection from existing background noise through acoustically treatment. This will ensure an effective damping of the sound intensity when the windows are closed.

In order to achieve adequate levels of acoustic insulation with the above recommendations, the windows shall be maintained closed. To minimise the impact of external noise on occupants, MVHR systems will provide high levels of background fresh air which will minimise the amount of time windows need to be open for ventilation. Additionally the MVHR systems will filter NO_x, PM₁₀ and PM_{2.5}, promoting occupant health and wellbeing.

However for the purposes of purge ventilation and overheating mitigation, open windows will guarantee adequate air change rates in the internal environment. To reduce overheating risk, natural ventilation through openable windows will be required. Due to the proximity of the site to the London City Airport, see Figure 12—12 this could cause a risk of internal noise break-in to occupants. The acoustic treatment of the windows and the MVHR ventilation systems will help to reduce the number of hours that windows will need be open to reduce overheating risk. Mechanical cooling would be required to mitigate the overheating risk whilst avoiding noise break-in from open windows. This has not been proposed to reduce energy demands, reduce occupant energy bills and carbon emissions.

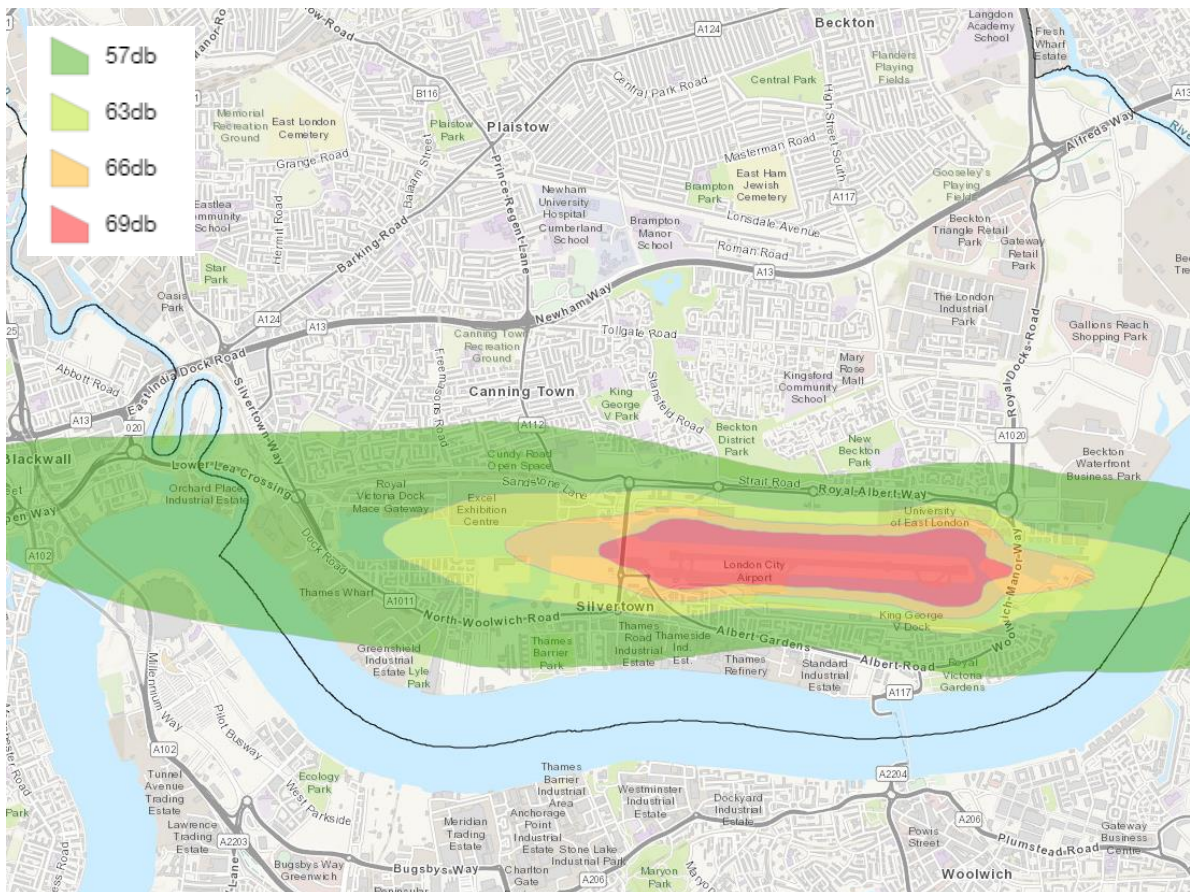


Figure 12—2 Forecast noise levels in terms of Decibel Contours from London City Airport (Source: LBN Local Plan website)

12.2 CIBSE TM52 and TM59 overheating methodology

According to CIBSE TM52 methodology, a room or building that fails any two of the three criteria is classed as overheating:

1. The first criterion sets a limit for the number of hours that the operative temperature can exceed the threshold comfort temperature (upper limit of the range of comfort temperature) by 1°K or more during the occupied hours of a typical non-heating season (1st May to 30th September).
2. The second criterion deals with the severity of overheating within any one day, which can be as important as its frequency, the level of which is a function of both temperature rise and its duration. This criterion sets a daily limit for acceptability.
3. The third criterion sets an absolute maximum daily temperature for a room, beyond which the level of overheating is unacceptable.

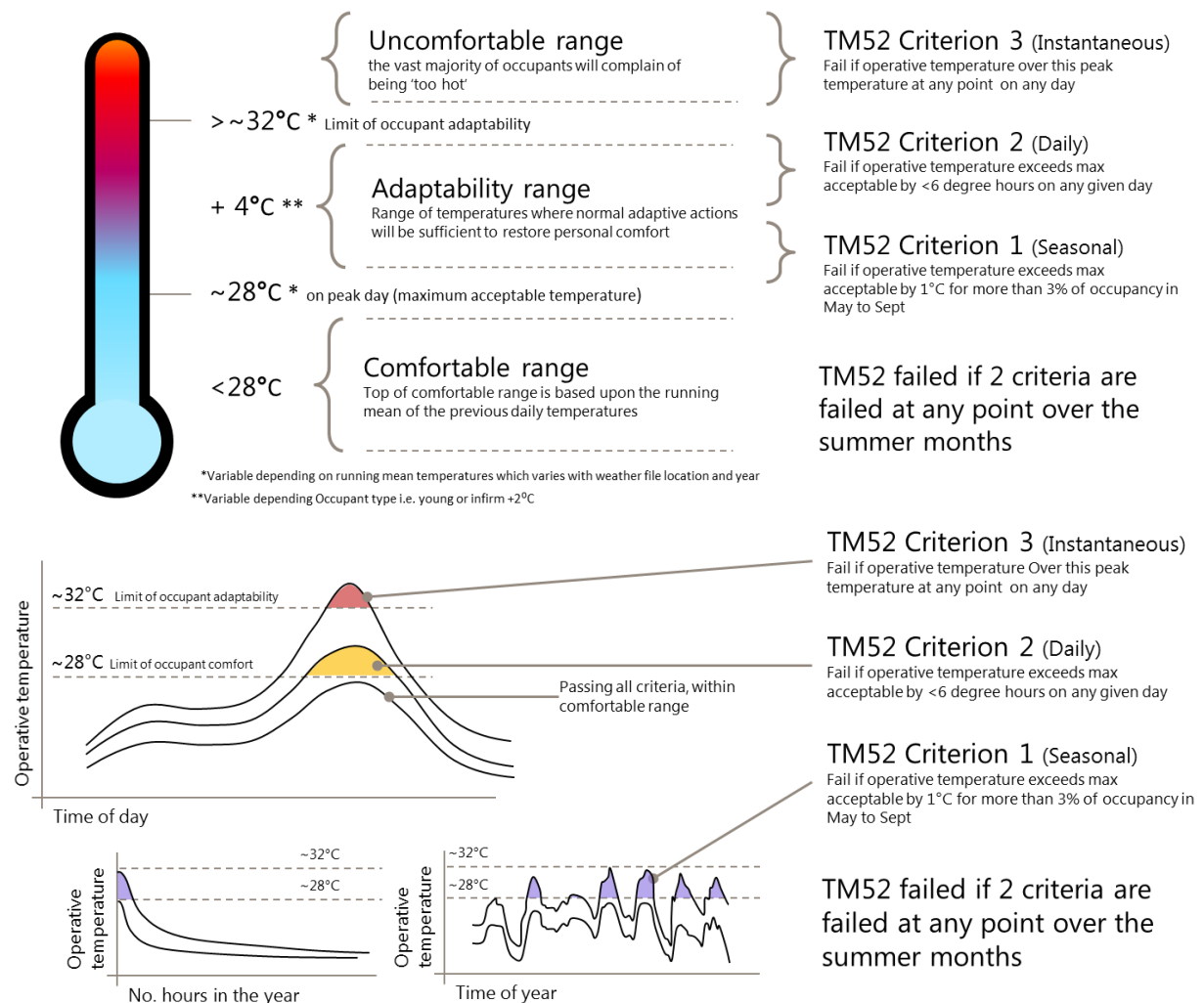


Figure 12—3 Visual representation of the TM52 pass/fail criteria

More specifically, the overheating assessment has been carried out according to CIBSE TM59: 2017, Design methodology for the assessment of overheating risk in homes. The adaptive comfort criteria assume that building occupants adapt to weather conditions, wearing lighter, looser clothing during summer for example and this approach accounts for this.

In line with TM59, criterion 1 is required to be passed. Criteria 2 and 3 are additional. Compliance also is only required under the 1989 weather file to align with TM59. Thermal comfort has been assessed for all weather files in current and future scenarios for completeness.

12.3 Residential overheating strategy

12.3.1 Detailed Phase 1 solar radiation

Figure 12—4 shows the solar exposure on the massing of Plots A and B that form part of the detailed application. It highlights that a few key facades and floors receive more solar exposure on the peak day from the 1989 weather file than others.

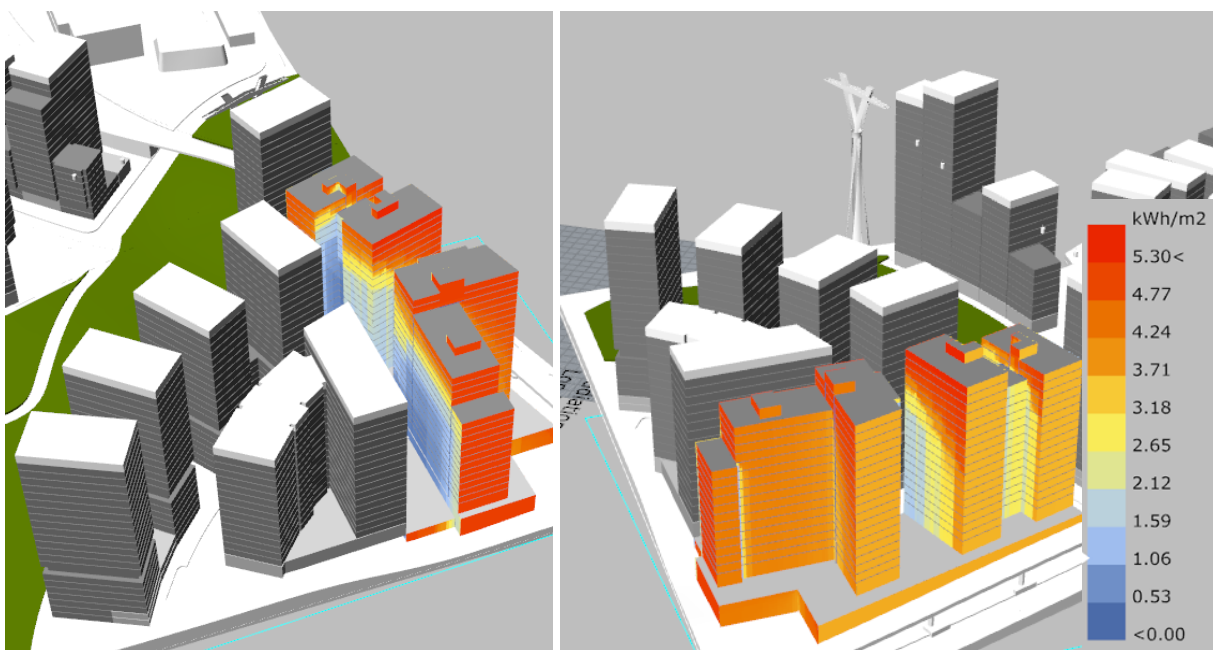


Figure 12—4 Two views depicting solar gain from Overheating weather file on the detailed plot massing on the peak day

The units modelled are outlined in Figure 12—5. These units have been chosen on the 13th floor upwards as these show the areas of highest solar exposure. Units on lower levels do not receive as much solar gain due to the over-shading from nearby plots. Modelling will be undertaken on these units to minimise the overheating risk.

