LANCASTER WEST
LOT 6 - VERITY CLOSE

LONDON, W11 4HE

ROYAL BOROUGH OF KENSINGTON AND CHELSEA

0197-ECD-XX-XX-RP-A-03003

RIBA STAGE 2 REPORT P01

APRIL 2022

ECD Architects
ENERGY CONSCIOUS DESIGN

LANCASTER WEST
NEIGHBOURHOOD TEAM
W11

This RIBA Stage 2 Report has been prepared by ECD Architects on behalf of RBKC

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Royal Borough of Kensington & Chelsea

Lancaster West Neighbourhood Team

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RIBA Stage 2 Report

Client: Royal Borough of Kensington and Chelsea

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Date: 11/04/2022

Comments:

Author	Reviewer	Date	Rev.	Notes
PLP	MB	11/04/2022		
PLP	MB	05/05/2022	P01	Client comments incorporated

CONTENTS

0.0 GLOSSARY

- AECB - Association for Environment Conscious Building is the leading network for sustainable building professionals such as local authorities, housing associations, architects etc. The AECB Retrofit Standard promotes the delivery of Net Zero carbon retrofits, combining a whole house 'fabric first approach' with ambitious energy efficiency measures.
- Airtightness - is the control of air leakage, or the elimination of unwanted zzs through the external fabric of the building envelope. This may be achieved by the correct and proper installation of a vapour check or vapour barrier. See Infiltration.
- **Annual Heat Demand** - This is the quantity of heat required by a building during the course of a year. Can refer either to space heating demand or water heating demand, or both. It is often divided by the building's square meterage to be able to compare it with buildings of different sizes.
- ASHP - Air Source Heat Pump is a type of heat pump that absorbs heat from a colder place and release it into a warmer place using the same process as an air conditioner. Unlike an air conditioning unit, however, it is able to both warm and cool a building and in some cases also provide domestic hot water. The system can often be connected to the existing heating pipes and radiator system.
- BIM - Building Information Modeling is an intelligent 3D model-based process that gives architecture, engineering, and construction professionals the insight and tools to more efficiently plan, design, construct and manage buildings.
- BIM Level 2 - is a collaborative working process which requires an exchange in the information process which is specific to the project and coordinated between various systems and participants.
- BRE - Building Research Establishment is a centre of building science which aims to improve buildings and infrastructure through research and knowledge.
- EnerPHit - This is the Passivhaus-equivalent standard for energy efficiency when refurbishing existing buildings. It follows a fabric first approach, and requires additional insulation, triple-glazed windows and mechanical ventilation with heat recovery.
- **EPC** - Energy Performance Certificate is a document which sets out the energy efficiency of the property within a lettering system A to G (Letter 'A' being the most efficient).
- **Heat Losses** - is a measure of negative heat transfer through a building's fabric from the inside to the outside. The colder the outside temperature, the warmer the inside, and the worse the thermal insulation of the building fabric, the greater the heat loss will be. Windows, doors, walls, ground floors and roofs all quickly lose heat unless they are well insulated. See U-values.
- HTC - Heat Transfer Coefficient or Smart HTC, is a thermal performance rating that is used to measure the whole building thermal performance and Pulse air tightness testing. It enables whole building heat loss to be determined with just 21 days of internal temperature and energy consumption monitoring using 4-5 temporary sensors.
- **HWC** - Hot Water Cylinder, to heat and store domestic hot water.
- **Infiltration** - is the unintentional or accidental introduction of outside air into a building, typically through cracks in the building envelope and through old or poorly fitted windows and doors. Infiltration is sometimes called air leakage. See Airtightness.
- **IRS** - Integrated Reception System: provides broadcast signals from multiple sources (typically terrestrial television, FM radio, DAB digital radio and tatellite TV) to multiple outlets, via a single aerial cluster and signal booster-distributor.
- MEV - Mechanical Extract Ventilation is a system which extract polluted air from wet rooms; without any heat recovery.
- MEP - Mechanical, electrical and plumbing engineering systems of a building.
- MVHR - Mechanical Ventilation with Heat Recovery is a unit that brings in fresh air and pre-warms this with the heat from outgoing air. This fresh, warmed air is then distributed to living areas, while stale air is extracted from kitchen and bathrooms. Windows can still be opened, but the building will still work even if windows are kept shut.
- **PART L (Approved Document)** - It is the official guidance of the Building Regulation which containts requirements relating to the standards for the energy performance and carbon emissions of new and existing buildings.
- **PAS2035** - PAS 2035 is the new over-arching document in the retrofit standards framework introduced following the recommendations of the Each Home Counts review. PAS 2035 essentially provides a specification for the energy retrofit of domestic buildings, and details best practice guidance for domestic retrofit projects.
- **Passivhaus** - Passivhaus is a standard for energy efficiency construction in new buildings. It results in ultra-low energy buildings that require little energy for heating and cooling spaces.
- **PE**- Primary Energy is the total primary energy demand from non-renewable energy sources that is supplied to the building.
- **PER**- Renewable Primary Energy is the unit of energy generated from renewable resources.
- **PHPP** - The Passive House Planning Package. This is a modelling tool used to help design a properly functioning Passivhaus/EnerPHit project. It requires information about the building size, shape, orientation as well as the proposed insulation to the walls, floors and roof. Detailed information on windows and doors are also required. The PHPP prepares an energy balance and calculates the annual energy demand of the building.
- **SAP** - System Assessment Procedure is a method which rates and certifies buildings performances for Energy of dwellings. It provides a calculating framework that is required to demonstrate if the building complies with Approved Document Part L.
- **SHDF** - Social Housing Decarbonisation Fund Demonstrator is a government programme which supports social landlords to demonstrate innovative approaches to retrofitting social housing at scale. It will mean warmer and more energy efficient homes, a reduction in households' energy bills, and lower carbon emissions.
- **Solar Gain** - Also known as 'solar heat gain' or 'passive solar gain', solar gain is the increase in thermal energy of a space as it absorbs solar radiation (heat from the sun).
- **Thermal Bridging** - also called a cold bridge, heat bridge or thermal bypass is an area of a buildings construction that has a significantly higher heat transfer than its surrounding materials. Thermal bridging can be responsible for up to 30% of a dwelling's heat loss (BRE).
- **U-Value** - A U-Value is the measure of heat transfer through an object or structure. U-Values are generally used to define thermal performance (heat loss) and assess the performance of a building. The lower the U-value the better insulated an element is.

1.0 Introduction

1.1 EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

Verity Close is an area of the Lancaster West Estate consisting of 32 houses in staggered terraces and two small blocks of flats, each housing 18 one-bedroom flats. ECD have been appointed to carry out retrofit works on a total of 52 socially rented or leasehold homes across the close as part of an estate-wide refurbishment programme being carried out by the Lancaster West Neighbourhood Team (LWNT). The aim of the scheme is to create a model 21st century estate.

The previous Stage 1 Feasibility Report provided an analysis of the existing buildings and outlined three levels of intervention: bronze, silver and gold, with a view to improve the energy performance of the homes by reducing heat demand and carbon emissions. Since then, the project brief has evolved and the decision has now been made to retrofit the houses to an EPC A Standard and the blocks of flats to an Enerphit Standard.

These ratings will be achieved through a combination of measures including installation of new windows and doors, external roof and wall insulation, PV panels and MVHR (Mechanical Ventilation with Heat Recovery). Residents will benefit from healthier, less draughty and warmer homes with significantly cheaper energy bills.

This RIBA Stage 2 report outlines the current design proposal which has been developed from our RIBA Stage 1 Feasibility Report and is supported by the resident's feedback collected during co-design events.

Figure 1 - Verity Close aerial view

1.1 BRIEF & BACKGROUND

BACKGROUND

The Lancaster West Estate is located in Notting Dale in north Kensington, London. There are 795 homes across the estate, the majority of which are flats.

The Lancaster West Estate is aiming to become a 21st Century Model social housing estate. To make this aspiration a reality, 6 lots of homes across the estate are to be refurbished to dramatically improve their energy efficiency, as well as addressing other issues identified by the multi-disciplinary team or raised by the residents.

Verity Close is Lot 6 of the estate comprising of a mix of flats and houses. Lancaster West Neighbourhood Team (LWNT) have appointed ECD Architects to provide multi-disciplinary design services from RIBA Stages 0-7 on this lot, and to work collaboratively with other consultants to deliver this ambitious brief.

In addition, the Council has ensured that the residents at Verity Close are fully engaged and consulted throughout the design process. This is an exciting Co-Design Project where Residents are given the opportunity to meet the consultants and express their preferences thus shaping the future of Verity Close together.

From our site investigations and the information provided by LWNT, the buildings in Verity Close are mostly leaky, damp and cold. As the price of Energy bills rockets, the possibility of some residents suffering from fuel poverty, becomes only too real. It is imperative therefore, that the houses and flats in Verity Close should become Energy Efficient homes that can be economically run whilst contributing towards addressing the Climate Emergency crisis

LWNT CORE PRINCIPLES

The Grenfell Tower tragedy in June 2017 highlighted the need for the estate to be maintained and refurbished and for its residents to be part of this process. LWNT have committed to ten core principles for the refurbishment and these have been agreed with residents:

1. The refurbishment will be resident led.
2. All refurbishment work will be done sensitively and in co-operation with residents.
3. There will be no demolishing of people's homes on the Estate.
4. We will create a model estate where the community can be proud to live and that the council can be proud to own.
5. We will make sure residents can make real choices on the refurbishment.
6. We will listen to all age groups and communities on what improvements they want to see.
7. The refurbishment will aim to provide jobs and skills training for local people
8. The refurbishment will improve local services, so they are of a high quality.
9. The refurbishment will create a sustainable estate that can be maintained to a high standard.
10. There will be transparent decision-making and feedback provided by the council at each step.

DESIGN TEAM

Lancaster West Neighbourhood Team have appointed ECD Architects to provide multi-disciplinary design services from RIBA Stages 0-7, to refurbish Verity Close, as part of an extensive programme of works within the Lancaster West Estate.

- Architecture – ECD Architects
- Structural Engineering – Wilde Engineering
- Cost Consultancy – Keegans

ECD Architects will also work collaboratively with other consultants as required by the client and the brief, such as:

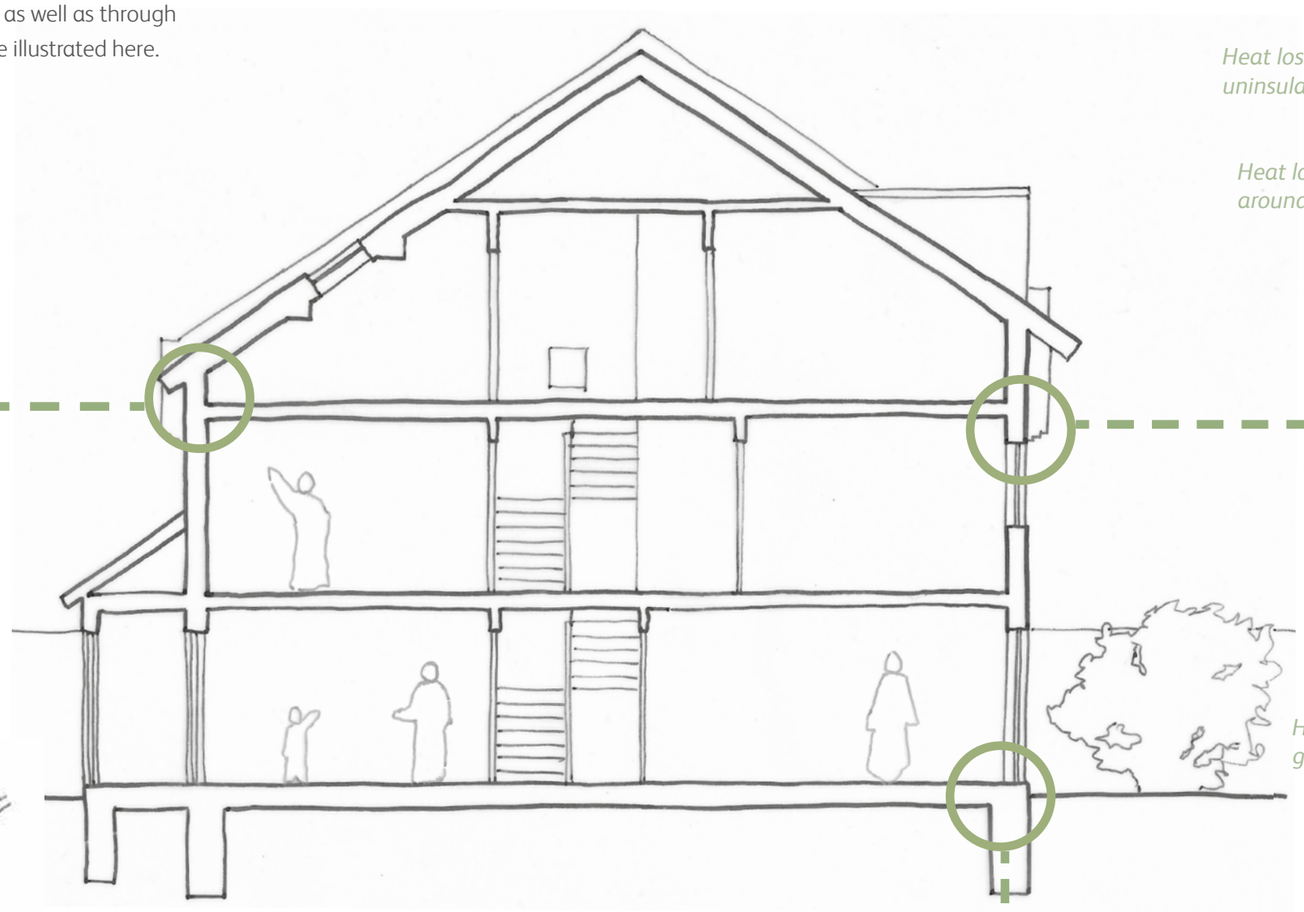
- Fire Consultancy – IFC
- Monitoring and POE – BuildTest Solutions
- Principal Designers – Derisk
- Fire Risk Assessments – IFC
- Mechanical, Electrical and Plumbing (estate-wide) – TACE
- CCTV, door entry, digital TV – TGA Consultancy

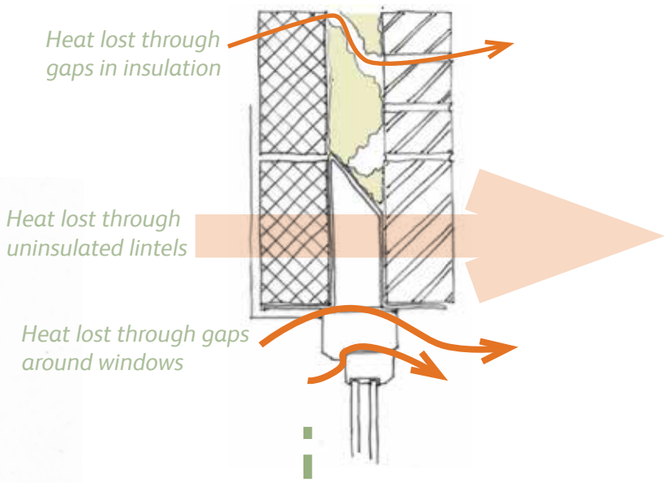
This process will enable Lancaster West to move one step closer to becoming a model 21st Century social housing estate that will be carbon neutral by 2030.

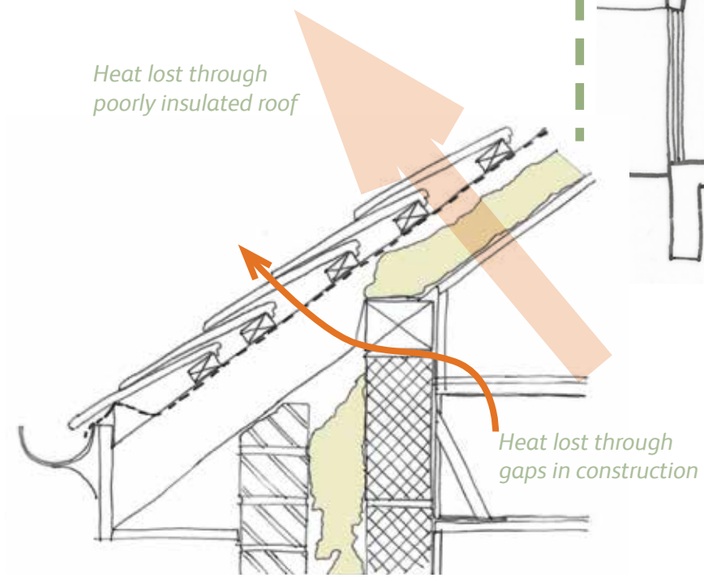
Figure 2 - Lancaster West Estate

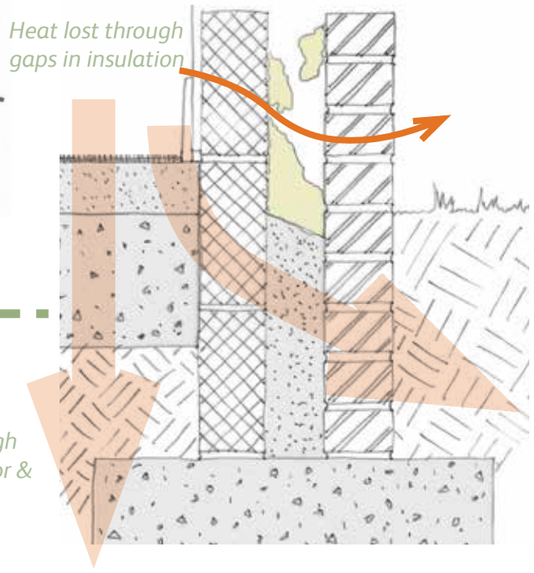
1.3 ENERGY

Having been built in 1979 the homes at Verity Close are less energy efficient than a new home, though they are more efficient than many on the estate. Wall insulation is patchy at best, and thermographic imaging will establish how contiguous and dry this is. There are known gaps in construction around window frames and panes, as well as vents through walls. Eaves junctions are not well-sealed. The ground floor is understood to be uninsulated, so heat is lost to the ground here, making the floor feel cold. While some roofs are understood to have some insulation at rafter or loft level, it is not expected that this is consistent. A lot of heat is lost through gaps in construction, as well as through the main building elements. Some particularly poor areas are illustrated here.









1.3 ENERGY

THE BRIEF

The Stage 1 Report described several energy standards: Bronze, Silver and Gold- that might have been implemented in the project. Additionally, the report also outlined the potential building works that might be carried out to meet each of those standards.

Since then, the brief has evolved and new energy targets have been set for both the houses and the flats at Verity Close. In the Stage 1 Report, ECD Architects pointed out that the EPC ratings for the existing properties range from EPC band E to C. However, as LWNT aspires to improve the existing energy performance of the properties in the Close considerably, the Design Team have been instructed to achieve an EPC A energy rating in the houses and an Enerphit Energy Standard in the blocks of flats. It is worth pointing out that meeting these standards will provide a huge benefit to the residents who will be able to enjoy warm homes and face reduced energy bills.

In summary the Energy standards to be achieved are:

- Houses: EPC A Rating

- Blocks of Flats: Enerphit Standard

A PILOT STUDY- 54 VERITY CLOSE-

LWNT have requested that a pilot study should be carried out in one of the houses prior to the undertaking of retrofit works elsewhere in the Close. The idea behing this strategy is to gather knowedge and lessons learnt that can then be applied to the remaining houses once the pilot study is completed.

No 54 Verity Close has been selected as the property that will be the pilot study. The intent with this property is to carry out building works whilst the occupants are away from the building. It will be a pilot study that will test the effectiveness of the building measures proposed.

ENERGY PERFORMANCE CERTIFICATES

An Energy Performance Certificate (EPC) give and approximate indication of a home's energy efficiency. The most efficient homes have A ratings and least efficient have a rating of G. The average in the UK is a D rating

Property number	Type		EPC band	Year	Floor area (m^2)	Primary energy use (kWh/m^2/yr)	CO_2 emissions (tonnes)	Space heating demand (kWh/yr)	Specific space heating demand (kWh/m^2/yr)
8	Flat	ground	C	2018	44	222	1.7	3831	87
9	Flat	ground	C	2017	46	167	1.3	2959	64
12	Flat	top	D	2012	73	224	3.1	7617	104
14	Flat	ground	C	2011	47	252	2		
17	Flat	mid	C	2020	43	143	1.1	1605	37
18	Flat	top	C	2016	46	191	1.6	3254	71
19	Flat	top	C	2017	45	170	1.3	2234	50
21	Flat	ground	C	2017	47	223	1.8	4274	91
24	Flat	top	C	2010	58	208	2		
25	Flat	top	C	2019	46	186	1.5	3339	73
27	Flat	ground	C	2010	47	257	2		
30	Flat	top	D	2013	47	246	2.2	5085	108
32	Flat	ground	C	2016	47	211	1.7	3573	76
34	Flat	mid	B	2010	45	179	1.3		
36	Flat	top	C	2012	48	200	1.8	4693	98
37	Flat	top	C	2013	46	169	1.5	4421	96
38	Flat	ground	C	2010	53	264	2.3		
40	Flat	top	C	2019	46	154	1.2	2321	50
41	Flat	mid	D	2012	38	251	1.8	3756	99
	Flat	Average							79
6	House	mid	E	2014	114	291	6.4	12072	106
7	House	end	D	2012	106	230	4.7	10686	101
44	House	end	D	2011	114	261	5		
47	House	mid	D	2016	120	192	4	10384	87
48	House	mid	E	2013	78	313	4.6	9705	124
57	House	mid	D	2015	126	192	4.3	12192	97
66	House	mid	C	2009	76	226	2.9		
	House	Average							103

Figure 3 - Available EPC Band information for existing properties

1.3 ENERGY

ARCHITECTURAL WORKS REQUIRED TO MEET EPC A AND ENERPHIT STANDARDS

Meeting the above energy standards will be achieved by combining and coordinating a series of architectural and M&E installation measures. Please refer to the M&E engineer's report for further information.

Generally, both houses and flats will receive External Wall and Roof Insulation (EWI). The external wall insulation will travel beyond the ground level in a new trench adjacent to the external wall which will enhance the thermal preformance of the existing concrete slab. The specific EWI type to be used is still to be confirmed.

All existing windows will be replaced with tripled glazed air-tight windows. The airtightness of the blocks of flats will aim at not being greater than 1ach at 50 pascals which is the minimum airtightness level required for Enerphit projects.

MVHR Units with associated piping will also be installed to mechanically ventilate and heat the properties. These units should provide a min of 75% efficiency (ie 75% of the heat within the property should be recovered as a minimum).

Overheating is always a risk in superinsulated homes. This risk will need to be studied over the next design stage.

