BOOM
COLLECTIVE

2 DUMPTON PLACE
PRIMROSE HILL

ENVIRONMENTAL ENGINEERING
ENERGY AND SUSTAINABILITY STATEMENT

C0103.R01.01
July 2014

C0103.R01.02
August 2014

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EXECUTIVE SUMMARY

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Executive Summary

This report is prepared in support of the change of use application for the office building at 2 Dumpton Place

In the development of the energy strategy and the preparation of this report BOOM Collective have undertaken the following activities:

- Referenced the original mixed use development planning documentation that is available on the London Borough of Camden planning portal; specifically the Sustainability Statement and Energy Strategy reports, both dated March 2011 and both produced by AJ Energy Consultants Ltd.
- Met with Studio Stassano Architects to coordinate the proposed mechanical and electrical services strategy for the new residential units with the architecture and existing structure.
- Referenced the planning requirements documented on the London Borough of Camden website.
- Consulted with the London Borough of Camden planning department (Camden Planning call reference number #04052) with regards to specific information required for the change of use planning application.

The original planning application documentation for the 2 Dumpton Place development confirmed a design approach targeting BREEAM Very Good for the office development and a Code for Sustainable Homes Level 3 for the residential Units. The developed energy strategy followed the 'Lean, Clean and Green' principles required as part of the London Plan and generally accepted as best practice guideline for low carbon operation in use.

In accordance with the requirements of Camden Planning Policy, BOOM Collective have developed an energy strategy for the change of use of the office building to residential units that is consistent with all of the above documents and guidelines, makes improvements on the carbon reduction compared to the existing residential units. A minimum of Code for Sustainable Homes level 3 will be achieved in all 3 residential units resulting from the change of use. The energy strategy can be summarised as:

- The original office development was described as having air source heat pumps to generate space heating and hot water and photovoltaic panels to generate electricity on the office building roof
- Each residential unit to be developed within the reconfigured office building will be provided with individual air source heat pumps to generate heating and hot water; solar thermal panels to supplement the hot water provision and individual mechanical ventilation heat recovery units to provide the ventilation requirements.
- The integration of solar thermal panels and MVHR within the energy strategy for the change of use residences represents an improvement on the carbon reduction compared to the existing 2 Dumpton Place residential units.

This report demonstrates that the proposed change of use of the office building to 3 residential units can be considered to be a sustainable development.

ENVIRONMENTAL ENGINEERING PLANNING REQUIREMENTS AND BUILDING REGULATIONS

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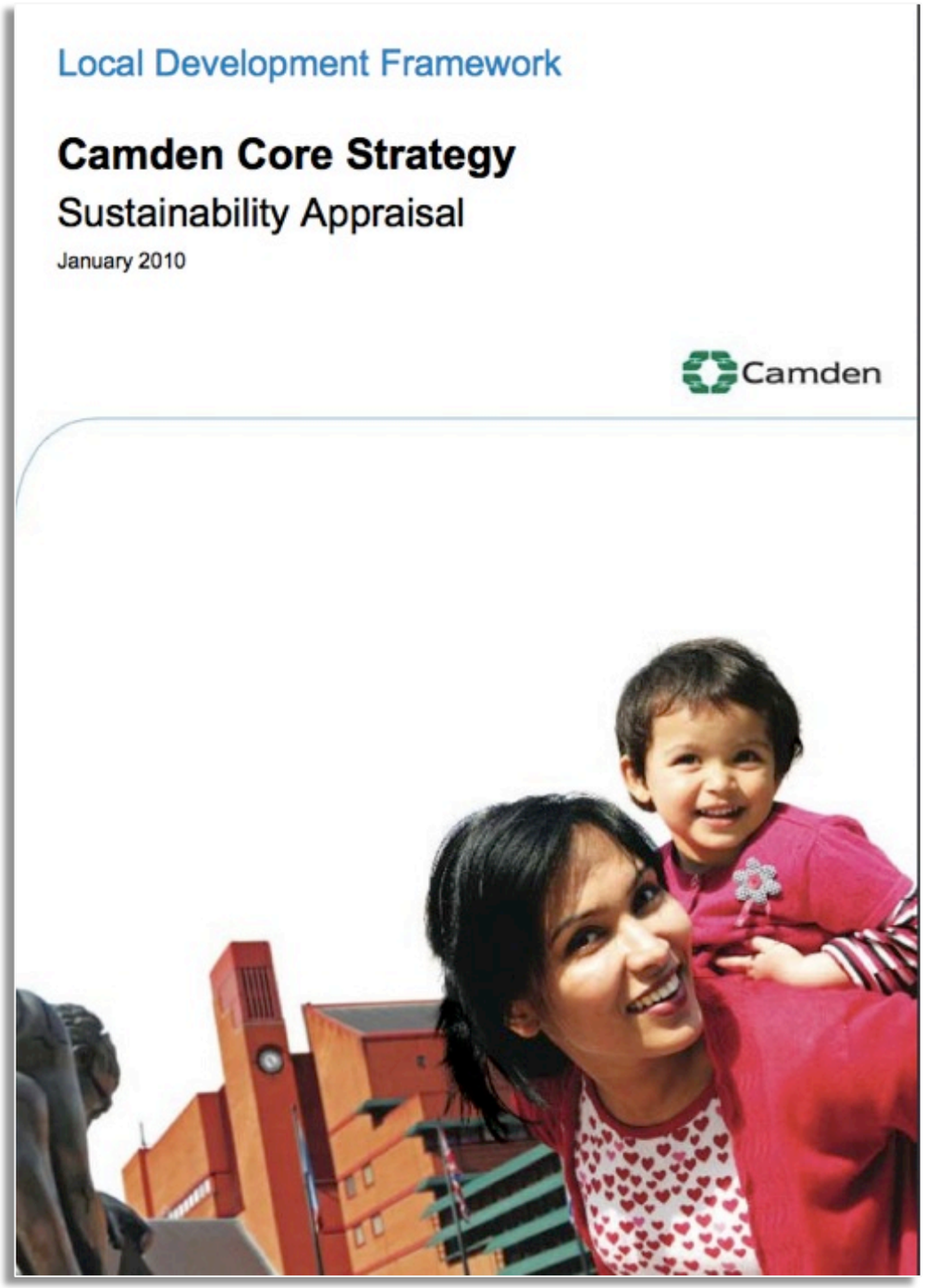
Environmental Engineering Planning Requirements and Building Regulations



The Proposed Development is located within the London Borough of Camden. The Local Development Framework for Camden sets out the planning strategy for managing growth and development in the future.

The Core Strategy and Development Policies that were adopted at Full Council on the 8th November 2010 detail the relevant policies within the adopted Development Policies document, which were extensively referenced in the original development Sustainability Strategy Statement and have been referenced within this report.

In particular, Policy DP22 – Promoting sustainable design and construction states:
'The Council will require development to incorporate sustainable design and construction measures. Schemes must:

- Demonstrate how sustainable development principles, including the relevant measures set out in paragraph 22.5 below, have been incorporated into the design and proposed implementation; and
- Incorporate green or brown roofs and green walls wherever suitable.

The Council will promote and measure sustainable design and construction by:

- Adopting the government target that all new build housing will be zero carbon by 2016 (Code for Sustainable Homes Level 6), along with the stepped targets of Code 3 by 2010 and Code 4 by 2013;
- Expecting developments (except new build) of 500sqm of residential floorspace or above or 5 or more dwellings to achieve 'excellent' in EcoHomes assessments from 2013 and at least 'very good' prior to 2013;
- Expecting non-domestic developments of 500sqm of floorspace or above to achieve 'very good' in BREEAM assessments, with the aim of increasing the target to a rating of at least 'excellent' in 2016, if feasible, and zero carbon from 2019, in line with the government's ambitions.

The Council will require development to be resilient to climate change by ensuring schemes include appropriate climate change adaptation measures, such as:

- Summer shading and planting;
- Limiting run-off;
  Reducing water consumption;
- Reducing air pollution; and
- Not locating vulnerable uses in basements in flood-prone areas.'

It should be noted that this change of use application is not new build and the design team are therefore maintaining and adapting the energy and sustainability strategies adopted at the original planning consent in 2011to achieve compliance.

Environmental Engineering Planning Requirements and Building Regulations

The original mixed use planning application documents demonstrated compliance with building regulations and planning requirements by undertaking energy assessments; a Code for Sustainable Homes Pre-assessment and and a BREEAM Pre-assessment.