12.3.2 Residential dynamic modelling

The overheating assessment has been carried out using IES Virtual Environment software 2017. The scope of the overheating assessment in this report is of typical floorplans for blocks A and B, for floors 13, 14, 15, 17 and 19. An image of the IES and Rhino models are shown in Figure 12—5.

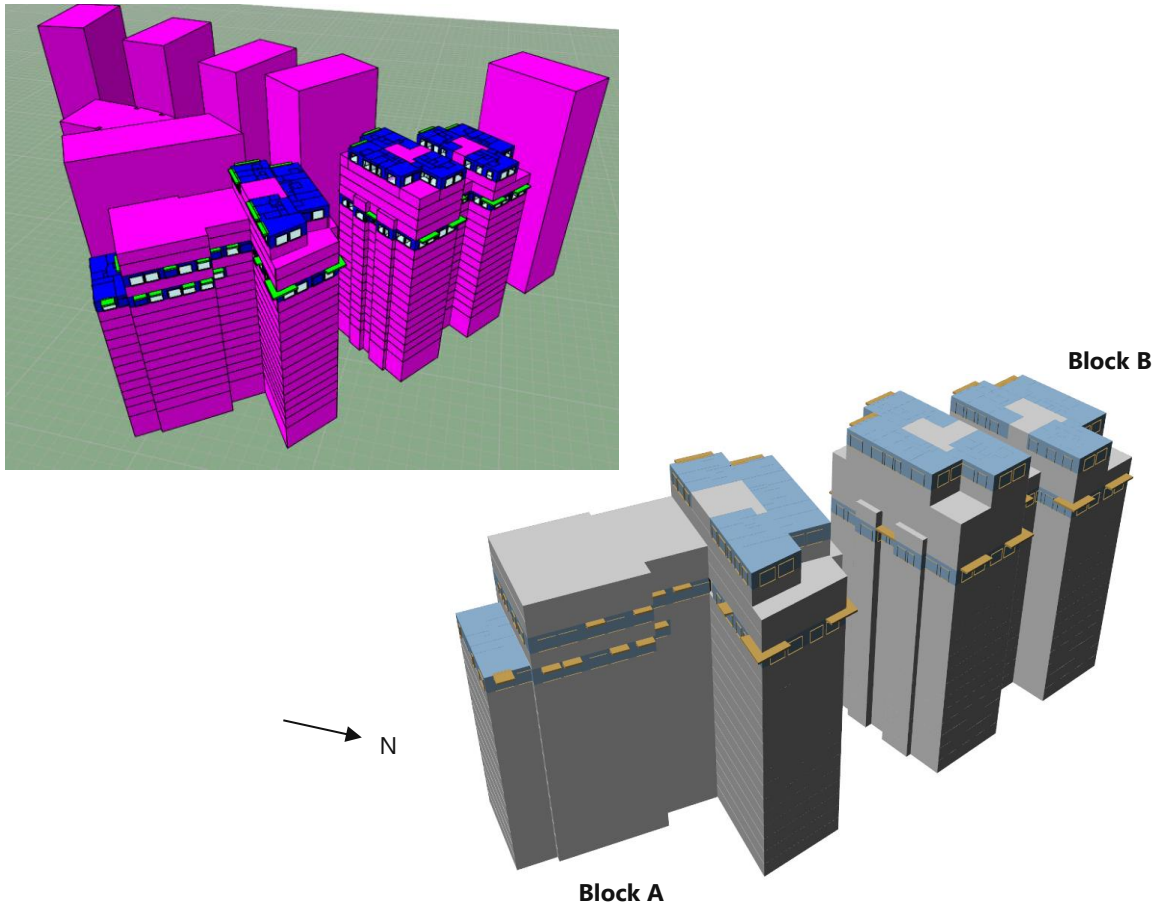


Figure 12—5 Computer models used for residential overheating analysis – top left (IES) and bottom right (Rhino)

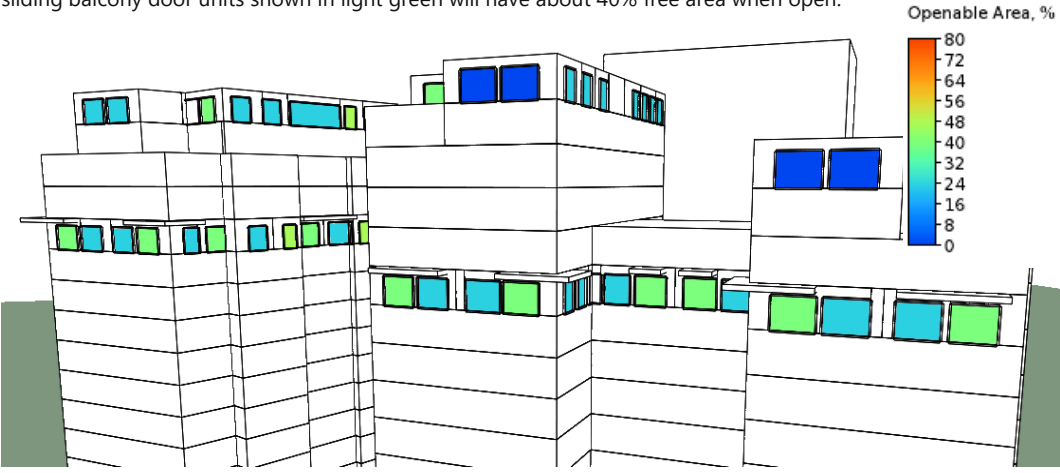
12.3.3 Simulation inputs

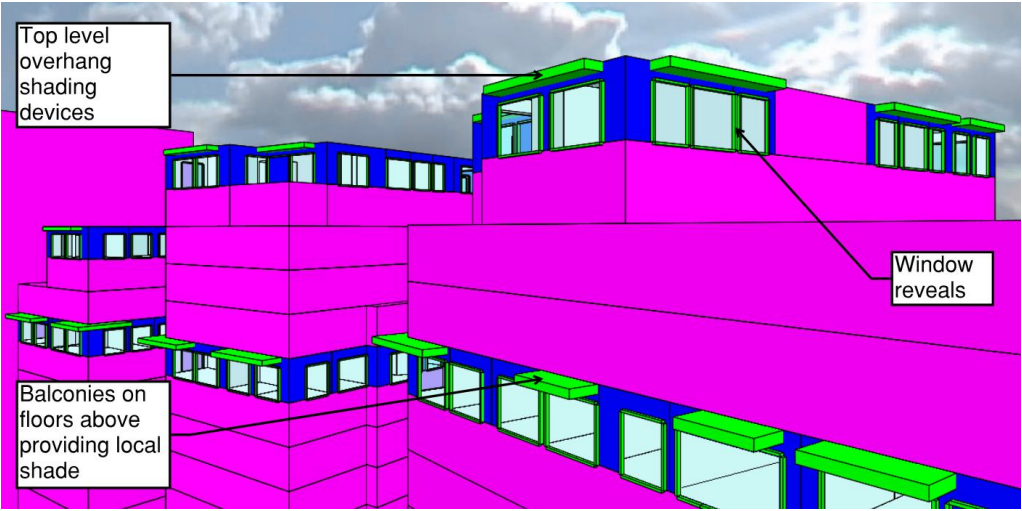
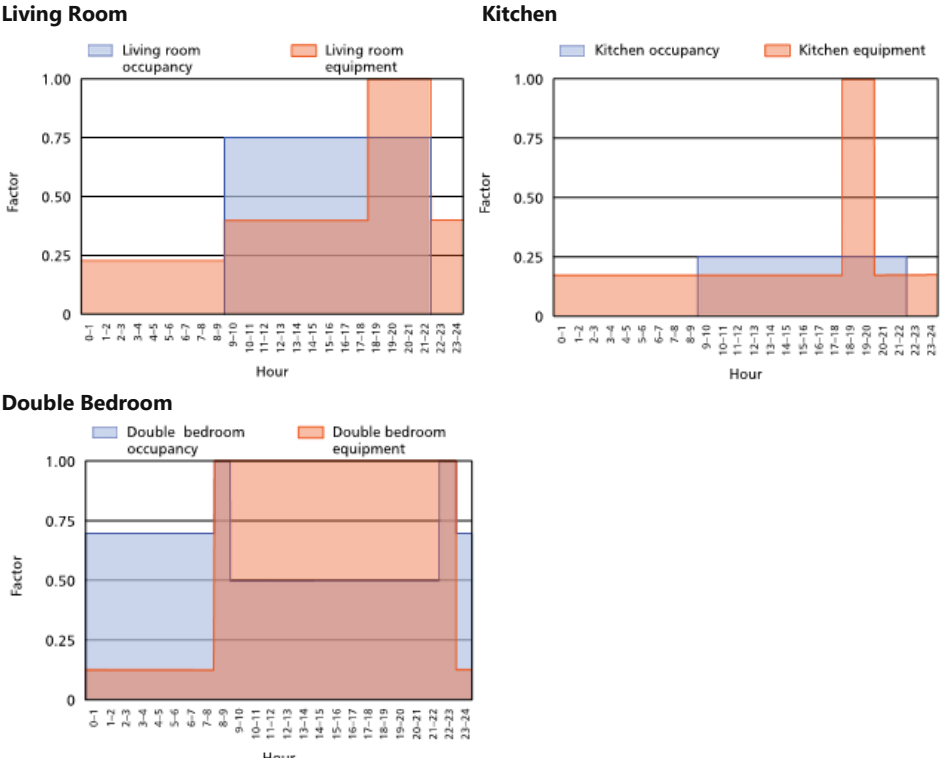
The overheating risk has been assessed using the CIBSE TM52 criteria in line with current GLA guidance. Values for internal gains and occupancy profiles are aligned with guidance from CIBSE TM59, which provides the standard methodology for overheating risk assessments in homes.

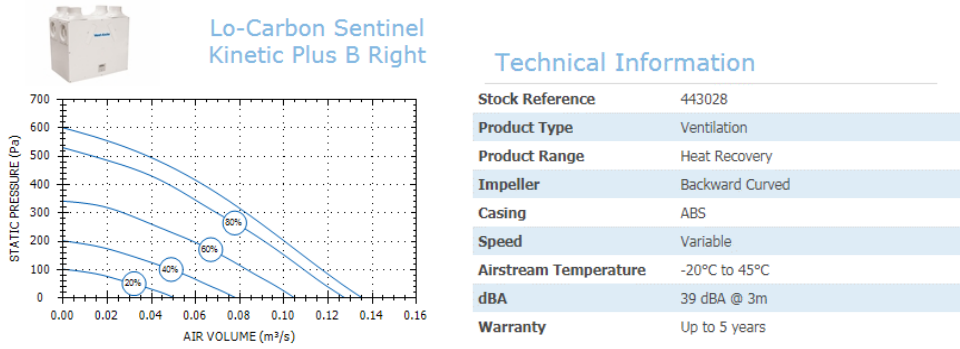
The core assumptions and inputs used in the modelling are detailed in Table 12-1.