An important point to make is that whilst 54 Verity Close will have ground floor insulation installed, other houses, may not be be able to receive ground floor insulation due to the building remaining occupied during the works.Whenever this is the case, the M&E strategy will need to be adjusted to ensure that the EPC A rating is still achiveable.

As a final point, we would like to advise that EPC and Enerphit standards are calculated with two different sofware tools, SAP and PHPP respectively. SAP will be upgraded during the project duration and there is a risk that by the time the homes are on site the EPC A rating that they were designed for, may have been modified.

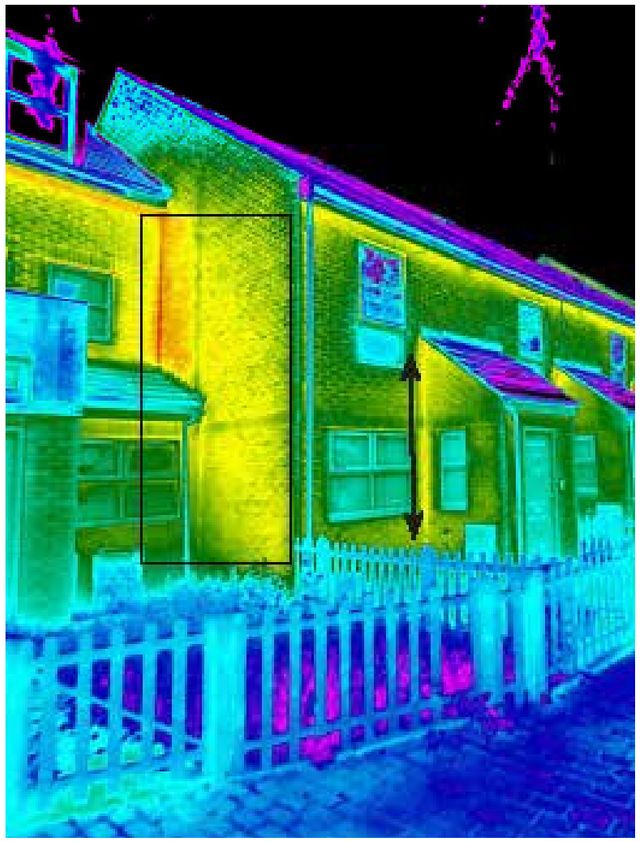


Figure 4 - Thermographic Images - Ext - No. 54 North East Elevation

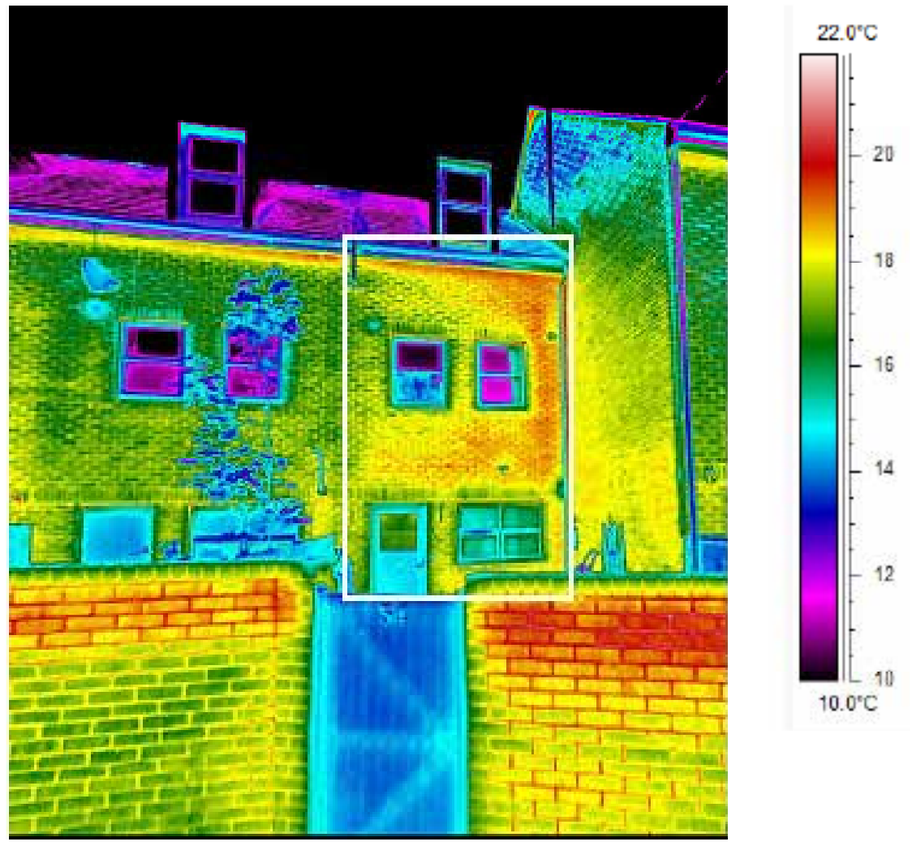


Figure 5 - Thermographic Images - Ext - No. 54 South West Elevation

Please refer to Appendix A7 for the full thermographic survey report.

1.4 PROJECT DIRECTORY

DESIGN TEAM

Name	Company	Role
James Traynor	ECD Architects	Account Director
Lizzy Westmacott	ECD Architects	Project Lead
Maria Buenaventura	ECD Architects	Senior Associate Architect
Laura Boffardi	ECD Architects	Architectural Assistant
Jess Scott	ECD Architects	Architectural Assistant/ Engagement Lead
Phoebe Pinks	ECD Architects	Architectural Assistant
Mark Allen	Derisk	Principal Designer
Abraham Nomafo	PPCR	Consultation Consultant
Tim Smith	Wilde	Structural Engineer
Joel Bain	Wilde	Structural Engineer
Tony Pearson	IFC Group	Fire Consultant
Jonathan Jordan	IFC Group	Fire Consultant
Daniel Willson	IFC Group	Fire Consultant
Eoin Doyle	Keegans	Director QS
Ibrahim Logun	Keegans	Project QS
Simon Bailey	Keegans	Project QS
Patrick King	ECD Architects	BIM Consultant

CLIENT

Name	Organisation	Role
James Caspell	LWNT	Neighbourhood Director
Andros Loizou	LWNT	Head of Refurbishment Design & Delivery
Alfie Peacock	LWNT	Project Manager for Verity Close
Bunmi Shekoni	LWNT	Refurbishment Design & Delivery Manager

1.5 SURVEYS

SUMMARY OF SURVEYS SO FAR

Since the first phase of engagement, access for a number of surveys has been requested from residents. These surveys have and will continue to assist ECD Architects in building up the most accurate possible picture of the existing dwellings at Verity Close. With this information, the most appropriate and viable improvements can in turn be proposed. The surveys requested have differed in the disruption they have invovled - from thermographic imaging taken from outside properties, to partition wall surveys assessing the build up of internal walls. While we have been successful in undertaking at least one of all the intended surveys, it will be adavtnageous to continue collecting further information through additional surveys should further residents wish to offer access.

NUMBER OF SURVEYS OBTAINED

PARTITION WALL

0 properties surveyed.

INTERNAL DIMENSIONS

2 properties surveyed.

TRIAL PITS

1 property surveyed.

ACOUSTIC SURVEY

5 properties surveyed.

DAMP SURVEY

2 properties surveyed.

SUMMARY OF SURVEY TYPES

Survey	What will it physically involve?	How long will it take?	How disruptive will it be?
Partition wall	The survey will involve a hole being made at a position of your choosing in your staircase wall. The wall will first be checked for asbestos, and sealed up. Once the wall is deemed safe, another surveyor will visit to make assessments about the wall's construction, and seal up and make good the hole upon completion.	Around 1 hour on one visit; 1-2 hours on a second visit.	Quite disruptive. Noise and dust while hole is being produced, but limited to staircase & adjacent room.
Internal dimensions	The surveyor will take measurements of walls in each room in the house using a laser scanner.	5-10 minutes in each room	Not very disruptive. Residents can be in same room while survey is being undertaken.
Trial pits	A surveyor will dig holes in the garden at the front and rear of the house which make the foundations visible. The surveyor will then measure and assess the foundations. The holes will then be filled in.	Around 2-3 hours.	Quite disruptive. Significant noise while pits are being produced, but all work is external.
Acoustic survey	The surveyor will generate a noise in one room (using a loudspeaker and tapping machine, which drops a weight in a sequence), and measure the sound in an adjoining room.	Around 1-2 hours	Very disruptive. Noise while survey undertaken. Residents would need to be outside of the room being tested.
Damp survey	A surveyor will use moisture meters to take readings from the walls to determine moisture levels. Special pins are used, which may leave a small pin size hole in the wall plaster.	Around 1 hour	Not very disruptive.

RETROFIT ASSESSMENTS

Retrofit assessments have been carried out for no.54 and no.29, each comprising of a condition report, occupancy report and energy report. Each require futher assessment to be completed. Please refer to the full reports in Appendix A1-A6.

2.0 Co-Design & Consultation

2.1 CONSULTATION OVERVIEW

PRIORITISATION WORKSHOPS

At the heart of LWNT's vision for refurbishing the Lancaster West Estate is co-design. Prior to ECD's appointment, Lancaster West Residents Association held a series of estate wide consultation events starting in October 2017, illustrated in the timeline. This engagement programme included workshops, meetings and ideas days where residents could voice their opinions. This concluded in the proritisation workshop

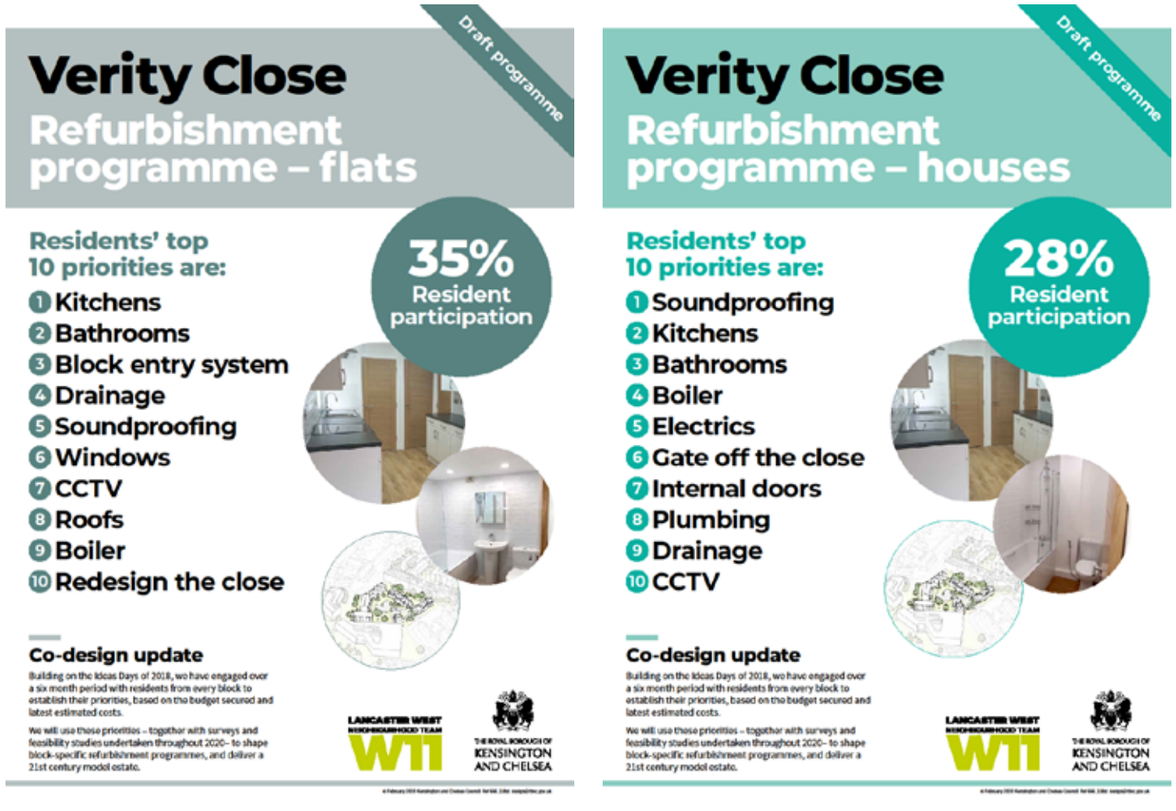


Figure 6 - Prioritisation workshop outcomes

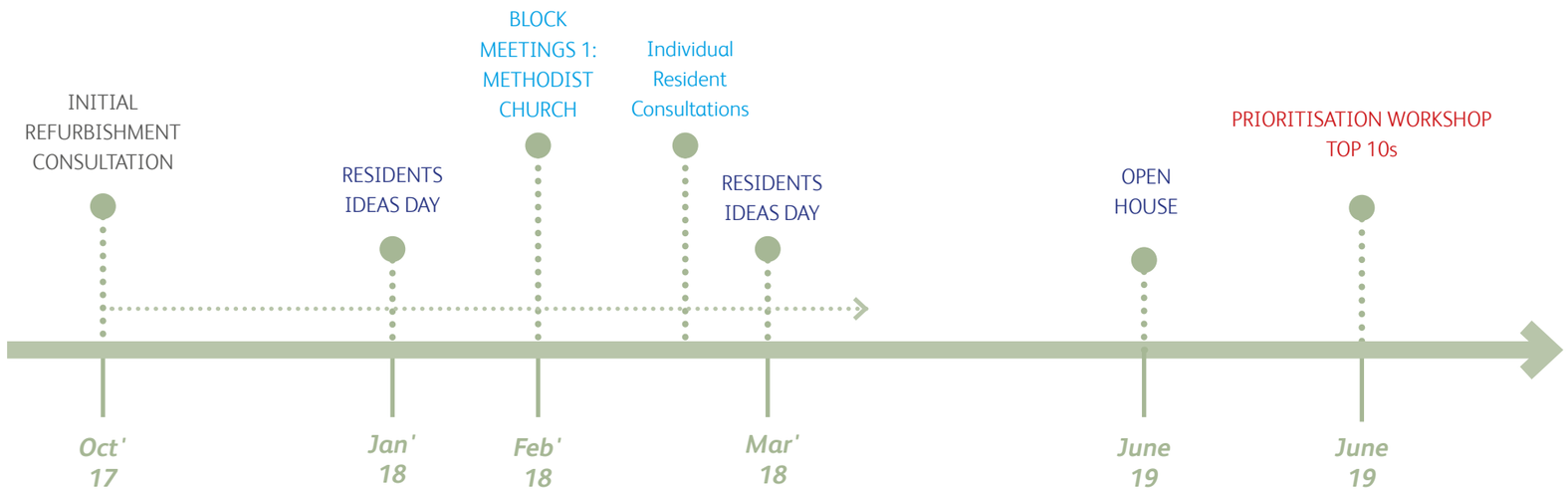


Figure 7 - Timeline of previous consultations

2.1 CONSULTATION OVERVIEW

CO-DESIGN

Following the initial consulations, the LWE established a three-phase plan for Co-Design of each lot, the first of which took place on Verity Close in March and April 2021. This phase involved holding an online webinar, an in person pop up event, and meeting residents through door knocking. A questionnaire was devised and shared with residents at these events to capture feedback on ECD's initial design ideas. Of the 68 houses and flats in Lot 6, 21 (37.74%) completed the survey. The results were published in an Initial Ideas Feedback Report and have informed the design options ECD have been working on since. Please refer to appendix A8 for the Initial Ideas Feedback Report.

The most recent consultation took place in February 2022 which included the emerging choices and preferences webinar. The Phase 1 and Phase 2 consultation presentations can be found in Appendix A9 and A10 respectively.

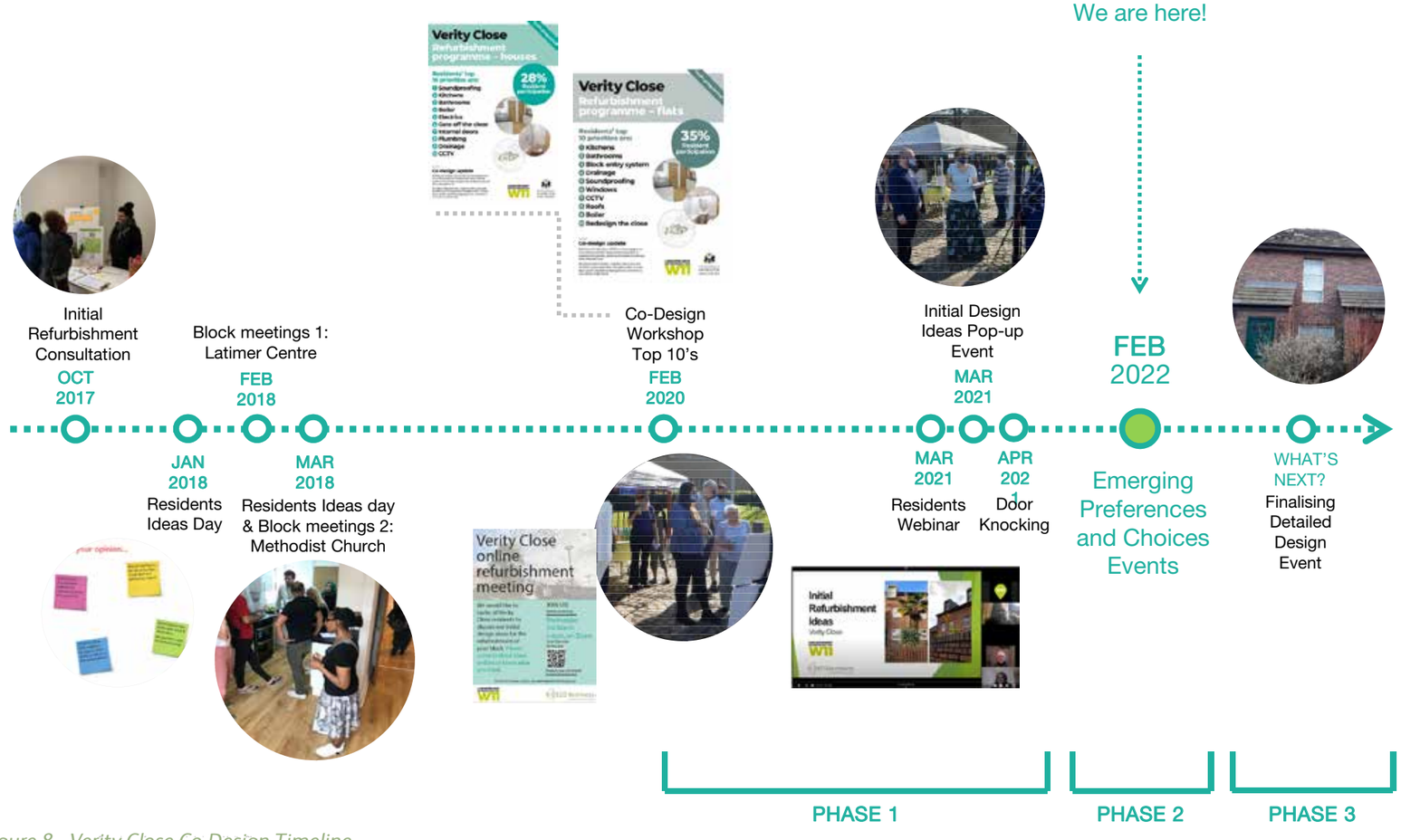


Figure 8 - Verity Close Co-Design Timeline

2.2 CONSULTATION FEEDBACK

QUANTITATIVE FEEDBACK

While the results of the first phase of engagement are written up in full in the Initial Ideas Feedback Report (see Appendix A8) it is worth noting some of the key preferences and priorities residents raised, which inform the architectural proposals suggested in the remainder of this chapter.

WINDOWS

93.33% of respondents were satisfied with whatever type of glazing is the most efficient for the block's needs, which was largely consistent across houses and flats and tenancy types. (15/21 responded to this question)

Majority of respondents (90%) were mainly positive about the prospect of triple glazed windows, which was largely consistent across houses and flats and tenancy types. (20/21 responded to this question)

INSULATION

External insulation was the clear preference between internal and external insulation options. 80% of respondents were generally positive about external insulation (20/21 responded to this question), as opposed to only 29.41% positive about internal insulation (17/21 responded to this question).

Between brick skin and render, brick skin was the clear preference with 75% of respondents generally positive about having the block insulated with brick skin (16/21 responded to this question). This is compared with only 38.46% positive about having the block insulated with render (13/21 responded to this question).

MECHANICAL VENTILATION WITH HEAT RECOVERY

With regard to MVHR system, respondents were largely positive with 73.68% generally positive at the idea of having a MVHR system installed in their home (19/21 responded to this question). Numerous respondents felt that this system would help with mould.

QUALITATIVE FEEDBACK

Aside from the quantitative results, we also captured a sense of residents' general concerns and questions with respect to the refurbishment. Some of the key themes to arise are collected below:

"Got lots of mould at the moment so MVHR will be good"

"Worried about all the pipework that MVHR will need"

Many respondents were concerned that **internal insulation was too disruptive and stressful.**

Leaks, condensation and draughtiness are currently issues residents experience with their windows

"We would like turn windows so we can wipe/clean whole window, not only inside window"

3.0 ARCHITECTURAL REPORT

3.1 DESIGN OVERVIEW

PURPOSE OF WORKS

The primary purpose of the project is to improve the energy performance of the homes by reducing heat demand and carbon emissions. This will be achieved through a combination of measures including installation of new windows and doors, external roof and wall insulation, PV panels and MVHR (Mechanical Ventilation with Heat Recovery). Residents will benefit from healthier, less draughty and warmer homes with significantly cheaper energy bills.