As required under Part L, the residential apartments have been assessed under Part L1A, and the commercial office building under Part L2A.

For the office building the 'Lean' building construction measures outlined below were used in the Part L2A calculations, and exceed the requirements of Part L2A:

- External walls at 0.22W/m2K
- Roof at 0.14W/m2K
  Ground floor at 0.20W/m2K
- Glazing at 1.6W/m2K
- Air permeability of 4m3/hr.m2;

In the instance where changes are made to the façade of the existing building, the above best practice thermal performance levels will be maintained.

The Code for Sustainable Homes pre-assessment indicated a score of 58.6% for the residential developments in the original development.

This change of use proposal for the office building to be converted into 3 dwellings over 4 floors including the basement will seek to maintain the scoring level when compared with the CSH assessment methodology that would have been applicable at the time of construction.

We do note that the single credit sought under the Health and Wellbeing Hea1 category 'Daylighting', will not be achieved for the apartment that covers the ground and basement. Reference should be made to BOOM Collective report referenced C0103.R02.02.

The loss of this credit will be sought to be gained elsewhere within the assessment methodology. Additional credits are specifically targeted in category Ene1, where the integration of solar thermal panels and MVHR within the energy strategy will improve carbon emission figures beyond the existing residential development. However, should this prove to be unachievable the loss of this daylight credit will not bring the scheme below the 57% threshold for Level 3 that existed at time of construction.

This report describes compliance with building regulations and planning requirements as the original Energy and Sustainability Strategies of the development are being maintained and indeed enhanced with change of use proposals documented. The team has demonstrated best endeavours to maximise the daylight provisions for the basement area of the new dwelling created and whilst this is not in-line with the original CSH assessment it will not be detrimental to the overall Level 3 targeted.

PROPOSED DESIGN CRITERIA

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Design Criteria - Basement

INTERNAL VENTILATION RATES:

Based on the Building Regs the various spaces require either a continuous ventilation rate, or a demand based ventilation rate intermittently.

Part L1(a): Minimum Ventilation Rates:

Room Description	Intermittent Extract	Continuous Extract
Bathrooms	15 l/s	8 l/s
WC	6 l/s	6 l/s
Circulation Spaces		
Kitchen	30 l/s adjacent to hob OR 60 l/s elsewhere	13 l/s
Living Room Areas		
Utility Spaces	30 l/s	8 l/s

A) In addition to the above, a minimum ventilation rate of 0.3 l/s per sqm of internal floor area.

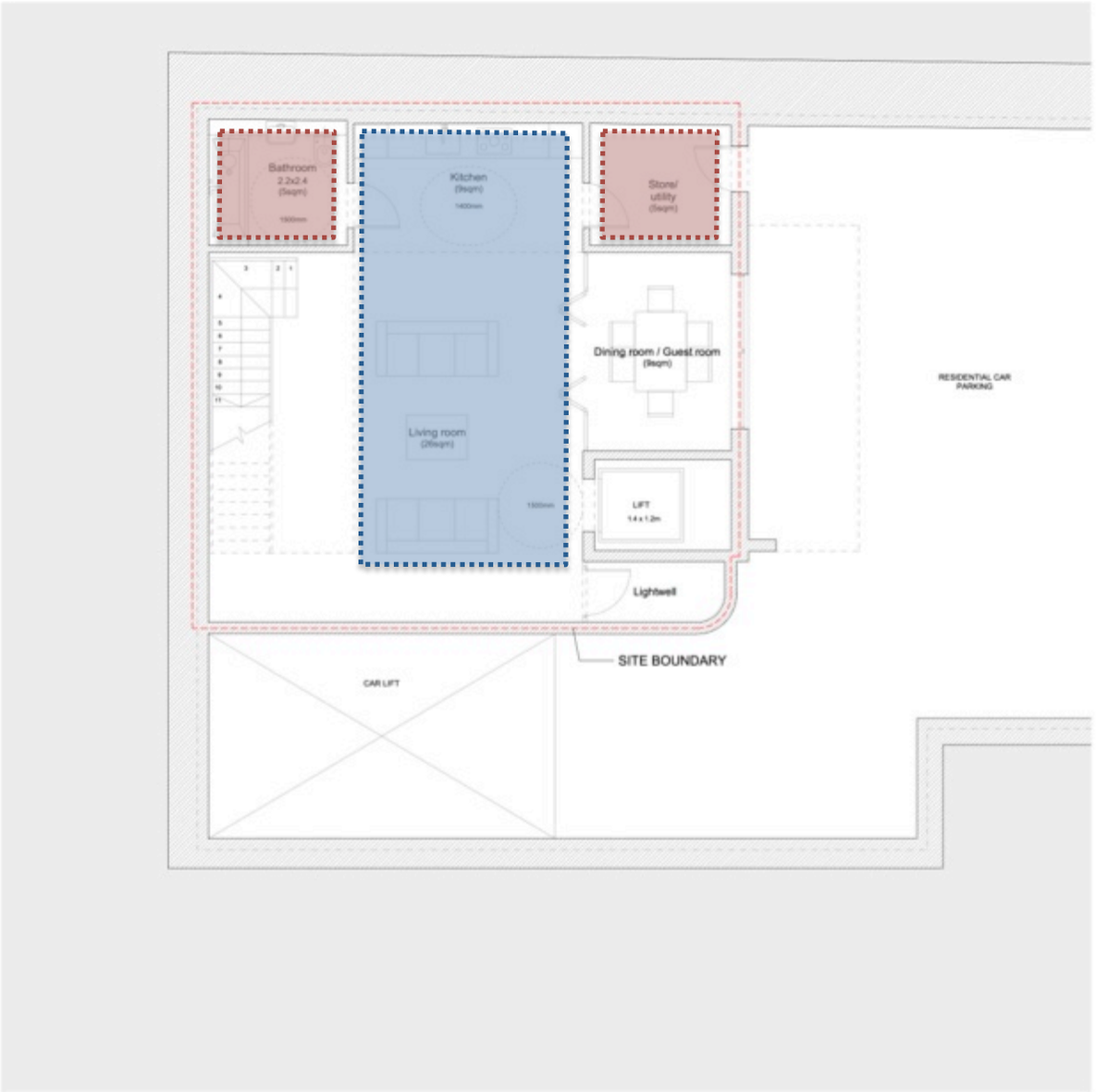
B) The mechanical supply air (the fresh air that has recovered energy from the exhaust air will generally be supplied to central zones within the dwelling

C) The apartments will have openable windows to enable the perimeter zones to benefit from natural ventilation in summer months.

AREAS IDENTIFIED IN BLUE WILL HAVE SUPPLY AIR

AREAS IDENTIFIED IN RED NEED EXTRACT AIR

NB:
ALL OTHER HABITABLE ROOMS CAN HAVE EITHER SUPPLY OR EXTRACT AIR TO SUIT THE WHOLE DWELLING STRATEGY.



INTERNAL AIR TEMPERATURES:

The internal space temperatures should reflect the seasonal weather and occupants use in the differing spaces.

CIBSE Recommended Design Comfort Criteria:

Room Description	Winter Temperature	Summer Temperature
Bedroom	17-19°C	23-25°C
Bathrooms	20-22°C	23-25°C
WC	19-21°C	21-23°C
Circulation Spaces	19-24°C	21-25°C
Kitchen	17-19°C	21-23°C
Living Room Areas	22-23°C	23-25°C
Utility Spaces	19-24-°C	21-25°C

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Design Criteria - Ground

INTERNAL VENTILATION RATES:

Based on the Building Regs the various spaces require either a continuous ventilation rate, or a demand based ventilation rate intermittently.