Table 12-1 Thermal comfort modelling inputs

Item	Modelling input
Calculation	Software - IES Virtual Environment v. 2017 3.1.0 Calculation tool – ApacheSIM Weather files: LHR1989_baseline LHR1989_2020High50pct

Item	Modelling input
	LHR1976_baseline LHR1976_2020High50pct LHR2003_baseline LHR2003_2020High50pct
Weather files	<p>The compliance analysis has been carried out using the three baseline Design Summer Year (DSY) weather files (1976, 1989, and 2003) for London Heathrow, the most representative weather data set for lower density urban and suburban areas, as described in CIBSE TM49 (2014). CIBSE TM49 sets out the DSY weather data sets for assessing overheating risk. In order for a more complete assessment of overheating to be undertaken, three DSY files have been produced representing summers with different types of hot events. These types and their associated year weather data set for London Heathrow are listed below:</p> <ul style="list-style-type: none"> • DSY1 – Moderately warm summer (1989) • DSY2 – Intense single warm spell (2003) • DSY3 – Long period of persistent warmth (1976) <p>For context, TM49 demonstrates the probability of a summer being as warm as or warmer than DSY1 is 1 in 9, for DSY2 this decreases to 1 in 19 and 1 in 27 for DSY 2 and 3 respectively (based on weighted cooling degree hours metric).</p> <p>In addition, the overheating risk has been assessed against three future weather files for London Heathrow 2020 with a high climate change scenario from the 50th percentile, taking into account heat island effect and correspond to historical data for three summers of extreme temperature (1976, 1989, and 2003).</p>
Fabric performance	External Wall U-value = 0.18 W/m ² K Glazing U-value = 1.4 W/m ² K g-value = 0.3 and 0.4 have both been used in this analysis
Glazing opening strategy	<p>Glazed elements are modelled as operating manually. The opening profile is linked to occupancy and windows will open when room is occupied and if internal air temperature is above 23°C (with a tolerance band of +-1°C). It is assumed that occupants close the windows when the outside air temperature exceeds the internal air temperature. Overnight the windows are set to open up to be fully openable for purge ventilation.</p> <p>There are a mixture of window free areas. Fixed panes are shown in dark blue, two-paned windows have one pane fixed and the other open to have about 23% free area, based on a top hung profile, are shown in light blue and sliding balcony door units shown in light green will have about 40% free area when open.</p>  <p style="text-align: center;">Figure 12—6 Opening free areas as applied to the glazing configuration</p>
Blinds	<p>To further reduce the amount of solar energy to the spaces, blinds have been modelled. They have been modelled in the apartments in the form of interior light-coloured blinds, operated as detailed below. This would in practice be done manually by the occupants, but it is assumed to be a realistic representation.</p> <p>The blinds modelled have a shading coefficient of 0.39 and a short-wave radiant fraction of 0.49</p>
Blinds operation strategy	Manually operated Incident radiation to lower device = 400 W/m ² Incident radiation to raise device = 300 W/m ²

Item	Modelling input
External shading	<p>170mm reveals on the windows and glazed doors are other passive means to limit direct solar energy to the space. They have been modelled as per the architects' drawings, along with balconies and top floor overhangs of 1600mm depth as per the images in Figure 12—7.</p>  <p>Figure 12—7 Local shading devices represented in the dynamic simulation model in IES</p>
Internal door opening strategy	<p>Internal doors are modelled as being open</p>
Occupancy and internal gains	<p>CIBSE TM59:2017 (Design methodology for the assessment of overheating risk in homes) has been used to set up internal gains and occupancy profiles for dwellings. Relevant loads have been set for 1, 2 and 3 bed dwelling units.</p>  <p>Figure 12—8 TM59 Occupancy and equipment use profiles by space.</p>

Item	Modelling input																		
Ventilation rates	<p data-bbox="331 353 1412 436">Mechanical Ventilation with Heat Recovery (MVHR) was implemented in the simulation model, based on the technical information below. Unconditioned external air is supplied to bedrooms at a rate of 4 l/s and to living rooms at 9 l/s to meet Part F minimum whole dwelling ventilation rates.</p> <div data-bbox="359 448 1324 795">  <p data-bbox="566 459 790 515">Lo-Carbon Sentinel Kinetic Plus B Right</p> <p data-bbox="853 492 1117 526">Technical Information</p> <table border="1" data-bbox="837 533 1324 795"> <tr> <td>Stock Reference</td> <td>443028</td> </tr> <tr> <td>Product Type</td> <td>Ventilation</td> </tr> <tr> <td>Product Range</td> <td>Heat Recovery</td> </tr> <tr> <td>Impeller</td> <td>Backward Curved</td> </tr> <tr> <td>Casing</td> <td>ABS</td> </tr> <tr> <td>Speed</td> <td>Variable</td> </tr> <tr> <td>Airstream Temperature</td> <td>-20°C to 45°C</td> </tr> <tr> <td>dBA</td> <td>39 dBA @ 3m</td> </tr> <tr> <td>Warranty</td> <td>Up to 5 years</td> </tr> </table> </div> <p data-bbox="331 801 1173 833">Figure 12—9 Typical mechanical ventilation with heat recovery unit technical information</p>	Stock Reference	443028	Product Type	Ventilation	Product Range	Heat Recovery	Impeller	Backward Curved	Casing	ABS	Speed	Variable	Airstream Temperature	-20°C to 45°C	dBA	39 dBA @ 3m	Warranty	Up to 5 years
Stock Reference	443028																		
Product Type	Ventilation																		
Product Range	Heat Recovery																		
Impeller	Backward Curved																		
Casing	ABS																		
Speed	Variable																		
Airstream Temperature	-20°C to 45°C																		
dBA	39 dBA @ 3m																		
Warranty	Up to 5 years																		

12.3.4 Results

The units analysed were living rooms, kitchens and bedrooms. Bathrooms, cupboards and corridors have been excluded from the analysis. Table 12-2 outlines different modelling runs which show the impact of different design measures in a cumulative effect, in order to effectively reduce overheating risk in the dwellings. Results for each of the three weather files (1976, 1989 and 2003) are presented, along with the results for the future projected weather files for reference.

Table 12-2 Results of TM59 assessment

Iteration/Model number and inputs				Weather file			Weather file		
Run	Window g-value	Blinds?	Night purge	1976-baseline	1989-baseline	2003-baseline	1976-2020	1989-2020	2003-2020
				Number of rooms failing CIBSE TM59 requirements			Number of rooms failing CIBSE TM59 requirements		
				(165 habitable rooms modelled in total)			(165 habitable rooms modelled in total)		
1	0.4	No	No	61	22	37	90	58	62
2	0.4	Yes	Yes	35	6	17	55	21	37
3	0.3	Yes	Yes	14	0	4	27	6	15

By making use of night time ventilation purge, including blinds and reducing the g-value, all spaces are compliant with TM52 using the TM59 methodology for the 1989 London Heathrow baseline weather file.

Assuming that the windows have the option to remain open at night during peak summer helps dissipate the heat while blinds reduce the amount of solar gain entering the space. By reducing the g value to 0.3 for these floors, all spaces are deemed thermally comfortable. These measures have been applied to these floors that were identified as having higher risk to solar exposure, in order to reduce the risks associated of overheating.

Assessments against the future projected weather file show that a small percentage of the rooms assessed struggle to pass TM59 comfort assessment for this weather, however 96% of the rooms assessed still pass in future weather data.

These few units are exposed to direct solar gain in the late afternoon due to be being west facing, which coincides with assumed cooking times. As it is late in the day, the sun angles are low making balconies ineffective. Little more can be done to reduce the risk of these spaces without impacting the level of daylight in the units.

12.4 Masterplan solar radiation and impacts

Having studied the detailed elements for overheating risk, we can apply the knowledge to the wider masterplan. Figure 12—10 shows the solar exposure to the wider masterplan for multiple views. Correlating the areas that required remediation on blocks A and B to their solar exposure levels, given in Figure 12—4, we can predict areas from the rest of the masterplan at an early stage that may be at risk.

Based on the results for these two blocks, we would propose that west facing flats with a solar exposure greater than 4.5kWh/m² should be studied and south or south-east facing flats with a solar exposure greater than 5kWh/m² should be studied. We would therefore propose that these areas are looked at for assessing the need of overheating risk reduction measures. Figure 12—10 highlights these areas at risk.

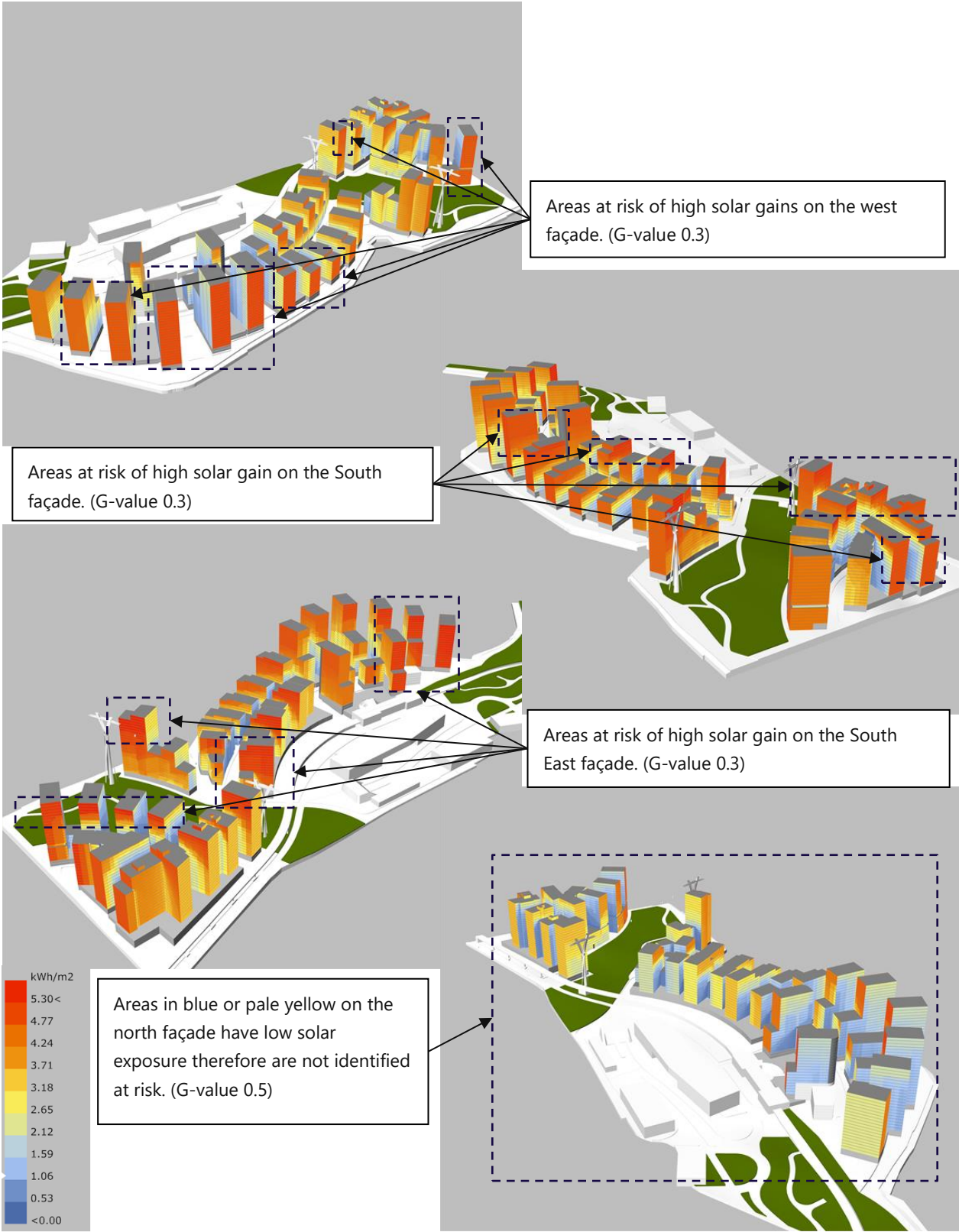


Figure 12—10 Solar exposure on the masterplan massing, with suggested areas of risk highlighted

12.5 Non-residential cooling demands

Active cooling is required in all typologies stated due to usage types and the associated internal gains. The GLA guidance on preparing energy statements states that for non-domestic spaces the actual cooling demand (MJ/m²) should be lower than the notional as laid out in the BRUKL report produced for the Part L analysis. Table 12-3 and Figure 12—11 below show that for the proposed units the actual cooling demand is significantly lower than the notional, therefore satisfying the requirement.

Cooling demands have been reduced mainly by reducing internal gains associated with lighting. In addition, canopies have been proposed along the South-West façade of retail units to provide shading and reduce solar gains (Figure 12—12).