CURRENT HEAT LOSS

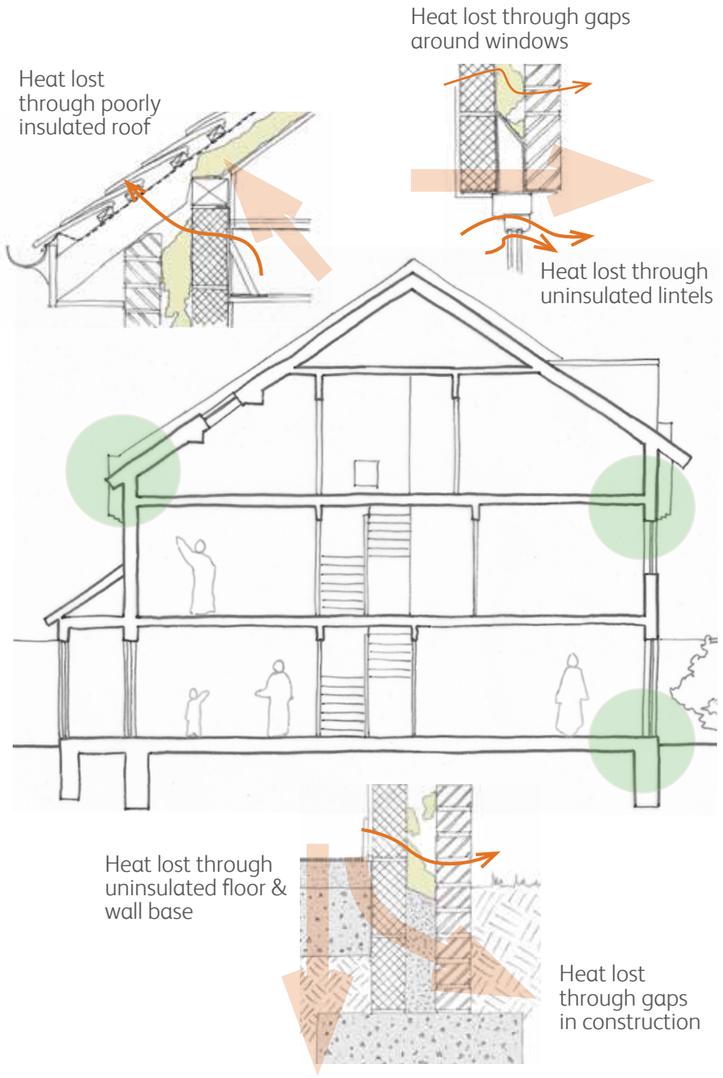


Figure 10 - Typical house section showing current heat loss

FABRIC-FIRST APPROACH

The external wall insulation combined with installation of triple glazed doors and windows work together to reduce energy loss. The adjacent diagrams show how these measures will come together in a typical house.

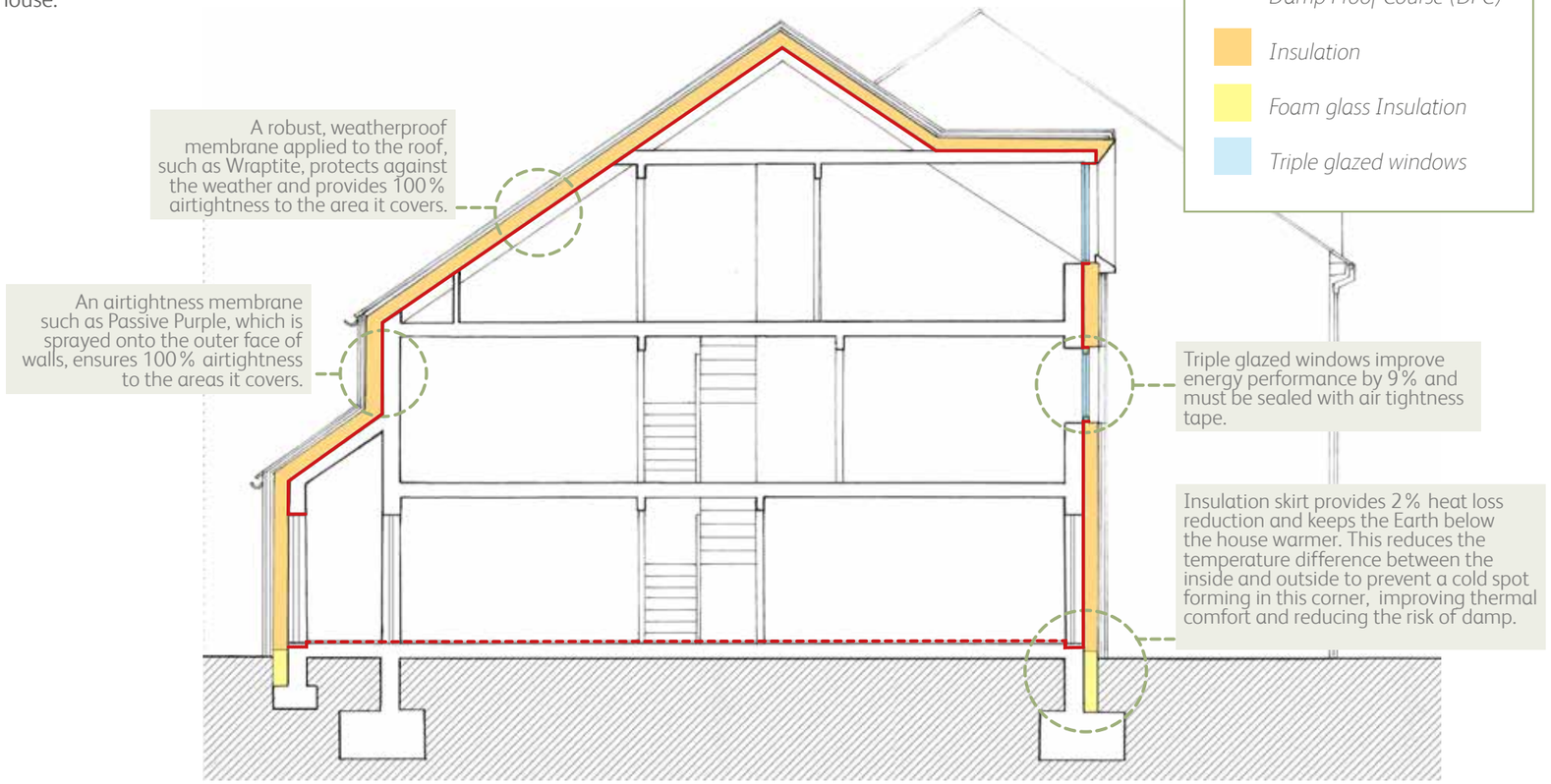


Figure 11 - Typica house section showing proposed fabric improvements

3.1 DESIGN OVERVIEW

Following on from further site investigation, feedback from LWNT & residents and design development, the options previously shown in the RIBA Stage 1 report have progressed in more detail for this RIBA Stage 2 report as presented in this section.

The work to be carried out is being split in to three phases, order to be confirmed:

1. The Pilot House - No.54
2. Other Houses
3. Flats

The purpose of doing a pilot house is to test the proposed measures in one property before rolling them out to the other houses. 54 Verity Close will be the first property to undergo works and hence the design team have been working closely with its residents to ensure that their opinions are taken on board and are integral to the design solution.

The majority of the proposed works will be carried out across flats and houses, however, there are certain improvements that are specific to each typology. At present, we have received external surveys across the close and internal surveys for house 54 and flat 29. It is anticipated that each home will have some variations which will impact the design, particularly in relation to the internal refurbishment works being carried out by LWNT.

There are four terraces of houses which include several typologies: end-terrace or mid-terraces of between two to four bedrooms, with some including dormers and additional extensions and possible internal works. In addition, due to only socially owned houses undergoing retrofit works and the staggered nature of the terraces, the details between houses will vary. These variations will be detailed further at a later stage.

*Order of phases to be confirmed

- Phase 1: Pilot- House 54
- Phase 2: Houses
- Phase 3: Flats
- Freehold properties - Not undergoing works

Figure 12 - Plan showing house types

PROPOSED SCOPE OF WORKS- HOUSES

- Installation of external wall insulation (EWI) on to the existing facade including below ground insulation, an airtightness layer and brick slip finish.
- Removal of existing concrete roof tiles and installation of external roof insulation finished with roof tiles.
- Upgrading existing single-glazed windows to new triple-glazed windows.
- Installation of new airtight skylights and modification of existing roof to suit
- Installation of new rainwater goods to connect with existing rainwater goods
- Installation of insulated, airtight doors
- Addition of photovoltaic panels
- Installation of mechanical ventilation with heat recovery (MVHR) including internal alterations to accommodate ductwork and equipment
- Internal refurbishment

Figure 13 - Typical house axonometric

PROPOSED SCOPE OF WORKS - FLATS

- Installation of external wall insulation (EWI) on to the existing facade including below ground insulation, an airtightness layer and brick slip finish.
- Removal of existing concrete roof tiles and installation of external roof insulation finished with roof tiles.
- Upgrading existing single-glazed windows to new triple-glazed windows.
- Installation of insulated, airtight doors
- Installation of new rainwater goods to connect with existing rainwater goods
- Addition of photovoltaic panels
- Installation of mechanical ventilation with heat recovery (MVHR) including internal alterations to accommodate ductwork and equipment
- Internal refurbishment
- Alterations to existing bin storage
- New flat entry system
- Improvements to communal areas

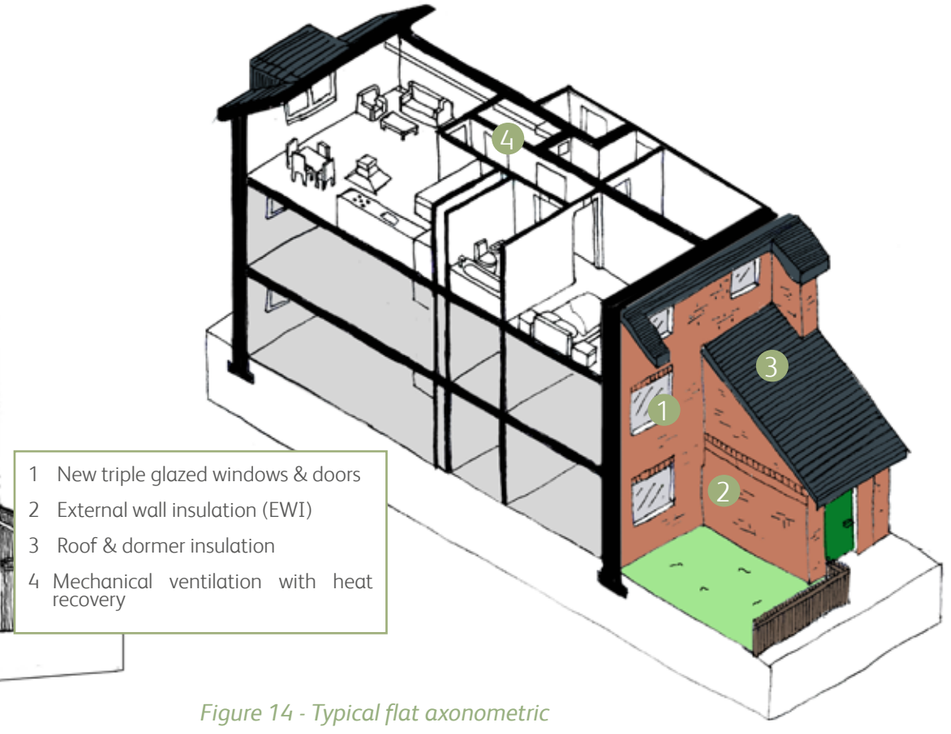


Figure 14 - Typical flat axonometric

3.2 PILOT HOUSE: SCOPE OF WORKS

ARCHITECTURAL

Building Envelope and External Works

- Strip out of existing roof with associated rainwater goods
- Strip out of existing windows, external doors and skylight
- Installation of external wall and roof insulation (assumed the walls will be finished with brickslips)
- Installation new triple glazed, airtight windows
- Installation of new airtight skylights and modification of existing roof to suit
- Installation of new airtight external doors
- Installation of new rainwater goods to connect with existing rainwater goods
- Creation of new trench to extend the EWI
- Move existing rainwater gulley to allow for new external insulation line
- Lead installation around dormers
- Possible inclusion of shading devices (eg. Brise soleil to mitigate overheating risk)
- Insulate over concrete slab

Internal Architectural Works

- Strip out all existing doors
- Strip out all floor finishes
- Strip out of ceilings in areas where required
- Strip out of bathrooms including all sanitary ware
- Strip out of kitchen built in store
- Strip out of all kitchen cabinets and appliances
- Strip out of existing floor finishes and sheathing board
- Extend existing stairs and create new landing
- Install new walls to create store to house MVHR
- Install new doors and modify walls if required to accommodate new dimensions
- Install mineral wool insulation between joists, screw new plywood sheathing with matting over
- Install new kitchen and appliances
- Install new bathrooms
- Create new bulkheads to house services
- Install second handrail along wall of staircase
- Fire stopping
- Decorations

M&E WORKS

- Addition of photovoltaic panels and inverter
- Heating: Air source heat pump, hot water cylinder and plasma radiators
- Installation of mechanical ventilation with heat recovery (MVHR)
- Installation of smart metering, Internal temperature monitoring inc. response to overheating
- Drainage alterations if required
- Extent of strip out tbc
- Installation of any services necessary for later transition to heat network
- Lighting upgrade
- New stop cock to main water
- Water softener
- Ethernet cables
- Installation of PV Panels
- Installation of new electrically powered doorbell
- Installation of garden light

3.2 PILOT HOUSE

EXISTING

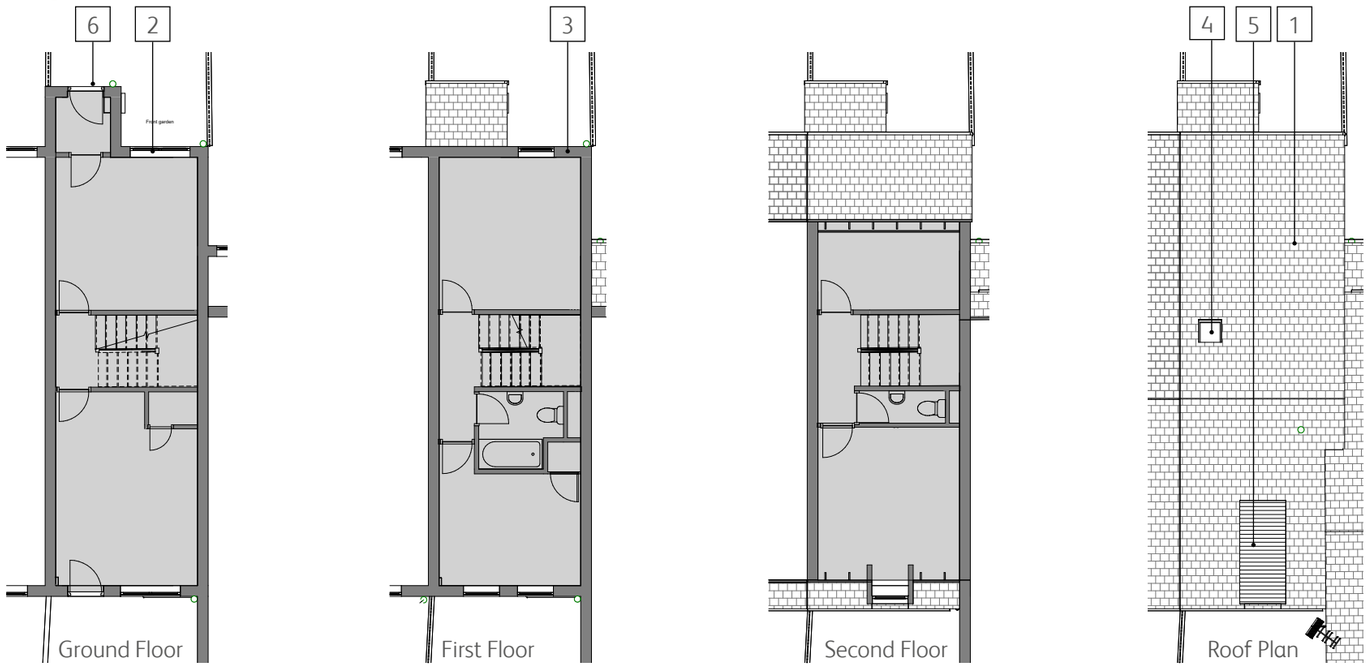
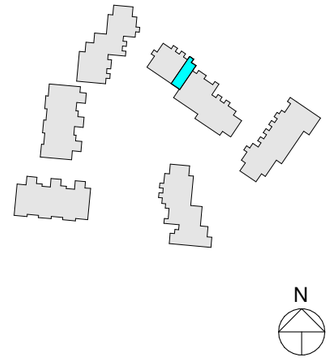


Figure 15 - House 54 Existing Floor Plans



Existing Building Condition

1 Existing concrete roof tiles

2 Existing single-glazed windows

3 Existing multi-red brickwork

4 Existing roof-windows

5 Existing window dormers

6 Existing doors

PROPOSED

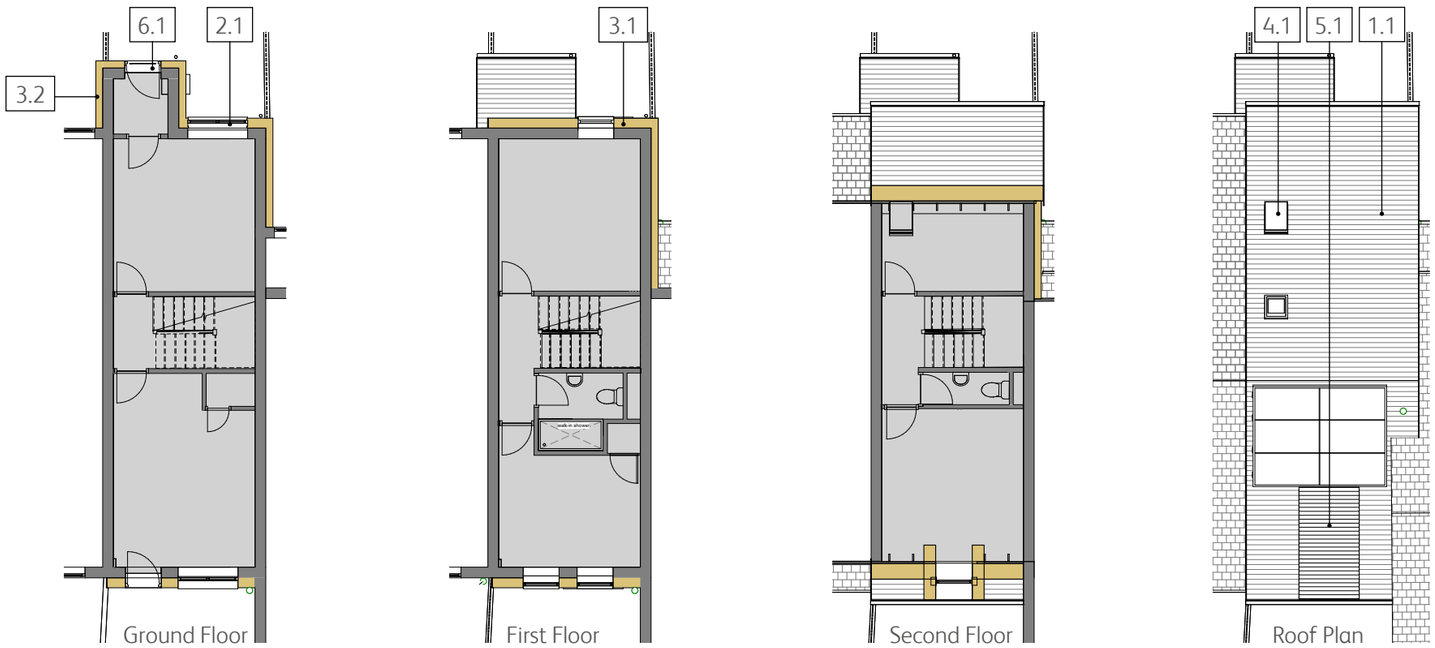


Figure 16 - House 54 Proposed Floor Plans

Proposed Measures

1.1 Insulation over existing roof and new slate roof tiling

1.2 New PV Panels

2.1 New triple-glazed windows in line with insulation

3.1 External wall insulation to be added with new external finish in brick slip

3.2 Thin high-performance external wall insulation to be added with new external finish in brick slip or render

4.1 New triple-glazed roof windows

5.1 Insulated window dormers with bevelled edging

6.1 Replace existing doors

External wall insulation

3.2 PILOT HOUSE

EXISTING ELEVATIONS

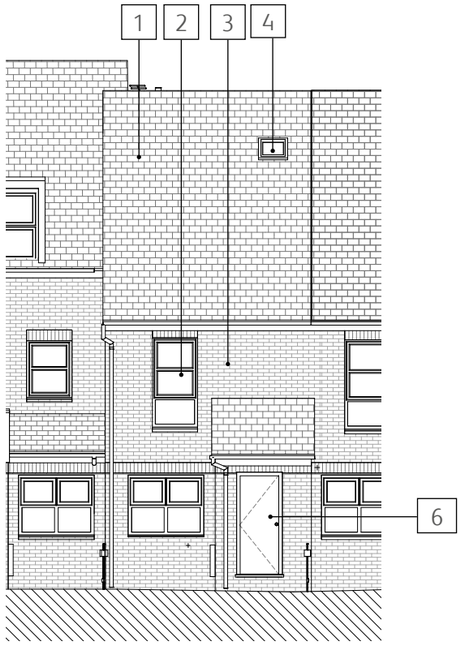


Figure 17 - House 54 Existing North Elevation

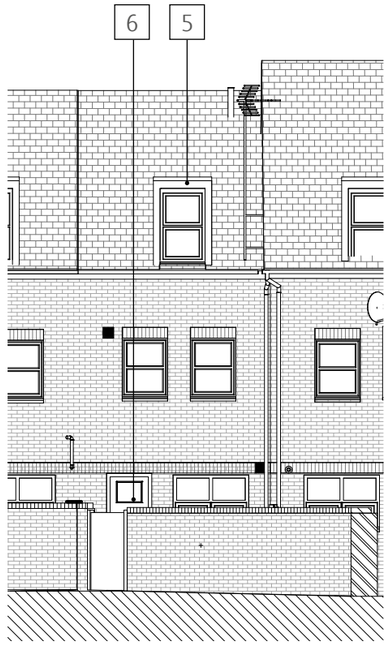
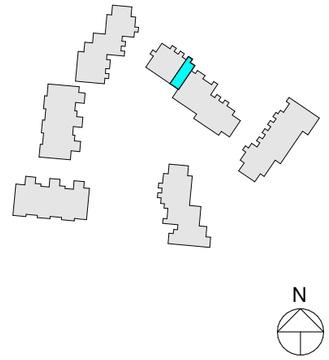