Part L1(a): Minimum Ventilation Rates:

Room Description	Intermittent Extract	Continuous Extract
Bathrooms	15 l/s	8 l/s
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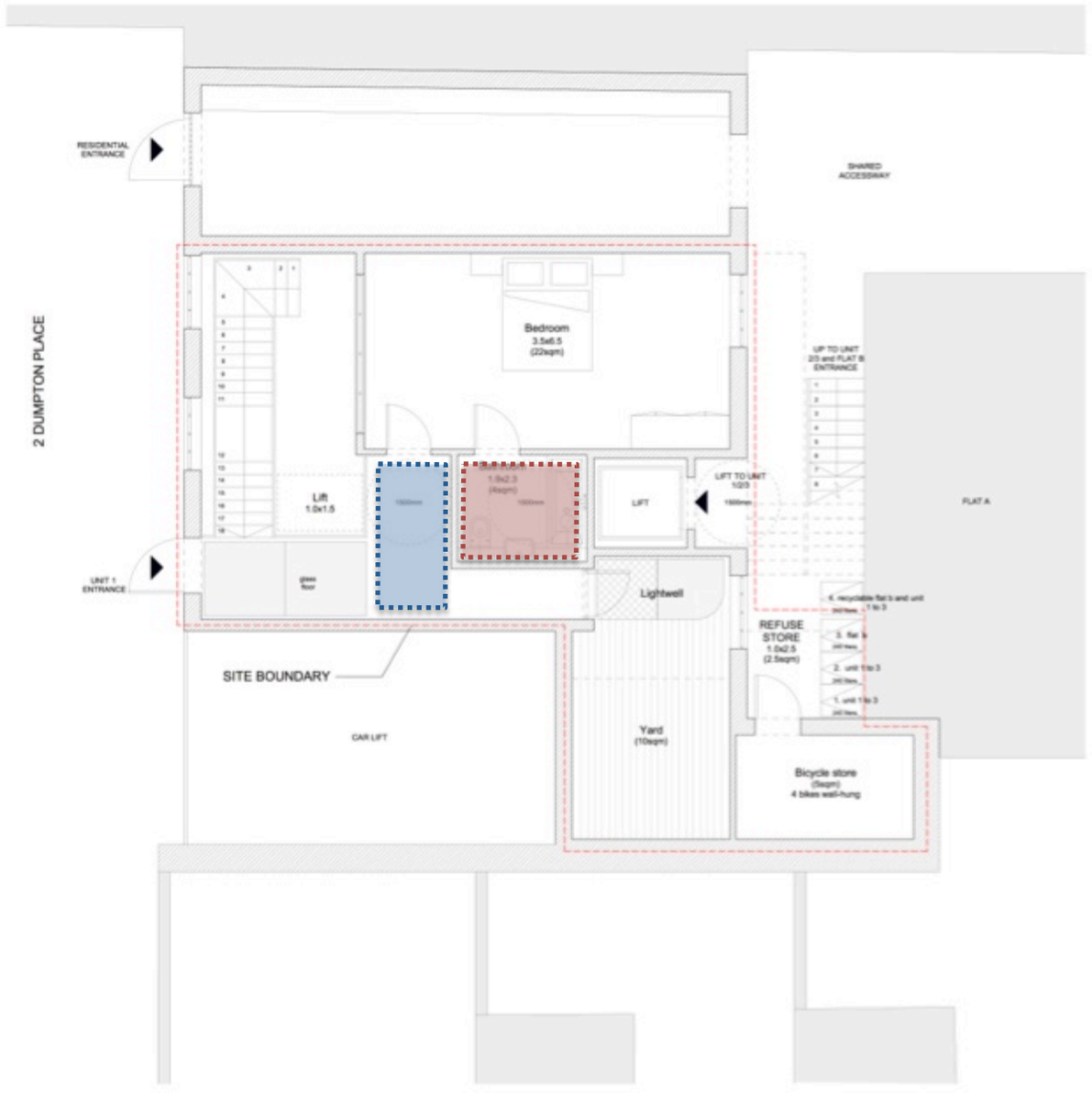

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Living Room Areas	22-23°C	23-25°C
Utility Spaces	19-24-°C	21-25°C

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Design Criteria - First

INTERNAL VENTILATION RATES:

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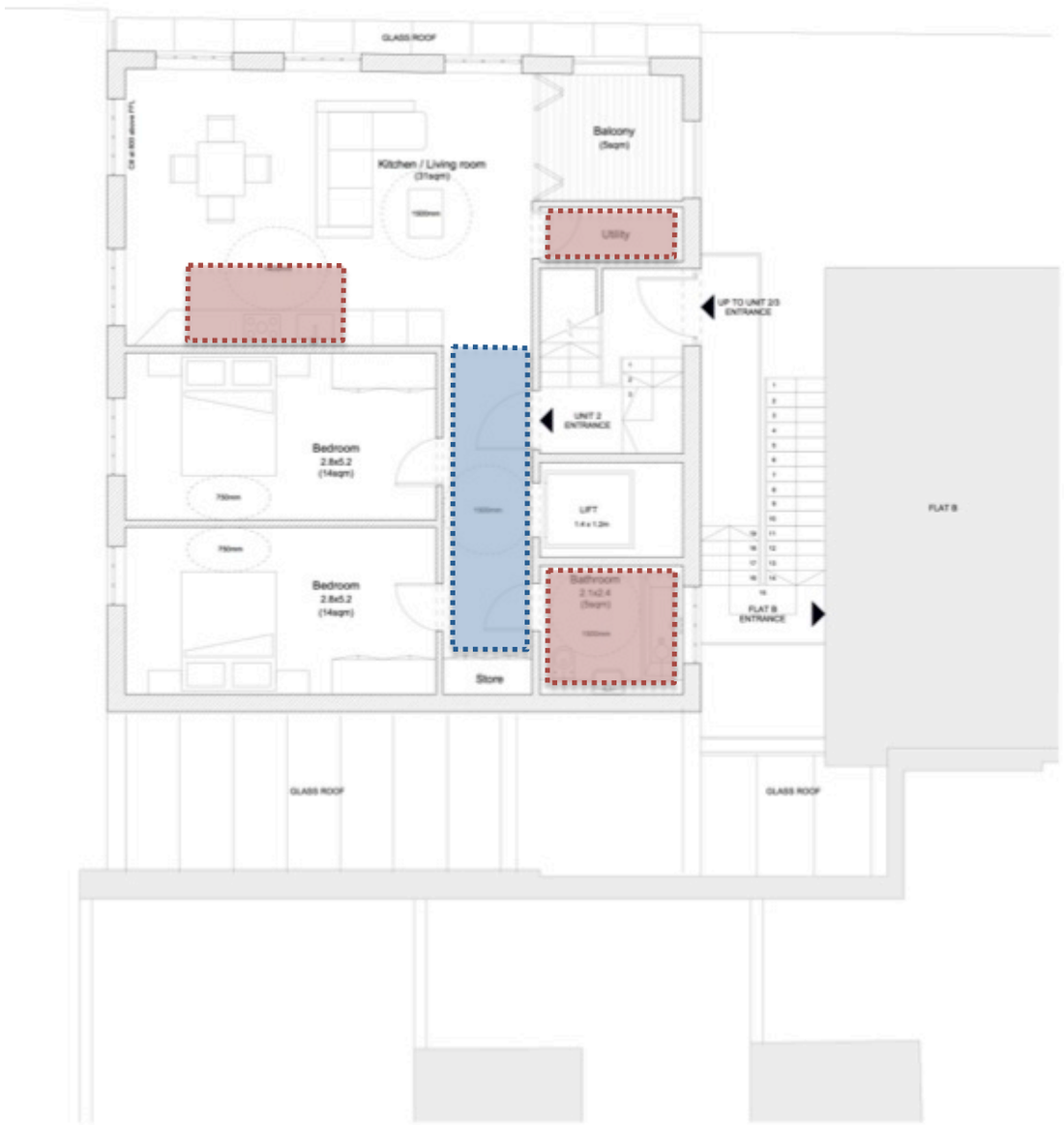

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Kitchen	17-19°C	21-23°C
Living Room Areas	22-23°C	23-25°C
Utility Spaces	19-24-°C	21-25°C

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Design Criteria – Second

INTERNAL VENTILATION RATES:

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Part L1(a): Minimum Ventilation Rates:

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Bathrooms	15 l/s	8 l/s
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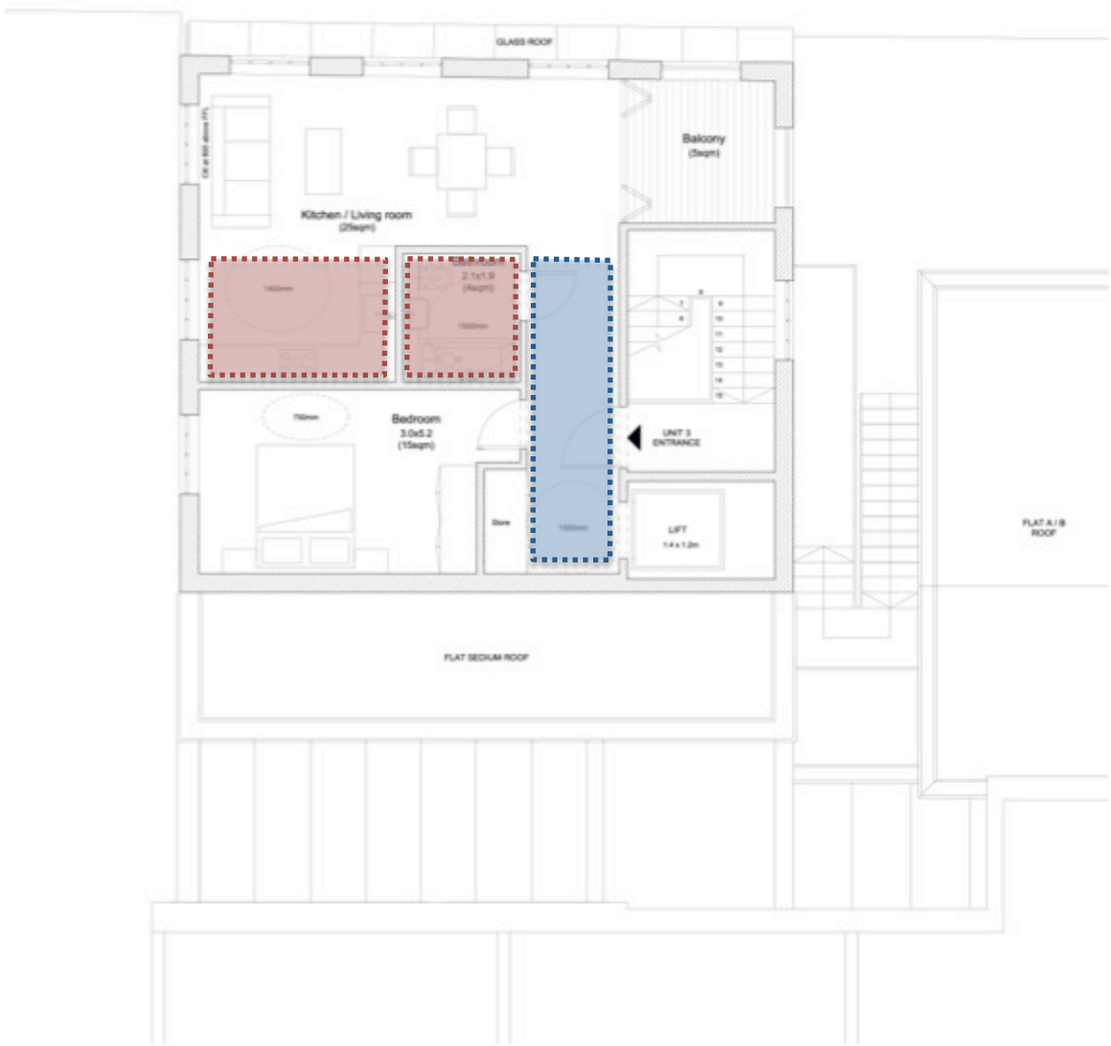

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Living Room Areas	22-23°C	23-25°C
Utility Spaces	19-24-°C	21-25°C

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PROPOSED ENERGY STRATEGY

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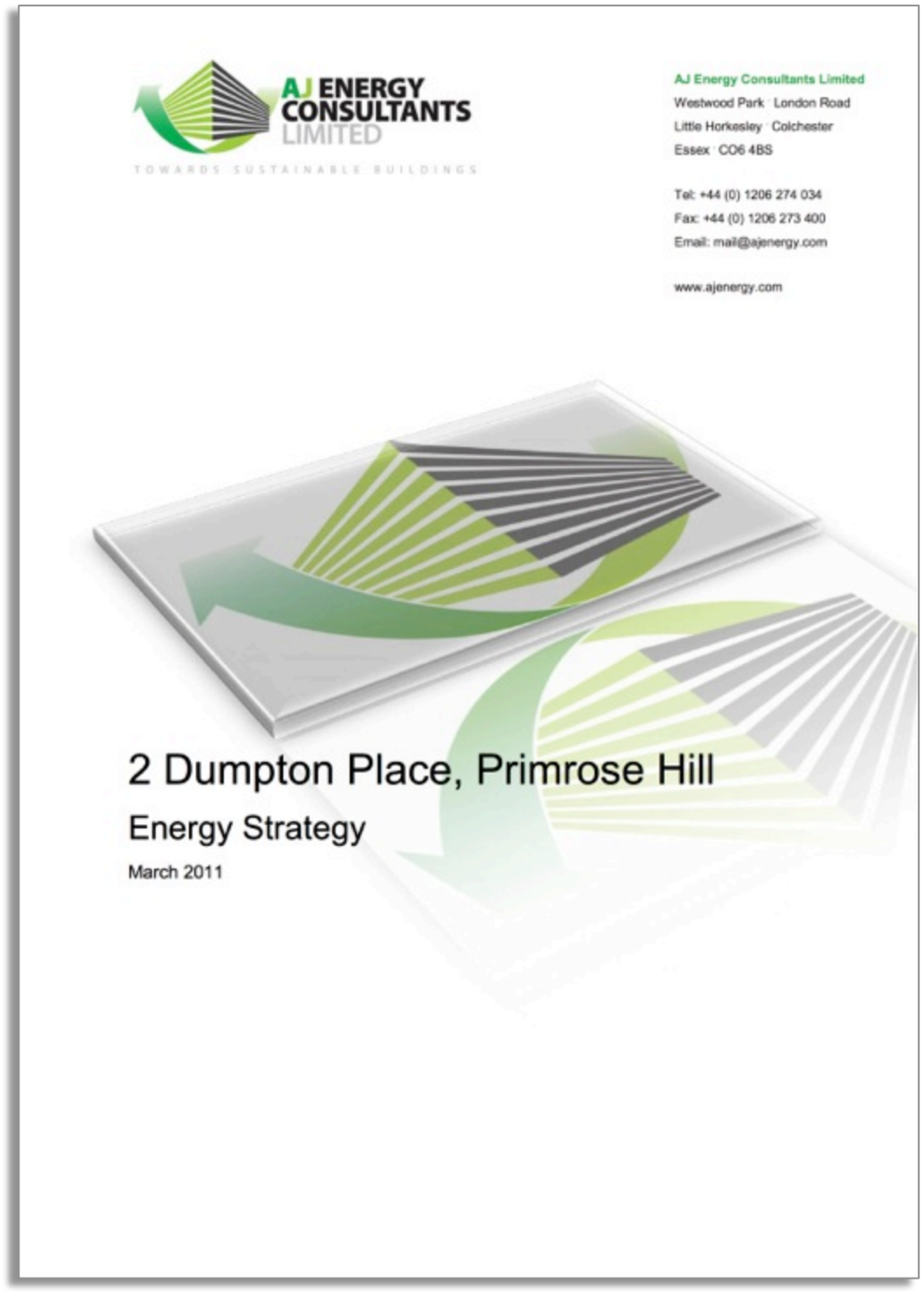
Proposed Energy Strategy



The original planning application energy strategy report for the mixed use development at 2 Dumpton Place, prepared by AJ Energy Consultants Ltd, detailed the process undertaken to arrive at the existing energy strategy. This process followed the 'Lean, Clean and Green' principles required under planning legislation and was concluded as follows:

"This document responds to planning policy in respect of energy consumption and carbon dioxide emissions. The methodology used herein is consistent with the London Renewables Toolkit (LRT) and Part L of the Building Regulations.

The Proposed Development features the following energy-saving measures:
- *Improved U-values as detailed within Section 6;*
- *Efficient heating and hot water systems as detailed within Section 6; and*
- *Efficient lighting systems as detailed within Section 6.*

The energy saving measures would be used to reduce the Proposed Development's energy requirements and to exceed the compliance requirements of Part L1A and L2A of the Building Regulations for residential and non-residential accommodation respectively.

A feasibility study of the currently available low and zero carbon technologies has been undertaken, and the following systems would be incorporated within the Proposed Development:
- *Air source heat pumps to generate space heating and hot water for the residential units; and*
- *Photovoltaic panels to generate electricity for the office building.*

The combination of the heat pumps and photovoltaic panels would reduce the annual carbon dioxide emissions of the Proposed Development by 16.4% when compared against the resultant carbon footprint after the energy efficiency measures are taken into account.

