

Energy, Sustainability Statement & Overheating Analysis

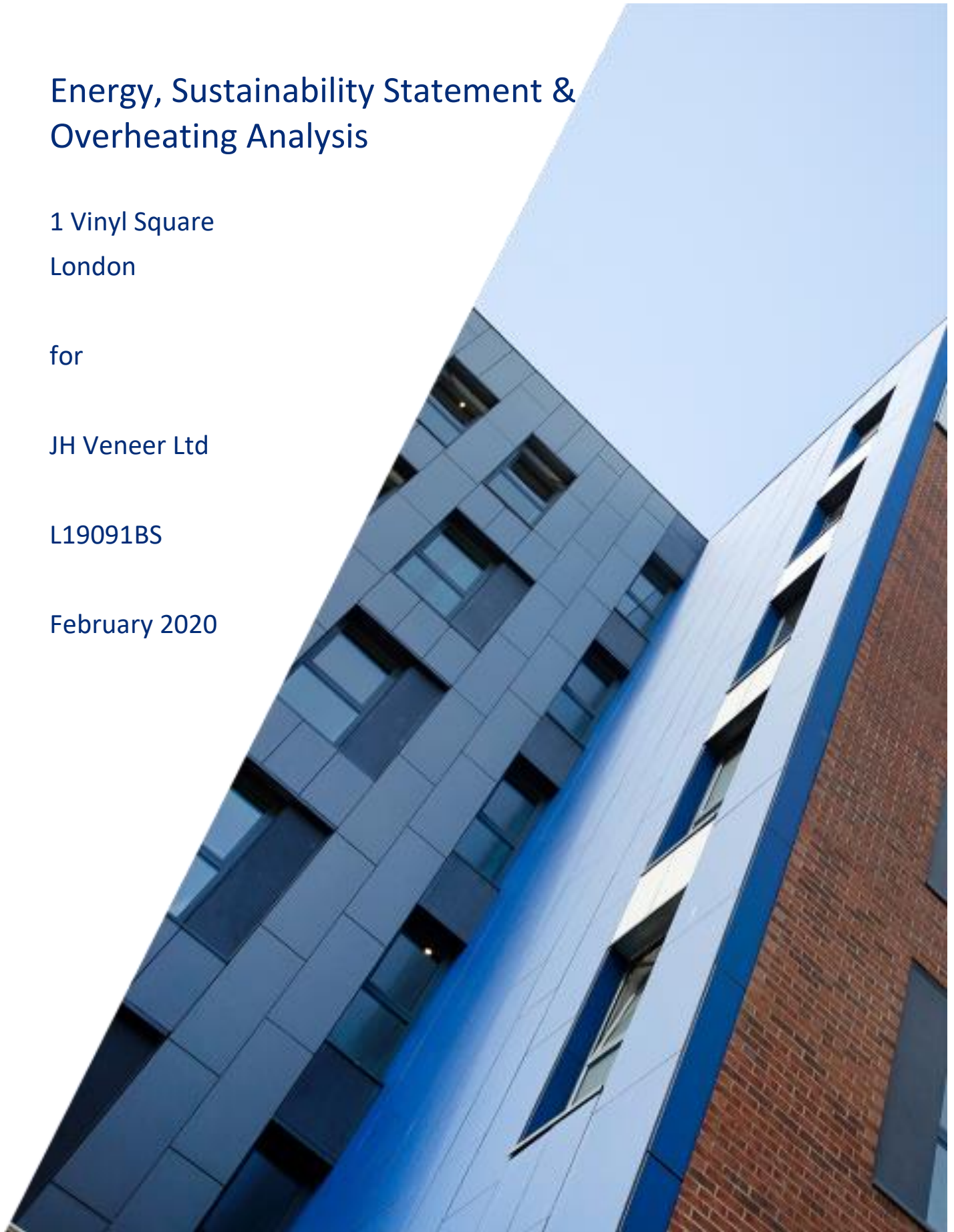
1 Vinyl Square
London

for

JH Veneer Ltd

L19091BS

February 2020



Energy, Sustainability Statement & Overheating Analysis

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Contents

1.0	Executive Summary	2
2.0	Introduction.....	3
2.1	Description of Site and Planning	3
2.2	Master Planning Information	5
3.0	Policy Context.....	6
3.1	Regional Policy – Greater London Authority (GLA)	6
3.2	Updated Draft London Plan (July 2019, for implementation in 2020)	8
3.3	GLA’s Energy Assessment Guidance (2018)	9
3.4	Local Policies – Hillingdon	10
4.0	Energy Hierarchy Approach.....	14
5.0	Energy & Carbon Assessments	15
5.1	General Approach.....	15
5.2	SAP Assessment Methodology	16
5.3	Baseline	17
5.4	Be Lean	19
5.5	Be Clean	21
5.6	Be Green	24
5.7	Site Wide Summary of Be Green Measures	24
6.0	Expected Carbon Emissions (As Designed).....	26
7.0	Carbon Offset Payment	28
8.0	Overheating Analysis	29
8.1	Analysis Information.....	29
8.2	Overheating Analysis Assessment.....	33
8.3	Summary.....	33
9.0	Non Domestic - Cooling Demand	34
10.0	Conclusions.....	35
11.0	Appendices	36

1.0 Executive Summary

This Energy, Sustainability & Overheating report has been prepared on behalf of JH Veneer Ltd. as part of a planning application for the site known as 1 Vinyl Square, which is located towards the western end of The Old Vinyl Factory site, in Hayes, West London.

This report demonstrates how sustainability and design principles shall be embedded into the development, to ensure the development's design parameters are achieved and even exceed the requirements of the Building Regulations and all other relevant energy policies as defined by the GLA. The sustainable features include energy efficient building services, use of passive design principles and adoption of some PV panels.

Furthermore, the report demonstrates how sustainability principles are adopted into the development to achieve compliance with the Draft New London Plan, in particular the new London Plan Policy for achieving zero-carbon target for major developments and additionally, the GLA Energy Assessment Guidance (2018), which requires a minimum 35% on-site carbon reduction target, of which Domestic elements of the development must deliver 10% carbon reductions through energy efficiency means.

The results of the "Be Clean" modelling identified that the minimum 35% carbon reduction targets have been met through the adoption of the measures detailed within the 'Be Lean' & 'Be Clean' sections of this report. The 'Be Green' measures have shown that the adoption of a small element of Photovoltaics has provided additional reductions without impacting on the other requirements of the site such roof amenity space and glare to flight paths. This has provided an estimated carbon reduction of 41% exceeding the requirements of the GLA and the site masterplan's Section 106 requirements.

The report shows how the proposed development has been designed using the principles of the Energy Hierarchy, in order to deliver significant carbon dioxide reductions and comply with the various relevant policies and regulations.

In particular, the design team have sought to minimise emissions at source by the incorporation of the "Fabric First" approach, sustainable design features and the connection to the Local District Heating Network for the provision of space heating and domestic hot water requirements. This approach is advantageous in ensuring a reduction in energy consumption without the need for tenant interaction as well as future reductions by the decarbonisation of the Energy Centre. In addition, this fabric first approach requires no maintenance by the tenants.

This report also shows compliance with the development's masterplan, showing that the proposed design parameters exceeds those required by the S106 Agreement (as approved in the masterplan's energy statement). As such is it expected that there will be no requirement for any Carbon Offsetting payments.

2.0 Introduction

Patrick Parsons have been instructed by, JH Veneer Limited, to produce an Energy and Sustainability Statement (which also included an Overheating Assessment) to support the planning application for a development at 1 Vinyl Square on the Old Vinyl Factory Site in Hayes, London. The development has previously been known as 'Veneer Store' and 'Veneer Building' as referenced in some old documents.