Figure 18 - House 54 Existing South Elevation



Existing Building Condition

1 Existing concrete roof tiles

2 Existing single-glazed windows

3 Existing multi-red brickwork

4 Existing roof-windows

5 Existing window dormers

6 Existing doors

PROPOSED ELEVATIONS

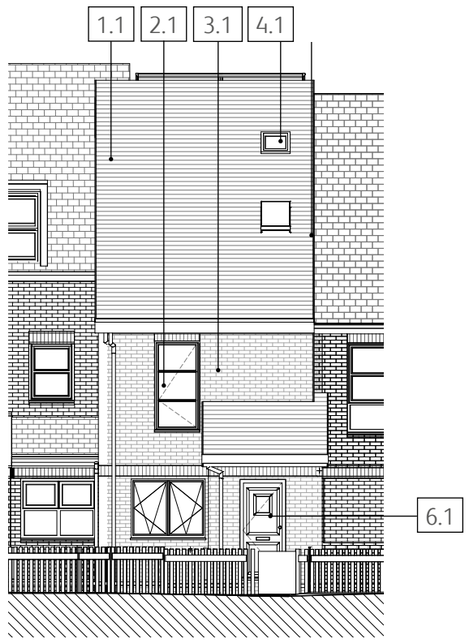


Figure 19 - House 54 Proposed North Elevation

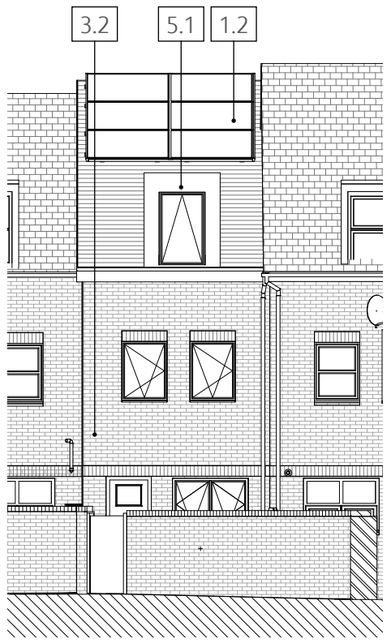


Figure 20 - House 54 Proposed South Elevation

Proposed Measures

1.1 Insulation over existing roof and new slate roof tiling

1.2 New PV Panels

2.1 New triple-glazed windows in line with insulation

3.1 External wall insulation to be added with new external finish in brick slip

3.2 Thin high-performance external wall insulation to be added with new external finish in brick slip or render

4.1 New triple-glazed roof windows

5.1 Insulated window dormers with bevelled edging

6.1 Replace existing doors

3.3 OTHER HOUSES

EXISTING GROUND FLOOR

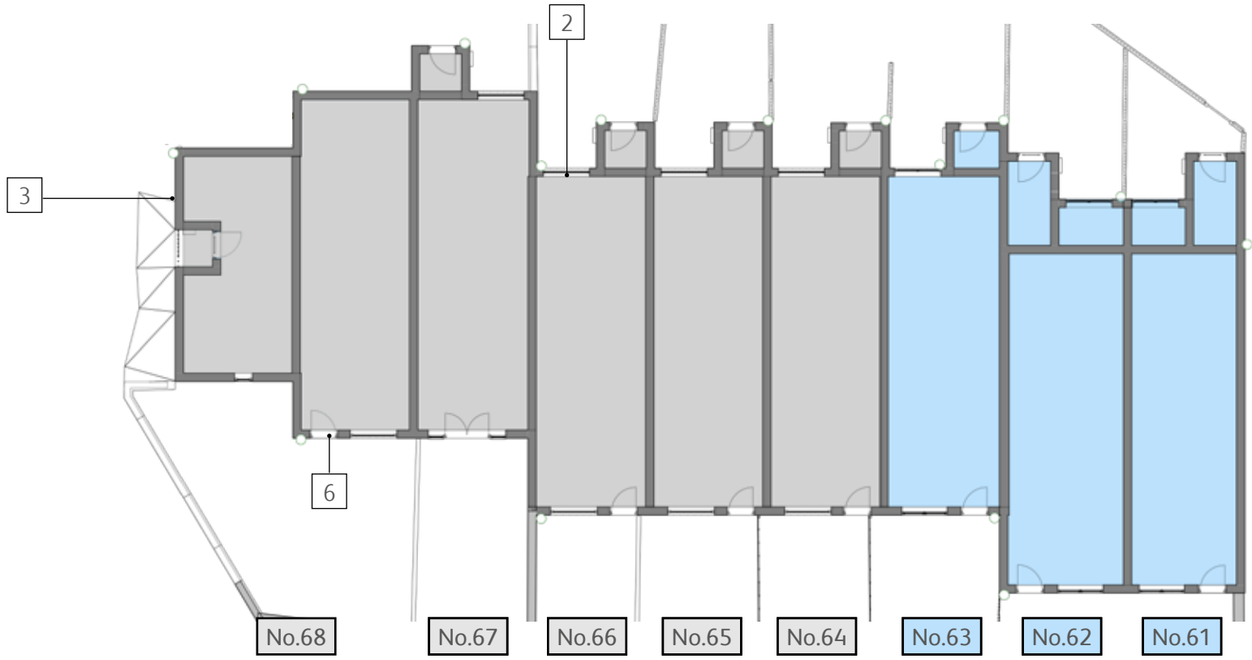


Figure 21 - Block 06 - Existing Ground Floor Plan

PROPOSED GROUND FLOOR

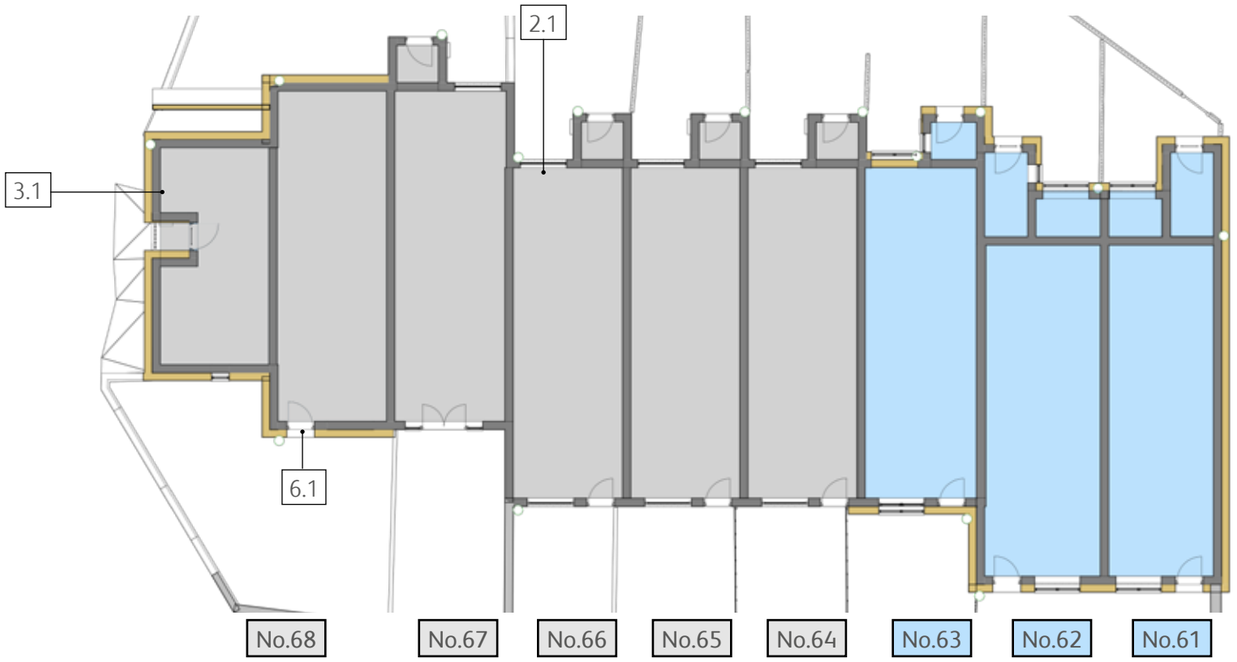
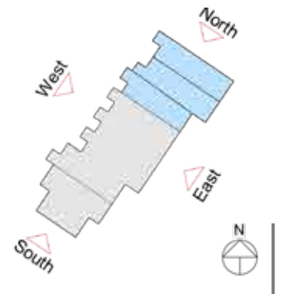


Figure 22 - Block 06 - Proposed Ground Floor Plan

Key Plan



Existing Building Condition

1 Existing concrete roof tiles

2 Existing single-glazed windows

3 Existing multi-red brickwork

4 Existing roof-windows

5 Existing window dormers

6 Existing doors

Proposed Measures

1.1 Insulation over existing roof and new slate roof tiling

1.2 New PV Panels

2.1 New triple-glazed windows in line with insulation

3.1 External wall insulation to be added with new external finish in brick slip

3.2 Thin high-performance external wall insulation to be added with new external finish in brick slip or render

4.1 New triple-glazed roof windows

5.1 Insulated window dormers with bevelled edging

6.1 Replace existing doors

External wall insulation

EXISTING ROOF PLAN

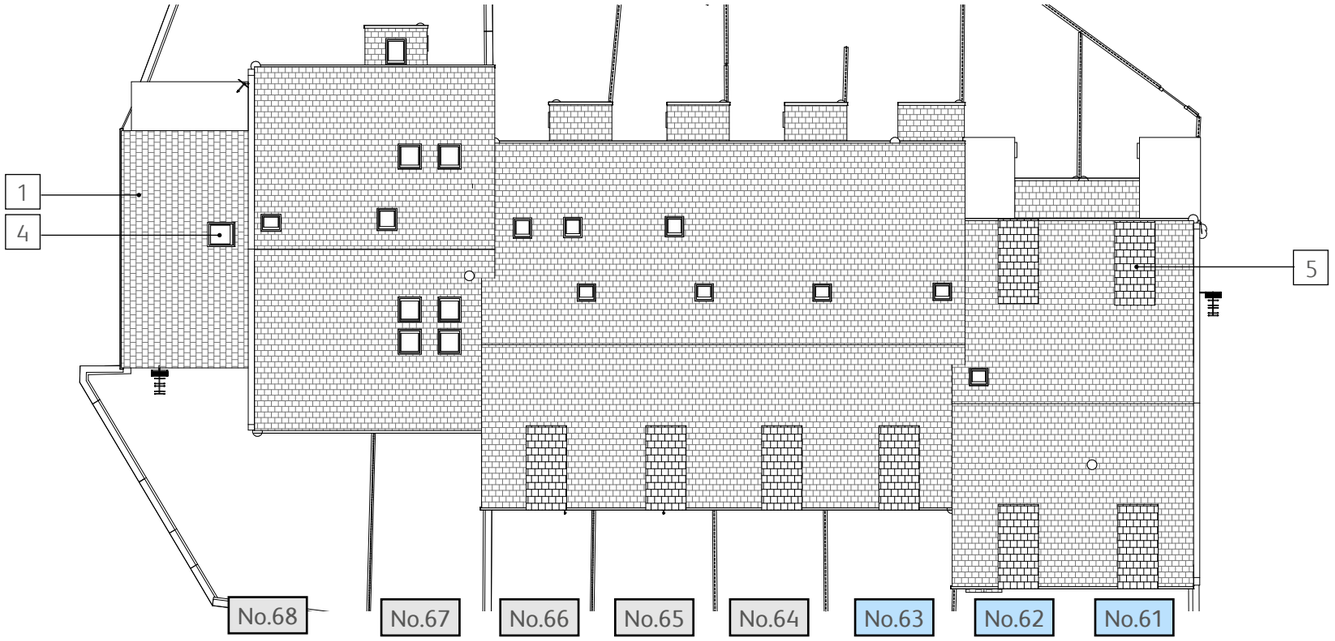
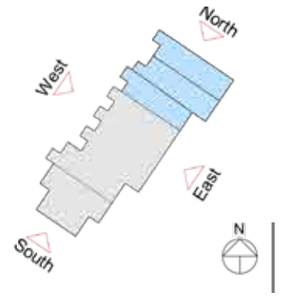


Figure 23 - Block 06 - Existing Roof Plan

PROPOSED ROOF PLAN

Figure 24 - Block 06 - Proposed Roof Plan

Key Plan



Existing Building Condition

1 Existing concrete roof tiles

2 Existing single-glazed windows

3 Existing multi-red brickwork

4 Existing roof-windows

5 Existing window dormers

6 Existing doors

Proposed Measures

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3.2 Thin high-performance external wall insulation to be added with new external finish in brick slip or render

4.1 New triple-glazed roof windows

5.1 Insulated window dormers with bevelled edging

6.1 Replace existing doors

EXISTING ELEVATIONS

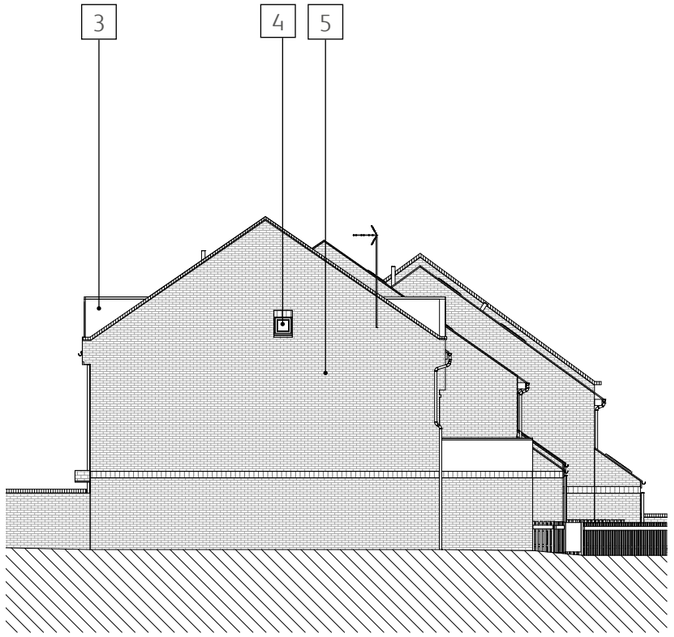
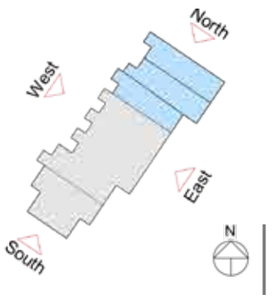


Figure 25 - Block 06 - Existing North Elevation

Figure 27 - Block 06 - Existing East Elevation

Key Plan



Existing Building Condition

1 Existing concrete roof tiles

2 Existing single-glazed windows

3 Existing multi-red brickwork

4 Existing roof-windows

5 Existing window dormers

6 Existing doors

PROPOSED ELEVATIONS

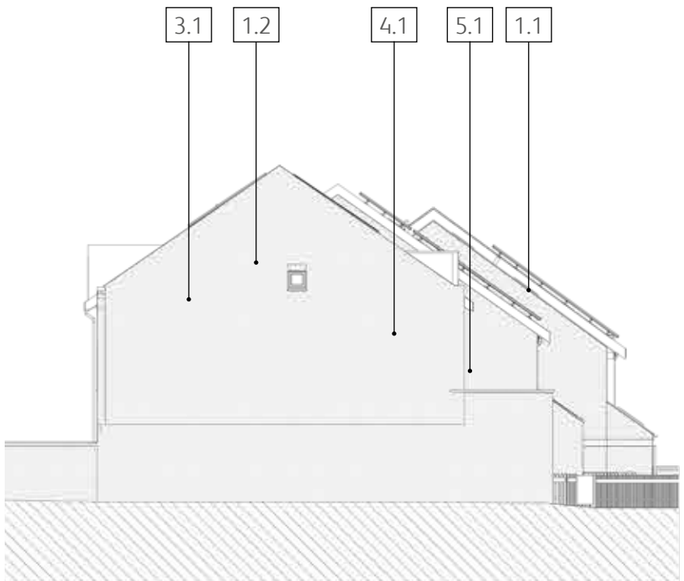


Figure 26 - Block 06 - Proposed North Elevation

Figure 28 - Block 06 - Proposed East Elevation

Proposed Measures

1.1 Insulation over existing roof and new slate roof tiling

1.2 New PV Panels

2.1 New triple-glazed windows in line with insulation

3.1 External wall insulation to be added with new external finish in brick slip

3.2 Thin high-performance external wall insulation to be added with new external finish in brick slip or render

4.1 New triple-glazed roof windows

5.1 Insulated window dormers with bevelled edging

6.1 Replace existing doors

EXISTING GROUND FLOOR

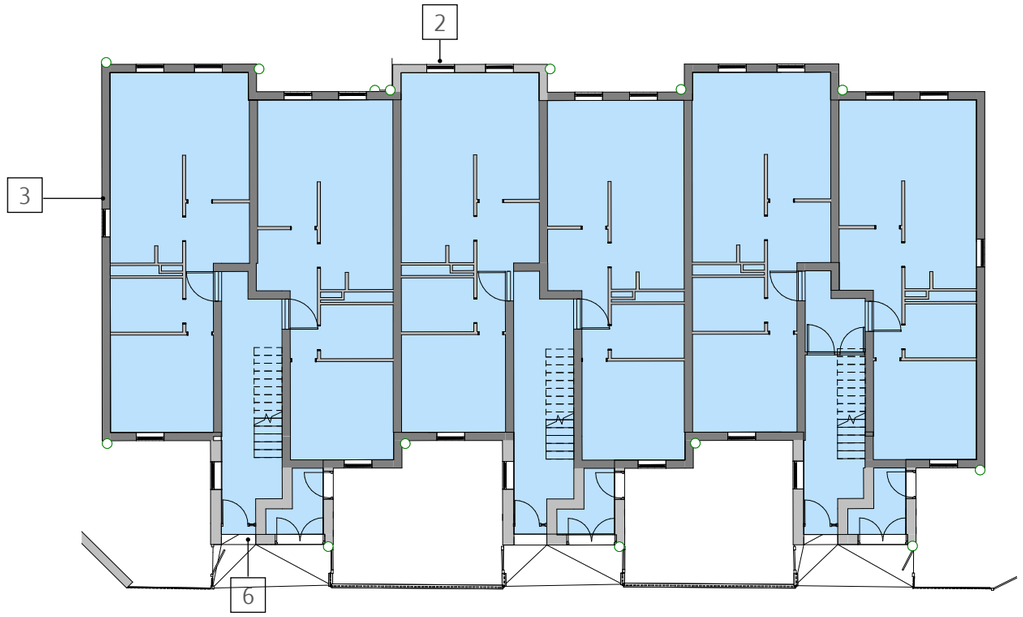
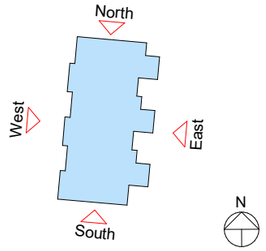


Figure 29 - Block 03 - Existing Ground Floor Plan

Key Plan



Existing Building Condition

1 Existing concrete roof tiles

2 Existing single-glazed windows

3 Existing multi-red brickwork

4 Existing roof-windows

5 Existing window dormers

6 Existing doors

PROPOSED GROUND FLOOR

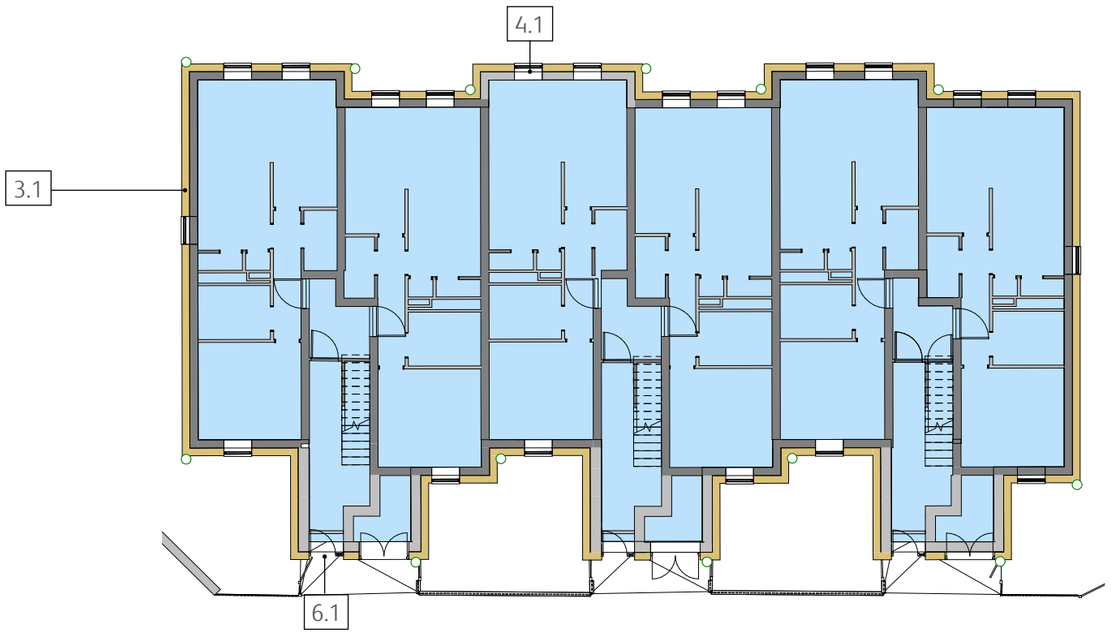


Figure 30 - Block 03 - Proposed Ground Floor Plan

Proposed Measures

1.1 Insulation over existing roof and new slate roof tiling

1.2 New PV Panels

2.1 New triple-glazed windows in line with insulation

3.1 External wall insulation to be added with new external finish in brick slip

3.2 Thin high-performance external wall insulation to be added with new external finish in brick slip or render

4.1 New triple-glazed roof windows

5.1 Insulated window dormers with bevelled edging

6.1 Replace existing doors

External wall insulation

EXISTING ROOF PLAN

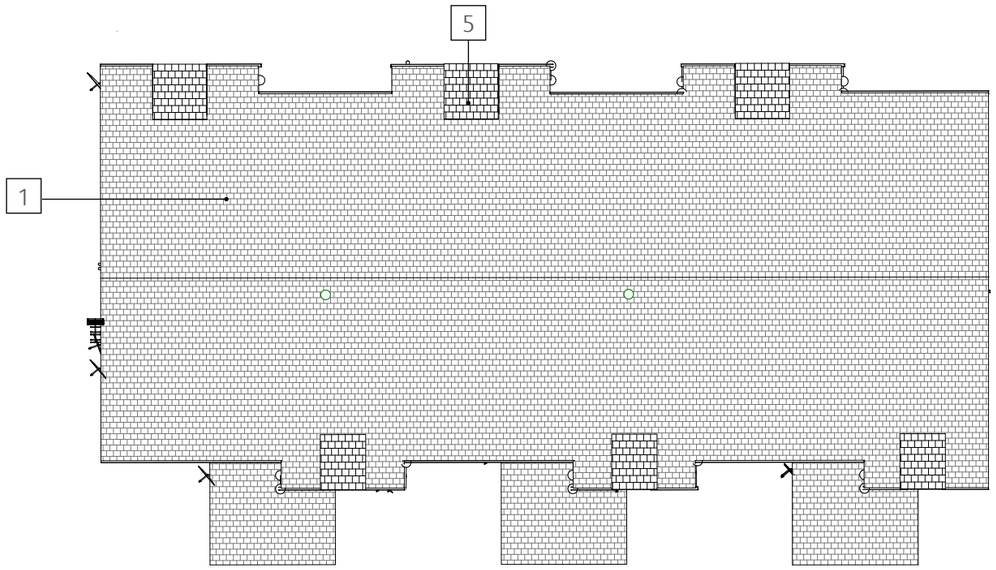
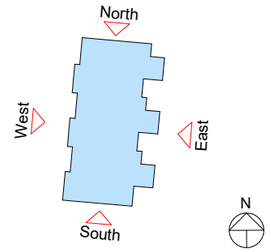