The incorporation of the energy efficiency measures and air source heat pumps equates to a minimum reduction of 29% against the TER 2010 for the residential units, which exceeds the mandatory energy requirements for Code 3 under the Code for Sustainable Homes Assessment."

The proposed Energy Strategy for the 3 number residential units to be formed form the change of use reconfiguration of the existing office building is consistent with the original strategy and will indeed improve on the energy reduction by the additional incorporation of heat recovery within the mechanical ventilation system. The Energy strategy proposal for each apartment is therefore:

- Retain the existing construction and where modifications are made use the best practice U-values and air tightness figures as the original development.
- Air source heat pumps to generate heating and domestic hot water.
- Roof mounted solar thermal panels (in lieu of PV arrays) to supplement the production of domestic hot water, and
- Mechanical ventilation heat recovery (MVHR), whole apartment ventilation strategy.

RENEWABLE ENERGY AND LZC TECHNOLOGIES

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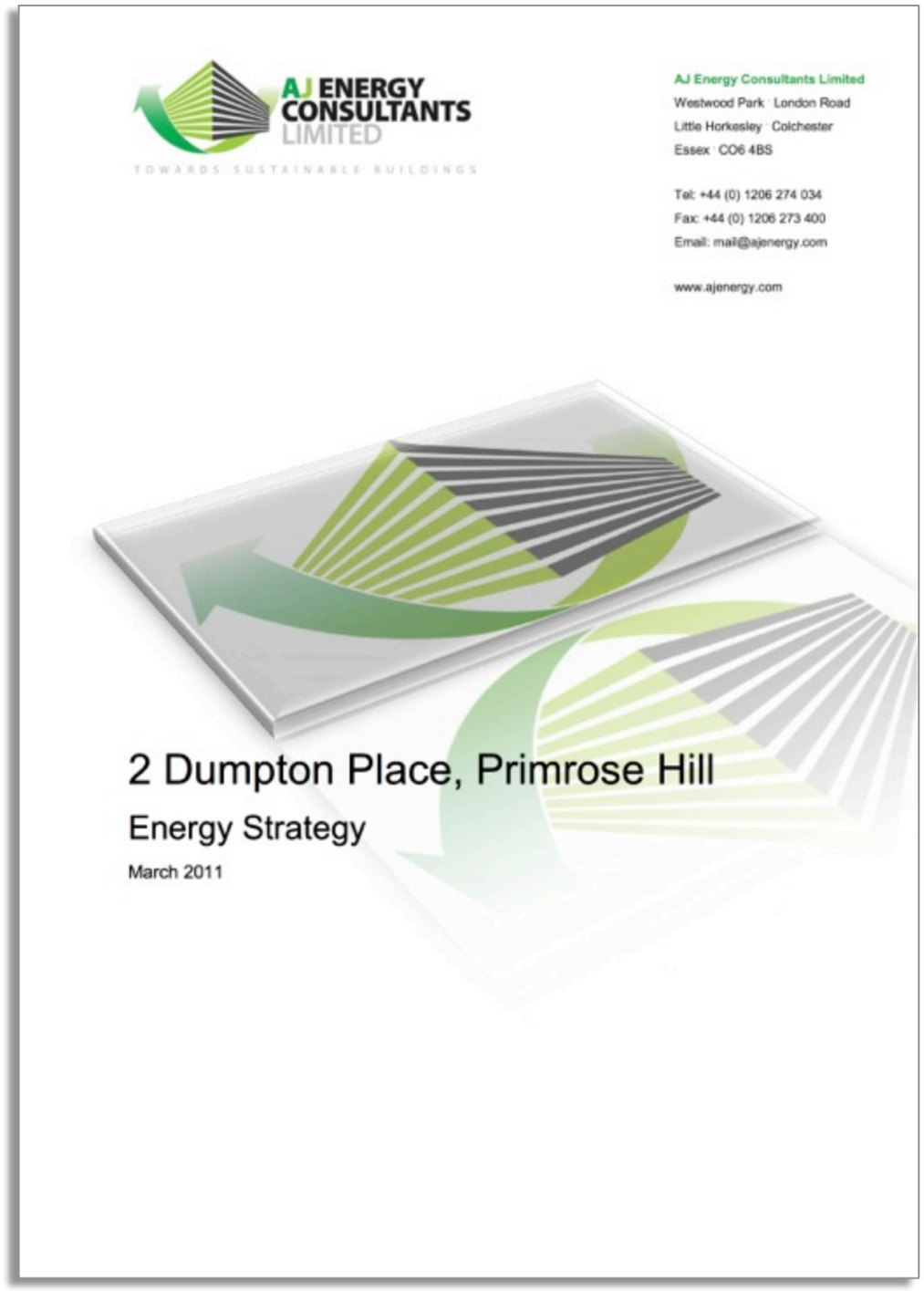
Renewable Energy and LZC Technologies



This report does not address options available for renewable energy and low, zero carbon (LZC) technologies as the original planning application Energy Statement included a detailed feasibility statement for community heating, renewable and LZC technologies.

BOOM Collective have concluded, however that the provision of photovoltaic arrays on the roof of the office building, intended for electrical generation for the office are now not feasible and the new change of use development will be better served by the adoption of solar thermal panels for each of the three apartments to supplement the production of domestic hot water by the air source heat pumps.

Additionally the introduction of a mechanical ventilation and heat recovery unit to exhaust air form bathroom and kitchen spaces and recover heat for injection into fresh air supply will further reduce carbon emissions.

PROPOSED MECHANICAL & ELECTRICAL ENGINEERING SERVICES

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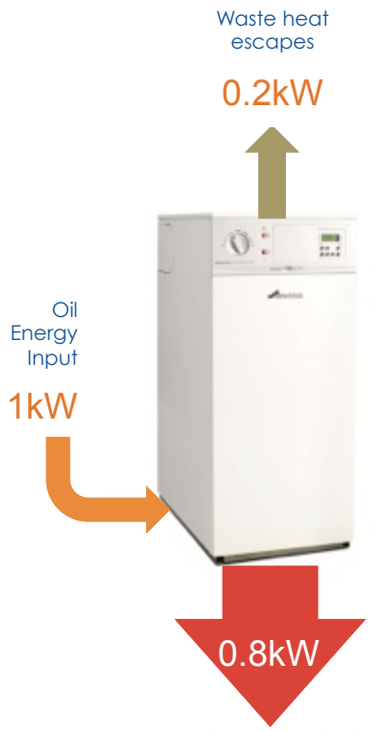
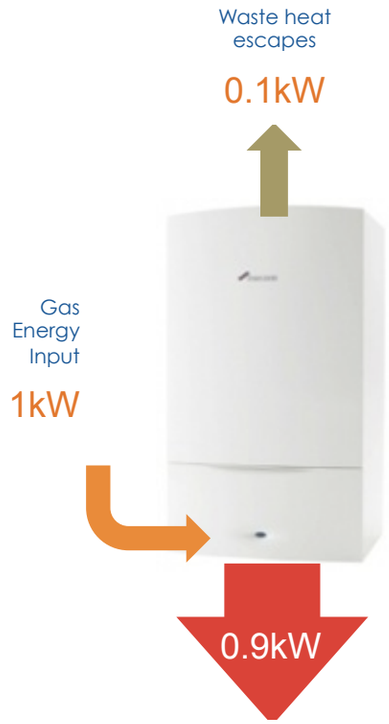
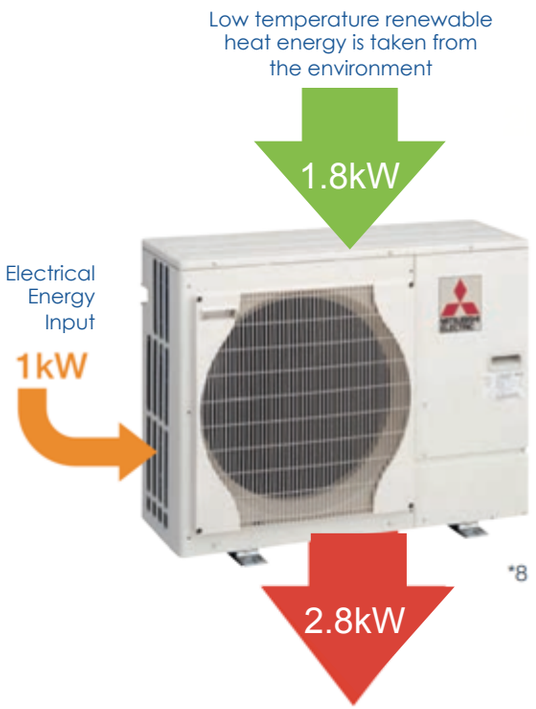
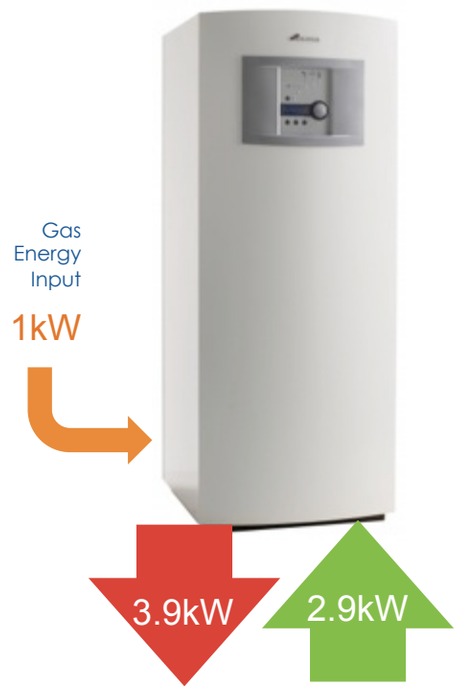
Mechanical & Electrical Engineering – Heat Generating Options:









TRADITIONAL OIL BOILER CO-EFFICIENCY OF PERFORMANCE (CoP)

TRADITIONAL GAS BOILER CO-EFFICIENCY OF PERFORMANCE (CoP)

TYPICAL AIR SOURCED HEAT PUMP CO-EFFICIENCY OF PERFORMANCE (CoP)

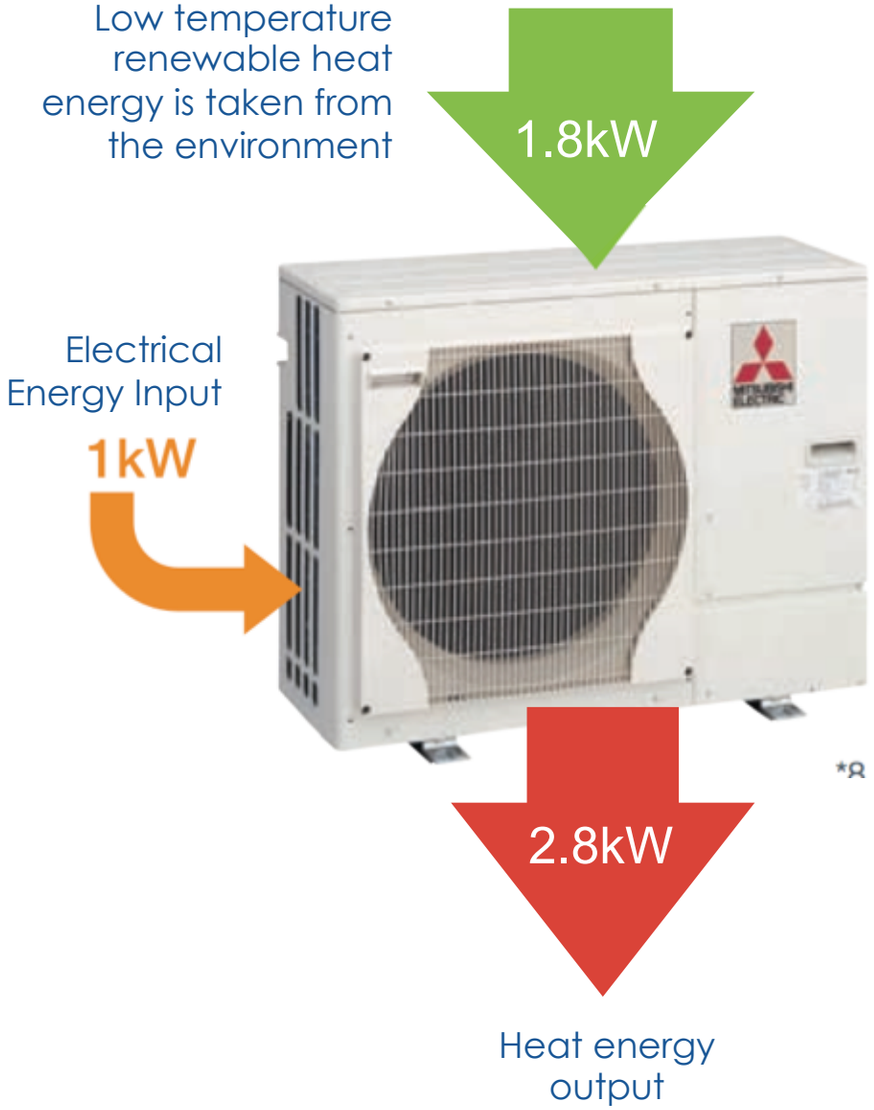
TYPICAL GROUND SOURCE HEAT PUMP CO-EFFICIENCY OF PERFORMANCE (CoP)

Comparable Metric	Traditional Oil Boiler	Traditional Gas Boiler	Typical Air Sourced Heat Pump	Typical Ground Sourced Heat Pump
Energy In	1 kW	1 kW	1 kW	1 kW
Heating Energy Out	0.7 – 0.9 kW	0.9 – 0.95 kW	2.5 – 3.0 kW	3.9kW
CO2 Emissions*1	0.268 kg/kWhr	0.184 kg/kWh	0.159 kg/kWh	0.114 kg/kWh
Utility Cost (for Energy Input)	5.4p / kWh	5.5p / kWh	13.8p / kWh	13.8p / kWh
Heat Output - Renewable Heat Incentive (RHI)*2	0p / kWh	0p / kWh	7.3p per kWh, so 20.44p/kW of input	18.8 p per kWh, so 73.32p/kW of input

*1 – Source is the Carbon Trust conversion factor – Sept 2013

*2 – Source Energy Saving Trust – April 2014. This is the current RHI, but it is known to be a system of digression, with further reductions anticipated.

Mechanical & Electrical Engineering – Heat Generating Proposal:



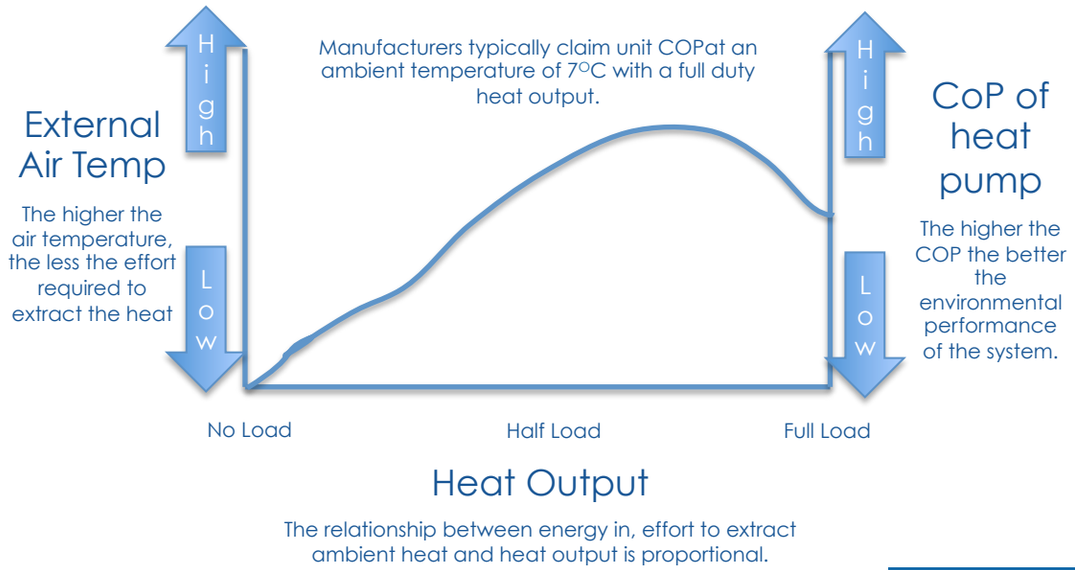
The proposed method of of heat generation for each individual residential unit in the reconfigured office development will be the use of Air Source Heat Pump technology which is consistent with the original 2 Dumpton Place planning application proposal and is part of the overall energy strategy to meet Building Regulation requirements.