Table 12-3 HVAC Systems Performance table from BRUKL report

Typology	Industrial	Community	Retail
	Cooling Demand (MJ/m ²)		
HVAC System	Fan Coil Units	Fan Coil Units	Fan Coil Units
Actual	144.5	47.5	159.4
Notional	194.7	61.1	165

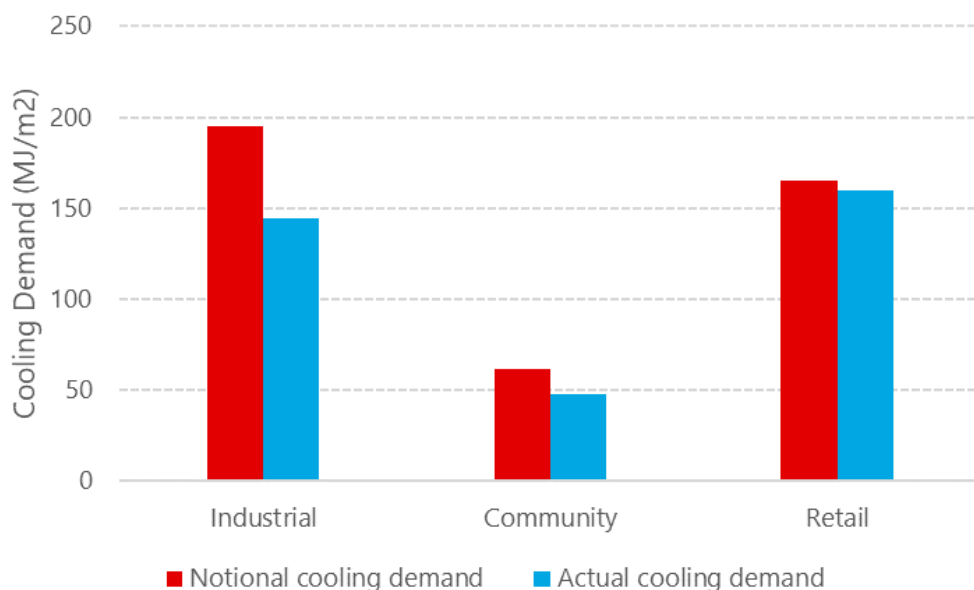


Figure 12—11 Reduction in annual cooling demands

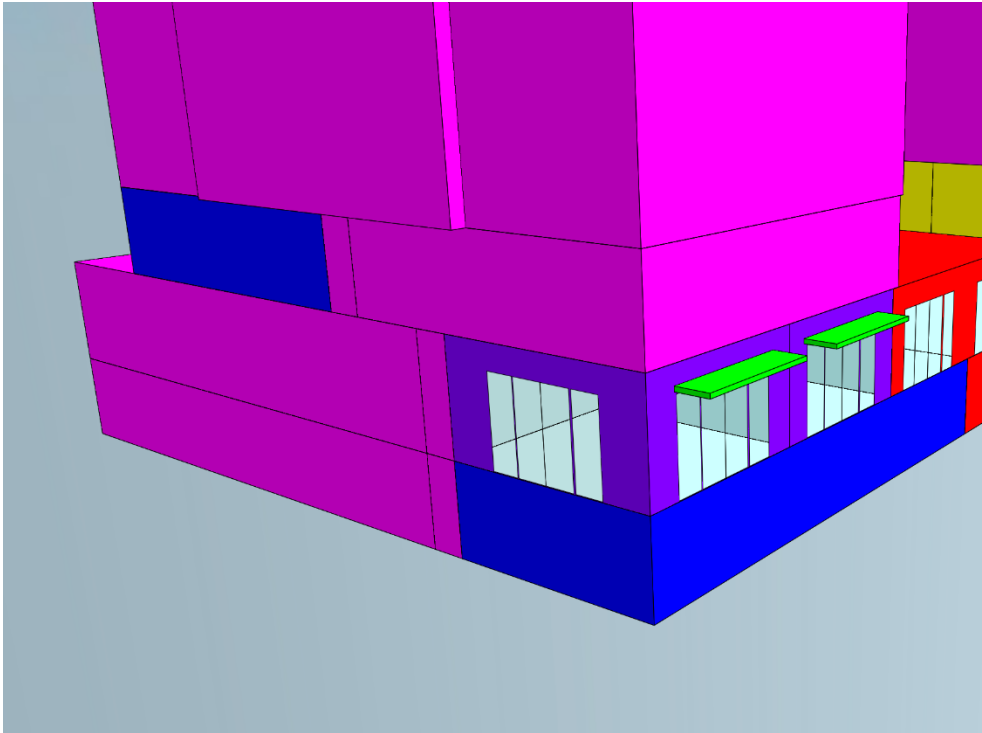


Figure 12—12 Canopies along South-West façade of retail units to reduce solar gains

13 Sustainability strategy

13.1 Overview

The aim of GLA London Plan Policy 5.3 is to ensure new developments are designed and constructed to minimise the environmental impact. This section considers how the development and design responds to various policies and project requirements in relation to:

- Water consumption and irrigation;
- Sustainable Urban Drainage systems;
- Biodiversity and green infrastructure;
- Transport; and
- Climate Change mitigation.



Zero carbon development through energy efficient design, low carbon heating, renewable energy systems and local carbon offsetting.



SMART energy metering for all residents so they can track and pay for their exact energy use.



Water efficient fittings & design solutions, including **rainwater harvesting for irrigation**.



A **holistic flood risk and drainage design** integrated into the natural environment increases site resilience to climate change.



Masterplan incorporates large areas of **high bio-diverse habitat gains** across the full build out.



BREEAM Certification of a minimum of 'Very Good' non-residential elements, which will guide sustainable design and construction across a wide spectrum of areas.



Significant areas of publicly accessible landscape will enable **easy access to green spaces**, helping people to relax and improving mental health.



Easy and close proximity to the DLR line through the Silvertown West station will help to promote public transport usage, reducing private vehicle usage and combatting localised air quality issues.

Figure 13—1 Summary and headline elements of the site sustainability strategy

Each section first considers the relevant policies and targets and then details how these have been met.

13.2 Proposed Water Management Strategy

The aspirational water strategy for the masterplan, as given in Figure 13—2, supports the conservation of water supplies and resources. This approach looks to minimise water demand as a priority, before considering the later steps of the hierarchy: efficient fixtures, fittings and distribution and alternative sources for lower grade use. The water resource strategy can also incorporate resilience and robustness to ensure longevity and minimise risk both to the physical systems and to the site occupants and visitors. This would tie in with a site-wide sustainable drainage strategy which incorporates the use of Sustainable Drainage Systems (SUDS), as prescribed by GLA London Plan Policy 5.13 Sustainable Drainage and detailed in Section 13.3.

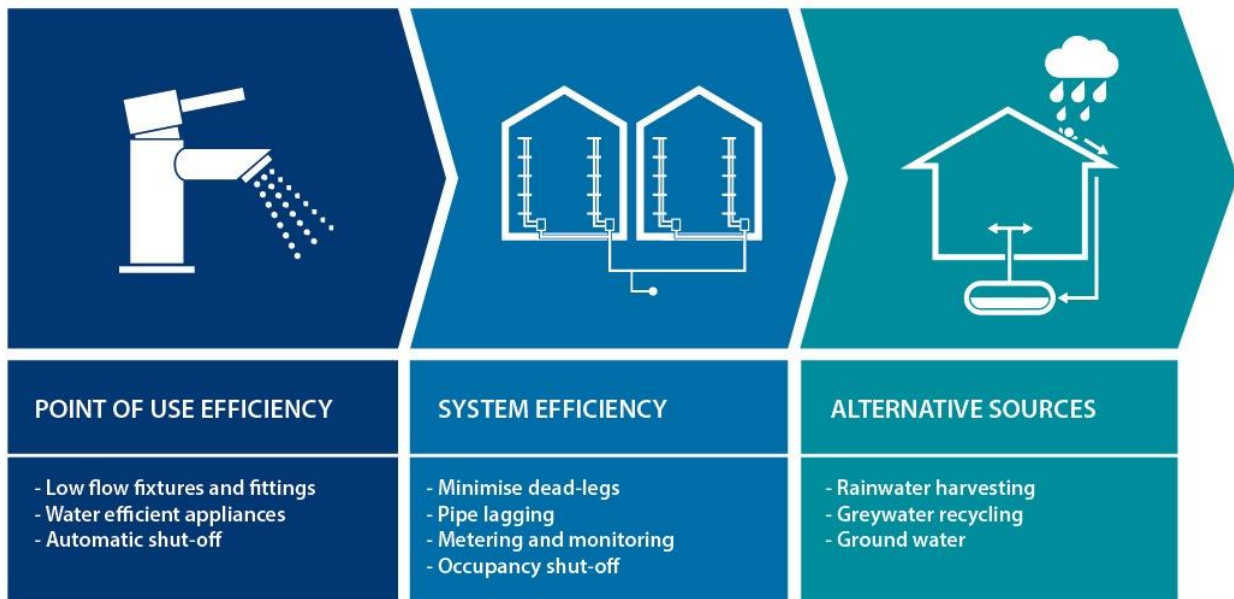


Figure 13—2 Water hierarchy

Water efficient fixtures and fittings can help reduce site water consumption and demand on wastewater infrastructure. These represent passive measures and require no behavioural changes by the end users. System efficiency can be optimised by improvements in the design and distribution of the water system, reducing leakages and losses across site. Intelligent design that reduces the number of dead legs and minimises overall distribution lengths shall be sought, whilst additional features such as flow restrictors and pressure reducing valves will be considered. The use of metering for all substantial uses and leak detected linked to a Building Management System (BMS) will be encouraged to enable close monitoring and management of water use in the commercial areas of the development.

Key Targets and Policies

Key drivers for the water strategy are to ensure efficient resource use and demand and to ensure whole life cost savings associated with efficient water resource system design and operation are outlined and achieved. The water strategy adopted will seek to meet key targets and policies summarised in Table 13-1.

Table 13-1 Key water targets

Policy	Requirements
BREEAM Wat 02	To ensure water consumption is monitored and managed effectively
BREEAM Wat 03	To reduce the consumption of potable water in new buildings through minimising wastage due to water leaks.
BREEAM Pol 03	To avoid, reduce and delay the discharge of rainfall to public sewers and watercourses, thereby minimising the risk and impact of localised flooding on and off-site, watercourse pollution and other environmental damage.
GLA London Plan Policy 5.13 Sustainable Drainage	<p>Development should utilise sustainable urban drainage systems (SUDS) unless there are practical reasons for not doing so, and should aim to achieve greenfield run-off rates and ensure that surface water run-off is managed as close to its source as possible in line with the following drainage hierarchy:</p> <ul style="list-style-type: none"> • Store rainwater for later use • Use infiltration techniques, such as porous surfaces in non-clay areas • Attenuate rainwater in ponds or open water features for gradual release • Attenuate rainwater by storing in tanks or sealed water features for gradual release • Discharge rainwater direct to a watercourse • Discharge rainwater to a surface water sewer/drain • Discharge rainwater to the combined sewer • Drainage should be designed and implemented in ways that deliver other policy objectives of this Plan, including water use efficiency and quality, biodiversity, amenity and recreation.
GLA London Plan Policy 5.15 Water Use and Supplies	<p>Development should minimise the use of mains water by:</p> <ul style="list-style-type: none"> • incorporating water saving measures and equipment • designing residential development so that mains water consumption would meet a target of 105 litres or less per head per day
GLA Sustainable Design and Construction SPG	<p>New non-residential developments, should aim to achieve the maximum number of water credits in a BREEAM assessment.</p> <p>In best practice schemes all residential units, including individual flats / apartments and commercial units, and where practical, individual leases in large commercial properties should be metered.</p>

Internal water consumption

The GLA’s Sustainable Design and Construction, Supplementary Planning Guidance, April 2014, requires water efficiency measures to be included within developments to reduce water consumption. With the following wording:

“Developers should design residential schemes to meet a water consumption rate of 105 litres or less per person per day.”

This is equivalent to the Code for Sustainable Homes Level 4 minimum requirements, and the following potential strategies, will be implemented to meet the target requirements:

- the sanitary fittings within each residential unit will include low water use WCs, showers, taps, baths and (where installed) white goods to comply with an average household water consumption of <105 litres/person/day; and
- an equivalent approach is provided for non-residential units as per BREEAM requirements.

The above statements can be achieved with a range of water fixtures and fittings, without the use of greywater recycling or rainwater harvesting. The targets will be reviewed on a block-by-block basis and an indicative specification will be reviewed at detailed design stage for building regulations requirements. Table 13-2 outlines several specification scenarios to meet the residential targets.

Table 13-2 Indicative Water fitting flow rates and capacities to meet Building Regulations, CFSH level 4 and GLA SPG requirements

	Indicative Scenario 1	Indicative Scenario 2	Indicative Scenario 3	Indicative Scenario 4
Strategy, Code level	Fittings-based, Code level 4	Fittings-based, Code level 4	Fittings-based, Code level 4	Fittings-based, Code level 4
WC (l/flush)	4 (single flush)	4/2.6 (dual flush)	5/3 (dual flush)	4/2.6 (dual flush)
Taps (excluding kitchen taps) (l/s)	4	4	4	4
Bath (litres capacity)	180	150	180	150
Shower (l/s)	8	11	8	10
Kitchen sink taps (l/s)	6	5	6	5
Washing machine (l/kg)	8.17	6.25	8.17	8.17
Dishwasher (l/place setting)	1.25	1.25	1.25	1.25
Predicted per capita consumption (for Building Regulations)	104.65	104.9	103.28	104.6

Avoiding demands and external water consumption

The avoidance of external water consumption has been fully considered across the landscape design. First native drought resistant specifics will be prioritised to minimise the need for managed irrigations systems. Only a few key managed areas, shown in orange in Figure 13—3, will require irrigation. These will be fed by drip system, or equivalent to increase the efficiency of supply.