Figure 31 - Block 03 - Existing Roof Plan

Key Plan



Existing Building Condition

1 Existing concrete roof tiles

2 Existing single-glazed windows

3 Existing multi-red brickwork

4 Existing roof-windows

5 Existing window dormers

6 Existing doors

PROPOSED ROOF PLAN

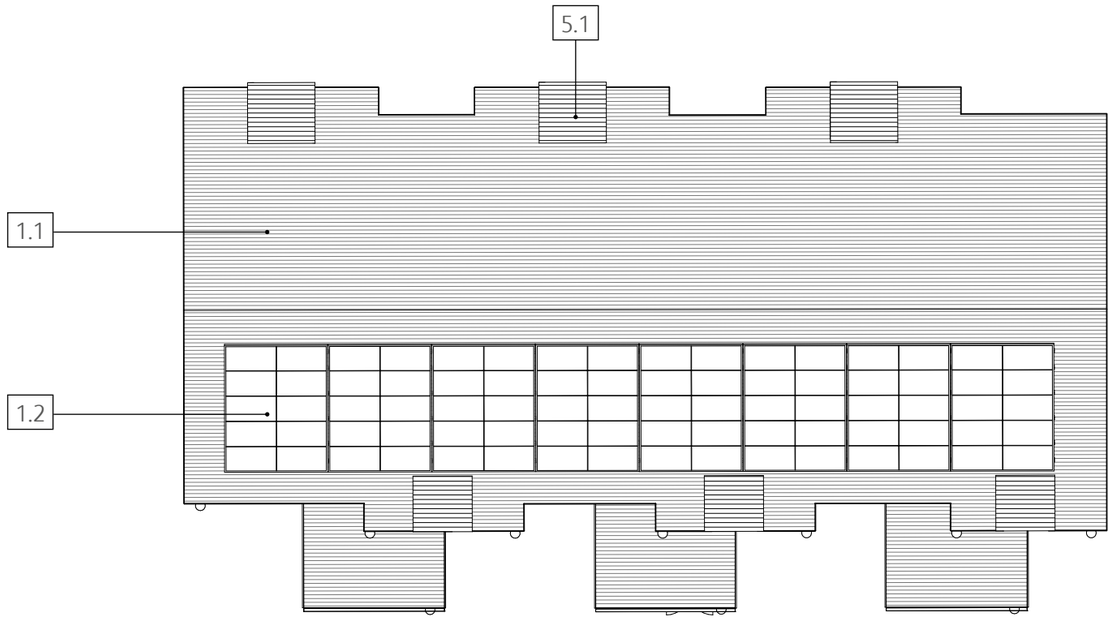


Figure 32 - Block 03 - Proposed Roof Plan

Proposed Measures

1.1 Insulation over existing roof and new slate roof tiling

1.2 New PV Panels

2.1 New triple-glazed windows in line with insulation

3.1 External wall insulation to be added with new external finish in brick slip

3.2 Thin high-performance external wall insulation to be added with new external finish in brick slip or render

4.1 New triple-glazed roof windows

5.1 Insulated window dormers with bevelled edging

6.1 Replace existing doors

3.4 FLATS

EXISTING ELEVATIONS

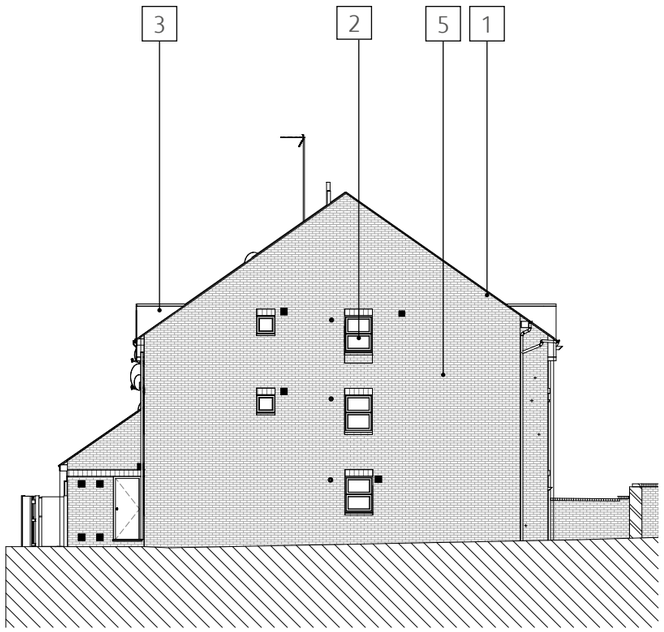


Figure 33 - Block 06 - Existing South Elevation

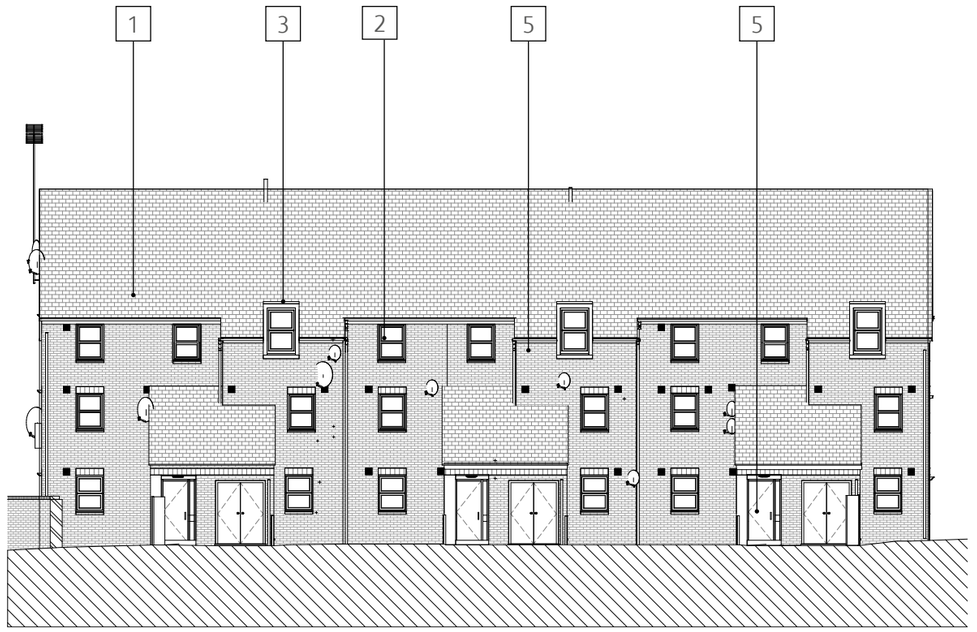
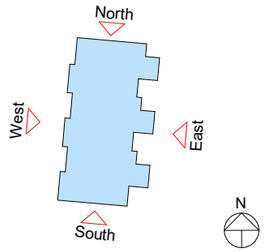


Figure 35 - Block 03 - Existing East Elevation

Key Plan



Existing Building Condition

1 Existing concrete roof tiles

2 Existing single-glazed windows

3 Existing multi-red brickwork

4 Existing roof-windows

5 Existing window dormers

6 Existing doors

PROPOSED ELEVATIONS

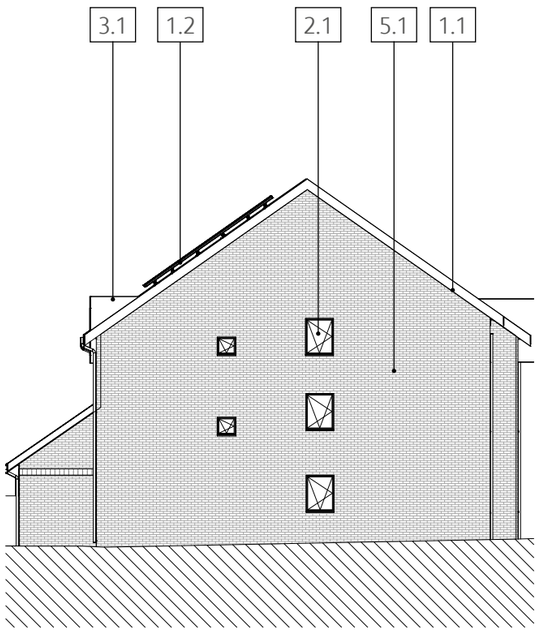


Figure 34 - Block 03 - Proposed South Elevation

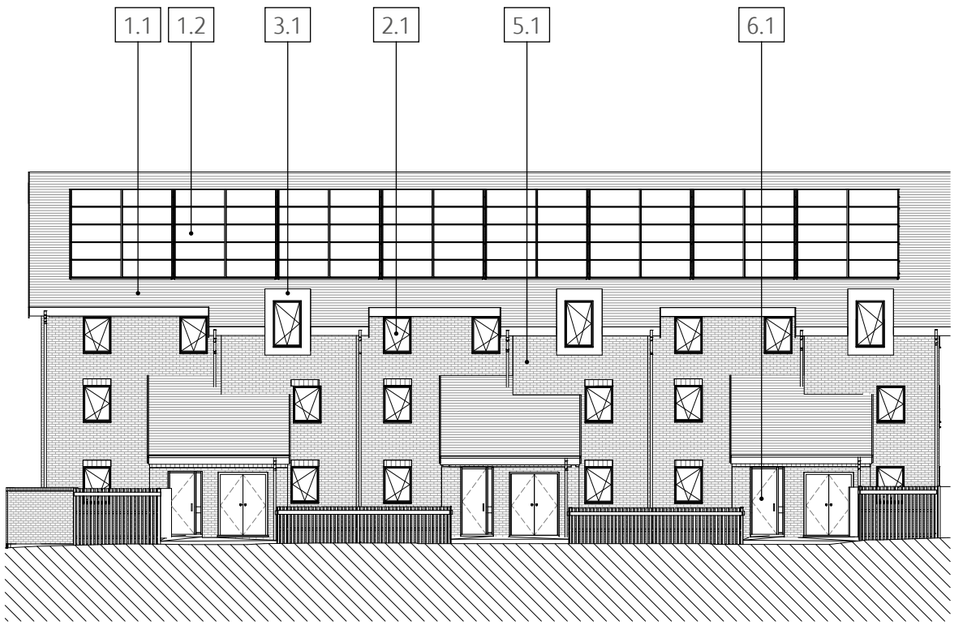


Figure 36 - Block 03 - Proposed East Elevation

Proposed Measures

1.1 Insulation over existing roof and new slate roof tiling

1.2 New PV Panels

2.1 New triple-glazed windows in line with insulation

3.1 External wall insulation to be added with new external finish in brick slip

3.2 Thin high-performance external wall insulation to be added with new external finish in brick slip or render

4.1 New triple-glazed roof windows

5.1 Insulated window dormers with bevelled edging

6.1 Replace existing doors

3.5 WALL SYSTEMS

EXTERNAL WALL INSULATION

In the previous stage 1 report we explored internal vs external wall insulation. As a result of resident consulations, we are progressing with the EWI option due to a this being favoured by the majority of residents.

This option allows for a layer of non-combustible (A1/A2 rated) insulation to cover the external face of the façade with a finishing layer - brick slips, render or a combination. Triple-glazed windows and doors to be installed in the new outer layer.

External Wall Insulation offers a quick installation process, which provides high levels of insulation, fire protection and acoustic attenuation. External Wall Insulation can be fixed from the outside, with minimal disruption to the residents, and without internal area losses. It also allows for the whole building to be "wrapped" in insulation, thus eliminating all thermal bridges and avoiding heat and air leakage.

In the blocks of flats in particular, an air tightness level of 1.0ach or better is to be achieved. This fabric first approach will significantly improve the energy performance and the associated comfort of these buildings.

VISUAL IMPACT

Only socially rented and leasehold homes will be externally insulated; the details between the new and existing facades will need to be carefully designed to ensure a cohesive colour scheme across the close. Several brick slip and render facade options have been considered and put forward to residents

Homes to be externally insulated

Figure 38 - Verity Close site axo

MANUFACTURERS

We have undertaken thorough research in order to make an informed decision regarding our choice of EWI system. Each system has been assessed in terms of safety, construction and performance, with research compiled in the table on the next page. The manufactures we have researched include:

- Beattie Passive
- Mechslip
- Permarock
- Alsecco

Due to the sensitive nature of the site, fire safety has been our main priority when choosing a system. We have undertaken regular meetings with our fire consultant, IFC, and the client to address any concerns. Across the estate the decision has been made to use only non-combustilble materials where possible. As part of our due diligence we have complete a non-combustibility tracker which can be found in Appendix A11.

The chosen EWI system and manufacturer will be confirmed in our Stage 3 report once all checks have been completed.

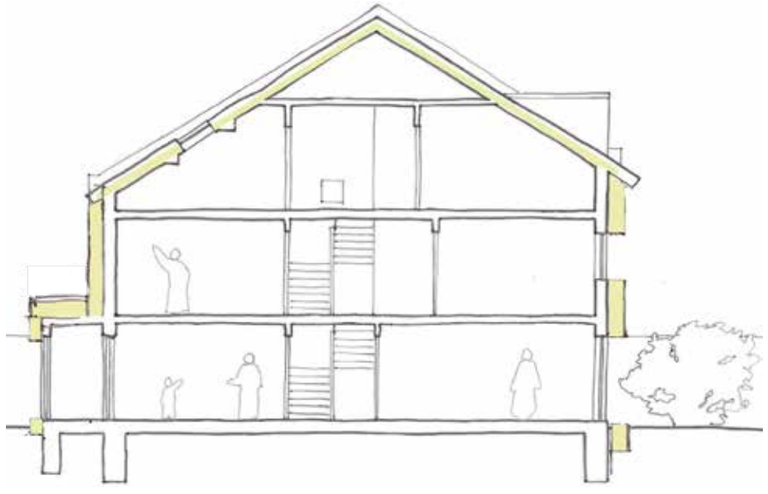


Figure 37 - External wall insulation in section

Figure 39 - EWI system construction process

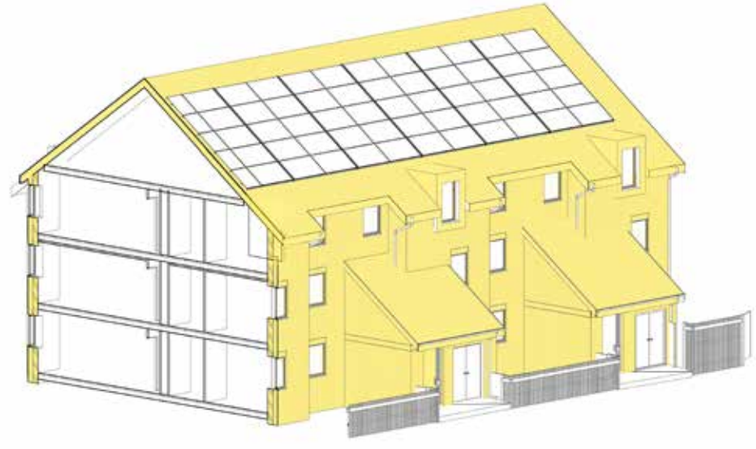
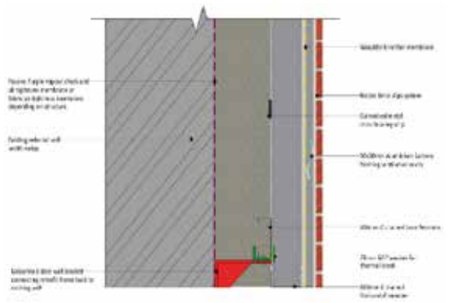
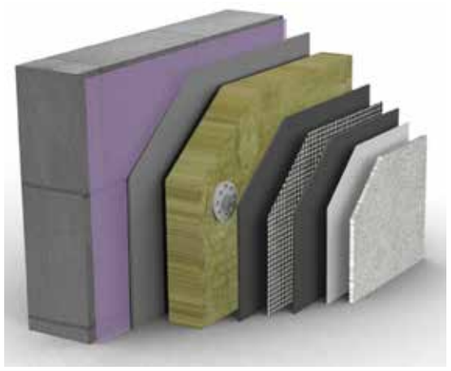


Figure 40 - 3D section view of EWI insulation over existing building, including roof insulation

*according to inital ideas survey

3.5 WALL SYSTEMS

EWI System	Build-up	Reaction to Fire Classification	Certificates	Fire Mitigation	Finishes
Beattie Passive (T-Cosy System) (Modular System)		No whole system test carried out. Fire tested elements achieving building control compliance; Sheathing Boards- A1; Rockwool Insulation- A1; Aluminium bracketry- A1; Airgap with aluminium battens and Tenmate Firebreaks- A1; Finishes - Brickslip System- A1; Carrier board; Clay Brickslips- A1 Fire tested elements exempt; Passive purple vapour control - B- s1, d0; Exempt; Thermal Break GRP bracket, Wraptite breather membrane	Passive House Certified Component BBA(Passive Purple) BBA (Rockwool Energysaver) BBA (Frametite)	Cavities: non-combustible, 30 minute cavity barriers horizontal 'Open State' to separating floor lines, vertical full depth to separating wall lines, and around openings where not provided by the construction itself. Astro Clad AFFRCLAD35 FireStrip	Brick slips (no limitation in choice) Beattie Passive provide render alternatives in addition to the brick slip system.
Mechslip		A1 classification for the whole system to BS EN 13501-2 : 2018 for external surface and reverse side. Tested at Warrington Fire Exova. Steel or aluminium helping hand brackets and vertical rails- A1; powder coated aluminium horizontal rails- A2 -s1,d0; Rockwool insulation- A1; Clay brick slips- A1; Airtightness membrane e.g. Passive Purple vapour control - B-S1,d0, thermal break pads (exempt). No further details shared from Manufacturer.	BBA Agrément certificate 20/5787	Cavities: non-combustible, 30 minute cavity barriers horizontal 'Open State' to separating floor lines, vertical full depth to separating wall lines, and around openings where not provided by the construction itself.	Very large range (300+) of Ibstock bricks – slips cut from full bricks No render finish available
Permaroc Mineral Fibre External Wall Insulation System with Permarock Brickslips/ Render		A2 -s1, d0 classification for the whole system* when specified with mineral fibre insulation, tested to EN 13501-1:2007 + A1:2009. Each component of the system is individually tested as required by the Standard to determine their individual heats of combustion using the method in EN ISO 1716. Mineral Fibre Insulation (Stonewool) - Euroclass A1 – BS EN 13501-1:2007 + A1:2009)Adhesively bonded + mechanically anchored for enhanced resistance to wind loading and additional structural stability in fire. The mechanical fixings are stainless steel which is deemed non-combustible (by Commission Decision) and excluded from non-combustibility requirements set out in the Building Regulations 2018. No further details shared from Manufacturer.	BRE	N/A	Permarock brick slips only - small range Render finish available
Alsecco Brick Finish (Ecomin 400 Clay Bricks) Render Finish (Ecomin 300 Mineral Fibre)		A2-s1, d0 classification for the whole system* EN13501-1 testing confirms the materials provided for the system are A2,s1-d0, including the brick slip system, although individual element certificates cannot be provided. Rockwool insulation is A1 rated, 40-300mm max. Mechanical and supplementary adhesive. Rail solution opition also available. No further details shared from Manufacturer.	BBA	N/A	Any brick slip - preference for procuring their own brick slips, ie. Clay and Alsecco brick slips Alsecco provide render alternatives in addition to the brick slip system.

*Whole system classification only valid under test conditions, and any diversion from these conditions could potentially invalidate the classification

3.5 WALL SYSTEMS

EWI System	Costs (£/m²)	Air tightness	Achievable U-Value	Lead-times	Construction Days	Acoustic Performance	Environmental Credentials	Warranty
Beattie Passive (T-Cosy System) (Modular System)	Brickslips £480-£550 Render £350-£450	The airtightness layer is part of Beattie Passive's system and is applied to the external face of the existing wall.	0.11 w/m²k and below can be achieved compared to building regulations of 0.28 w/m²k 300mm max insulation	**12 weeks** (6-8 weeks design, 4-6 weeks mobilization)	15 days on site	Beattie Passive delivers 63dB which is six times better than build regulations giving a dramatic reduction in related sound issues between dwellings and external noise such as busy roads or flight paths.	All materials used are sourced from fully certified supply chains and are A+ rated in the BRE Green Guide. Embodied Carbon, Whole Life Carbon and Life Cycle Costing data is available for a typical retrofit.	Beattie Passive test and certify all buildings upon structural completion to ensure they deliver performance as designed. Testing and certification ensure it is a quality assured and guaranteed product. The performance warrantee is not performance-backed, however there are material warranties for each individual element.
Mechslip	Brickslips £530-£580 Render N/A	Airtightness layer such as Intelligent Membranes 'Passive Purple' liquid applied membrane to external face of existing walls.	Approximately 0.16 W/m2K achievable based on 250mm thickness of Rockwool insulation	Currently 12 weeks for Mechslip system plus brick lead-in time	tbc	Similar to other systems using Rockwool insulation, circa 45-55dB sound attenuation	Rockwool insulation has a BRE Green Guide A+ rating and is fully recyclable.	Information requested
Permaroc Mineral Fibre External Wall Insulation System with Permarock Brickslips/ Render	Brickslip £500-£550 Render £400-£450	Mineral fibre EWI system has an air leakage of around 0.015 ac/h.	0.12 W/m²k can be achieved using max 250mm of Mineral Fibre external wall insulation	**8 weeks** (based on the item that takes the longest time to be delivered, which is the brick slip. Other elements of the system will be ready on site in as little as 6 weeks	9-17 days on site	PermaRock have not formally measured the sound attenuation of their system, however, they believe it could achieve typical performance of 45-55 dB.	The insulation used in the PermaRock system has Zero Ozone Depletion Potential (zero-ODP) and zero global warming potential (GWP) The system has an overall Ecopoint Rating m² – 0.10, equivalent to an 'Excellent' Rating.	Material warrantee of up to 25 years available for panel system.
Alsecco Brick Finish (Ecomin 400 Clay Bricks) Render Finish (Ecomin 300 Mineral Fibre)	Brickslip £250-£300 Render £150-£200	The alsecco system requires a direct bond with the wall and has many fixings. The airtightness layer can be applied only on the internal wall surfaces behind the plasterboard, which will cause significant internal disruption.	0.16 W/m²k can be achieved using 200mm High density mineral wool with a clay brick finish (Ecomin 400 Clay) 0.14 W/m²k can be achieved using 220mm dual density mineral wool & an acrylic slip finish (Ecomin 400 Acrylic)	**10 weeks** (based on the item that takes the longest time to be delivered, which is the brick slip. Other elements of the system will be ready on site in as little as 6 weeks	2-3 weeks with brick slip finish, less for render	PermaRock have not formally measured the sound attenuation of their system, however, they believe it could achieve typical performance of 45-55 dB.	No environmental credentials declared.	Material warrantee of up to 10 years available for panel system. Can be extended to 25 depending on installer. The building owner has an obligation for ongoing maintenance and for repairs to be dealt with in a timely manner in order for the warrantee to remain valid.