It should be noted that this report has been updated (Revision 6) to incorporate the comments provided by the Greater London Authority (GLA) on 12/02/2019 which as be summarised as the following:

- Inclusion of SAP 2012 Results
- Inclusion of GLA Carbon Emissions Reporting Spreadsheet
- Supporting Evidence for the Use of SAP 2012 Assessments
- Details of District Heating System and Proposed PV installation area
- Revised summary statement on Overheating Results
- Inclusion of Cooling Demand values
- Commentary of District Heating decarbonisation
- Confirmation of the use of Heat Interface Units within in each heating space (Domestic and Non Domestic).

2.1 Description of Site and Planning

The development address is 1 Vinyl Square, The Old Vinyl Factory, Blyth Road, Hayes, London, UB3 1SY, and is within the London Borough of Hillingdon. This is a vacant brownfield site formerly occupied by the Veneer Building. The wider site, 'The Old Vinyl Factory' (TOVF) has outline planning permission, however the ability to submit a reserved matters application for 1 Vinyl Square has lapsed.

The maximum height of the building will be 11 storeys (ground plus 10 floors) plus lift overruns. The description of the proposed development is:

A "mixed-use development comprising residential dwellings (C3 Use Class) and commercial floorspace (flexible A1/A2/A3/A5/B1 Use Class), car parking, cycle parking and associated landscaping."

There is a legal agreement in place relating to the site wide masterplan which requires that this development "1 Vinyl Square Building" is connected to the site's energy centre, via a local district heating network. This forms part of a site wide requirement to save a minimum of 394 tCO₂ per annum across the whole site. This is the equivalent of a 34.9% carbon savings (based on SAP 2009 calculations), taken from the site wide energy statement.

Section 13 of the S106 legal agreement has the following criterion which are required to be met:

Criterion 1 - Carbon savings are required to meet or exceed the threshold of 394 tonnes per annum.

Criterion 2 - The Energy Strategy to support each phase of the development in achieving the necessary BREEAM and Code for Sustainable Homes Rating.

Criterion 3 – The Energy Strategy to utilise Combined Heat and Power. The CHP unit has been installed in the energy centre and is operational.

Criterion 4 - All measures necessary to meet the threshold of a 394 tonne carbon emissions saving per annum to be completed and operational. The CHP unit has been installed in the energy centre; is currently estimated to be able to provide a carbon saving of 438 tonnes per annum once all phases of the development are operational.

Criterion 5 - Any shortfall in the saving of 394 tonnes carbon per annum to be offset with a financial contribution.

A report provided by MTT, which can be found in **Appendix H**, confirms that the carbon saving for the site are currently on course to exceed this threshold. This report was required to comply with the masterplan Section 106 and has been approved by the Council.

Within this report, the development will be shown to be bettering the estimated carbon saving and it is therefore expected that no Carbon Offset payments will be required. Given the requirement to connect to the CHP (energy centre) along with the requirement to meet the 394 tonnes of carbon saving.

2.2 Master Planning Information

The following design parameters (including U-Values) are understood to have been adopted for all site buildings as part of the master planning energy analysis (this is referenced in Appendix H). The values are given below for future reference against the final design parameters presented in this report.

Item	Value
U Value external walls:	0.16 W/m ² .K
U Value external roofs:	0.14 W/m ² K
U Value ground floor floors:	0.12 W/m ² .K
U Value external windows/doors:	1.4 W/m ² .K (whole unit)
U Value communal circulation walls:	0.16 W/m ² .K
U Value party walls:	0.0 W/m ² .K
Y-value (thermal bridging):	0.15 (SAP default)
Shading Devices:	Light coloured curtain or roller blind – fraction closed 0.8
Air permeability:	5 m ³ /m ² h
Ventilation:	MVHR with SFP = 0.6; heat recovery 90%
Design air change rate:	3
Space Heating and DHW:	Community CHP / gas boilers
Space Heating and DHW efficiency:	89% (heat to power = 1.25)
Controls:	Programmer, room thermostat, TRVs and interlock
Emitters:	Underfloor heating
% low energy light fittings:	100%
Renewables:	None

3.0 Policy Context

On a National Level the development will need to comply with all Building Regulations, including Part L 2016 (plus amendments) as well as other standards.

3.1 Regional Policy – Greater London Authority (GLA)

Greater London, producing 9% of UK carbon emissions, has the lowest CO₂ per capita emissions in the UK (4.2tCO₂ per person). This is due to the urban nature of the transport system, a high population density and a greater proportion of residential areas and lesser proportion of large industrial facilities¹. Despite its relatively low share of UK emissions however, it is worth noting that with a population of 8.623 million in 2015² 4.2tCO₂ per person equates to 36.217 million tCO₂ which is more than all the energy consumed by Morocco (35.66 million metric tonnes), Slovakia (34.54) and Cuba (34.46)³. In order for London to reduce its emissions, it must not only save energy, but also generate it from renewable sources.

3.1.1 The London Plan

Taking the lead from the national targets, London has set its own targets in the London Plan. Chapter 5 of the London Plan 2016 sets out a comprehensive range of policies underpinning London's 'Response to Climate Change'. These policies cover climate change mitigation, adaptation, waste, aggregates, contaminated land and hazardous substances.

"The Mayor seeks to achieve an overall reduction in London's carbon dioxide emissions of 60 per cent (below 1990 levels) by 2025."⁴ It is thought that whilst challenging, the target set by the Mayor should be achievable with the full commitment and collaboration of all stakeholders.

London Plan Policies state that energy must be integral part of the design of any new development (p.9). Indeed, energy assessments must:

- Be submitted at the planning application stage, not submitted post planning in response to a condition
- Commit to reducing regulated CO₂ emissions below those of a Part L 2013 of the Building Regulations compliant development through energy efficiency measures alone
- Include information demonstrating that the risk of overheating has been mitigated through the incorporation of passive design measures
- Demonstrate that connection to existing or planned district heating networks has been prioritised and provide correspondence to support this
- commit to a site wide heat network to allow connection to existing or planned district heating networks identified in the area
- commit to a single energy centre to supply the site wide heat network
- where CHP is applicable, select renewable technologies that are complementary with the optimal operation of the CHP.

1 Department for Energy and Climate Change 2014 Local Authority Carbon Dioxide Emissions

2 UK Population 2016

3 International Energy Statistics, EIA

4 Chapter 5, London's Response to Climate Change, The London Plan 2016.

This document sets out to address the following London Plan Policies;

Policy 5.2 - Minimising Carbon Dioxide Emissions - the development proposals will make the fullest contribution to minimising carbon dioxide emissions in accordance with the following energy hierarchy:

- Be Lean: use less energy
- Be Clean: supply energy efficiently
- Be Green: use renewable energy.

As outlined in the Mayor's Sustainable Design and Construction Supplementary Guidance (SPG) published in April 2014. From 6 April 2014 the Mayor will apply a 35% carbon reduction target beyond Part L 2013 of the Building Regulations - this is deemed to be broadly equivalent to the 40 per cent target beyond Part L 2010 of the Building Regulations, as specified in Policy 5.2 of the London Plan for 2013-2016.

Policy 5.3 - Sustainable Design and Construction - requires that the highest standards of sustainable design and construction should be achieved to improve the environmental performance of new developments.

Policy 5.5 - Decentralised Energy Networks - requires that 25% of the heat and power used in London to be generated through the use of localised decentralised energy systems by 2025.

Policy 5.6 - Decentralised Energy in Development Proposals – Development proposals should evaluate the feasibility of CHP systems

Policy 5.7 - Renewable Energy - requires that all major developments seek to reduce their CO2 emissions through the use of onsite renewable energy generation wherever feasible. As this is a Minor Development, the inclusion of renewable technologies is not mandatory.

Policy 5.9 – Overheating and Cooling – encourages the design of spaces to avoid overheating and excessive heat generation and to reduce overheating due to the impacts of climate change and the urban heat island effect.

Housing Standards Policy 5.15 Water use and Supplies – Developments should minimise the use of mains water by incorporating water saving measures and designing to achieve a target of 105 litres or less per person per day.