HEAT PUMP DESIGN PERFORMANCE:
Ambient Winter Design Temperature = -4OC
(Based on CIBSE 99.6% probability design data).

The heat pump must continue to provide heating when the ambient temperature falls below the -4OC design point, but the effective heat output will be less. The Heating flow and return temperatures will be set at 35OC flow and 30OC return air to maximise the Heat Pump CoP. This will increase the quantity of pipework required for under-floor heating.

Acoustic performance of the external condensers are approx. 28dB at 1m. This will be operating at any time day and night, so will be considered for night time noise levels. The European accepted 'No Observed Effect Level' (NOEL) should be maintained with a Level of ambient noise at night being below 30dB (as a result of heating systems). 2No units operating together will increase the Noise Level to 31 dB at 1m.

Additional energy meters will be required to qualify for the RHI tax incentive, as set out in :https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/211993/A_guide_to_metering_for_payment_for_the_domest_Renewable_Heat_Incentive_.pdf



Mechanical & Electrical Engineering – Heating Proposals:

INTERNAL AIR TEMPERATURES:

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CIBSE Recommended Design Comfort Criteria:

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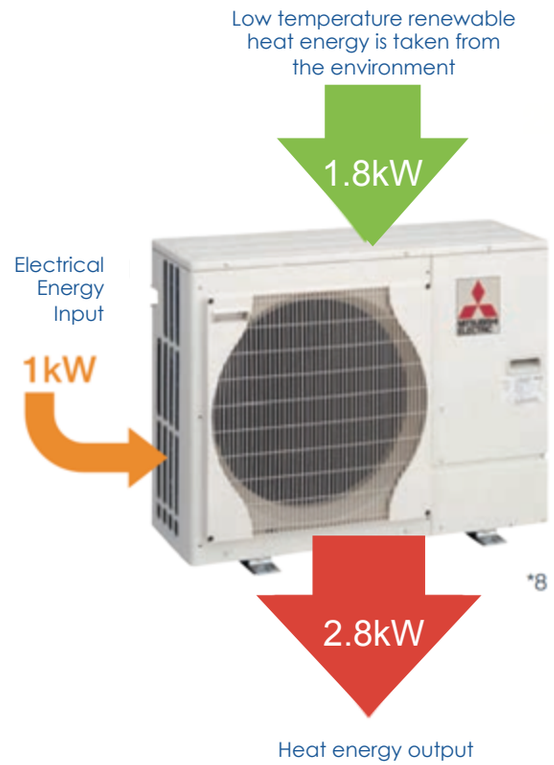


Under floor heating will provide the comfort control in all occupied spaces within each flat of the reconfigured office building.

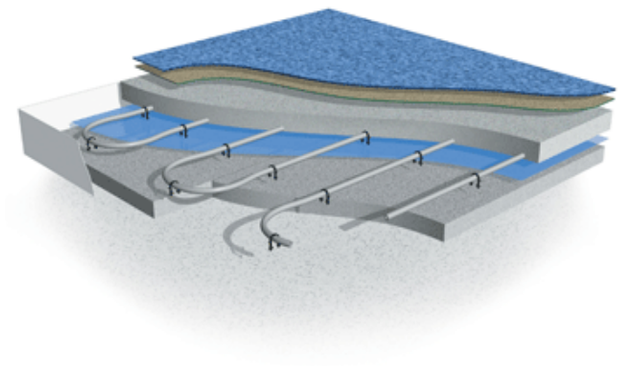
Each area allocated as an area of under floor heating is considered a 'thermal zone' and is to provide background heating when enabled from the controls.

The background heating will be sufficient to raise the room air temperature from cold up to the room set point criteria, taking into account building fabric losses, infiltration and ventilation requirements for the thermal zone itself and any neighboring areas that sit outside of the thermal zone (i.e. the bathroom floor needs to heat the entire bathroom, but has the thermal zone limited by the floor area).

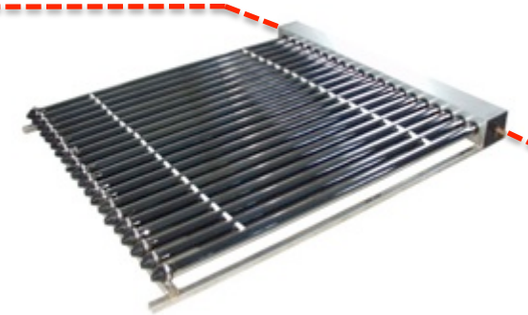
Each thermal control zone is to have a wall mounted room thermostat located as per the architectural layout and aligned with the light switch.

The heating pipework will run at approx. 50oC when calling for peak heating, the heat output for the UFH is to be designed accordingly. The floor temperature is anticipated to operate at around 29oC.

The Trade Contractor responsible for the Heating & Hot Water will take full responsibility for all registration and certification for any Gas Safe Registration and also obtaining the Renewable Heat Incentive certification. On handover a Gas Safety Record (relating to refrigeration) is to be included in the handing over documentation.



Mechanical & Electrical Engineering – DHWS Proposal:



ROOF MOUNTED SOLAR HOT WATER PANELS:

Solar Hot Water Panels to supplement the generation of hot water via the heat pump will reduce the energy consumption of the residential units.

The installation must fit on the flat roof area of 2.1m wide (East –West axis) by 4m long (North to South axis) for each flat.

C/w solar expansion vessel (approx. 25 litres) and solar heat transfer station with circulator valves and digital controller.

Supply and install scope is to include heat transfer fluid and suitable frame for mounting and fixing to the roof.

The installer is to be suitably qualified to facilitate the installation to receive the RHI allowance.

Solar panels are to have an integral 'drain-back' overheating and freezing protection facility.

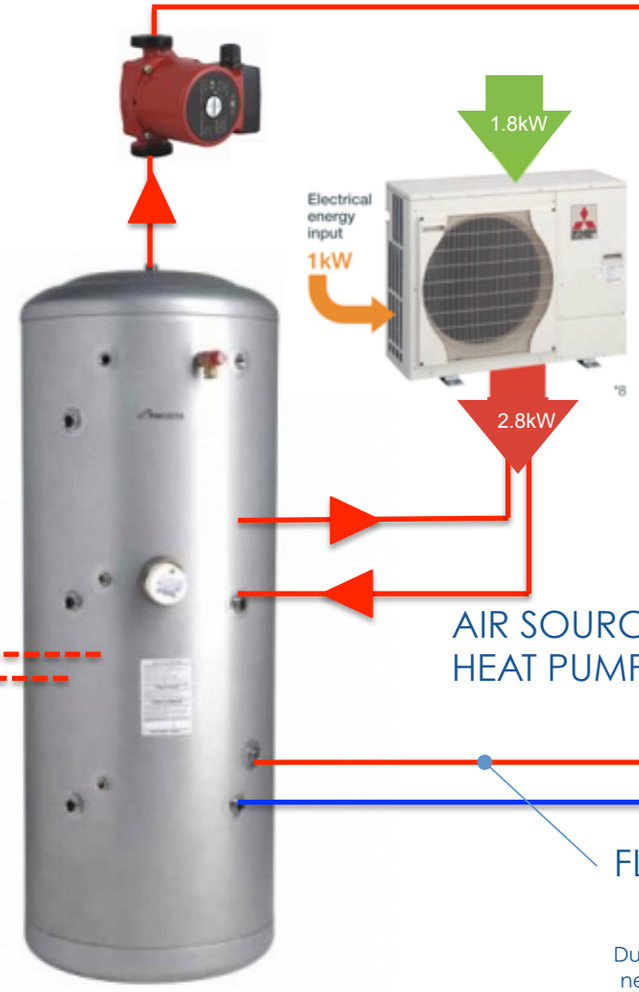
The DHW storage vessel will need to increase to a Duel Coil arrangement.

ANCILLARY ITEMS:

There will be a variety of ancillary items such as pumps, sensors, etc to ensure the system is able to be well maintained and reliable..

DHW FITTINGS:

Refer to schedule for provisions and flow rates.



AIR SOURCE HEAT PUMP

THERMOSTATIC MIXING VALVE:

The mixing valve is to balance the hot and cold mixed water temperature and to provide scold protection.

SYSTEM CONTROL:

The installer is responsible for the inclusion of a control system that integrates the automated control the hot water storage and the heat pump control. This is to provide weather compensation and protect the system from overheating during any sustained period of not being used.