Note 1: Cost above are indicative only, including supply, installation, allowances for general premilinaries (exluding access scaffolding) and OH&P.
Note 2: Cost for houses and flats would be the same in terms of £/m2, as indicated by the suppliers/manufacturers. Assuming this is applicable to both Verity Close and Talbot & Morland

3.6 ROOF

PV PANELS

Photovoltaic (PV) panels will be installed on the roofs across the close. These will supply electricity to the houses and flats below. In combination with the fabric upgrade measures and the use of air source heat pumps and energy efficient fittings, these could enable the upgraded houses to become net zero operational carbon. These homes would still require electricity from the grid at some times, but at others they could export electricity back to the grid. Please refer to the M&E engineer's report for further details.

The image below shows where PV panels might be added, the areas being based on:

- South, east or west facing roofs
- Properties that aren't privately owned
- Avoidance of dormers & roof-lights

Further work will be needed to establish how much energy these panels could produce and the best way to divide electricity for use in the flats. This will also be part of establishing whether the homes can reach the net zero carbon goal.

Photovoltaic panels have been pursued here as an option rather than green roofs, which would cover the roof's surface with vegetation. While green roofs foster biodiversity and contribute towards achieving a striking appearance, they tend not to work well on pitched roofs, like those present at Verity Close. It can also be difficult to ensure that insects thriving in the vegetation don't infiltrate the building and compromise comfort inside the home. For these reasons, photovoltaic panels have been prioritized as an option more suitable to the site and for the estate's zero carbon agenda.

Figure 41 - Possible PV placement

LOW ENERGY HOME

Photovoltaic panels have already been installed at 50 Verity Close. In this case they have been installed over new roofing. It is also possible to have more integrated photovoltaic panels, that sit in line with the roof, making them less obtrusive. New ways of integrating photovoltaics into roofs are becoming available all the time, including Tesla photovoltaic tiles. However any system will have to be weighed up in terms of aesthetics, cost and ensuring that it does not create any fire risk.

Figure 42 - Photovoltaic panels installed in line with roof covering

Figure 43 - Photovoltaic tiles among existing tiles

Figure 44 - Tesla photovoltaic tiles

3.7 DORMERS

DORMER DESIGN

As part of the EWI system, the dormers will also be fitted with external wall insulation. This means that the roof and cheeks will be thicker than those of the existing dormers. We are proposing a bevelled design which will slim down the profile of the new dormer.

Figure 45 - Verity Close Roof View

Figure 46 - Dormer Option 1 Visualisation

Figure 47 - Dormer Option 2 Visualisation

3.8 WINDOWS & DOORS

Windows were raised as a priority by residents of the flats at Verity Close, and windows in the houses have been observed to be poorly fitted. In all options new windows and external doors are proposed to reduce heat loss through the window, and allow a more airtight seal to the existing walls.

At present there are a range of single and double glazed windows around Verity Close, so there is already variation in appearance. Single glazed windows, and double glazed windows tend to be cold on the inside surface of the glass, the frame and the surroundings when it is cold outside. This can mean that condensation forms, sometimes leading to mould. This can also cause drafts to move around rooms, making the home feel less comfortable. Additionally heat is conducted through the glass, and can also be lost as warm air travels out through gaps around the window edges.

NEW WINDOWS

New windows will change the appearance of the homes, but can still be kept relatively similar to the existing appearance.

Triple-glazed windows are proposed. Triple glazing will lose about 5 times less heat than single glazing, reducing heating bills. This improvement is even greater when the windows seal closed properly and are well sealed to the walls, as warm air cannot escape around them.

Most of the newer windows around the Close are uPVC framed. It would be possible to use a similar type of frame for new triple glazed windows. At 50 Verity Close windows have been replaced with timber framed windows with a polyester powder coated aluminium external layer. This protects the outside of the window, while having a more traditional timber appearance inside (though this is often painted).

Several window options were put forward to residents during the Phase 2 Consultation. The results of resident's feedback from this consultation have demonstrated a clear preference for Top Hung Reversible Windows - Ideal Combi Futura+ across flats and houses and the preferred material is agreed as aluminium.

There was no clear preference for window colour during the latest consultation. This will developed further in the next stage along with making a final decison for EWI finish. It is important that these decisions are made in paralled to ensure a cohesive appearance across the close.

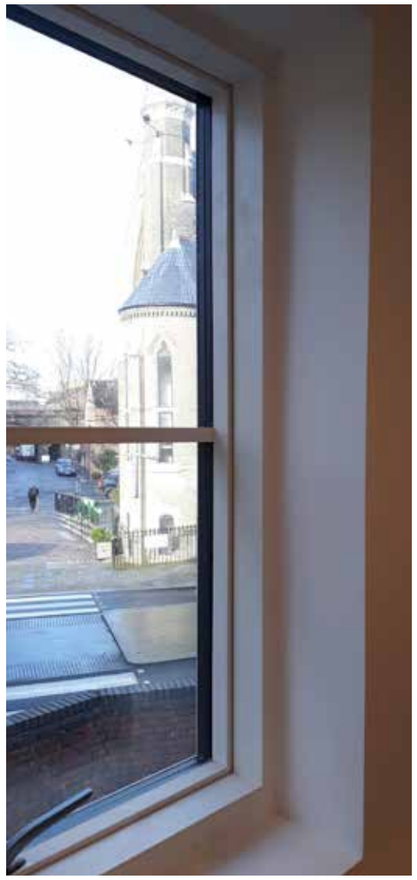


Figure 48 - New triple glazed windows at 50 Verity Close

Figure 49 - New side hung triple glazed casement window at 50 Verity Close. The frame is deep, but appears slender from inside & out

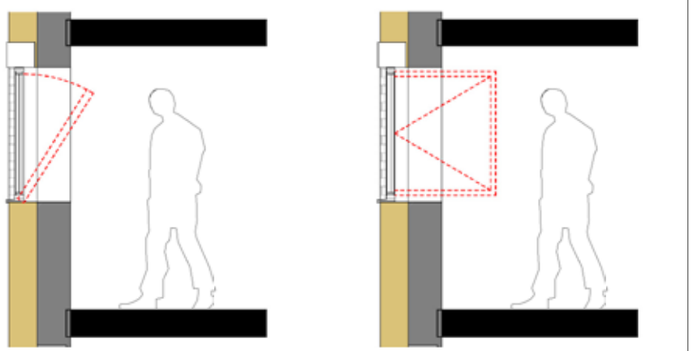
Figure 50 - New triple glazed roof-lights at 50 Verity Close. These examples are made by Velux, and can function like other Velux roof-lights

3.8 WINDOWS & DOORS

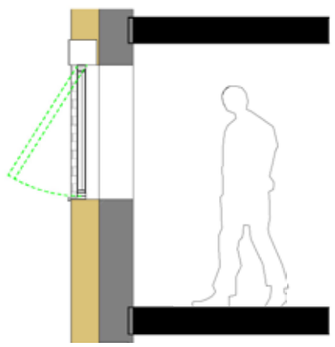
PROPOSED WINDOW OPTIONS

Window Performance		U-Value** (W/m²K)	Security accreditation	Frame thickness	Internal finish	External finish	
Tilt and Turn Window Idealcombi Futura + I		0.82	SbD*	54mm	Aluminium	Aluminium	
Velfac In		0.94	None	93mm	Timber	Aluminium	
Top Hung Reversible Idealcombi Futura+		0.87	SbD	53mm	Timber	Aluminium	Residents preference
Velfac 200E		0.83	None	53mm	Timber	Aluminium	

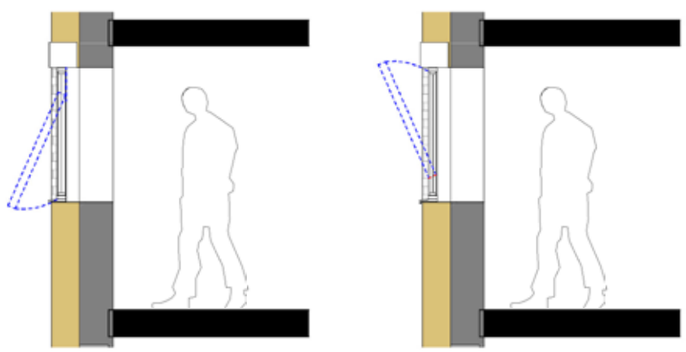
WINDOW OPENING TYPES



TILT & TURN WINDOW



TOP HUNG WINDOW



TOP HUNG REVERSIBLE WINDOW

3.8 WINDOWS & DOORS

NEW DOORS TO HOUSES

New insulated doors, with good seals, and double or triple glazing are also proposed to reduce heat loss from the houses. How large the area of glazing is could vary between houses, according to residents' preferences, as this is noted to vary around the Close at present.

In the silver options, in order to maintain an airtight layer around the home it is best to avoid having letterboxes through these new doors. Therefore it is suggested that residents would have new letterboxes next to their front door. These would be Secured by Design approved, to avoid any risk of 'fishing' of post. A range of styles and colours are available, so these could reflect residents' individuality.

NEW COMMUNAL DOORS TO FLATS

In the flats the main communal front doors would need to be improved thermally, as the communal stair area would be treated as part of the 'warm' space. The style of door can be chosen with residents, though will of course need to be suitably robust for communal use, and its opening be connected to the door entry system.

Additionally doors at the rear of the flats at ground level would also need to be upgraded. Front doors to flats within the building would not need to be upgraded as part of thermal upgrade works. It is proposed that postal delivery to flats continues as at present, through these individual flat front doors.

All new windows and doors would be Secured by Design certified where necessary, which in many cases would improve security in the homes

Figure 51 - New insulated triple glazed door at 50 Verity Close

Figure 52 - A variety of styles of outdoor letterbox are available

3.9 APPEARANCE

OPTION 1: MATCH EXISTING FACADE

The first option is to use brick slips which are colour matched as closely as possible to the existing buildings. This will ensure a cohesive appearance across the close, causing minimal disruption to the overall aesthetic.

This will involve finding a bespoke blend that closely resembles the existing texture and colour, however, some small differences will be unavoidable.

Figure 53 - CGI of proposed design on flats - option 1: match existing facade

Figure 54 - CGI of proposed design on houses - option 1: match existing facade

OPTION 2: CONTRASTING BRICK SLIPS

An alternative option for the brick slips is to use two different shades which are complimentary to the existing bricks and to each other. This intends to celebrate the differences rather than attempting to camouflage them.

Colour samples have been taken from around the surrounding area to explore what works well together and ensure that the design works well in context.

Figure 55 - CGI of proposed design on flats - option 2: contrasting brick slips

Existing Brickwork

Brunswick

Finniestone

Engineering Blue

Ice White

Figure 56 - CGI of proposed design on houses - option 2: contrasting brick slips

OPTION 3: SMOOTH RENDER

This option explores the possibility of a render finish, inspired by the local surroundings where many of the buildings have been rendered but retain some areas of brickwork.

Pros

- Versatile, available in a wide range of colours, textures and finishes
- Opportunity to change the appearance of the close

Cons

- Render is vulnerable to weathering which over time can cause staining and fading to the facade
- It requires regular maintenance

Figure 58 - CGI of proposed design on flats - option 3: smooth render

Figure 59 - CGI of proposed design on houses - option 3: smooth render

OPTION 4: DUAL TEXTURE RENDER

This is a development of Option3, incorporating two textures of render; one smooth and one rough. The rough render is used to bring more life to the facade by using the contrasting textures to emphasise the windows

Pros

- Versatile, available in a wide range of colours, textures and finishes
- Opportunity to change the appearance of the close

Cons

- Render is vulnerable to weathering which over time can cause staining and fading to the facade
- It requires regular maintenance

Figure 60 - CGI of proposed design on flats - option 4: dual texture render

Figure 61 - CGI of proposed design on houses - option 4: dual texture render

3.10 FIRE SAFETY PROPOSALS

MAXIMISING FIRE SAFETY

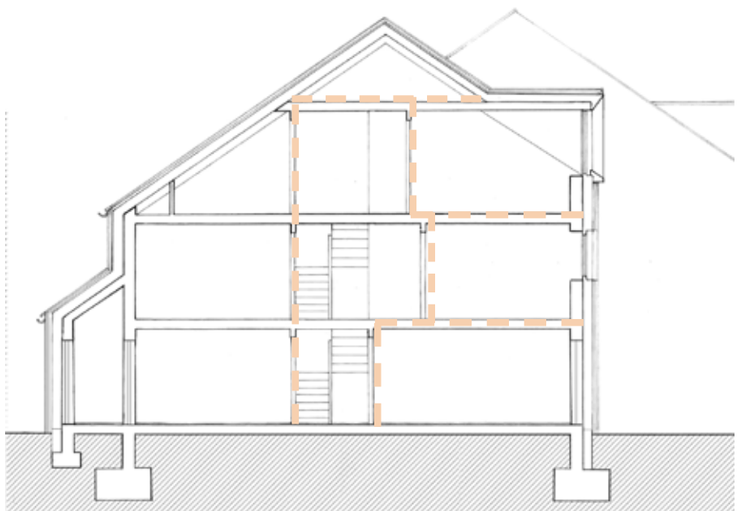
In the light of the Grenfell tragedy and the ongoing inquiry plus the findings of the Building Safer Future report and draft Building Safety Bill; any proposals for changes to the existing buildings will, quite rightly, be required to demonstrate the most rigorous approach to maximise the Fire Safety of residents and the wider community. ECD company policy is to recommend A1 materials on external walls wherever possible and not less than A2 in accordance with Building Regulations Part B.

A bespoke non-combustibility tracker has been prepared and will be updated as the design develops to record all external wall materials and their non-combustibility credentials. Please refer to appendix A11 for our Stage 2 Non-Combustibility Tracker. The detailed design information will be reviewed by our independent Fire Consultant and submitted to Building Control for approval prior to the commencement of the works. During construction the contractor will be required to demonstrate to the Clerk of Works (with photographic evidence) the installation of all materials. This evidence will be tagged to the BIM model and will be handed over to LWNT on completion of the works thereby ensuring a 'Golden Thread' of information is maintained from design to completion.

Please refer to IFC's Fire Safety Inspection Report & Outline Fire Safety Strategy which can be found in Appendix A12 and A13 respectively for more information.

TYPICAL HOUSE

SECTION



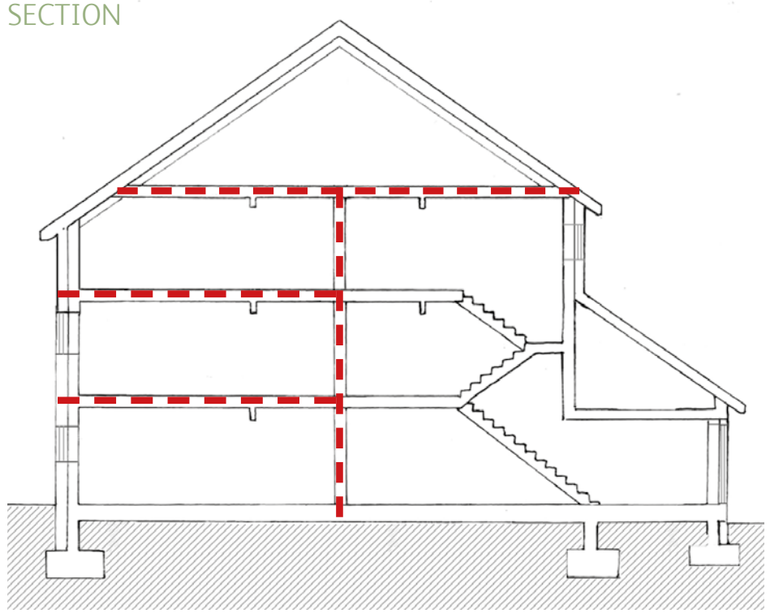
FLOOR PLANS

SECOND FLOOR FIRST FLOOR GROUND FLOOR

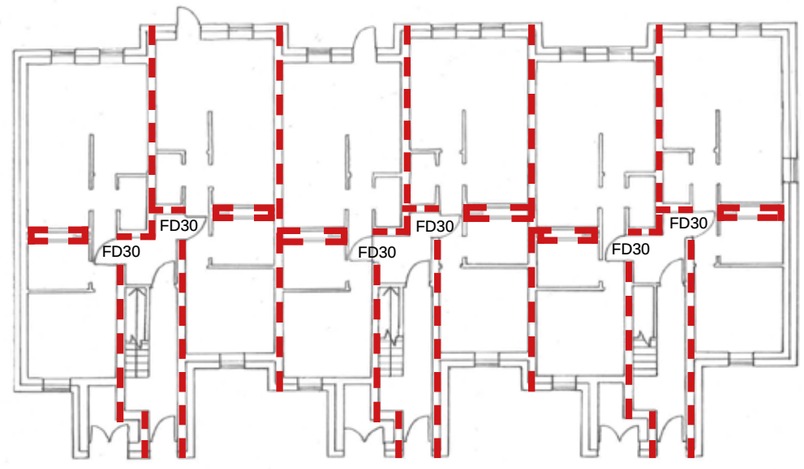
Ceiling over store and kitchen to be 30 minute fire resistant

TYPICAL FLAT

SECTION



FLOOR PLANS



60 min fire compartmentation required
30 min fire compartmentation required

ECD Architects
ENERGY CONSCIOUS DESIGN

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Job No. / Ref.	P-20-AA0197
Drawing No.	200197-ECD-XX-XX-TR-A-00001
Project.	RBKC - LWE - Verity Close
Revision:	
Project Lead	Lizzy Westmacott
Checked by	Maria Buenaventra

Approved / Compliant
Pending / Further Information Required
Not Approved / Non Compliant

External Wall Materials Tracker

Rev.	Date	Revision Comment

Ref	Building Element	Minimum Required Combustibility Rating (Building Control Compliance)	Manufacturer	Product	NBS Clause	A1 Rated	Fire Classification	Fire Classification	Building Warranty Approval	Building Control Approval	Comments	BBA / CE Certification	Third Party Testing/Data/Accreditation
					(Refer to Relevant Drawing)	Y/N	System	Elements	Y/N / Date / Written Reference	Y/N / Date / Written Reference		Y/N	e.g. BBA / CWCT / Data Sheet + Rating
1.0	Beattie Passive External Wall Insulation System												
1.01	Bricktec Brick Slip System with brickslips finish	A2 - s1, d0 or A1	Brictec	Clay bricks: Product type will vary		Y		A1			A1 Non-combustible EN13501-1 EN 13823:2010, EN 11925-2:2010+AC:2011 and EN 13501-1	N	BOBAS Accreditation, Warrington Fire Certification and soon to have LABC Type Approval
1.02	Steni Board with Render Finish	A2 - s1, d0 or A1	Steni	Steni Nature		N		B - s1, d0			Beattie Passive with a render finish should not be used in buildings over 11m high	N	Classification according to EN 13501-1
1.03	Aluminium battens within cavity	A2 - s1, d0 or A1	Brictec	Aluminium U channel acting as batten		Y		A1			Material Classified as A1 by 1996D0603 — EN — 12.06.2003 — 002.001 — 1 without requiring further testing . 20 mm thick cavity with barriers to satisfy Building regulations	N	
1.04	Breather Membrane	EXEMPT	A Proctor Group	Wraptite Breather Membrane		N		B - s1, d0			Class B-s1,d0 when tested to EN 13501-1 (on Class A1 or A2-s1,d0 substrate)	Y	CER 15/5274 A Proctor Group Ltd.
1.05	Sheathing board	A2 - s1, d0 or A1	Benx	Y-Wall		Y		A1			BS EN 13501-1 : 2007 +A1 2009	Y	
1.06	Aluminium Channels	A2 - s1, d0 or A1	Cosmos Aluminium	Aluminium rail		Y		A1			Material Classified as A1 by 1996D0603 — EN — 12.06.2003 — 002.001 — 1 without requiring further testing	N	
1.07	Insulation	A2 - s1, d0 or A1	Rockwool	Rockwool Energysaver Insulation		Y		A1			Class A1 in accordance with BS EN 13501-1 : 2007. BBA approved for use up to 25m in height	Y	BRE Certificate no: 89/2316 https://www.bbacerts.co.uk/search/?doc=%2F1cqZ846KdQ3jKX4FeBFXuU8pC4mAzbOPiM%3D
1.08	GRP channel (thermal break)	EXEMPT	Engineered Composite	GRP hanger frame		N					We've sought informations but no response received from manufacturer	N	
1.09	Galvanised Steel Wall bracket	A2 - s1, d0 or A1	Various	Galvanised Steel		Y		A1			Material Classified as A1 by 1996D0603 — EN — 12.06.2003 — 002.001 — 1 without requiring further testing	N	
1.10	VCL: Airtightness membrane	EXEMPT	Intellingent Membranes	Passive Purple vapour and air tightness vapour membrane		N		C - s1, d0			BS EN 13501-1 : 2007.	N	BRE Certificate no: 18/5505 https://www.bbacerts.co.uk/search/?doc=%2F1AsZ8k8KNc3jKX4Fa8EC7M%3D
	Mechslip												
2.0	SYSTEM	A2 - s1, d0 or A1	Mechslip	Mechslip		y	A1				A1 to BS EN 13501-2 : 2018 for external surface and reverse side. Tested at Warrington Fire Exova	Y	Whote System classification to BS EN 13501-2 : 2018
2.01	Brickslips	A2 - s1, d0 or A1	Ibstock	Clay brick slips		Y		A1			Classified as A1 without further testing under European Commission Paper 96/603/EC	N	
2.02	Brickslip Aluminium rails	A2 - s1, d0 or A1	Machslip	Aluminium rails		N		A2 - s1, d0			Material Classified as A1 by 1996D0603 — EN — 12.06.2003 — 002.001 — 1 without requiring further testing	N	
2.03	Stainless steel Cladding Support System	A2 - s1, d0 or A1	AxiAL	AXR1		Y		A1			Material Classified as A1 by 1996D0603 — EN — 12.06.2003 — 002.001 — 1 without requiring further testing . Cavities including non combustible 30min cavity barriers to satisfy Building Regulations	Y	BBA Certificate 20/5842. Fire Testing by Warringtonfire and Classified A1 to EN 13501-1
2.04	Thermal Break Pads	EXEMPT	AxiAL	Supplied with helping hand brackets		N					We've sought informations but no response received from manufacturer	N	
2.05	Rigid Insulation within cavity	A2 - s1, d0 or A1	Rockwool	Rainscreen Duo Slab		Y		A1			Rated Euroclass A1 when assessed to EN 13501-1	Y	
2.06	Airtightness membrane	EXEMPT	Intellingent Membranes	Passive Purple vapour and air tightness vapour membrane		N		C - s1, d0			We've sought informations but no response received from manufacturer	N	
	Permarock External Wall Insulation System												
3.0	SYSTEM	A2 - s1, d0 or A1	PermaRock Products Limited	Permarock Products Limited		N	A2 - s1, d0				A2-s1,d0 classification when specified with mineral wool insulation. EN 13501-1:2007 + A1:2009. Test method/standard: EN ISO 1716	N	BRE Global Certification. SWIGA approved high-rise system
3.09	Finish	A2 - s1, d0 or A1	PermaRock Products Limited	Brickslip pointing mortar		N					We've sought informations but no response received from manufacturer	N	BRE Global Certification.
3.08	Brickslip Finish	A2 - s1, d0 or A1	PermaRock Products Limited	Brick slips		N					We've sought informations but no response received from manufacturer	N	BRE Global Certification.
	Render Finish	A2 - s1, d0 or A1	PermaRock Products Limited	Permarock Silicone Ultra K15		N					We've sought informations but no response received from manufacturer	N	BRE Global Certification.
3.06	Primer (for render finish only)	A2 - s1, d0 or A1	PermaRock Products Limited	K&R Primer		N					We've sought informations but no response received from manufacturer	N	BRE Global Certification.
3.04	Reinforcement (for render finish only)	A2 - s1, d0 or A1	PermaRock Products Limited	Bedding mortar basecoat		N					We've sought informations but no response received from manufacturer	N	BRE Global Certification.
3.07	Adhesive	A2 - s1, d0 or A1	PermaRock Products Limited	Brick slips adhesive		N					We've sought informations but no response received from manufacturer	N	BRE Global Certification.
3.05	Reinforcement	A2 - s1, d0 or A1	PermaRock Products Limited	Reinforcing mesh		N					We've sought informations but no response received from manufacturer	N	BRE Global Certification.
3.03	Fixings	A2 - s1, d0 or A1	PermaRock Products Limited	Plug fixture		N					We've sought informations but no response received from manufacturer	N	BRE Global Certification.
3.02	Insulation	A2 - s1, d0 or A1	Rockwool Ltd	Mineral Fibre Insulation: Stonewool		Y		A1			BS EN 13501-1:2007 + A1:2009. Harmonized standard EN 13162:2012	N	BRE Global Certification.
3.01	Adhesive	A2 - s1, d0 or A1	PermaRock Products Limited	Lamella Adhesive		N					We've sought informations but no response received from manufacturer	N	BRE Global Certification.