3.2 Updated Draft London Plan (July 2019, for implementation in 2020)

It should be noted that the London Plan (2016) was in place when the site wide planning application was submitted and approved. But every effort has been made within this energy assessment to adopt elements and betterments suggested within the Draft 2019 version wherever possible.

Policy GG6 Increasing efficiency and resilience

Developments should seek to improve energy efficiency and support the move towards a low carbon circular economy, by ensuring buildings and infrastructure are designed to adapt to a changing climate, making efficient use of water, reducing impacts from natural hazards like flooding/heatwaves, while mitigating against and avoiding contributing to the urban heat island effect, contributing towards London becoming a zero-carbon city by 2050.

Policy S12 Minimising Greenhouse Gas Emissions

Developments should be net zero-carbon. This means reducing greenhouse gas emissions in operation and minimising both annual and peak energy demand and should include a detailed energy strategy to demonstrate how the zero-carbon target will be met.

A minimum on-site reduction of at least 35 per cent beyond Building Regulations is required for major development. 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: through a cash in lieu contribution to the borough's carbon offset fund, or off-site provided that an alternative proposal is identified, and delivery is certain.

Policy S13 Energy infrastructure

Developments should establish the future energy and infrastructure requirements arising from large-scale development proposals such as Opportunity Areas, Town Centres, other growth areas or clusters of significant new development. Developments energy masterplans should be developed for large-scale development which establish the most effective energy supply options.

3.3 GLA's Energy Assessment Guidance (2018)

This report will aim to achieve the following requirements of the GLA's Energy Assessment Guidance (2018).

Energy assessments must:

- be submitted at the planning application stage, not submitted post planning in response to a condition
- commit to reducing regulated CO2 emissions below those of a development compliant with Part L 2013 of the Building Regulations through energy efficiency measures alone
- demonstrate how the zero-carbon target for residential developments will be met, with at least a 35% on-site reduction beyond Part L 2013 and proposals for making up the shortfall to achieve zero carbon, where required
- demonstrate at least a 35% on-site reduction beyond Part L 2013 for non-residential development. Developments comprised of both domestic and nondomestic uses must demonstrate this target has been achieved for domestic and non-domestic uses separately
- include information demonstrating that the risk of overheating has been mitigated through the incorporation of passive design measures
- demonstrate that connection to existing or planned district heating networks has been prioritised and provide correspondence to support this
- commit to a site-wide heat network to allow connection to existing or planned district heating networks identified in the area
- commit to a single energy centre to supply the site-wide heat network
- investigate suitable low carbon and/or renewable heating plant for installation within the energy centre if connection can't be made to an area wide network
- investigate and commit to maximising the installation of renewable technologies (including the potential for storage) on site
- include information on how the building's actual energy performance will be monitored post-construction
- align with related documents and assessments that are submitted as part of the planning application, e.g. Air Quality Assessments, Sustainability Statements

3.4 Local Policies – Hillingdon

It is understood that there is a Local Development Plan that has been developed by the London Borough of Hillingdon which is divided into two parts:

- Local Plan Part 1 - Strategic Policies (adopted in November 2012)
- Local Plan Part 2 - Development Management Policies (adopted in January 2020)

The following policies are noted as being relevant and will be incorporated into this energy assessment.

LPP1 - Policy EM1: Climate Change Adaptation and Mitigation

Hillingdon Council will ensure that climate change mitigation is addressed at every stage of the development process by:

1. Prioritising higher density development in urban and town centres that are well served by sustainable forms of transport
2. Promoting a modal shift away from private car use and requiring new development to include innovative initiatives to reduce car dependency.
3. Ensuring development meets the highest possible design standards whilst still retaining competitiveness within the market.
4. Working with developers of major schemes to identify the opportunities to help provide efficiency initiatives that can benefit the existing building stock.
5. Promoting the use of decentralised energy within large scale development whilst improving local air quality levels.
6. Targeting areas with high carbon emissions for additional reductions through low carbon strategies. These strategies will also have an objective to minimise other pollutants that impact on local air quality. Targeting areas of poor air quality for additional emissions reductions.
7. Encouraging sustainable techniques to land remediation to reduce the need to transport waste to landfill. In particular developers should consider bioremediation ⁽³⁹⁾ as part of their proposals.
8. Encouraging the installation of renewable energy for all new development in meeting the carbon reduction targets savings set out in the London Plan. Identify opportunities for new sources of electricity generation including anaerobic digestion hydroelectricity and a greater use of waste as a resource.
9. Promoting new development to contribute to the upgrading of existing housing stock, where appropriate.

The Borough will ensure that climate change adaptation is addressed at every stage of the development process by:

10. Locating and designing development to minimise the probability and impacts of flooding.
11. Requiring major development proposals to consider the whole water cycle impact which includes flood risk management, foul and surface water drainage and water consumption.
12. Giving preference to development of previously developed land to avoid the loss of further green areas.
13. Promoting the use of living walls and roofs, alongside sustainable forms of drainage to manage surface water run-off and increase the amount of carbon sinks.
14. Promoting the inclusion of passive design measures to reduce the impacts of urban heat effects.

LPP2 - Policy DMEI 2: Reducing Carbon Emissions

- A) All developments are required to make the fullest contribution to minimising carbon dioxide emissions in accordance with London Plan targets.
- B) All major development proposals must be accompanied by an energy assessment showing how these reductions will be achieved.
- C) Proposals that fail to take reasonable steps to achieve the required savings will be resisted. However, where it is clearly demonstrated that the targets for carbon emissions cannot be met onsite, the Council may approve the application and seek an off-site contribution to make up for the shortfall.

LPP2 - POLICY DMEI 3: Decentralised Energy

- A) All major developments are required to be designed to be able to connect to a Decentralised Energy Network (DEN).
- B) Major developments located within 500 metres of an existing DEN, and minor new-build developments located within 100 metres, will be required to connect to that network, including provision of the means to connect to that network and a reasonable financial contribution to the connection charge, unless a feasibility assessment demonstrates that connection is not reasonably possible.
- C) Major developments located within 500 metres of a planned future DEN, which is considered by the Council likely to be operational within 3 years of a grant of planning permission, will be required to provide a means to connect to that network and developers shall provide a reasonable financial contribution for the future cost of connection and a commitment to connect via a legal agreement or contract, unless a feasibility assessment demonstrates that connection is not reasonably possible.

- D) The Council will support the development of DENs and energy centres in principle, subject to meeting the wider policy requirements of this plan and in particular on design and air quality.

LPP2 - Policy DME1 10: Water Management, Efficiency, and Quality

- A) Applications for all new build developments (not conversions, change of use, or refurbishment) are required to include a drainage assessment demonstrating that appropriate sustainable drainage systems (SuDS) have been incorporated in accordance with the London Plan Hierarchy (Policy 5.13: Sustainable drainage).
- B) All major new build developments, as well as minor developments in Critical Drainage Areas or an area identified at risk from surface water flooding must be designed to reduce surface water run-off rates to no higher than the pre-development greenfield run-off rate in a 1:100 year storm scenario, plus an appropriate allowance for climate change for the worst storm duration. The assessment is required regardless of the changes in impermeable areas and the fact that a site has an existing high run-off rate will not constitute justification.
- C) Rain Gardens and non-householder development should be designed to reduce surface water run-off rates to Greenfield run-off rates.
- D) Schemes for the use of SuDS must be accompanied by adequate arrangements for the management and maintenance of the measures used, with appropriate contributions made to the Council where necessary.
- E) Proposals that would fail to make adequate provision for the control and reduction of surface water run-off rates will be refused.
- F) Developments should be drained by a SuDS system and must include appropriate methods to avoid pollution of the water environment. Preference should be given to utilising the drainage options in the SuDS hierarchy which remove the key pollutants that hinder improving water quality in Hillingdon. Major development should adopt a 'treatment train' approach where water flows through different SuDS to ensure resilience in the system.