This design and proposed approach will significantly reduce the overall potable water demand across the site.

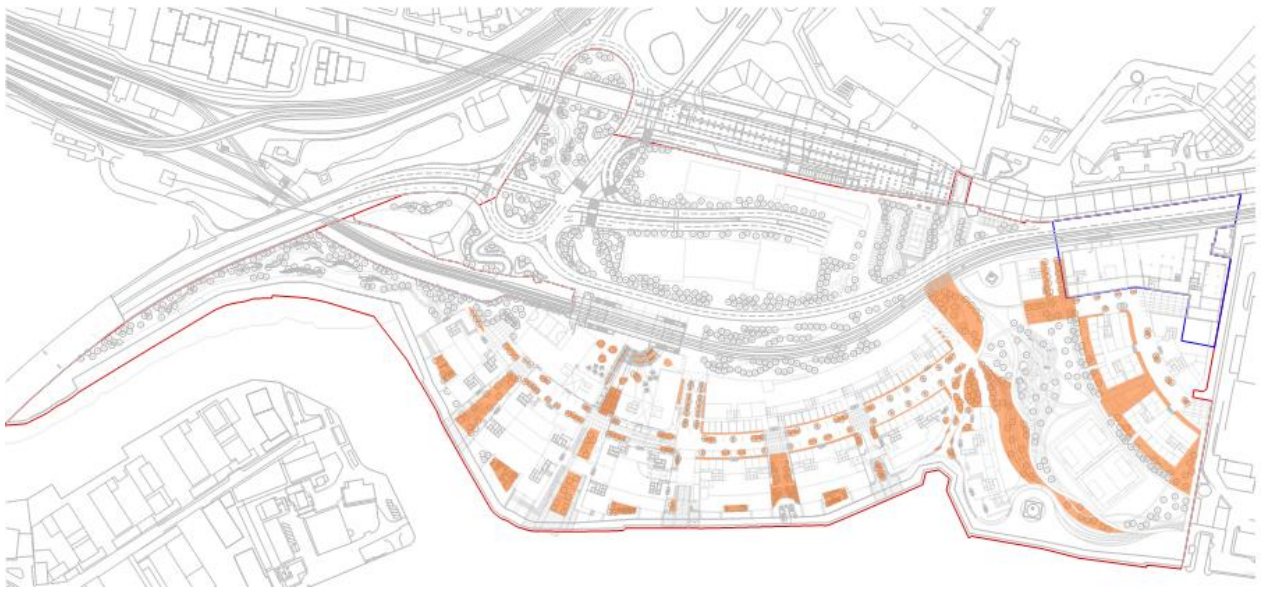


Figure 13—3 Masterplan landscape and irrigation strategy diagram (Orange are irrigated areas)

Increased system efficiency

Improvements in the design and distribution of the water system can reduce leakages and losses across site. Dead legs will be minimised in pipe runs, and all DHW pipework shall be insulated to minimise heat loss in the system. The use of metering not only allows water consumption to be monitored, but indicates leakage or excessive use due to malfunctioning fittings. This will also contribute towards achieving the Wat 02 BREEAM credits in the non-residential elements.

Rainwater harvesting

Rainwater is considered to be a relatively clean water source, needing only minimal treatment before use in non-potable water schemes. It has been widely used over the past 3000 years, and its collection and use is regarded as a simple and generally safe practice. Collection and diversion of surface run-off can also be used to mitigate flood risk and control drainage, and as such it can be a central part of any sustainable urban drainage system (SUDS).

In the south east of the UK, London has an average annual rainfall in the region of 600mm/year, although the long term effects of climate change are likely to increase the variability of this.

Rainwater will be harvested from the development's roof and hard landscaping as part of the SuDS strategy and will then be used for irrigation of brown/green roofs and soft landscape.

Greywater recycling

Greywater recycling systems require dual collection pipe work: one set of pipe work is required to collect greywater and a second set of pipe work is required to collect all other wastewater flows. In most off-the-shelf treatment facilities the greywater undergoes biological treatment prior to being locally distributed in a dedicated non-potable pipe network for use in toilet flushing or other residential non-potable demands. Greywater recycling has been reviewed but it has been found not feasible. See the Environmental statement (water chapter) for more information.

13.3 Sustainable Urban Drainage solutions

Sustainable Drainage Systems constitute an essential element of the surface water drainage network. SUDS focus on the integration of certain aspects of the hydrological cycle into the surface water drainage network and aim in decreasing runoff rates and volumes in a sustainable way.

The masterplan has the ambition to design a surface water drainage network in compliance with relevant standards and regulations. These are as follows:

- There will be no surcharging of the drainage system for a 1 in 2 year storm;
- The drainage can be surcharged with no flooding for a 1 in 30 year storm; and
- The drainage can flood on-site for a 1 in 100 year storm with a 40% climate change allowance provided the flood water remains on site and does not flood habitable areas or affect safe ingress and egress to the site for occupiers.

All surface water drainage options outlined in this report adhere to these principles

Management of surface water flows across the masterplan

It is proposed that surface water will be discharged directly to the River Thames, for all areas of the site where the proposed levels permit gravity drainage to the river, as shown in blue in Figure 13—4.

As the discharge is to a surface water body, there is no requirement to restrict the rate of discharge to the River Thames. However, since the invert levels of the outfalls are all below the mean high water level, each day there will be a period of time when the water level within the River Thames will prevent the flow of surface water through the outfall, a scenario known as tide-locking.

In order to prevent surface water flooding during periods when there is a high water level in the River Thames, the surface water drainage network has been designed with additional capacity in the form of oversized pipes.

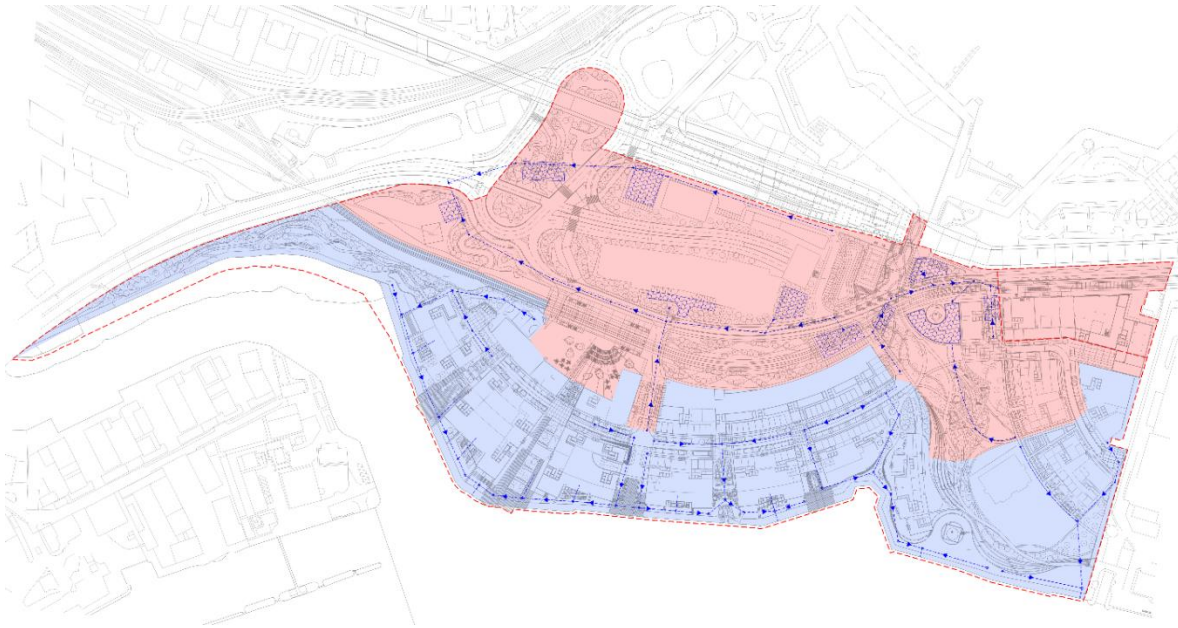


Figure 13—4 Plan showing the overall proposed surface water drainage strategy

For the parts of the site that cannot be drained by gravity to the River Thames, due to the proposed topography or other obstructions, it is proposed that surface water runoff is discharged to the existing TW surface water sewer network via a series of SuDS features, including above and below ground attenuation.

In order to meet the requirements of the London Plan, it is proposed that where surface water is discharged to the TW network, it is restricted to three times the greenfield rate, which is 692.5l/s or 36.9l/s/ha. Due to the size and topography of the site, it is proposed that two connections are made to the existing TW water network.

It is proposed that a combination of above and below ground attenuation is used to restrict the rate of surface water discharge to the TW network to 36.9l/s/ha. Where possible, attenuation will be provided within open features such as swales and ponds. These are primarily located within the large area of landscaping to the south of the site. In all other locations, storage will be provided by underground crate attenuation systems or tanks.

In term of the SuDS hierarchy, the following considerations have been made:

- Open water features and swales – large area of soft landscaping to the south of the development contains a large open water feature which will act as a retention basin for surface water during storm events;
- Bio-retention strips – these are proposed on either side of the central spine road within areas of hard landscaping, to be used in conjunction with piped systems to convey surface water to the mains sewers;
- Green roofs – proposed on some of the buildings, to help attenuate and reduce the surface water discharge rate from the proposed development as well as providing wider sustainability benefits in the form of habitats, energy efficiency and potential for public realm; and
- Below ground attenuation – proposed in locations where there is not sufficient space for open water features, the volume of which have been sized to restrict discharge rate to at least three times the calculated greenfield runoff rate.

The following systems are considered possible for the masterplan, as sketched out in Figure 13—5.



Figure 13—5 Masterplan Drainage and SUDs strategy diagram (small arrows shows falls, thick blue shows dry swales, pink shows reed bed/water feature)

Site flooding provides an opportunity to use water as an underlying aesthetic and ecological advantage for the Site. By evaluating the topographic levels where water may flow across the site in major flood events or typical daily flows, the masterplan has created a network that binds together with the streetscape, landscape and public realm making spaces useful and visually appealing.

A series of dry drainage swales will be the link between the overflow drainage and flooding as they provide a major landscaping feature that runs through the Site creating an intertwining green/blue link from the homes to Dock Park. Strong landscape and tree planting will utilise the water to thrive and allow for a biodiverse environment. All flows are then contained in Dock Park itself, a reed bed water lagoon is proposed as a major visual and ecological feature. Where a final outflow would lead into drainage outfalls.

Proposed Surface Water Drainage Strategy – Phase 1

As the development is located in Central London, infiltration into the ground will not be suitable as a means of surface water disposal due to the underlying London Clay, which is known to have a very low infiltration rate. Additionally, as a minimum distance of 5m would be required between a building and an infiltration device (in line with Building Regulations) it would not be possible to house an infiltration device on site as the building occupies the majority of the site footprint. As such, infiltration into the ground is not a viable option for this development.

The closest watercourse is the River Thames, which is located approximately 200m to the west of the site. Due to the proposed site levels Phase 1 is located at a low point on the site (approximately 2.4m AOD at ground level). As a result it would not be possible to discharge to the River Thames without introducing a surface water pump station. As such discharge of surface water to an adjacent water course is not a feasible option for the development site.

The existing Thames Water sewer network adjacent to the site comprises of combined water sewers only, therefore discharge of surface water to a surface water sewer is not possible for the development. Based on the above, the only feasible discharge location for surface water runoff from the site is to the Thames Water combined sewer network.

As such the proposed surface water strategy for the site has been developed to utilise sustainable drainages systems (SuDS) to attenuate surface water at source and reduce the risk of downstream flooding. The scheme will attenuate surface water using podium attenuation, before discharging via gravity to the Thames Water combined sewer adjacent to the site within North Woolwich Road.

13.4 Biodiversity and landscape

An ecological appraisal has been undertaken to review the existing ecological baseline, confirm the site’s current ecological status, assess any potential impacts of the development and identify how protection of biodiversity and habitat quality will be achieved and where biodiversity enhancements can be made.

Ecological input and advice have been provided to the design team regarding potential impacts of the development and on incorporation of measures for mitigation/compensation and enhancement including input into landscape designs to support both BREEAM and ecological enhancements for the site.

The development aims to provide landscaping that offers both naturalised amenity space and creates new locally appropriate habitats as well as contributes to green and blue infrastructure. The proposals have been developed to align with the National Planning Policy Framework, GLA London Plan Policies, Newham Local Plan Policies and BREEAM.