3.10 FIRE SAFETY PROPOSALS

Ref	Building Element	Minimum Required Combustibilty Rating (Building Control Compliance)	Manufacturer	Product	NBS Clause	A1 Rated	Fire Classification	Fire Classification	Building Warranty Approval	Building Control Approval	Comments	BBA / CE Certification	Third Party Testing/Data/Accreditation
					(Refer to Relevant Drawing)	Y/N	System	Elements	Y/N / Date / Written Reference	Y/N / Date / Written Reference		Y/N	e.g. BBA / CWCT / Data Sheet + Rating
	Alsecco Ecomin 400 EWI System (for Brickslip Finish) and Ecomin 300 EWI System (for Render Finish)												
4.0	ECOMIN 400 SYSTEM (Brickslip Finish)	A2 - s1, d0 or A1	Alsecco Ltd	Ecomin 400		N	A2 - s1, d0				EN 13501-1:2007 + A1:2009.	N	German certifier
4.1	Brickslip Finish	A2 - s1, d0 or A1	TBC	Clay Brickslips		Y		A1			We've sought informations but no response received from manufacturer	N	
4.2	Basecoat	A2 - s1, d0 or A1	Alsecco Ltd	Armatop A &Mesh		N		A2-S1,d0			We've sought informations but no response received from manufacturer	N	
4.3	Insulation	A2 - s1, d0 or A1	Rockwool Ltd	Mineral Wool Insulation Boards HD-M (for mechanical fixing)		N		A1			BS EN 13501-1:2007 + A1:2009. Harmonized standard EN 13162:2012	N	
4.4	Adhesive	A2 - s1, d0 or A1	Alsecco Ltd	Armatop PM		N		A2-S1,d0			We've sought informations but no response received from manufacturer	N	A2-s1, d0 according to DIN EN 13501
4.5	Sub Primer	A2 - s1, d0 or A1	Alsecco Ltd	Sub Primer HT		N					We've sought informations but no response received from manufacturer	N	
	ECOMIN 300 SYSTEM (Render Finish)	A2 - s1, d0 or A1	Alsecco Ltd	Ecomin 300		N	A2 - s1, d0				We've sought informations but no response received from manufacturer	N	
4.1	Paint Finish	A2 - s1, d0 or A1	Alsecco Ltd	Alsicolor carbon		N					We've sought informations but no response received from manufacturer	N	
4.2	top coat	A2 - s1, d0 or A1	Alsecco Ltd	Silitect T1.5		N		A2-S1,d0			We've sought informations but no response received from manufacturer	N	
4.3	top primer SC	A2 - s1, d0 or A1	Alsecco Ltd	Top Primer SC		N					We've sought informations but no response received from manufacturer	N	
4.4	Basecoat	A2 - s1, d0 or A1	Alsecco Ltd	Armatop A &Mesh		N		A2-S1,d0			We've sought informations but no response received from manufacturer	N	
4.5	Insulation	A2 - s1, d0 or A1	Rockwool Ltd	Mineral Wool Insulation Boards HD-M (for mechanical fixing)		Y		A1			BS EN 13501-1:2007 + A1:2009. Harmonized standard EN 13162:2012	N	
4.6	Adhesive	A2 - s1, d0 or A1	Alsecco Ltd	Armatop PM		N		A2-S1,d0			We've sought informations but no response received from manufacturer	N	A2-s1, d0 according to DIN EN 13501
4.7	Sub Primer	A2 - s1, d0 or A1	Alsecco Ltd	Sub Primer HT/P		N					We've sought informations but no response received from manufacturer	N	

3.11 VENTILATION STRATEGY & CEILING HEIGHTS

MECHANICAL VENTILATION WITH HEAT RECOVERY

The proposed external wall insulation is designed to minimise heat loss, in part by improving the air tightness of each building. Improvements to the airtightness layer keeps hot air in and additional ventilation is required.

The proposed Mechanical Ventilation with Heat Recovery (MVHR) system brings in fresh air and pre-warms this with the heat from outgoing air. This fresh, warmed air is then distributed to living areas, while stale air is extracted from kitchen and bathrooms. Windows can still be opened, but the building will be automatically ventilated without any manual input. The MVHR system is being designed by TACE, who are the M&E Engineers. Full details of their current proposal can be found in Section 5 of this report.

In addition to the MVHR unit itself, there is associated ductwork to ensure good ventilation throughout the house, which requires some lowering of ceiling and storage for the unit itself. ECD are working closely with TACE to minimise the impact of this ductwork by using localised bulkheads over kitchen cabinets and reserving lowered ceilings for cirulation areas such as corridors where possible.

Current proposals for MVHR and ductwork are indicative and subject to change. There are several house typologies which will require alternate ceiling plan strategies.

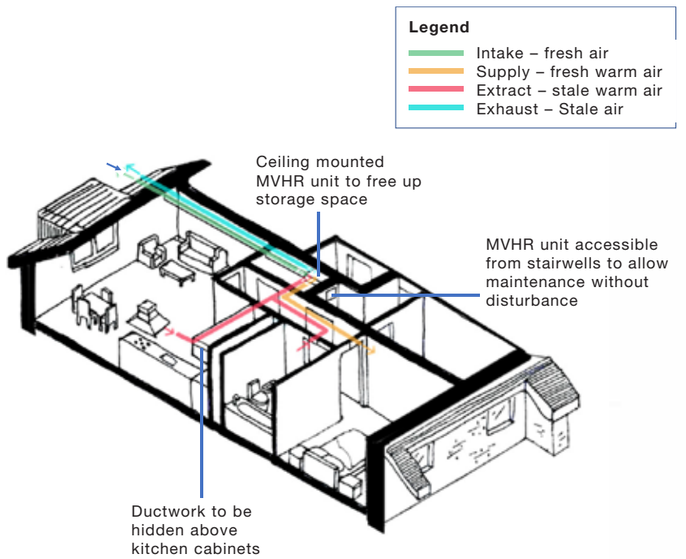
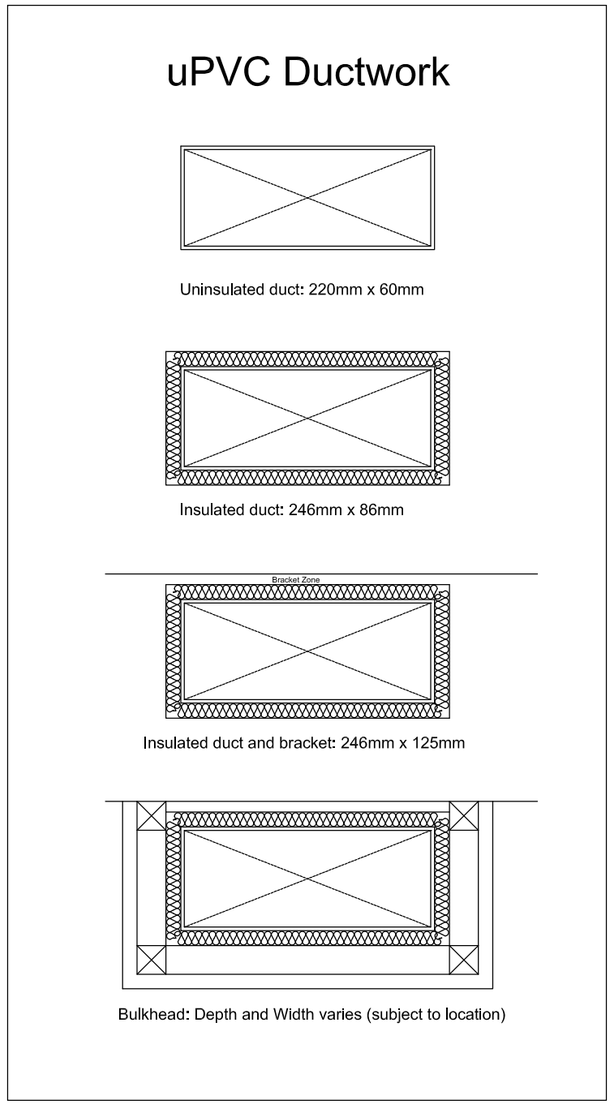


Figure 62 - Typical Flat MVHR layout

OPTIONS OF uPVC

The ductwork associated with MVHR requires pipes to be highly insulated in order to reduce heat loss. The following ductwork sizing is indicative and subject to change. The ductwork type decision is still to be made.

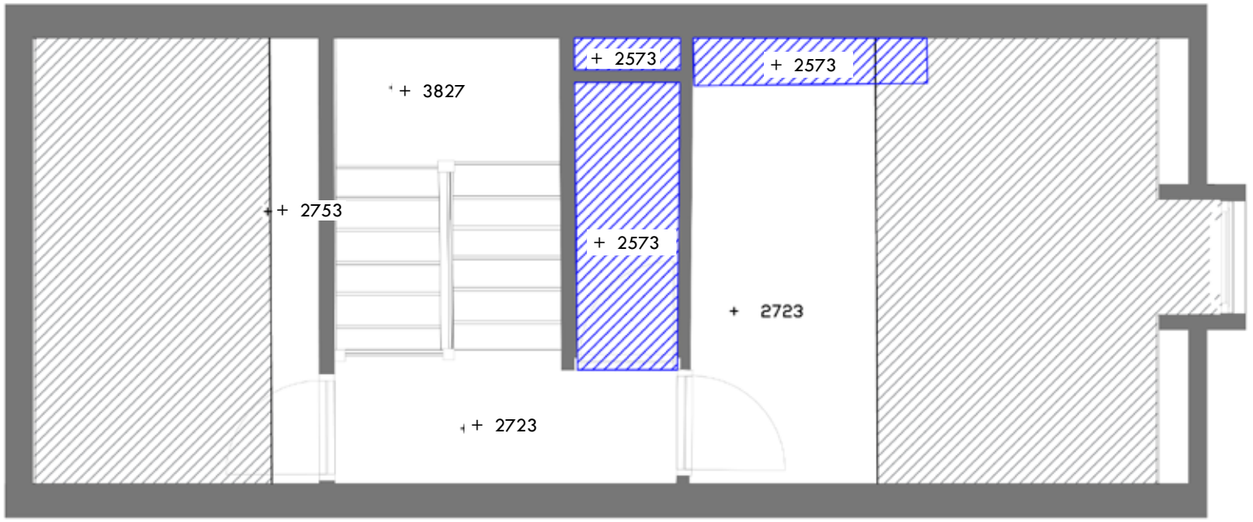


3.11 VENTILATION STRATEGY & CEILING HEIGHTS

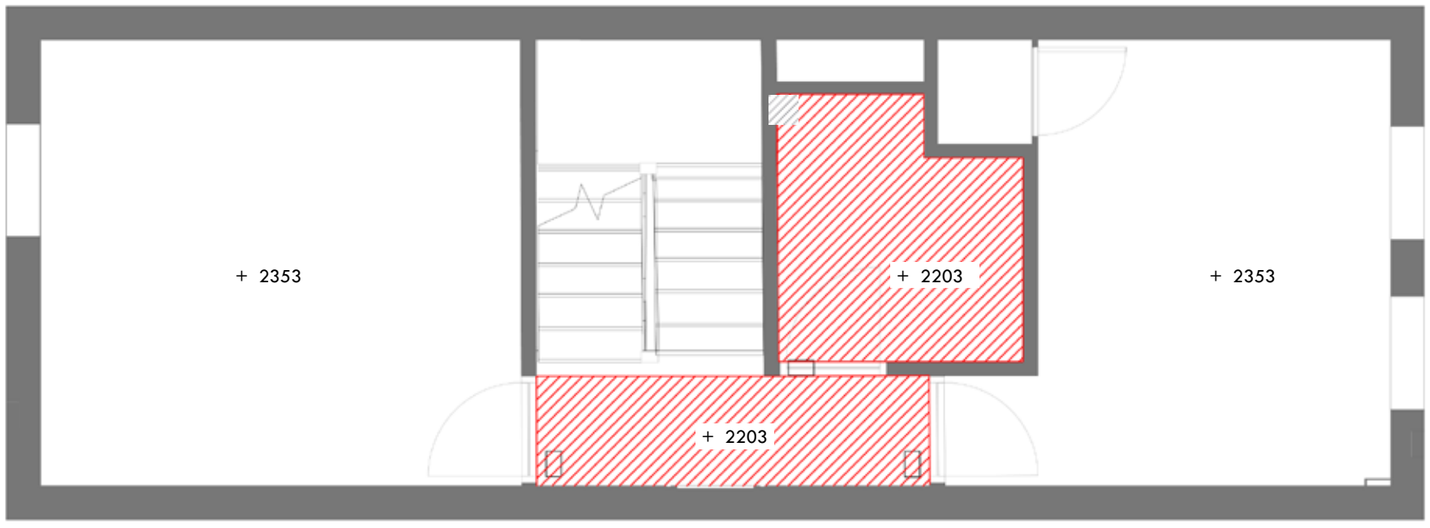
PROPOSED CEILING HEIGHTS - TYPICAL HOUSE

MVHR unit in roof space

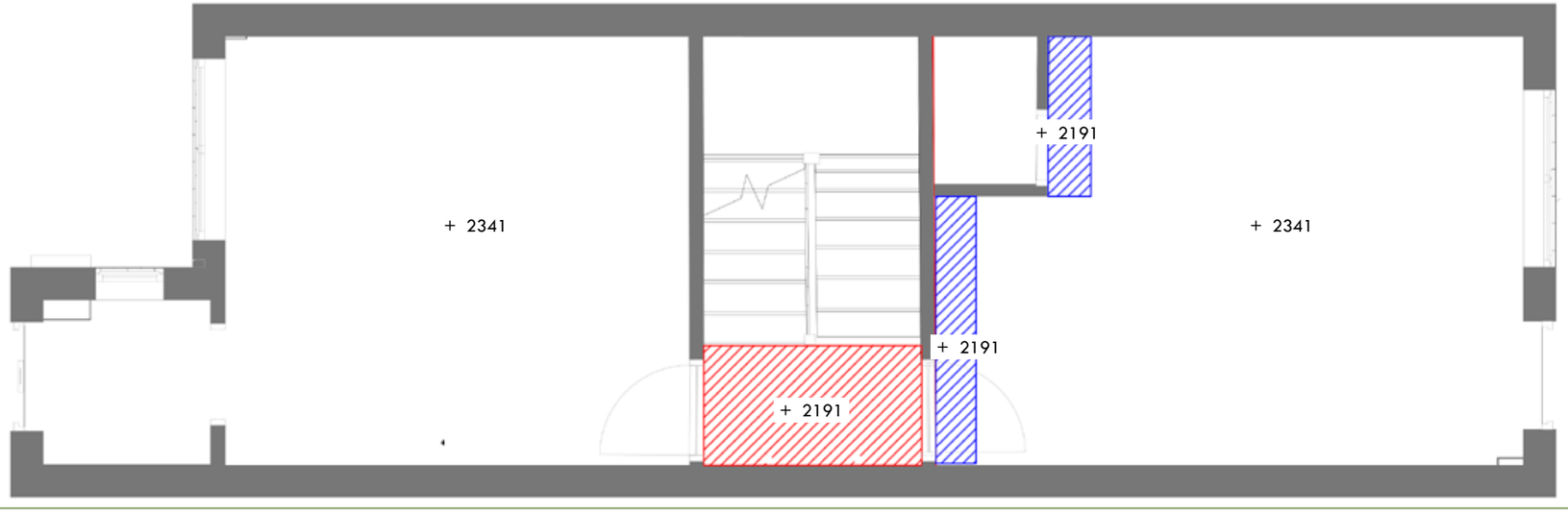
Note: Ceiling height plan derived from TACE MVHR layouts



Second Floor



First Floor



Ground Floor

All heights are indicative at this stage and will have to be co-ordinated with the M&E design. Final design and proposed sections will be mad available during the next design stage.

- \+ Floor to ceiling height
- Low ceiling in habitable area
- Bulkhead
- Sloped ceiling - pitched roof

3.11 VENTILATION STRATEGY & CEILING HEIGHTS

PROPOSED CEILING HEIGHTS - FLAT

OPTION 1: CENTRALISED MVHR UNIT, ACCESSIBLE FROM COMMUNAL AREAS

Pros

- Access from communal areas for filter change & maintenance
- Cheaper & more efficient than separate through wall fans

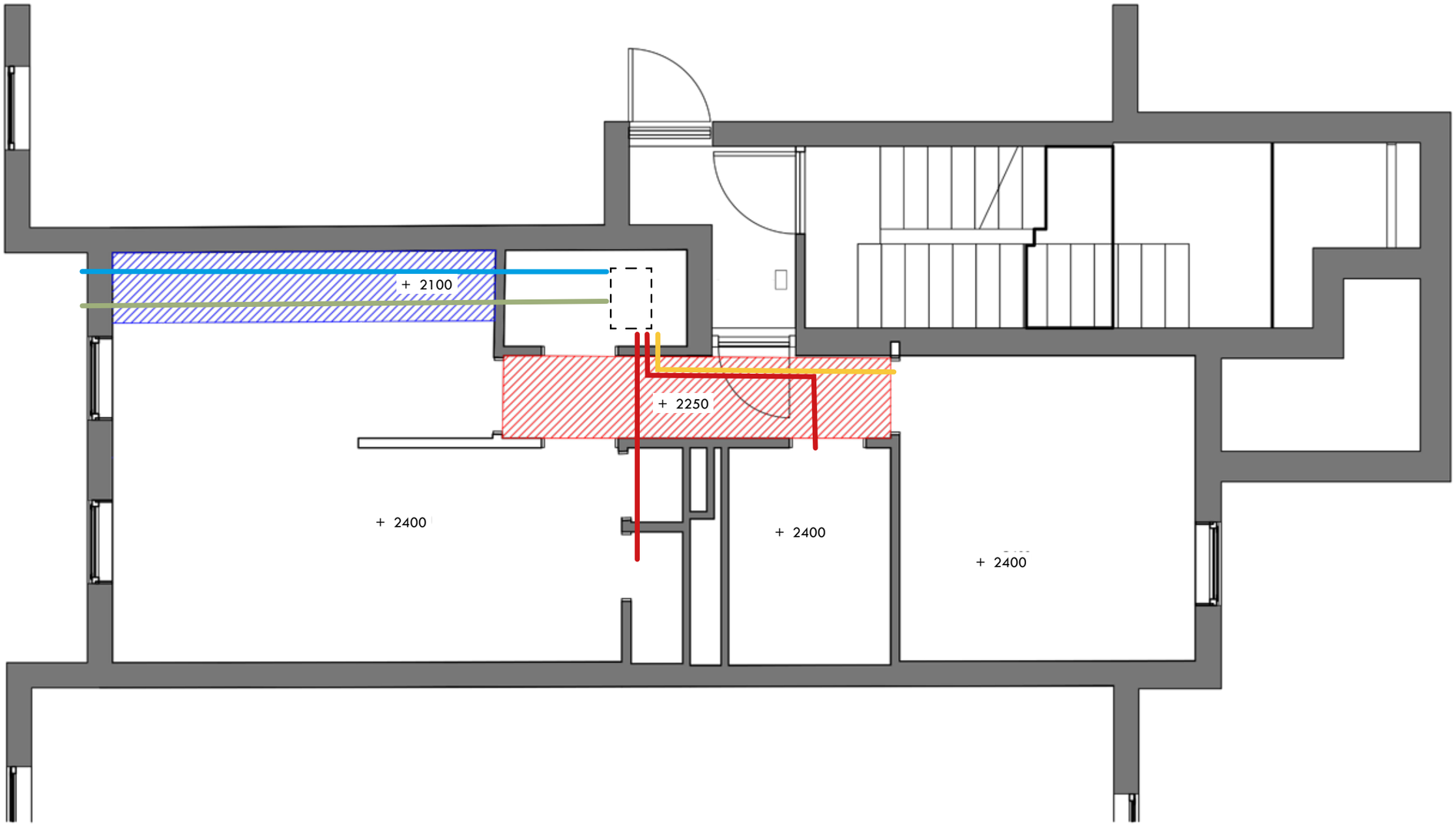
Cons

- Long runs for exhaust & intake - cold pipes within thermal envelope, bulky with expensive insulation

+ Floor to ceiling height

Low ceiling in habitable area

Bulkhead



3.11 VENTILATION STRATEGY & CEILING HEIGHTS

PROPOSED CEILING HEIGHTS - FLAT
OPTION 2: THROUGH WALL MVHR UNITS

Pros

- Less intrusive installation
- Smaller & less ductwork needed
- No cold ductwork internally