Water Efficiency

- G) All new development proposals (including refurbishments and conversions) will be required to include water efficiency measures, including the collection and reuse of rainwater and grey water.
- H) All new residential development should demonstrate water usage rates of no more than 105 litres/person/day.
- I) It is expected that major development⁸ proposals will provide an integrated approach to surface water run-off attenuation, water collection, recycling and reuse. Water and

Wastewater Infrastructure

- J) All new development proposals will be required to demonstrate that there is sufficient capacity in the water and wastewater infrastructure network to support the proposed development. Where there is a capacity constraint the local planning authority will require the developer to provide a detailed water and/or drainage strategy to inform what infrastructure is required, where, when and how it will be delivered.

4.0 Energy Hierarchy Approach

The Energy Hierarchy adopts a set of principles to guide design development and decisions regarding energy, balanced with the need to optimise environmental and economic benefits.

The hierarchy, which is a widely accepted approach amongst many local councils, and a key part of the London Plan Energy Assessment approach, seeks to ensure that any development incorporates energy efficiency through this approach:

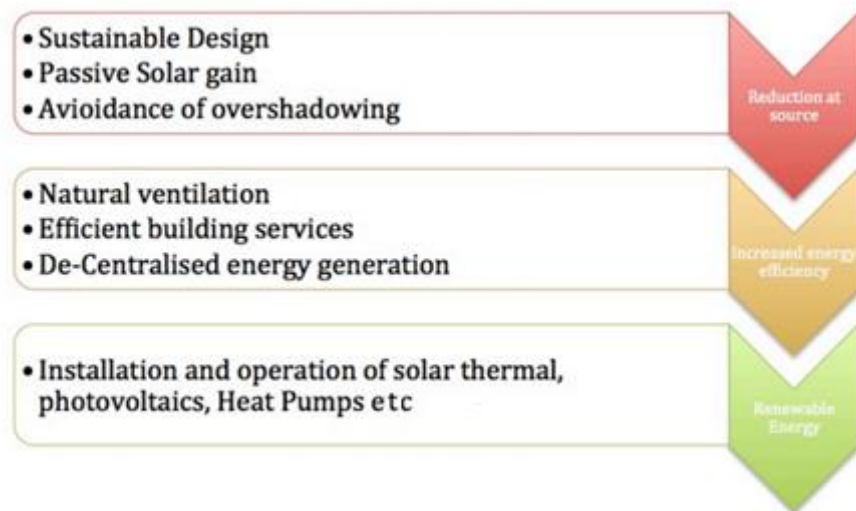


Figure 1: Energy Reduction Design Process

This is summaries as:

- Be Lean: use less energy
- Be Clean: supply energy efficiently
- Be Green: use renewable energy.

It is considered that within the above principles, carbon reduction forms the most appropriate approach from both the practical and financial perspective. The industry is broadly in agreement that energy efficient and low carbon technologies have the greatest impact in offsetting CO2 emissions. Therefore, it is logical to encourage enhanced mitigation through energy efficiency and low carbon technologies in the first instance, as opposed to applying renewables as the first option at a significantly greater cost.

5.0 Energy & Carbon Assessments

Energy calculations for the proposed “1 Vinyl Square Building” development have been undertaken and simulation results produced using accredited SAP and BRUKL software packages (from Elmhurst Energy and IES VE).

SAP Assessments have been used to assess the Domestic elements of the building (approximately 97% of the building area) and BRUKL Assessments have been undertaken on the whole building but the results have been used only to analyse the Non-Domestic elements of the building (approximately 3% of the building area).

The results of these assessments have been summarised in this report, with detailed output sheet provided in the Appendices of this report, as noted below. The results of these sheets have been, where required, entered within the GLA’s Carbon Emissions Reporting (CER) spreadsheet for both the Domestic and Non-Domestic elements.

5.1 General Approach

As noted, the Lean, Clean and Green approach will be adopted and used to record the adoption of improved design parameters. As such high efficiency equipment shall be specified throughout the heating, cooling and ventilation systems. Several measures shall be taken to ensure efficiency from a building services point of view such as:

- Use of natural light where possible
- Low energy light fittings with intelligent control
- Photocell and time clock controlled external lighting control
- High levels of thermal insulation
- High efficiency condensing gas boiler(s)
- High efficiency ventilation equipment
- Inverter driven variable speed pumps and fans

As required by a Section 106 agreement the development will be connected to the existing decentralised energy centre (which contains a Gas CHP system with back up Gas Boilers).

Following this a review of the renewable options and low carbon technologies has been undertaken and where practical, any viable technologies shall be adopted.

At each stage a detailed energy assessment (for Domestic and Non-Domestic elements) will be undertaken, to demonstrate how the carbon dioxide emissions are being reduced to meet the policy requirements.

5.1.1 Baseline Assessment (Notional Target Emissions)

Assessments have been undertaken using minimum standards of U-Values and system efficiencies to determine the baseline case.

5.1.2 “Be Lean” Assessment

Assessment have been undertaken to show that by adopting high efficiency systems, improved U-Values, improved building fabric permeability, high efficiency lighting, and extensive control options. Improvement in Carbon Emissions can be achieved and that for this stage the development can achieve a minimum 10% improvement on Building Regulations.

5.1.3 “Be Clean” Assessment

Using the “Be Lean” design parameters with a connection to the Local District Heat Network, providing heat energy from the Energy Centre to the building, has been assessed as Be Clean.

5.1.4 “Be Green” Assessment

The results of the “Be Clean” assessments should therefore identify that the 35% minimum carbon reduction has been achieved against Building Regulations through the adoption of the design parameters within both the ‘Be Lean’ & ‘Be Clean’ assessment. As these will be similar or better than those proposed as part of the site wide energy assessment outlined in sections 2.1 and 2.2 of this report.

However, an analysis of suitable Low and Zero Carbon technologies that could be applicable to the development shall be reviewed and discussed. Where possible suitable technologies have been adopted and the assessments undertaken to demonstrate the maximum reduction in carbon which can be achieved, in the context of the Mayor’s drive towards a zero-carbon target for all major developments.

5.2 SAP Assessment Methodology

It should be noted that for this development the SAP assessments have been undertaken under the SAP 2012 process.

This is required to align this development with the overall site master plan (an approved outline planning application) which encouraged the adoption of the local District Heating network, rather than localised heating sources within each building, and therefore the use of a gas fire CHP Energy Centre was adopted and is required by legal agreement for One Vinyl Square. Under a SAP 2012 methodology there is support for connecting to the District Heating network, which in turn supports the broader planning requirement to connect to a district heating network where possible, in line with the guidance given in Appendix 3 of the Energy Assessment Guidance (2018).

In addition, in this case, unlike other smaller development situated near existing / older district heating networks, we understand the energy centre has been designed to provide the heating load for the whole site, including this development, so not connecting to the energy centre district heating would reduce its efficiency levels and be against the general guidance given in the London Plan. It would also be in breach of the Section 106 agreement for the site which is not permitted.

If SAP 10 were to be adopted, the carbon factors used would result in the available district heating connection working against this development, making connections uneconomical and would result in the loss of amenity space at roof level to allow for the accommodation of additional PV arrays. This seems counterproductive when a S106 agreement is requiring a connection to be made. In addition, the incentive to adopt decarbonisation strategies for the Energy Centre and implementation of a future National Heating Strategy would be lost. The building would lose the ability to minimise the effect of any future changes in heating requirements as outlined by the Chancellor Spring Statement (2019 - Future Homes Standard) which could be easily undertaken at a District Heating level but would be much harder to implement on a flat by flat level. Enabling future energy centre decarbonisation to achieve a wider impact.

We would therefore strongly suggest that analysis of the carbon emission of the development be allowed to be assessed under the SAP 2012 process.

5.3 Baseline

Following the latest guidance from GLA on producing energy statements (October 2018), Part L compliant calculations have been completed to provide the baseline i.e. 'notional' emissions for the proposed building (Domestic and Non Domestic elements).