Key Targets and Policies

During planning and construction, the development will aspire to meet the biodiversity and green infrastructure targets and policies outlined in Table 13-3.

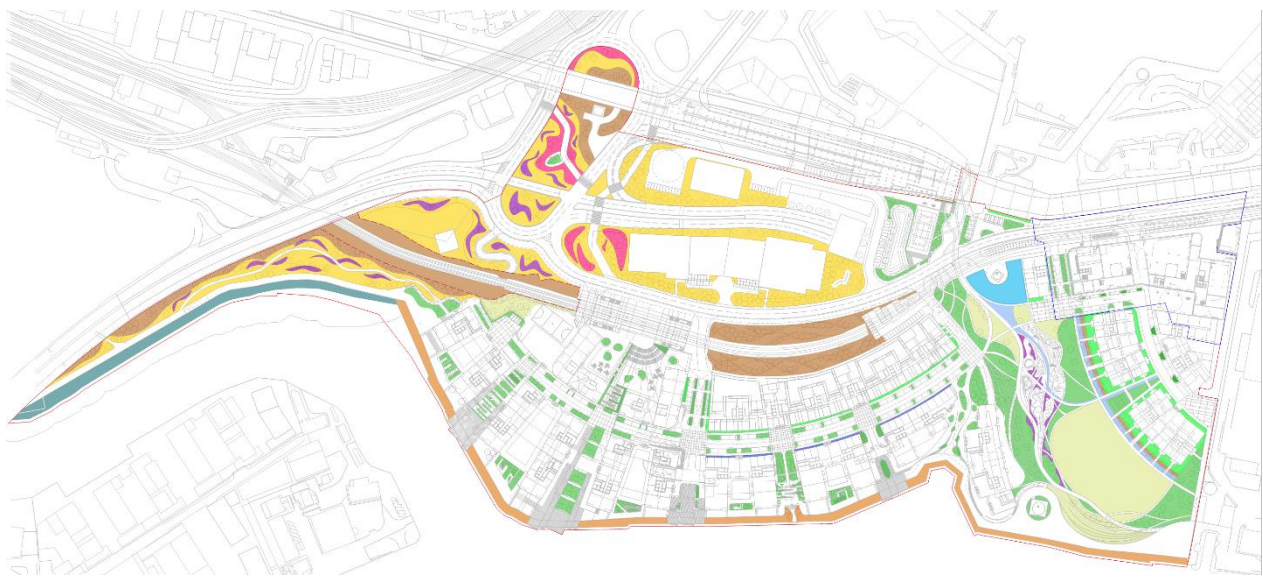
Table 13-3 Key Biodiversity targets

Policy	Requirements
GLA London Plan Policy 7.19 Biodiversity and access to nature	Development proposals should wherever possible, make a positive contribution to the protection, enhancement, creation and management of biodiversity
GLA London Plan Policy 5.10 Urban Greening 5.11 Green Roofs and development site environs	Development proposals should integrate green infrastructure from the beginning of the design process to contribute to urban greening, including the public realm. Elements that can contribute to this include tree planting, green roofs and walls, and soft landscaping.
GLA Sustainable Design and Construction SPG	The design of developments should prioritise landscape planting that is drought resistant and has a low water demand for supplementary watering. Developments should contribute to the Mayor’s target to increase tree cover across London by 5% by 2025. Any loss of a tree/s resulting from development should be replaced with an appropriate tree or group of trees for the location, with the aim of providing the same canopy cover as that provided by the original tree/s.

Biodiversity and Green Infrastructure Strategy

Former industrial brownfield sites create constraints that in the past have kept redevelopment at bay. The Thameside West site is no different and provides many challenges to create a strong place and setting appropriate for people to not only work in but also live and enjoy day to day life. The major hurdle of the masterplan was to create clear permeable accessibility to ensure that the site isn't isolated or turning it's back to the riverside while also creating clear linkages through existing and future infrastructure such as the Silvertown Flyover, The Lower Lea Crossing (A1020), , Dock Road, DLR flyover, Cable Car and the proposed Silvertown Tunnel.

Strong open spaces such as Dock park and the Leaway Ecology Park anchor ends of the site buffering some of these issues while at the same time creating green 'lungs' to allow the site to breath and become flexible enjoyable outdoor amenity spaces. Smaller scale character areas or neighbourhoods have spaces and streets of varying scale, materiality and character to then feed into a logical hierarchy that is easily navigable through the site. The layering and crossroads of key character spaces is highlighted through the creation of strong squares and use of materials that guides users through and on to other sites along the much walkable River Thames. A circuit of liveable green spaces with appropriate play and amenity also provides ample reasons and a draw for visitors to stay and enjoy Thameside West with the ambition to want to live in as well.



Drawing Notes	Area (Sqm)		
Amenity lawn	7700.04	Dry Suds chanel for privacy frontage	202.84
Ground cover and ornamental planting	10682.38	Buffer planting for privacy frontage	1734.05
Tall perennials	1594.81	Buffer planting for infrastructure frontage	9721.55
Grassland meadow	15572.73	Thames intertidal planting	3615.65
Wildflower meadow	1604.32	Existing intertidal planting	2340.38
Wetland and marginal planting	944.64		
Dry Suds chanel Dock Park	888.66	TOTAL	56602.05

Figure 13—6 Landscape masterplan and habitats with areas

Habitats

Comprising almost 2Ha of land prioritising natural habitats and waterside / wetlands, the Leaway Park and Eastern Ecology Areas create an important natural resource for conservation, teaching and offsetting the impacts of the significant transport infrastructure.

Leisure Park

The 2.5Ha Dock Park provides a significant uplift in green open space for the local community, along with planting for visual amenity and habitat creation. Formal and informal play; semi-private and public gardens; opportunities for food and drink; sports and leisure all combine to make a contemporary park a huge asset at the heart of the masterplan.

Habitat retention and creation

Figure 13—7 outlines the proposed habitat retention and creation across the whole masterplan. Some of the measures include but not limited to:

- Utilisation of native species or species with a known benefit to wildlife including pollinators and other invertebrates as well as birds and bats within planting scheme;
- Provision of native planting;
- Installation of bat boxes into the façades of the proposed buildings;
- Incorporation of bird nesting boxes;
- Installation of artificial invertebrate habitat features;
- Application of sustainable horticultural principles; and
- Installation of gaps in fences for hedgehogs and other terrestrial wildlife.

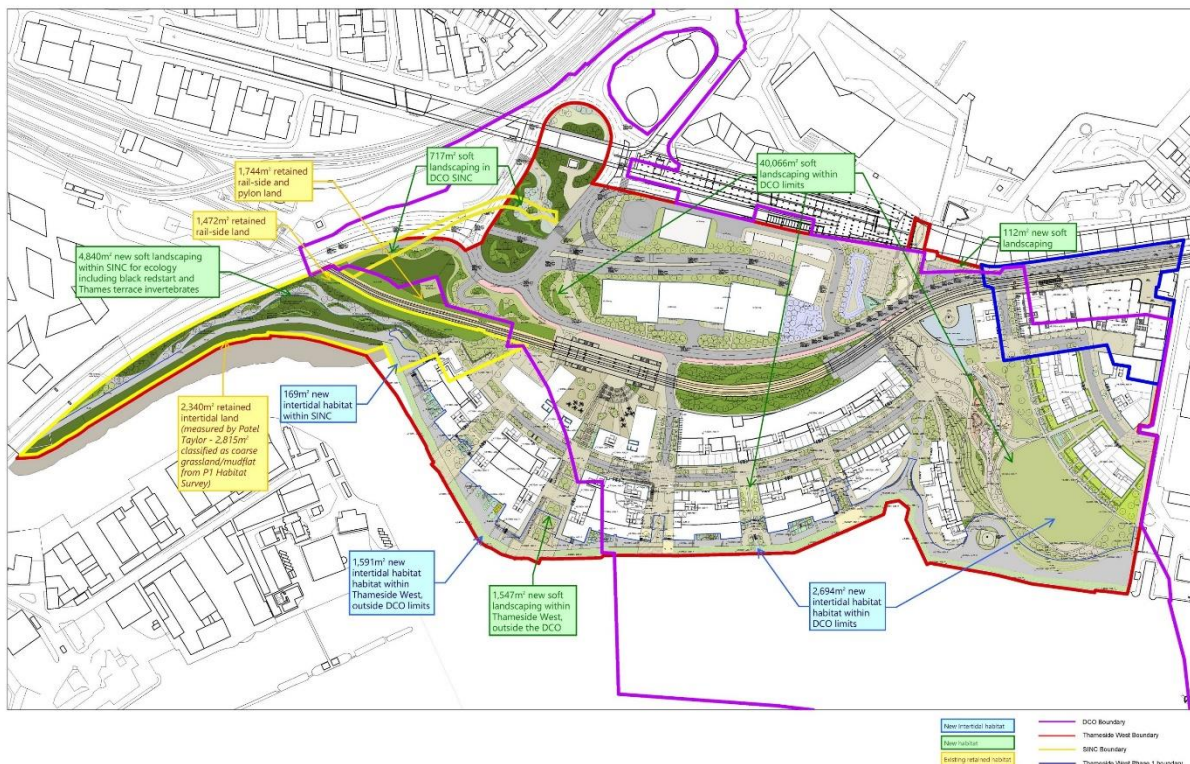


Figure 13—7 Proposed softscape strategy for Thameside West masterplan area marked up with habitat retention and creation

Adaptation to Climate Change with landscape

The brown roof and green corridors throughout the site will help people and wildlife adapt to the rising temperatures and extreme weather events associated with climate change. Green infrastructure helps to mitigate climate change by reducing greenhouse gas emissions through carbon storage and sequestration.

Where possible the landscape planning will prioritise planting that is drought resistant and planting that relies solely on precipitation during all seasons of the year. Where this is not possible plants and trees with a low water demand for supplementary watering will be prioritised and provided with rainwater irrigation. This will be drip-fed subsurface irrigation incorporating soil moisture sensors and will be zoned appropriately.

13.5 Waste management

13.5.1 Designing Out Waste

The development should consider the waste hierarchy shown in Figure 13—8. The waste hierarchy prioritises measures which look to reduce waste generation through the design process. Opportunities to design out waste will be investigated and potentially integrated as the project develops. At this stage, the following guidelines and legislation have been considered in the formulation of this SWMP:

- Defra (2008) *Non-statutory guidance for site waste management plans*;
- Waste and Resources Action Programme (WRAP) (2010) *Guidelines for measuring and reporting construction, demolition and excavation waste*; and
- WRAP (2011) *Achieving good practice Waste Minimisation and Management*.



Figure 13—8 Waste hierarchy

Measures Considered by Designers

The following measures should be considered to design out waste:

- Where possible, elements of the development will be fabricated and constructed off-site;
- The size and design of new building elements should be optimised in order to eliminate unnecessary elements and reduce off-cuts resulting from the construction process;
- The complexity of the design should be reduced and the construction process standardised in order to reduce the quantity of materials required; and
- Where possible, excavated material should be re-used on-site.

Other Design Considerations

Additional waste minimisation design measures should also be considered during subsequent design stages and, where possible, be incorporated into the project design. Options include the following:

Design solutions

- Consider matching design sizes to standard sizes of material supply in order to reduce off-cut waste;
- Maintain high quality control standards and process monitoring to ensure rejected batches of material are kept to a minimum; and
- Reduce the complexity of the design to standardise the construction process and reduce the quantity of materials required.

Logistics

- The development of a logistics plan for the project will ensure that due consideration is given to material requirements throughout the construction phase. This will enable efficient management of the delivery and storage of materials and will ensure that the most effective logistic methods are adopted;
- Adopt 'just-in-time' delivery protocols to reduce the space required for storage within the site. This will also minimise the risk of site congestion and material spoiling during bad weather; and
- Investigate the use of construction consolidation centres that provide effective supply chain management solutions, enabling the safe and efficient flow of construction materials and equipment from supplier to site.