The system control is to be central to either the heat pump & the hot water storage and adjustable to suit the occupants needs, (i.e. time clock control). The controls are to be compatible with the under floor heating control.

SANITATION DESIGN FLOW RATES

	Design Flow Rate (l/s)	Minimum Flow Rate (l/s)	No of fittings
WC	0.13	0.05	5
WHB	0.15	0.10	5
Bath	0.50	0.20	1
Shower	0.20	0.10	3
Kitchen Sink	0.30	0.20	2
Washing Machine	0.20	0.15	1
Dish Washer	0.15	0.10	1

A) These figures can be used for sizing each individual pipe to the appliance referred to.
B) The choice of outlet fittings/appliances can affect the flow rate delivered at the outlet fitting/appliance. Manufacturer's advice should be sought.
C) The manufacturer should be consulted for required flow rates and pressures to washing and dish-washing machines

NB: This information is based on Table 5 of BS 5885: 2011 and the proposed development for a 5 Bedroom Dwelling

SINGLE COIL DHW STORAGE VESSEL:

Based 45 litres per day, per person with DHW at 60degC.

An additional 3kW immersion heater is to be provided for backup purposes.

FLOW & RETURN PIPEWORK CONFIGURATION:

Due to the long distribution routes, consideration needs to be given to minimizing dead legs and ensuring circulation is maintained, avoiding legionella, but also ensuring waiting time for hot water is acceptable.

As the water travels in pipework at approx. 1 m/s, the time from turning on a tap to receiving hot water would be 30secs for a 30m run. To avoid this a flow and return system (rather than using trace heating) is proposed.

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Mechanical & Electrical Engineering – Ventilation Proposal:

INTERNAL VENTILATION RATES:

Based on the Building Regs the various spaces require either a continuous ventilation rate, or a demand based ventilation rate intermittently.

Part L1(a): Minimum Ventilation Rates:

Room Description	Intermittent Extract	Continuous Extract
Whole dwelling ventilation		29 l/s based on a 5 bedroom dwelling
Bathrooms	15 l/s	8 l/s
WC	6 l/s	6 l/s
Circulation Spaces		
Kitchen	30 l/s adjacent to hob OR 60 l/s elsewhere	13 l/s
Living Room Areas		
Utility Spaces	30 l/s	8 l/s

A) In addition to the above, a minimum ventilation rate of 0.3 l/s per sqm of internal floor area.

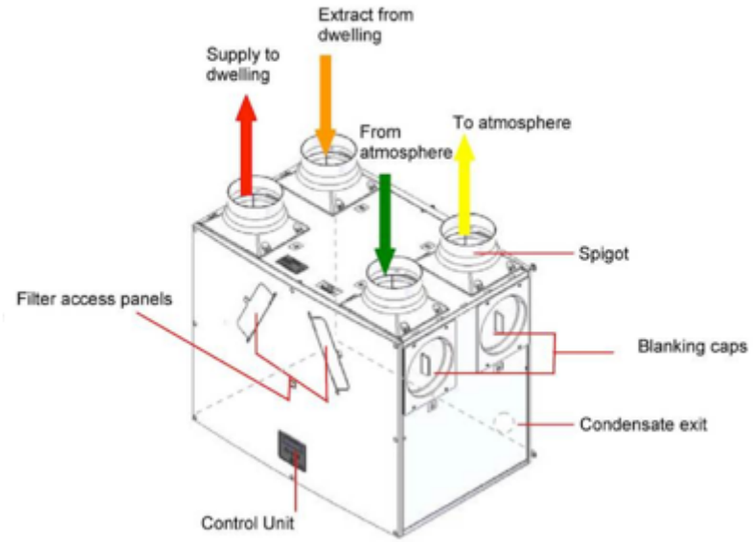
B) The whole dwelling ventilation rate is based on Suite 1 having two occupants and each of the other bedroom spaces having a single occupancy. If more than one occupant is envisaged then the ventilation rate should be increased by 4 l/s.

AIR INTAKES AND EXHAUST

Sufficient distance should be provided from sources of pollution such as air exhaust points and car parking to prevent air intake becoming polluted.

VENTILATION GRILLES

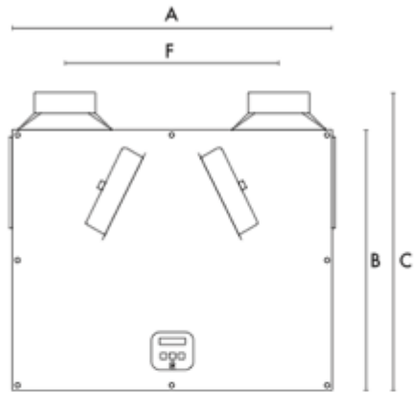
Ventilation grilles will be located in the internal walls and building envelope to supply air in at low level and to extract air out at high level.

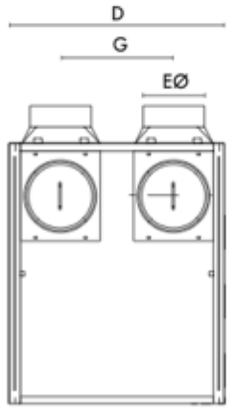


TYPICAL MECHANICAL VENTILATION HEAT RECOVERY (MVHR) UNIT

A	B	C	D	EØ	F	G
785	635	722	550	150	520	275

Weight: 24kg





Each residential unit in the reconfigured office building of 2 Dumpton Place will be provided with a mechanical ventilation heat recovery unit (MVHR)

This MVHR unit will continually exhaust air from kitchen, bathroom and utility rooms and recovery heat energy to be transferred to fresh air ventilation in central circulation/living areas.

All of the residential units will be provided with openable windows to enable the occupants to supplement the MVHR system at times of the year where outside air temperatures could be favourable i.e. late spring through to early autumn.

The MVHR system is an integral part of the overall low carbon energy strategy to achieve compliance with Building Regulations and provide a further level of provision for climate change.

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Mechanical & Electrical Engineering – Power Distribution:

CONSUMER UNIT

RESIDUAL CURRENT DEVICE (RCD)

With the introduction of the recent (BS 7671:2008 incorporating amendment no 1: 2011) 17th Edition IEE Wiring Regulations consumer units in the UK must provide RCD protection to all cables embedded in walls excepting high integrity circuits such as those for burglar alarms or smoke alarms. The RCD shall be rated at 30mA.

MINITURE CIRCUIT BREAKER

MCB's will be type B rated and capable of withstanding a fault current of 10kA minimum, clearly identify all outgoing circuits using typed labels

Sizing:
Use a 5amp fuse or 6amp MCB for lighting circuits
Use a 15amp fuse or 16amp MCB for immersion and storage heater circuits
Use a 20amp fuse or MCB for small radial circuits up to 20m²
Use a 30amp fuse or 32amp MCB for larger radial circuits, ring circuits up to 100m², cookers and electric showers up to 7200W

CODES OF PRACTICE

The whole of the electrical services installations will be designed, supplied, installed and commissioned in accordance with the Requirements for Electrical Installations BS7671.2008 (IEE Wiring Regulations Seventeenth Edition), all relevant British Standards, Codes of Practice, NHBC and Health and Safety publications.

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The Landlord areas and provisions will be provided with a dedicated distribution board. Separately metered supplies will be provided to each flat in the reconfigured office building and will be provided with a new duel split-load consumer unit. Where a flat covers two floors, the lower flat for e.g., the consumer unit will typically be provided to allow for the following circuits:

RCD 1:
1. Basement Power
2. Basement Lighting
3. External Lighting
4. Cooker
5. Ventilation Plant
6. Spare

RCD 2:
1. Ground Floor Power
2. Utility/Store
3. Ground Floor Lighting
4. External Plant
5. Spare
6. Spare

On the first and second floors where each apartment covers the one floor the consumer unit will typically be provided to allow for the following circuits:

RCD 1:
1. Living/Kitchen Power
2. External Lighting
3. Cooker
4. Ventilation Plant
5. Utility/Store
6. Spare

RCD 2:
1. External Power
2. Internal Lighting
3. Ground Floor Lighting
4. External Plant
5. Spare
6. Spare

By alternating the circuits like this, power will always be present on one floor if either RCD trips out.

25% spare ways will be provided before the RCD unit for future use. Based on these proposed circuits the consumer unit should be a 12 way unit to ensure spare capacity is incorporated.

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