The baseline inputs can be seen in Table 1 while baseline carbon results can be seen in Tables 2a and 2b.

The baseline full assessment details can be found in Appendix A (SAP) and D1 (BRUKL).

Baseline SAP 2012 Results	
Domestic Target Emission Rate (TER)	16.6 kgCO ₂ /sqm

Table 2a: Domestic Baseline Assessment Results

Baseline BRUKL Results	
Non Domestic Target Emission Rate (TER)	1.9 kgCO ₂ /sqm

Table 2b: Non Domestic Baseline Assessment Results

Element		Details	Comments
Fabric U-Values (W/m²K)	Ground Floor	0.25 W/m²K	Minimum Target U-Value (Part L2A, Building Regs 2010)
	External Walls	0.35 W/m²K	Minimum Target U-Value (Part L2A, Building Regs 2010)
	Roof	0.25 W/m²K	Minimum Target U-Value (Part L2A, Building Regs 2010)
Opening U-Values (W/m²K)	Glazing	2.2 W/m²K	Minimum Target U-Value (Part L2A, Building Regs 2010) G Value: 0.4
Ventilation	Air Tightness	10 m³/h.m² at 50 Pa	Limiting Fabric Parameter Target of 10
	Mechanical Ventilation	Mech Extract Only – Restaurant/Bar Space, Studios, Apartment Bathrooms & Kitchen/Living Spaces Natural Ventilation Only – Bedrooms, Amenity Area, Common & Apartment Circulation Spaces, Bin & Cycle Store & Plant Room(s)	
Heating	Primary Heating System	Central Boilers with HIU & Radiators	Default Efficiency - 81%
	Domestic Hot Water	Central Boilers with HIU	Default Efficiency - 81%, Storage Volume - 4000 litres
	Controls	None	
Cooling	(Restaurant/Bar Area Only) Split System – Via ASHP - Default Efficiencies – SEER – 3.2 kW/kW		
Lighting	Whole Building	Halogen Light Fittings Minimum efficacy of 60 Lumens per circuit Watt	
	Controls	Manual Switching Only	
Metering	Heating	Local Metering - No BMS	
	Lighting	Local Metering - No BMS	
Electric Power Factor		Less than 0.9	

Table 1: Baseline Assessment Inputs

5.4 Be Lean

At the 'Be Lean' stage of the Energy Hierarchy a fabric first approach has been applied in order to minimise energy consumption and resulting CO₂ emissions. Furthermore, best practice and appropriate measures have been included into the design, to minimise the environmental impact on the development as set out in Policies 5.2 and 5.3 of The London Plan 2016. Furthermore, meeting the emerging GLA Requirements (2018) of achieving a minimum 10% improvement on Building Regulations for residential developments.

The Be Lean inputs can be seen in Table 3 and carbon saving results can be seen in Tables 4a and 4b below.

The baseline full assessment details can be found in Appendix B (SAP) and D2 (BRUKL).

Be Lean SAP 2012 Results	
Baseline – Domestic Target Emission Rate (TER)	16.6 kgCO₂/sqm
Be Lean – Domestic Target Emission Rate (TER)	14.4 kgCO₂/sqm
% Improvement	13%

Table 4a: Domestic Be Lean Assessment Results

Be Lean BRUKL Results	
Baseline – Non Domestic Target Emission Rate (TER)	1.9 kgCO₂/sqm
Be Lean – Non Domestic Target Emission Rate (TER)	1.2 kgCO₂/sqm
% Improvement	36%

Table 4b: Non Domestic Be Lean Assessment Results

Element		Details	Comments
Fabric U-Values (W/m²K)	Ground Floor	0.13 W/m²K	Improved U-Value (Increased Insulation)
	External Walls	0.12 W/m²K	Improved U-Value (Increased Insulation)
	Roof	0.11 W/m²K	Improved U-Value (Increased Insulation)
Opening U-Values (W/m²K)	Glazing	1.2 W/m²K	Improved U-Value Double Glazed, Low-E Coated G Value: 0.45
Ventilation	Air Tightness	4m³/h.m² at 50 Pa	Air Tightness Improvement over Target of 10
	Mechanical Ventilation	Extract Only – Bathrooms MVHR - Restaurant/Bar Space, Apartment Kitchen/Living Spaces, Studios Natural Ventilation Only – Bedrooms, Amenity Area, Common & Apartment Circulation Spaces, Bin & Cycle Store & Plant Room(s)	
Heating	Primary Heating System	Central Boilers with HIU & Radiators	Efficiency 91%
	Domestic Hot Water	Central Boilers with HIU	Efficiency 91%, Storage Volume - 4000 litres
	Controls	None	
Cooling	(Restaurant/Bar Area Only) Split System – Via ASHP - Default Efficiencies – SEER – 3.5 kW/kW		
Lighting	Whole Building	LED Light Fittings Improved efficacy - 90 Lumens per circuit Watt	
	Controls	Bathrooms - Manual Switching Only Restaurant/Bar Space - Manual Switching c/w Photoelectric Addressable Options, Occupancy Sensing, Time-Switches, Automatic Daylight Zoning Control & Constant Illuminance Control. Amenity Space, Bin & Cycle Store, Plant Room(s) & Circulation Spaces – Presence Detection c/w Occupancy Sensing & Occupancy Sensing Time-switches	
Metering	Heating	Local Metering - No BMS	
	Lighting	Local Metering - No BMS	
Electric Power Factor		Greater than 0.95	

Table 3: 'Be Lean' Assessment Inputs

5.5 Be Clean

The next stage of the Energy Hierarchy, 'Be Clean' aims to supply energy efficiently into the proposed development. This works in conjunction with the GLA guidance, which states that once energy demands have been minimised, all planning applications must demonstrate how their energy systems will efficiently supply energy and reduce CO2 emissions. This includes the systems inside the building and any site associated heat supply infrastructure.

A Section 106 legal agreement attached to 'The Old Vinyl Factory' planning permission for the master plan includes the agreement for this development to be connected to the local District Heat Network (DHN). This aligns with the GLA's requirement that connections to site wide heat networks should be prioritised.

5.5.1 Connection to the Energy Centre

As noted above, as part of the site masterplan, there is a site wide energy centre that the development is required to connect to under the Section 106 legal agreement. The map shown in Figure 3 illustrates the Local District Heat Network that the development will be connected to as designed by VITAL Energi.

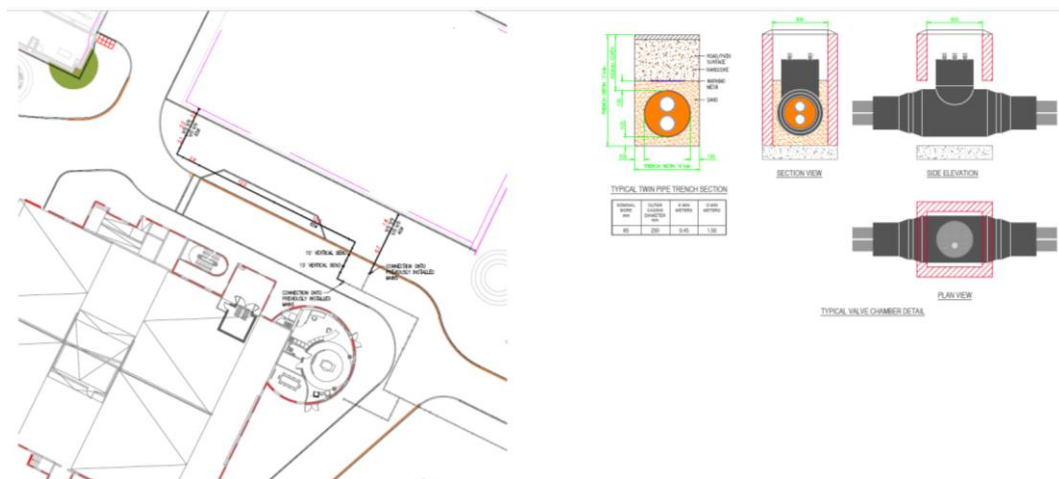


Figure 2: Local Heat Distribution Networks, VITAL Energi

The district heating consists of two stubs and valve chambers located at the southern end of the 1 Vinyl Square site. These are located in the public realm associated with this development. The district heating was designed by Vital Energi for the wider site and was constructed by them. The network originates at the Energy Centre in the Powerhouse (located approximately 150m east of the 1 Vinyl Square building) and branches off to each building on the site. At the 1 Vinyl Square Building, the two stubs are capped connections which are 40mm and 65mm nominal bore twin pipes, as highlighted on the summary drawing 1615/460/100 in Appendix J, which is based on Vital Energi's Construction Drawing and Charles Edwards Ltd.'s 'As-Built' drawing.