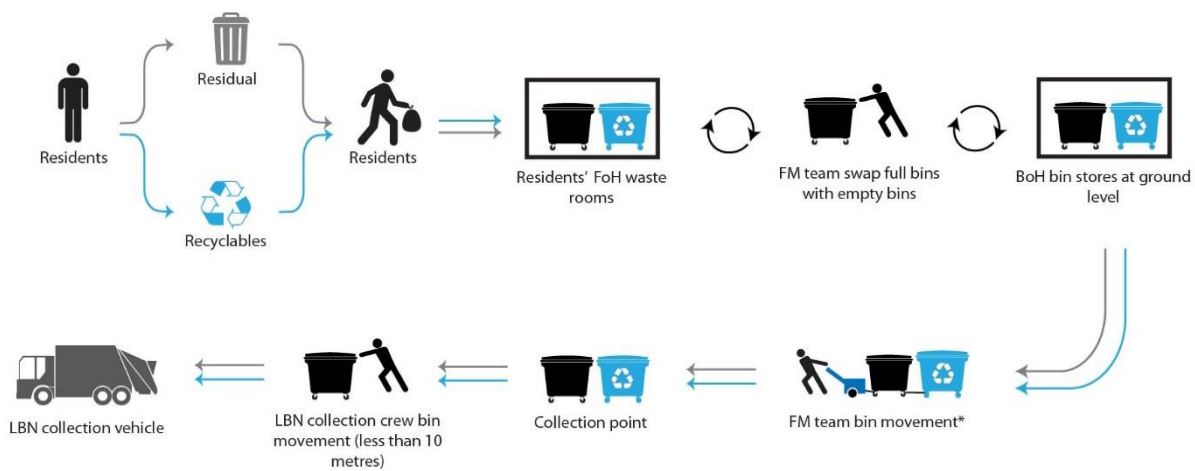
Materials procurement

- Specific information relating to sustainable waste management should be incorporated into tender documents for third party contractors. When appointing a waste management company to handle the transportation, recovery and disposal of waste, contractual obligations should be implemented to ensure that these sustainable waste management measures are carried out;
- Construction materials should meet local planning authority sustainability recommendations in order that the development can attain Building Research Establishment Environmental Assessment Method (BREEAM) accreditation;

- Reduce the amount of surplus materials by ordering the correct amount of materials at the right time;
- Material storage areas should be safe, secure and weatherproof to prevent damage and theft;
- Consider assigning the role of supply chain manager so that relationships and partnerships can be developed with suppliers who are able to implement waste minimisation at source;
- Set up agreements with suppliers to take back surplus materials and packaging;
- Engage with the supply chain to source products and materials that use minimal packaging and segregate packaging for re-use; and
- Aim to maximise the use of reclaimed and recycled materials.

13.5.2 Phase 1 Residential Waste management strategy

Both the affordable and market units in Phase 1 will be served by the ‘traditional’ local authority collection option, as is illustrated schematically in Figure 13—9 In brief, waste will be stored in 1,100 litre containers and collected on a weekly basis by LBN’s operatives.



*If waste room is further than 10 metres from collection point. Otherwise, LBN collection crew can access waste room directly.

Figure 13—9 Illustration of Phase 1 residential waste strategy

Internal Storage

To ensure that recyclables are collected separately from general refuse, adequate internal storage should be provided in all units for the separation of recyclable materials from other waste. The internal storage could take the form of a ventilated cupboard or drawer, typically located within the kitchen. Examples of internal waste storage systems are shown in Figure 13—10.



Figure 13—10 Examples of kitchen waste segregation units

Residential Waste Movement

LBN guidance states that residents should be required to walk no further than 30 m horizontal distance when carrying refuse and recycling. To satisfy this requirement, four designated front-of-house (FoH) waste rooms have been incorporated, one for each residential core. Residents in Block A and Block B will move their bagged segregated waste via lifts or stairs down to their nearest FoH waste room. Full bins will then be swapped by an on-site facilities management (FM) team with empties from larger back-of-house (BoH) stores, where bins can be stacked to save space.

It has not been deemed possible to bring Core 2 and Core 3 in each block down to ground level, as the brief to the architects from the applicant has been to maximise the footprint of the industrial units in this space. As such, the FoH waste rooms for these two cores will be located at first floor podium level, while the FoH waste rooms for Core 1 and Core 4 will be located at ground level. Meanwhile, the BoH bin store for Block A will be located at ground level adjacent to Core 1 and the BoH store for Block B adjacent to Core 4.

In line with LBN guidance, sufficient space has been provided across the FoH and BoH bin rooms to store waste generated over a period of one week, with residual waste and mixed recyclables stored in large 1,100 litre bins.

All waste storage rooms will be designed to comply with the recommendations set out in BS 5906:2005². For safety reasons, the waste rooms should be constructed within a fire compartment structure and fire extinguishers will be deployed in each room.

To ensure that recyclables are collected separately from general refuse, it is also recommended that appropriate signage on waste segregation is displayed in all FoH waste rooms and that residents receive a waste and recycling information pack when they move into their new home.

13.5.3 Masterplan residential waste strategy

In order to save space and improve the efficiency of waste management operations, a 'hybrid' waste management strategy has been proposed as the preferred waste management option for the residential dwellings across the site. This strategy is illustrated schematically in Figure 13—11.

² British Standard BS 5906:2005 Waste management in buildings. Code of practice.

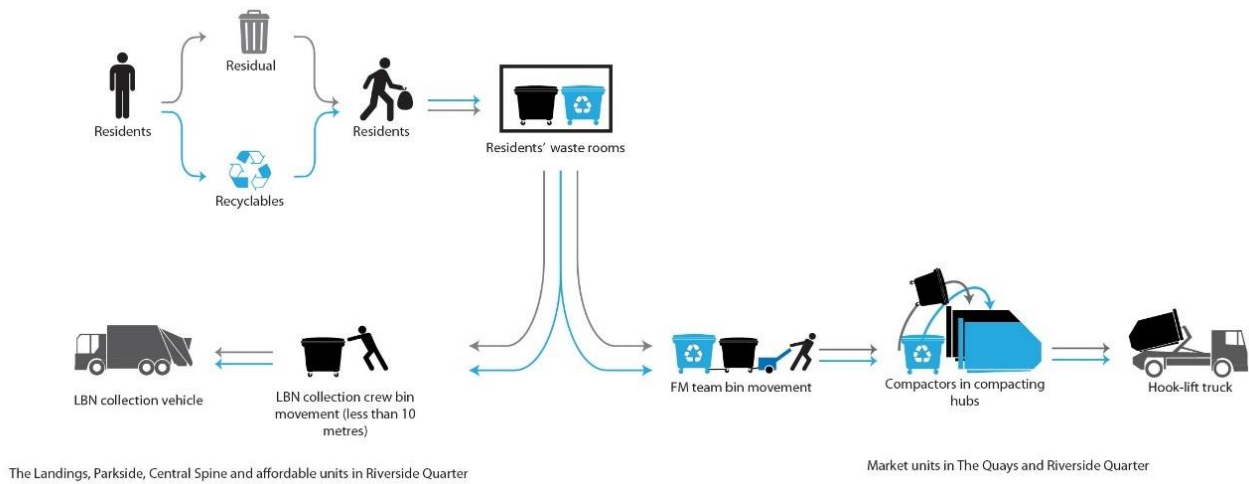


Figure 13—11 Illustration of proposed residential waste strategy for outline masterplan

In brief, waste from the 2,445 market units in The Quays and Riverside Quarter will be compacted, while the remaining units across the scheme will be served by LBN’s ‘traditional’ collection service, with all of their waste stored (and collected) in 1,100 litre bins.

For reference, The Landings is comprised of plots A and B, Parkside of plots C, D, E and F, The Quays of plots G, J, M and N, the Central Spine of plots H, K, L and P and Riverside Quarter of plots Q, R, S, T and U.

While the hybrid strategy is the preferred waste management option for the site, it should be noted that this option is dependent on LBN being able to offer a compactor collection service in future. During the meeting with LBN’s Waste and Public Space Commissioner, held on 17th October 2018, it was agreed that while LBN do not currently offer a compactor collection service, the waste management policy landscape will have evolved by the time The Quays and Riverside Quarter are constructed, meaning that there is potential for LBN to be able to collect compactors in future. As such, compacting areas have been shown in the outline planning submission. However, the design also provides adequate scope to adapt the waste management strategy at reserved matters stages, if required.

13.6 Sustainable Transport strategy

The overall transport strategy for the development is to meet the needs of a sustainable urban community such as Thameside West by incorporating a comprehensive transport strategy that promotes sustainable modes of transport wherever possible. A Transport Assessment and Framework Travel Plan have been undertaken for the site and are based on the transport priorities set out in Policy 6.1 of the GLA London Plan. Transport strategies will aim to encourage patterns and nodes of development that: reduce the need to travel (especially by car); improve accessibility of public transport, walking, and cycling; support measures that encourage shifts to more sustainable modes and appropriate demand management; and promote walking by ensuring an improved public realm.

Key Targets and Policies

During planning and construction, the development will aspire to meet the transport targets and policies outlined in Table 13-4.

Table 13-4 Key Transport targets

Policy	Requirements
GLA London Plan Policy 6.1 Strategic Approach	<ul style="list-style-type: none"> • Improve the capacity and accessibility of public transport, walking and cycling. • Support measures that encourage shifts to more sustainable modes of transport. • Promoting walking by ensuring an improved urban realm.
GLA London Plan Policy 6.9 Cycling	Developments should: <ul style="list-style-type: none"> • Provide secure, integrated, convenient and accessible cycle parking facilities in line with the minimum standards set out in Table 6.3 and the guidance set out in the London Cycle Design Standards (or subsequent revisions) • Provide on-site changing facilities and showers for cyclists • Contribute positively to an integrated cycling network for London by providing infrastructure that is safe, comfortable, attractive, coherent, direct and adaptable and in line with the guidance set out in the London Cycle Design Standards (or subsequent revisions) • Provide links to existing and planned cycle infrastructure projects including Cycle Superhighways, Quietways, the Central London Grid and the 'mini-Hollands'
GLA London Plan Policy 6.10 Walking	Development proposals should ensure high quality pedestrian environments and emphasise the quality of the pedestrian and street space by referring to Transport for London's Pedestrian Design Guidance.
BREEAM Tra 01-05	To promote development in proximity to good public transport networks, local amenities, cyclist facilities, alternatives to private cars, and a range of travel options.

Transport Strategy

The masterplan aspires to delivering a scheme that enhances the existing public realm and creates a new public realm that is comprehensible, high quality, easily navigable, connected, and incorporates urban greening. The proposals will be developed to align with GLA London Plan Policies and Newham Local Plan Policies where possible. As part of the wider Canning Town masterplan, Thameside West will facilitate pedestrian and cycling access and traveling by incorporating the masterplan's key pedestrian and cycling routes.

A Transport Assessment and Framework Travel Plan for the site are being provided as part of planning application. Please refer to these for more detailed information.

13.7 Response to climate change

The development is committed to delivering a scheme that addresses climate change mitigation and adaptation, and contributes to meeting targets to reduce carbon dioxide emissions. In accordance with GLA London Plan Policy 5.1 to 5.22, developments should contribute to both mitigating and adapting to climate change and to meet targets concerned with reducing carbon dioxide emissions.

Key Targets and Policies

The design and construction of Thameside West will seek to address the climate change related targets and policies as summarised in Table 13-5.

Table 13-5 Key climate change targets

Policy	Requirements
GLA London Plan Policy 5.2 Minimising Carbon Dioxide emissions	Development proposals should make the fullest contribution to minimising carbon dioxide emissions in accordance with the energy hierarchy. Residential buildings: <ul style="list-style-type: none"> • 35 percent improvement over Part L 2013 (40% improvement over the 2010 Building Regulations) Non-Domestic buildings: <ul style="list-style-type: none"> • Meet 35 percent improvement over Part L 2013.
GLA London Plan Policy 5.9 Overheating and Cooling	Major development proposals should demonstrate how the design, materials, construction and operation of the development would minimise overheating and also meet its cooling needs. New development in London should also be designed to avoid the need for energy intensive air conditioning systems as much as possible.
GLA Sustainable Design and Construction SPG	The Sustainable Design Construction SPG Section 3 highlights developments should comply with London Plan policies to reduce overheating, prioritising drought resistant plants, installing resilient foundations and increasing green cover and trees.
BREEAM Wst 05	To minimise the future need of carrying out works to adapt the building to take account of more extreme weather changes resulting from climate change and changing weather patterns.

Climate Change Strategy: Mitigation

Climate change mitigation methods are focussed around reducing or preventing greenhouse gasses where possible. Sustainable design measures that have been included to help mitigate climate change risks include:

- High standards of energy efficiency - e.g. efficient double glazed windows, low U-values and low air tightness.
- Connection to the local district heating network supplies low carbon heat to the development
- Development of an electrically driven (from heat pumps) energy centre on site for future phases
- Specifying low energy lighting strategy to reduce operational energy demand.
- As part of the wider Canning Town masterplan, Thameside West integrates transport strategies to encourage walking, cycling, and electric car usage and provide easy access to public transport.