The district heating demand assumed for the 1 Vinyl Square Building as part of the site wide district heating network (designed by Vital Energi) is summarised in Appendix M. These demands were produced by the utility's consultant MTT, and subsequently amended by the District Heating designer to confirm a total availability to the development of 717kW thermal

power and 615kVA electrical power. Notwithstanding the up lift in homes proposed for the site, the provisions are sufficient to support the development of 134 homes.

Additional Energy Assessment information has been provided in Appendix M3 on the CHP size and NOx emission figures along with those for the Boilers provided within the Energy Centre.

It is understood that the operator is reviewing decarbonisation strategies and undertaking energy monitoring in line with the requirements of the GLA.

5.5.2 Revised Heating Strategy

To allow the adoption of the district heating network, a revised heating strategy for the whole building has been adopted. A primary building wide heating distribution system shall be proposed that will provide heat energy to each flat and non-domestic element of the building, via local Heat Interface Units within each space. These HIU's will be able to provide both heating and direct hot water.

The connection to the district heating network will be via plate heat exchangers within the ground floor of the development (based on a duty and standby arrangement). The plate heat exchangers will be sized to provide for the whole heating and hot water demands of the building.

5.5.3 Be Clean Results

The 'Be Clean' inputs can be seen in Table 5 while the carbon saving results can be seen in Tables 6a and 6b below.

The Be Clean full assessment details can be found in Appendix C and D3.

Be Clean SAP 2012 Results	
Baseline – Domestic Target Emission Rate (TER)	16.6 kgCO ₂ /sqm
Be Lean – Domestic Target Emission Rate (TER)	14.4 kgCO ₂ /sqm
Be Clean – Domestic Target Emission Rate (TER)	10.6 kgCO ₂ /sqm

Table 4a: Domestic Be Clean Assessment Results

Be Clean BRUKL Results	
Baseline – Non Domestic Target Emission Rate (TER)	1.90 kgCO ₂ /sqm
Be Lean – Non Domestic Target Emission Rate (TER)	1.20 kgCO ₂ /sqm
Be Clean – Non Domestic Target Emission Rate (TER)	1.01 kgCO ₂ /sqm

Table 4b: Non Domestic Be Clean Assessment Results

Element		Details	Comments
Fabric U-Values (W/m²K)	Ground Floor	0.13 W/m²K	
	External Walls	0.12 W/m²K	
	Roof	0.11 W/m²K	
Opening U-Values (W/m²K)	Glazing	1.2 W/m²K G Value: 0.45	
Ventilation	Air Tightness	3 m³/h.m² at 50 Pa	Air Tightness Improvement over Target of 10
	Mechanical Ventilation	Extract Only – Apartment Bathrooms MVHR - Restaurant/Bar Space, Apartment Kitchen/Living Spaces, Studios Natural Ventilation Only – Bedrooms, Amenity Area, Common & Apartment Circulation Spaces, Bin & Cycle Store & Plant Room(s)	
Heating	Primary Heating System	District Heating - HIU & Radiators	
	Domestic Hot Water	District Heating - HIU	
Cooling	(Restaurant/Bar Area Only) Split System – Via ASHP - Default Efficiencies – SEER – 3.5 kW/kW		
Lighting	Whole Building	LED Light Fittings Minimum efficacy of 95 Lumens per circuit Watt	
	Controls	Apartments & Common WC's - Manual Switching Only Restaurant/Bar Space - Manual Switching c/w Photoelectric Addressable Options, Occupancy Sensing, Time-Switches, Automatic Daylight Zoning Control & Constant Illuminance Control. Amenity Space, Bin & Cycle Store, Plant Room(s) & Circulation Spaces – Presence Detection c/w Occupancy Sensing & Occupancy Sensing Time-switches	
Metering	Heating	Local Metering & Central Metering – Connects to BMS	
	Lighting	Provision for Lighting Metering – Lighting system warns of 'out of range' values.	
Electric Power Factor		Greater than 0.95	
Carbon Factors		SAP10 = 0.21 kgCO ₂ /kWh	

Table 1: 'Be Clean' Assessment Inputs

5.6 Be Green

The GLA's guidance (October 2018) states that on-site renewable resources should be maximised regardless of whether the carbon targets have been otherwise satisfied.

Furthermore, Policy 5.7 of the London plan, states "The Mayor seeks to increase the proportion of energy generated from renewable sources, and expects that the projections for installed renewable energy capacity outlined in the Climate Change Mitigation and Energy Strategy and in supplementary planning guidance will be achieved in London"

As such individual projects are expected to consider renewable technologies and seek to reduce carbon dioxide emissions wherever possible.

A renewables assessment has been carried out to evaluate the adoption of different low and zero carbon technologies on to the development. The following technologies were reviewed.

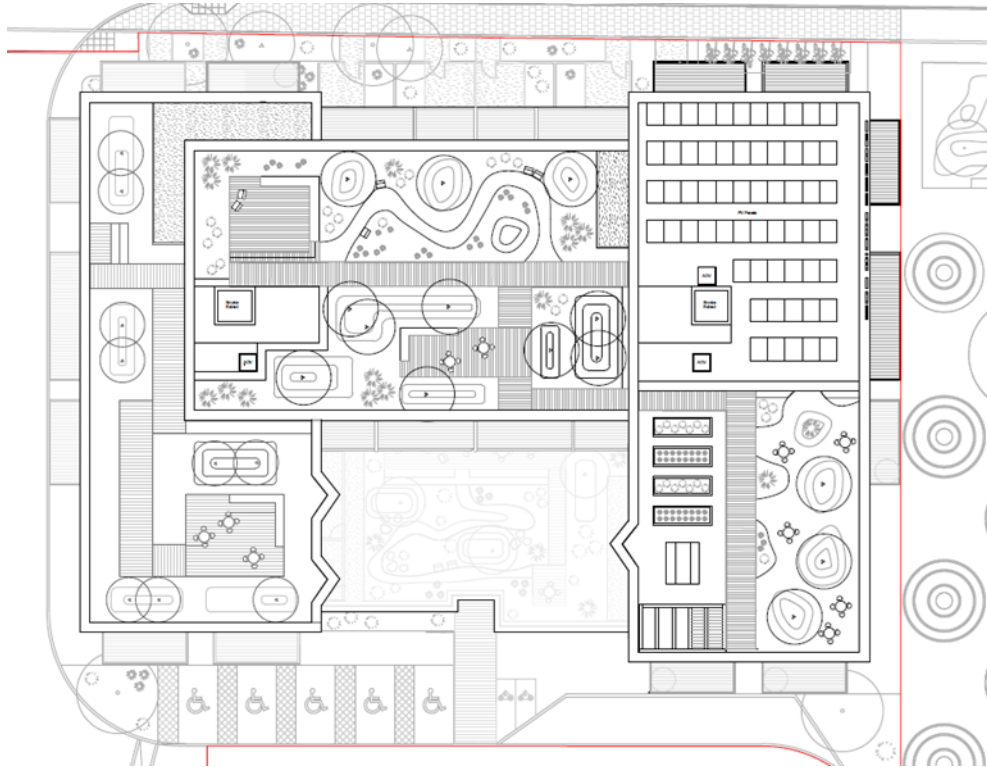
- Local CHP (Gas Fired Combined Heat and Power)
- Solar Thermal
- Photovoltaic Cells
- Wind Turbines
- Ground Source Heat Pump
- Air Source Heat Pump
- Biomass

Appendix L provided a detailed summary of the technical aspects of the above Low and Zero Carbon Technologies (LZCT), and also contains a summary table of the key points of that technical review.

5.7 Site Wide Summary of Be Green Measures

In order to reflect the latest GLA Guidance (October 2018) that on-site renewable resources should be maximised regardless of whether carbon targets have been achieved and following the review of the available LZCT, the most feasible option was roof mounted Photo Voltaic however the use of PV arrays will need to be limited due to required allocation of amenity spaces on the roof area.

In support of reducing carbon emissions to their maximum, we have introduced Photo Voltaic arrays on to the development, making use of the available unused roof space. As can be seen from the roof plan below. The remainder of the roof has been used for Amenity Space as required by other elements of the planning regulations. Fortunately, the unused space, which cannot be used for amenity space (due to height restrictions) provides a suitable area for a modest PV installation.



We would strongly suggest that this layout maximises the mix of amenity and PV space allocation, showing strong supporting evidence that the development is looking to minimise its carbon footprint where feasible. It is estimated that the PV installation shall consist of 59 Panels and this will provide an estimated, 15,000 kWh peak energy.

It should be noted that this PV installation will not be included in the Non Residential Assessment.

6.0 Expected Carbon Emissions (As Designed)

The results of the energy assessments have been inputted into the CER and a printed version of this spreadsheet is provided in Appendix K.

The tables below have been taken from the CER as a summary of the results.

Domestic Assessments (SAP 2012)

Table 1: Carbon Dioxide Emissions after each stage of the Energy Hierarchy for domestic buildings

	Carbon Dioxide Emissions for domestic buildings (Tonnes CO ₂ per annum)	
	Regulated	Unregulated
Baseline: Part L 2013 of the Building Regulations Compliant Development	148	
After energy demand reduction	129	
After heat network / CHP	95	
After renewable energy	87	

Table 2: Regulated Carbon Dioxide savings from each stage of the Energy Hierarchy for domestic buildings

	Regulated domestic carbon dioxide savings	
	(Tonnes CO ₂ per annum)	(%)
Savings from energy demand reduction	19	13%
Savings from heat network / CHP	34	23%
Savings from renewable energy	8	5%
Cumulative on site savings	61	41%
Annual savings from off-set payment	87	-
	(Tonnes CO ₂)	

Non Domestic Assessments (BRUKL)

Table 3: Carbon Dioxide Emissions after each stage of the Energy Hierarchy for non-domestic buildings

	Carbon Dioxide Emissions for non-domestic buildings (Tonnes CO2 per annum)	
	Regulated	Unregulated
Baseline: Part L 2013 of the Building Regulations Compliant Development	2	
After energy demand reduction	2	
After heat network / CHP	1	
After renewable energy	1	

Table 4: Regulated Carbon Dioxide savings from each stage of the Energy Hierarchy for non-domestic buildings

	Regulated non-domestic carbon dioxide savings	
	(Tonnes CO ₂ per annum)	(%)
Savings from energy demand reduction	1	36%
Savings from heat network / CHP	0	8%
Savings from renewable energy	0	0%
Total Cumulative Savings	1	44%

As can be seen both Domestic and Non Domestic elements have achieved the GLA general requirement of reducing Carbon Emission greater than 35% with the additional element that 10% domestic reductions were made via reducing energy demand.

7.0 Carbon Offset Payment

The CER also provides the following table on a Domestic Carbon Offsetting Payment.

	(Tonnes CO ₂)	
Cumulative savings for off-set payment	2,603	-
Cash in-lieu contribution (£)	156,177	

As noted previously, the MTT energy centre S106 agreement report found in Appendix H, confirms that the carbon saving from utilising the energy centre for the demands of this development exceeds the threshold of 394 tCO₂ per annum outlined in Criterion 5, Section 13 of the S106 Agreement, requiring any shortfall being offset with a financial contribution. The Council has approved the MTT energy centre report and confirmed that the carbon savings have been met.

Consequently, we believe that no Carbon offset payment is required.

Furthermore, it should be noted that the 'Be Clean' measures implemented above meets the minimum 35% on-site carbon reduction target. This is in line with Mayor's drive towards a zero-carbon target for major developments as outlined in the updated Draft London Plan, due to be implemented in 2020.

8.0 Overheating Analysis

The aim of this analysis is to investigate whether the proposed 1 Vinyl Square residential building can comply with the CIBSE TM59 Design methodology - the assessment of overheating risk in homes.

The calculations used within the analysis have been performed based on the assumptions and input parameters contained within the 'Be Clean' section of the report and the CIBSE TM59 design methodology with regards to lighting, occupancy, building operation, construction thermal properties and windows openings.

A copy of the overheating check list is provided within Appendix E.

8.1 Analysis Information

8.1.1 Building Type & Data

The following information has been used:

Building Type: Residential

Weather File Location: London, United Kingdom (DSY1)

Building Geometry: The building has been modelled using layout drawings and elevations issued by JTP Studio.

8.1.2 Construction Element Data

The following U-Values & G-Values were used in the Overheating Analysis, based on the 'Be Clean' Design Data:

Construction Element	U-Value W/m ² K
Ground Floor	0.13
External Walls	0.12
Roof	0.11

Table 2: Construction Element

Glazing Reference	Thermal Transmittance (U-Value) W/m ² K	Solar Transmittance (G-Value) [BS EN 4100]	Light Transmittance
External Glazing	1.2	0.40	0.71
Application: All Glazing has an available window opening of 100mm. Openable windows are restricted to 10% outward opening. Window exposure type(s): - Semi-Exposed Wall / High Rise			

Table 3: Glazing Element Table

All windows are to be fitted with internal blinds with the following parameters:

- Shading Coefficient – 0.25
- Short-wave radiant fraction – 0.3
- Blind Type – Dark Coloured / Black-out blind
- Fraction of Daylight Hours Closed – 0.5

8.1.3 Window Opening, Occupancy, Lighting & Equipment Profiles

Window Opening Profiles

All openable windows have a 100mm outward opening – This allows enough fresh air into the space to prevent overheating, with some restriction for safety.

The Noise Impact Assessment requires ventilation to be provided as noise levels are too high to allow for ventilation via openable windows only. Windows are openable for purging.

The window operating profile is set based on assessment guidance from CIBSE TM59 and include the following conditions over a 24-hour period:

- Windows are open if the room air temperature reaches 22°C or greater.
- Windows are open if the Room Carbon Dioxide levels reach 500 ppm (parts per million) or greater.

TM59 states that occupants are likely to use openable windows upon internal temperatures reaching 22°C or greater, this has been replicated in the IES model using the Macroflo application.

Internal Gains - Occupancy, Lighting, Equipment Profiles

Internal gains and profiles (occupancy, equipment and lighting) have been created in accordance with CIBSE TM59 guidance and subsequently applied to the IES thermal model. They represent a robust test that ensures the key aspects of overheating are captured, namely the hours when risk is highest (i.e. the middle of the day/early afternoon) and night-time hours when, if rooms do not cool down, sleep can be disrupted.

The following table describes the heat loads for each occupied room type required for assessment with CIBSE TM59 criteria.

Room	People (W/person)	Equipment (W)	Lighting (W/sqm)
Studio/Cluster Bedroom – Day Occupancy	1 x 75W per person	100W max consumption	2
Studio/Cluster Bedroom – Night occupancy	2 x 52.5W per person	100W max consumption	-
Kitchen/Living Areas	1 x 75W per person	1000W max consumption	2

Table 4: Adopted Heat Loads

8.1.4 Be Green Results

The 'Be Green' carbon saving results can be seen in Tables 7a below.