Climate Change Strategy: Adaptation

In accordance with the GLA Sustainable Design and Construction Supplementary Planning Guidance, consideration has been given to the following topics:

- Water conservation and minimising flood risk
- Use of green infrastructure to minimise and mitigate heating to the urban environment
- Avoiding responses to climate impacts which lead to increases in energy use and CO₂ emissions
- Overheating and cooling (addressed in the Energy section of this report)
- Water quality and waste water infrastructure
- Resilient foundations

The following measures are have already been taken or being considered by the design team to mitigate the above impacts deriving from climate change:

- An Irrigation tank in combination with rainwater harvesting in order to reduce the need of fresh water during dry periods.
- Use of waterproof façade systems and protection of sensitive materials/sealants from weather exposure.
- Any plastics and sealants in the facades will be hidden from direct exposure to UV.
- Special care will be given in movement joint details to avoid direct exposure to UV radiation.
- Provision of design details to facilitate tenants select appropriate plants and equipment.
- Special consideration for appropriate expansion/contraction in movement joints design.
- Solar reflectance of hard landscaping will be considered further in the next design stages to reduce the Urban Heat Island Effect.
- Change of brown roofs to green roofs will be considered for higher reflectance.
- Green and brown roofs are expected to provide additional attenuation to rainwater flow rate.
- Surface water run-off rates will be lower than the pre-developed site allowing for a 40% increase rainfall from climate change.
- Piled foundations with piled caps will be predominant in the substructure. It is considered that this kind of foundation will not be affected by any ground movement deriving from extreme wet and dry periods.
- The use of clay boards will be considered in the basement walls in order to allow for the clay heave effect.

14 BREEAM assessment

14.1 Introduction



Figure 14—1 BREEAM Topics

BREEAM (Building Research Establishment's Environmental Assessment Method) is the world's first sustainability rating scheme for the built environment and has contributed much to the strong focus in the UK on sustainability in building design, construction and use. BREEAM is now an international standard that is locally adapted, operated and applied.

Within BREEAM, ten categories of environmental impact are assessed, each covering a number of clearly defined issues. These issues seek to mitigate the impact of a new or refurbished building on the environment by setting performance-based criteria and benchmarks and a given number of credits is available for addressing each one.

Within each environmental performance category, there are a number of credits which developments are assessed against. Where evidence is provided demonstrating that the criteria of the credit have been met, the appropriate number of credits can be awarded. A weighting is applied to account for the varying importance of the different categories and then the category totals are added together to produce a single overall score on a scale of Pass, Good, Very Good, Excellent or Outstanding. The performance standard for each rating is summarised below in Table 2.1.

Table 2.1: BREEAM performance standards

BREEAM Rating	% Score
Outstanding	85 %
Excellent	70 %
Very Good	55 %
Good	45 %
Pass	30 %
Unclassified	<30 %

14.2 BREEAM New Construction 2018

BREEAM is the leading means of reviewing and improving the environmental performance of buildings and communities in the UK. Around every three to four years, BREEAM reviews its certification schemes to ensure they follow industry best practice and innovation. BREEAM New Construction 2018 was released this year, and the new scheme has identified the following key areas as the focus for this update from the 2014 version:

Technical

- Scheme Alignment
- Performance Gap
- Transport
- Health & Wellbeing
- Sector Tailoring
- Materials
- Unregulated and embodied Energy

Non-Technical

- Scheme document accessibility
- Digital tools
- Value case
- Data collection / analytics

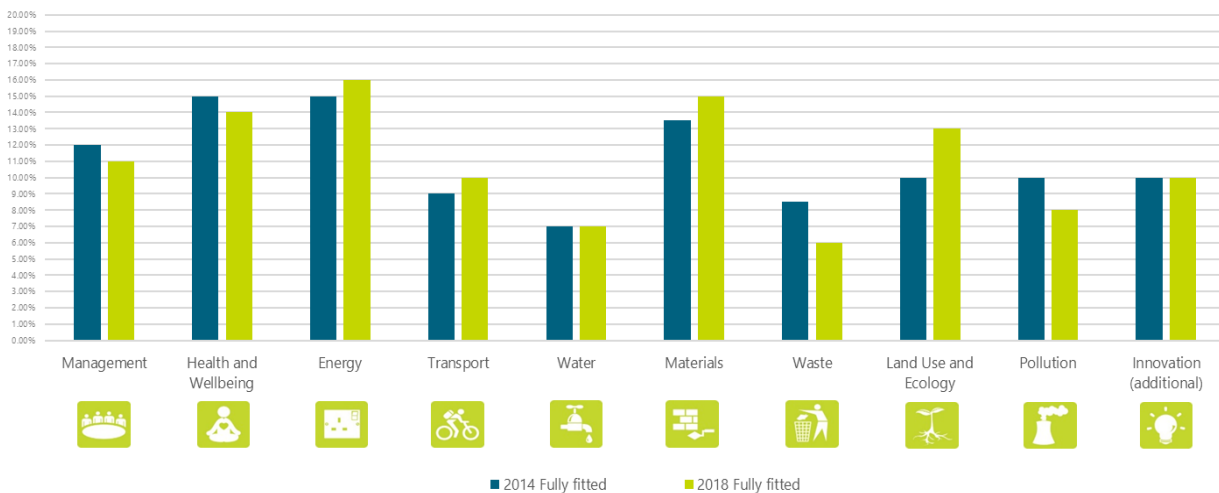


Figure 14—2 2014 to 2018 BREEAM weightings

Figure 14—2 shows that the weightings have changed between 2014 and 2018 schemes. The weighting for Energy, Transport, Materials and Land use and Ecology have increased.

14.3 Shell and Core vs Full fit-out

The BREEAM New Construction version can be applied to fully fitted, shell only and shell and core building projects. The proposed development has a mixture of potential use types which will come under the BREEAM Shell and Core Retail, Community and Industrial assessments. A shell only or shell and core building project is defined as one where the developer's scope of works is the design and construction of the base building only, leaving a range of construction and fit-out works to be completed before the building is able to be occupied. This may include some or all of the following elements: the structure, building envelope, core building systems including building servicing strategy and installations (such as HVAC) or plant support for installation of such systems and where present, fit-out of common areas.

The Shell and Core option of certification is available where the developer's scope of works covers shell works, external elements and hard and soft landscaping, plus core building services. Core building services relates to the installation of central or communal transportation systems, water systems, fit-out of common areas, central mechanical and electrical systems including HVAC, but without local fitting of systems within tenant areas. The systems will typically be centralised with capped off distribution to each tenanted area (for future connection as part of a tenant's fit-out works).

This does not include the full scope of a typical Category A fit-out, due to the fact that the specification of items such as ceiling finishes, raised floors and the zoning of local services above the lettable floor area and other Category A works are not typically finalised until the space undergoes final fit-out according to the tenant's specification and are liable to change. These items are, therefore, excluded from a shell and core assessment

LBN's Detailed Sites and Policies Development Plan Document (October 2016) requires a minimum of BREEAM 'Very Good' for non-residential elements over 500sqm GIA and an 'Excellent' rating for major applications. It is unclear if this refers to fully fitted or Shell and Core. It is proposed that the BREEAM rating is reviewed on a plot by plot basis when the RMA is brought forward. This will allow for BREEAM scheme changes, certification types and level changes.

14.4 Office/Industrial: BREEAM Pre-assessment Summary

Pre-Assessment & Results

A BREEAM pre-assessment has been carried out for a non-specific shell & core building type, using BREEAM 2018 New Construction, Shell and Core, Sector: Industrial (office), to identify the credit areas which are currently achievable, at risk and not currently targeted.

The Pre-assessment sets out an indicative route to achieving the target but that the developer is not committing to any specific route to gain the BREEAM Excellent rating. Based on the pre-assessment undertaken, a commercial unit would be expected to achieve ~56%. However there are several credits that could potential be gained if targeted. If these are targeted a score of 76% could be achieved. These results are displayed in Figure 14—3.

The scores stated are indicative and are subject to change based on detailed design. The pre-assessment results indicate that the proposed development is on target to achieve a 'Excellent' rating providing that at least the credit areas identified as low risk and targeted (green) will be challenging. It should also be noted that all credit areas identified as "minimum standards for a BREEAM 'Excellent' rating" have been identified as low risk. Credit areas identified as in the not targeted section (red).

BREEAM SCORE SUMMARY		
MINIMUM REQUIRED	70.0%	Excellent
TARGETED	55.8%	Very Good
POTENTIAL	76.4%	Excellent
NOT TARGETED	100.6%	
ACHIEVED	0.0%	



Figure 14—3 BREEAM pre-assessment results

Due to ambiguity on current occupiers and the very recent changes to BREEAM 2018 a score of 'Very Good' can be achieved and committed to. The risk of these 'Potential' credits being gained is still unclear because very few schemes have been submitted under the new BREEAM 2018, and none have been through post construction.

The possibility of the development's ability to achieve 'Excellent' will need to be reviewed through the design to reduce the risk of the potential credits, shown in orange. Future plots under RMA will also need to review the potential BREEAM certification level as the BREEAM scheme matures and future schemes are released.

The BREEAM pre-assessment for Phase 1 has been provided in Appendix C for review if required.

Appendix A GLA's Overheating Checklist

Domestic Overheating Checklist		
Section 1 – Site features affecting vulnerability to overheating		
Site Location	Urban	Yes
	Per-urban	No
Air quality/ Noise Sensitivity	Busy roads/A Roads	The NE facades are expected to be exposed to traffic generated by existing developments.
	Railways/ Overground/DLR	Yes
	Airport/Flight Path	Yes
	Industrial uses/ Waste facility	No
Proposed building use	Will any buildings be occupied by vulnerable people (e.g. elderly, disabled, young children)?	Unconfirmed, not expected
	Are residents likely to be at home during the day (e.g. students)?	Unconfirmed, not expected
Dwelling aspect	Are there any single aspect units?	Yes
Glazing ratio	Is the glazing ratio (glazing: internal floor area) greater than 25%?	Yes
	If yes, is this to allow acceptable levels of daylighting?	Yes
Security - Are there any Security issues that could limit opening of windows for ventilation?	Single storey ground floor units	Yes
	Vulnerable areas identified by the Police Architectural Liaison Officer	Yes
	Other	Unknown
Domestic Overheating Checklist		
Section 2 – Design Features implemented to Mitigate Overheating Risk		
Landscaping	Will deciduous trees be provided for summer shading (to windows and pedestrian routes)?	Yes
	Will brown roofs be provided?	Yes
	Will other green or blue infrastructure be provided around buildings for evaporative cooling?	Yes – very close to the Thames River
Material	Have high albedo (light colour) materials been specified?	Yes
Dwelling Aspect	% of total units that are single aspect	Indicative 20% for both blocks
	% single aspect with N / NE / NW orientation	~50%
	% single aspect with E orientation	~50%
	% single aspect with S / SE / SW orientation	~60%
	% single aspect with W orientation	~50%
Glazing ratio - What is the glazing ratio (glazing; Internal floor area) on each facade?	N/NE/NW	~36%
	E	~42%
	S/SE/SW	~38%
	W	~47%

Daylighting	What is the average daylight factor range?	<p>Block A Mean – 3.82% Mode – 1.7% Median – 3.43% ADF Range - 0.36% to 15.27% % of spaces > 1.5% SDF – 87%</p> <p>Block B Mean – 3.84% Mode – 1.04% Median – 3.14% ADF Range - 0.71% to 14.02% % of spaces > 1.5% SDF – 84%</p>
Window opening	Are windows openable?	Yes
	What is the average percentage of openable area for the Windows?	Top hung window – 23% Sliding doors – 40% Refer to section 12.3.3
Window opening - What is the extent of the opening?	Fully openable	Yes
	Limited (e.g. for security, safety, wind loading reasons)	No
Security	Where there are security issues (e.g. ground floor flats) has an alternative night time natural ventilation method been Provided (e.g. ventilation grates)?	MVHR will provide background continuous vent
Shading	Is there any external shading?	Reveals, balconies and top level overhangs
	Is there any internal shading?	Blinds
Glazing specification	Is there any solar control glazing?	Yes (0.3 g-value for levels 13 and above, 0.5 g-value for below)
Ventilation - What is the ventilation Strategy?	Natural – background	No
	Natural – purge	Yes
	Mechanical – background (e.g. MVHR)	Yes
	Mechanical – purge	No
	What is the average design air change rate	Minimum 4 ach
Heating System	Is communal heating present?	Yes
	What is the flow/return temperature?	75-45°C
	Have horizontal pipe runs been minimised?	Where possible
	Do the specifications include insulation levels in line with the London Heat Network Manual	Yes

Appendix B SAP and BRUKL reports