The Be Clean full assessment details can be found in Appendix C.

Be Clean SAP 2012 Results	
Baseline – Domestic Target Emission Rate (TER)	16.6 kgCO₂/sqm
Be Lean – Domestic Target Emission Rate (TER)	14.4 kgCO₂/sqm
Be Clean – Domestic Target Emission Rate (TER)	10.6 kgCO₂/sqm
Be Green – Domestic Target Emission Rate (TER)	9.7 kgCO₂/sqm

Table 4a: Domestic Be Clean Assessment Results

8.1.5 Mechanical Services

Ventilation

The ventilation strategy for the building shall be mixed mode Mechanical Ventilation with purge vent via openable windows. Each apartment will have its own system, these are either an extract only system for the apartment bathrooms and an MVHR system with summertime bypass for the rest of the apartment. NOX and particulate filtration maybe required on the MVHR intake dependent on the outcome of the Air Quality report.

Natural ventilation is accessible via openable windows for purge vent during higher external temperatures or to remove fumes or odours.

Mechanical Ventilation is provided in the Studios, Apartment Kitchen/Living Areas and Bathrooms. Kitchen extract is provided via a ducted extractor hood located above the hob with local control.

Summaries for ventilation strategies can be seen below.

Natural Ventilation

Natural ventilation supply for all occupied rooms is via openable windows. Internal doors are to be undercut.

Mechanical Supply and Extract Ventilation MVHR

Each apartment will have its own system, these are either an extract only system for the apartment bathrooms and an MVHR system with summertime bypass for the rest of the apartment. Mechanical Ventilation Heat Recovery will be implemented in appropriate areas throughout the building (i.e. Apartment Kitchen/Living Spaces). This aims to decrease the rate of heat loss from the building by reducing the reliance on openable windows for fresh air, thus reducing energy usage. The windows will still be openable for purge ventilation.

As stated previously each apartment will have its own system, these can be either an extract only or an MVHR system with summertime bypass. Systems will operate continuously, and each apartment will operate individually; domestic ducted extractor hoods shall be provided above cooker hobs.

The ventilation flow rates are as follows.

Mechanical Ventilation Rates (Background)

- Bathroom - 8 l/s
- Kitchen/Living Area - 13 l/s

8.2 Overheating Analysis Assessment

8.2.1 Assessment Software

The dynamic thermal model was created using IES Apache simulation software version 2019.0.0.0.

8.2.2 TM59 Simulation

The simulation results were analysed using the Vista Pro software TM59 analysis tool, used to assess the likelihood of overheating for occupied rooms. The simulation results were assessed using the comfort parameters set the following:

- Activity Level – Very Light Work
- Clothing Level – Summer / Outdoor/ Active
- Building Category - Category 2 (new building and refurbishment)

8.2.3 Dynamic Thermal Analysis Simulation Results

The simulation results confirm that all rooms comply with CIBSE TM59, which can be found in Appendix G.

As a requirement of TM59, stating that ‘if blinds were part of the strategy used to gain a pass, then results without blinds must also be included for information’. Considering this, an additional simulation has been undertaken without the blinds being included in the design, the results of this simulation showed that 10 Rooms would fail the Overheating Analysis, the complete results from this simulation can be found in Appendix F.

8.3 Summary

Based on the information and parameters provided within this section of the report and overheating analysis has been undertaken via a constructed and simulated dynamic thermal model. This model has calculated that the occupied rooms for the development are shown to pass with the CIBSE TM59 criteria (when provided with Blinds).

It should be noted that without blinds 10 flats out of the 134 fail to pass TM59, as such blinds will be installed in a permanent manner, with guidance written into the Building User Guide provided to each Tenant.

9.0 Non Domestic - Cooling Demand

From a review of the BRUKL documents provided it can be seen that the following cooling loads are associated with the Baseline Building and the Actual Building:

BRUKL	Cooling Energy Consumption (kWh/m2)	Reduction
Baseline (Notional)	0.223	
Be Green (Actual)	0.036	16%

It can also be seen that there is an overall reduction in the associated energy consumption connected with Cooling the Non Domestic elements of the building.

10.0 Conclusions

This report shows how the proposed development has been designed using the principles of the Energy Hierarchy and other energy efficiency principles, to deliver carbon dioxide emission reductions. In particular, the design has sought to minimise emissions at source by the incorporation of the “Fabric First” approach and sustainable design features. This has also allowed the building to pass Overheating requirements given in TM59.

Utilising these design parameters, in conjunction with the connection to the Local District Heat Network to provide efficient space heating and domestic hot water, ensures the proposed development achieves a good reduction in CO₂ against the baseline case and shows compliance with all energy policy standards defined by the GLA & London Plan.

Based on the findings within this report, the minimum improvement of 35% on the Target Emission Rate has been achieved and exceeded (41%) across the Development with the ‘Be Lean’, ‘Be Clean’ and ‘Be Green’ modelling Inputs. This should satisfy the requirements of the current GLA Requirements and the emerging requirements currently published in Draft London Plan 2019.

The proposed development has shown that it meets the GLA Requirements of achieving a minimum 10% improvement on Building Regulations for residential developments through the energy efficiency measures. The assessment results have also shown that both Domestic and Non Domestic element can achieve a minimum reduction of 35% carbon emissions, with the whole site predicted to achieve 41% reduction with the incorporation of a small PV arrangement on used roof space.

The use of the District Heating Network, although based on Gas Fire CHP and Boilers, will provided sufficient carbon savings through decentralisation as well as allowing future decarbonisation of site with minimal impact on each dwelling. It is noted that the operator of the Network is looking to progress this as the site is developed to the breadth discussed in the masterplan for the site. This is in line with Mayor’s drive towards a zero-carbon target for major developments as outlined in the updated Draft London Plan.

‘Be Green’ measures (renewable energy options) were also considered in detail for this development, but with such an urban site (with an existing district heating network) there were limited options. However, the most feasible option, PV has been developed using the available roof space that doesn’t have a detrimental impact on the required amenity spaces also being provided on the roof.

This report shows that the most technically viable and financially feasible approach has been adopted. It also provides the most appropriate way to proceed to satisfy the requirements of the National Planning Policy Framework, GLA and London Borough of Hillingdon Planning Policies and Building Regulation.

The carbon saving provided from using the energy centre and district heating network for the heating and hot water demand, along with the improvement in building fabric for the 1 Vinyl Square development can be seen to have exceeded the Masterplan requirements for this building and therefore we believe there should be no carbon offset payments required.

11.0 Appendices

- Appendix A – Be Lean SAP Sheets
- Appendix B – Be Clean SAP Sheets
- Appendix C – Be Green SAP Sheets
- Appendix D – BRUKL Sheets
 - Appendix D1 – BRUKL ‘Baseline’ Sheets
 - Appendix D2 – BRUKL ‘Be Lean’ Sheets
 - Appendix D3 – BRUKL ‘Be Clean’ Sheets
- Appendix E – Overheating Checklist (Domestic)
- Appendix F – Overheating Analysis (TM52 without Blinds)
- Appendix G – Overheating Analysis (TM52 with Blinds)
- Appendix H – MTT Report (Master Planning Consented)
- Appendix J – Infrastructure Drawings
- Appendix K – GLA CER Spreadsheet
- Appendix L – Renewables Assessment Summary
 - Appendix L1 – Renewables Assessment Review
 - Appendix L2 – Renewables Assessment Summary Table
- Appendix M – Energy Centre Details
 - Appendix M1 – Local District Heat Network Summary
 - Appendix M2 – Planning Condition Discharge (S106)
 - Appendix M3 – Energy Centre Commissioning Sheets

UK locations:

Newcastle upon Tyne

London

Glasgow

Huddersfield

Birmingham

Guildford

International locations:

Dubai

Sydney



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