Cons

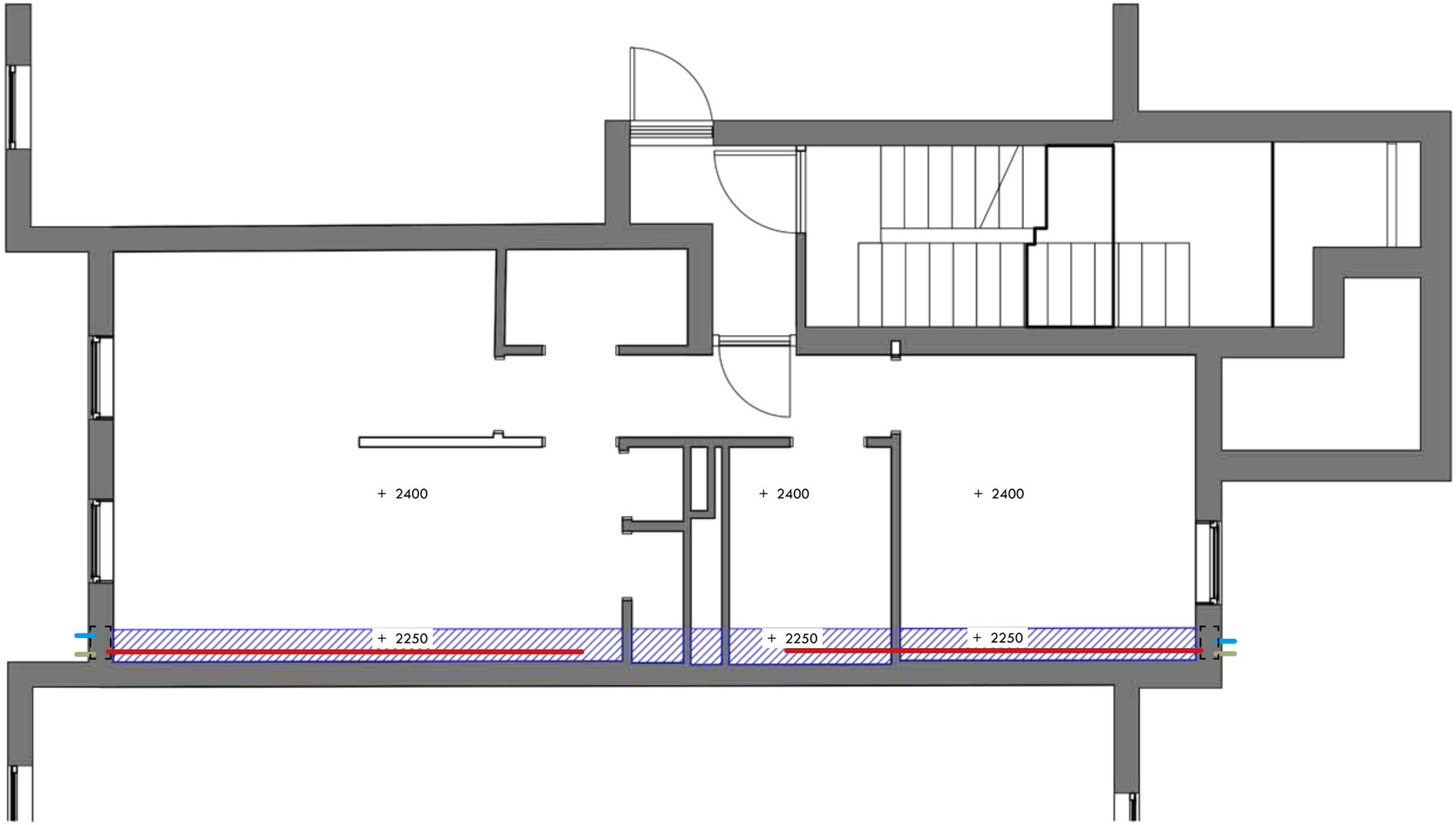
- Less efficient units (thought PHI certified)
- 2 units = 2 fans = more power needed
- Entry required to flat for maintenance

All heights are indicative at this stage and will have to be co-ordinated with the M&E design. Final design and proposed sections will be mad available during the next design stage.

+ Floor to ceiling height

Low ceiling in habitable area

Bulkhead



3.12 DISRUPTION

The intention of LWNT is to keep all residents in-situ where possible. We are therefore being careful to assess the impact of the works on the residents at an early stage in order to minimise disruption. The following section outlines the predicted level of impact for various operations. Please note that this is indicative at this stage and is subject to change. The sequence and phasing of works is to be discussed with contractors and interdependencies assessed.

Legend - Level of disruption

- Minimal disruption
- Low level disruption
- Medium level disruption
- High level disruption

Stage 1: Site Prep

The initial stage will involve clearing the external area around the homes and digging a 600mm trench around the building perimeter ready for the below ground insulation, with temporary walkways installed at building entrances. Any utilities, drains and fixings will need to be removed and relocated. The majority of this work is done outside of the house and contractors will be careful to ensure no dust enters the house and minimise noise. The scaffolding will then be installed to support and help the contractors.

The level of disruption in this phase is focused primarily on the external space, with possible flowerbed removal along the exterior wall.

Stage 2: Roof Works

The external insulation works will be carried out top-down, beginning with the roof. This involves stripping the roof build up down to the rafters, and replacing with an external system of fireboard and GRP brackets to create a cavity, in preparation for insulation to be sprayed into the void.

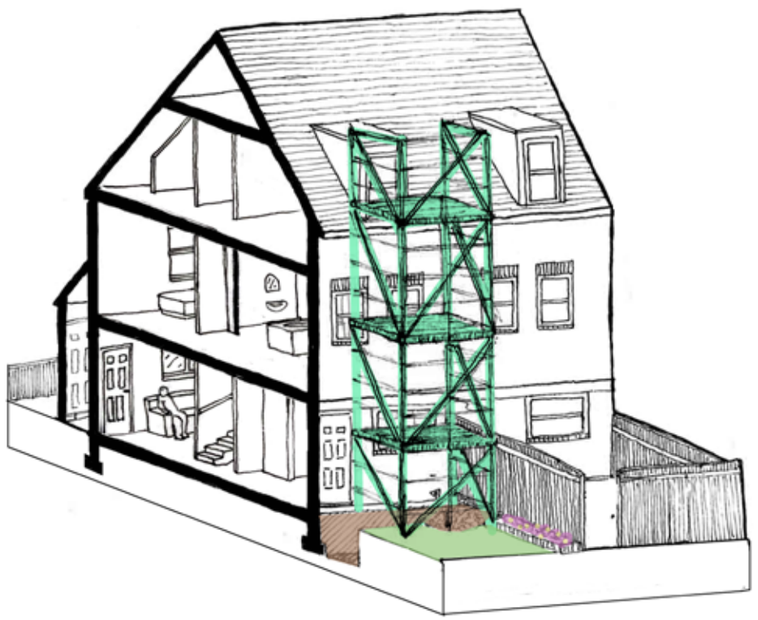
The dormer will also need to be insulated.

This will be a particularly disruptive stage and will require residents to vacate the loft rooms for safety reasons.

Stage 3: Walls

The fire-safety measures include magply A1 fire-rated non-combustible fire boards around the building and an 18mm versapanel around window reveals.

At this stage the main works are moved back to the exterior of the house and no major disruptions will be in place.

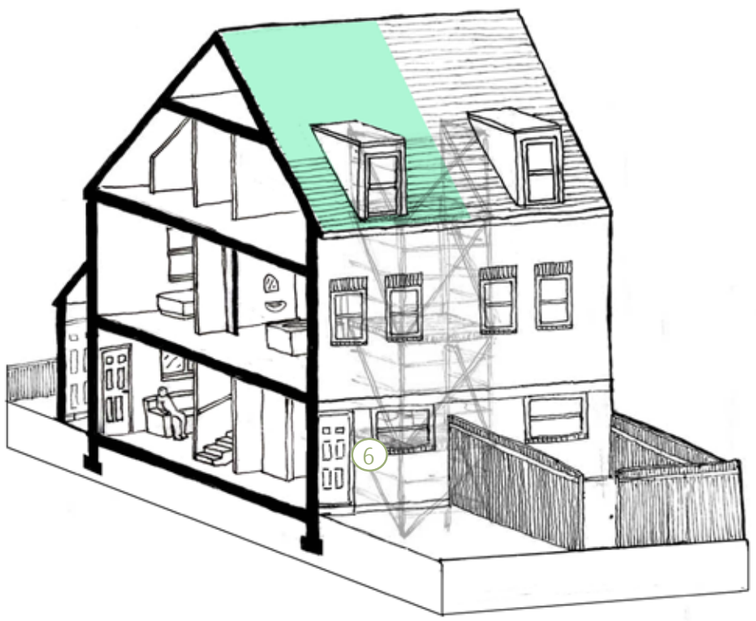


1 Clearing vegetation and other obstacles

2 Digging trench

3 Installing scaffolding

4 Remove existing drains to be reposition during retrofit



5 Stripping roof build up

6 Installing GRP brackets and airtightness membrane

7 Roof finished with steni-board - gutters and downpipes attached

8 Spraying insulation into roof cavity

7 Passive Purple airtight membrane sprayed on

9 Installing GRP wall brackets and aluminium rails

10 Spraying purple passive airtight membrane

11 Attaching A1 fire-rated non-combustible fire boards to create void

12 Insulation pumped into wall cavity

3.12 DISRUPTION

Legend - Level of disruption

Minimal disruption | Low level disruption | Medium level disruption | High level disruption

Stage 4: MVHR

The MVHR system (Mechanical Ventilation & Heat Recovery) will be installed. This is the largest portion of internal work, but the contractors will ensure this is carried out efficiently with minimal disruption to residents.

Externally, all holes required for the ductwork will be made good by blocking with concrete, reapplying the Purple Passive and adding firestops around the ducting.

Hence, this is the only phase when the level of disruption is mainly inside the house while only minor works will be carried outside.

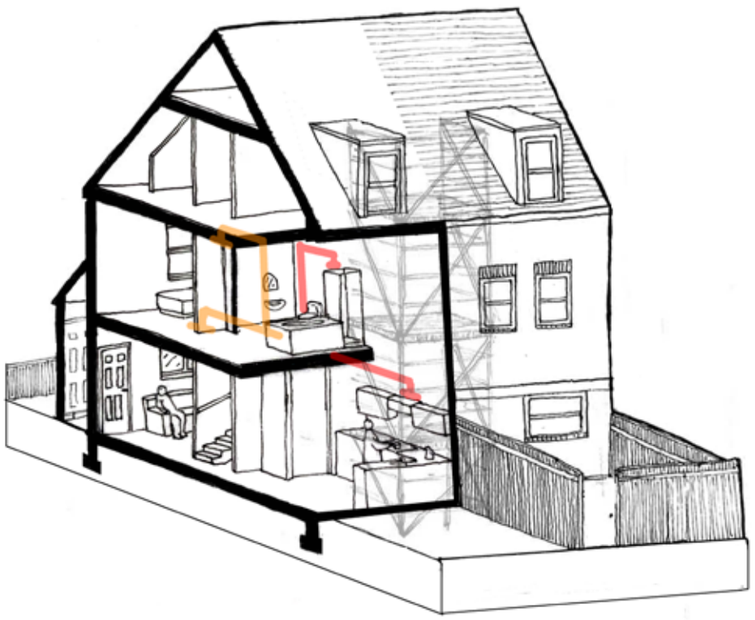
Stage 5: Windows & Doors

The existing windows will be replaced with Passivhaus certified triple glazing, and the doors will be replaced to the same standard. The windows will be chosen by residents to ensure that they are happy with the changes.. Replacing all windows to the same specification will ensure consistency across the site.

In this phase residents will experience again some levels of disruption both outside and inside, at all floors. while the windows will be put in place. The process will be quick and efficient anyway.

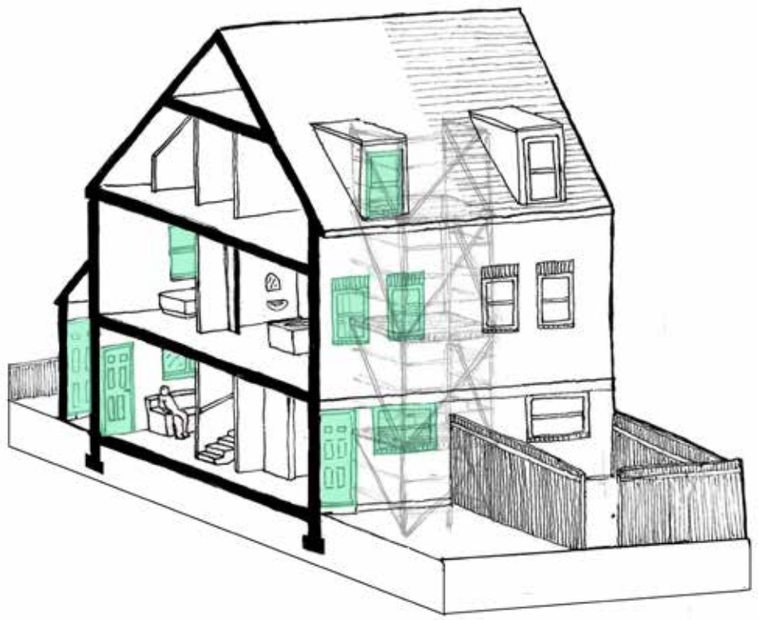
Stage 6: Internal Alterations

New kitchens and bathroom will be installed in some homes.This will inevitably be disruptive to residents as these are internal works. Howveer, internal refurbishment was one of the key priorities of the Verity Close residents and will provide a much needed revamp to the currently outdated fittings.



13 Installing MVHR system

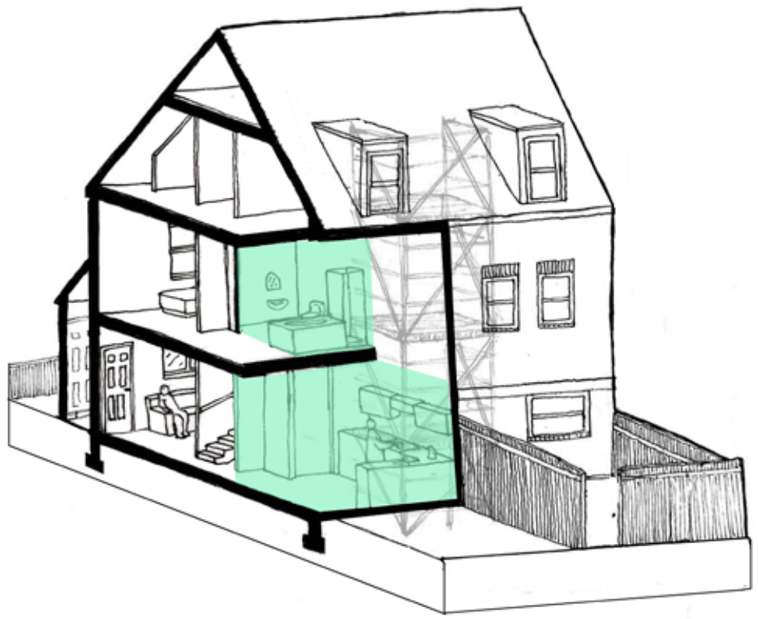
14 Ensure ducts are airtight: block holes with concrete and reapply purple passive



15 18mm versapanel around window reveals to enhance fire safety

16 Replace existing windows with triple glazing

17 Replace existing doors



18 New bathrooms fitted

19 New kitchesn fitted

3.12 DISRUPTION

Legend - Level of disruption

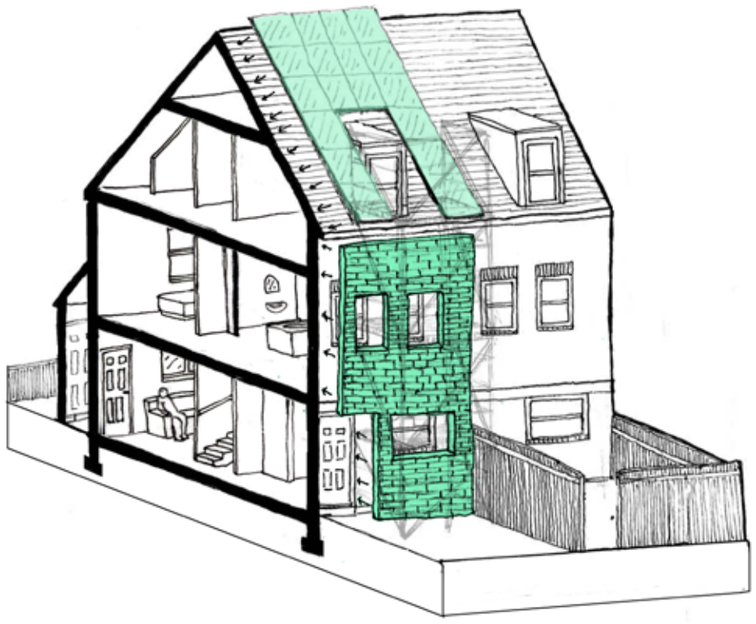
Minimal disruption | Low level disruption | Medium level disruption | High level disruption

Stage 7: PV Panels & Exterior Finish

The house begins to feel like home again as the exterior layer is installed. Brick slip finish will be used to ensure that the retrofit closely resembles the aesthetic of the existing buildings.

PV panels can be added at this stage if the Gold standard option is chosen, which will result in significant reduction in energy bills for residents and help to meet the desired environmental standards. The final results will be revealed as the scaffolding comes down and the site is tidied up.

At this stage the inside of the house is not going to experience any more disruption and is already fully functional. Also the outdoor spaces will quickly be restored and the level of disruption in this stage is minimal in all the site areas.



20 Install brick slip finish

21 Install PV panels

Stage 8: Site clearance and building completion

The final results will be revealed as the scaffolding comes down and the site is tidied up. Residents will be able to enjoy their new and improved homes. There will be an instantly noticeable improvement in the thermal comfort of each home, as well as long-term savings due to reduced energy costs.

The minor disruptions experienced in the previous phases would have been worth the final result.

20 Take down scaffolding

21 Tidy the site

22 Happy residents

Future Works: District Heating

Verity Close is part of the proposed district heating network extension for Lancaster West, with works due to take place in the next few years. The changeover of these systems will need to take place during summer as residents are to remain in situ. This will cause some disturbance as gardens will have to dug up to install the additional pipe work.

Legend

DST HTG — Proposed district heating.

DST (P) — Proposed primary district heating.

SEWER — Sewer.

4.0 STRUCTURAL REPORT

Wilde

Lancaster West estate,

Verity Close

Royal Borough of Kensington & Chelsea

London W11 4HE

Stage 2 Report.

Project no. 5657
March 2022

Version:1
Status: Final
Prepared By: TJS

1

Contents

Index

Appendix

1.0 Executive Summary

2.0 Introduction

3.0 Structural Investigation work

The stage 1 report described the superstructure. On these buildings further investigation work has been undertaken. Trial pitting to expose the foundations on the perimeter of number 54 was undertaken. In addition, a visual survey has been undertaken of the external elevations to establish any defects in the structure. Also, there was a visual inspection in the roof space to number 54.

Foundations

A trial pit was dug at the front and rear of number 54. The pits showed that there are mass concrete strip foundations supporting the perimeter walls. At the front the pit showed a 510mm deep concrete foundation with a 50mm projection in front of the cavity wall. The top of the foundation was only 100mm below ground level. At the rear the mass concrete foundations was 810mm deep with a 700mm projection in front of the cavity wall. This top of this foundation was 900mm below ground level.

The pits showed that the foundations were bearing on clay.

External survey

No significant defects were noted in the external elevations of the properties that could be seen from ground level.

Roof

The roof to number 54 was visually examined from the inside. There is a dormer on one side and slope extends into the top floor room on the other side but the roof structure could be seen above this level.

There are 100 x 30 @ 600mm spacing timber rafters supported at the top and bottom and on 225 x 90 timber purlins which span across the width of the unit.

Drawing 5657 – SK01 has been produced showing the roof structure details that could be seen.

4.0 Design development.

It is generally proposed to install insulation on the outer external faces of these properties. Full details of the proposed insulation need to be advised.

In addition, PV panels are also proposed. The size, weight and proposed locations of the PV panels is to be advised so the roof structures can be checked.

Fixing to the external brick walls is not likely to be a problem. There have a sound surface with adequate additional load capacity. The trial pits show the foundation details which will enable the interface between the insulation and foundations to be designed.

The roof structures will however, need to be more closely looked at. When the build-up of the insulation and specification has been decided, along with the PV's, the roof structures will need to be reviewed for the additional loads. Some strengthening may be necessary. This should be relatively easy to undertake with the addition of another timber purlin or purlins, spanning across the units to support the rafters and therefore break their span. This wall also relive the loads on the other purlin.

6.0 Next Steps

Further investigations

Whilst the roof structure, where visible, has been visually inspected at number 54 it has been assumed that other properties will be similar. This is satisfactory for this design stage but there are details around the dormers and other areas currently concealed with ceilings that should be inspected before the designs are finalised.

The trial pitting was restricted to property number 54. It would be prudent to check other properties to ensure that this is representative.

The ground floor is concrete. To investigate it will need to be either cored or dug up in a discrete location. This has been avoided so far as it will be disruptive to tenants and could potentially damage the waterproof barrier.

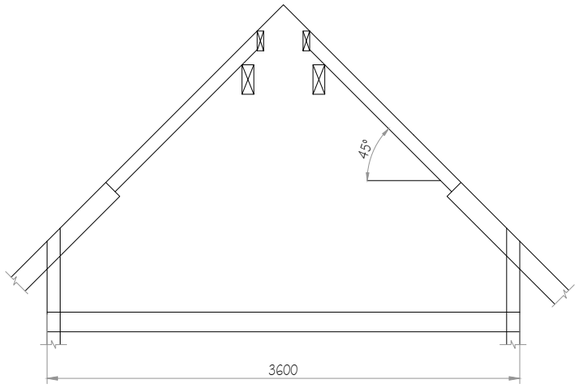
Design Development

The structural details will be developed in conjunction with the rest of the design. This will establish if any strengthening work will be required in the roofs.

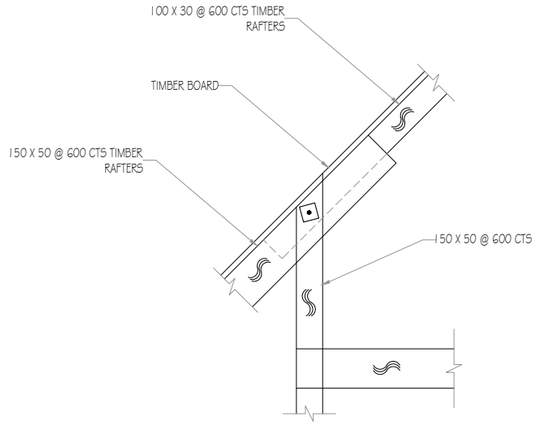
It is understood that the MVHR units will be located in a cupboard over the staircase and an access ladder will be required. The structure can be advised when details are available.

Roof lights are proposed. Alterations are also being considered to the dormers. Details to be advised so roof framing/trimming can then be designed.

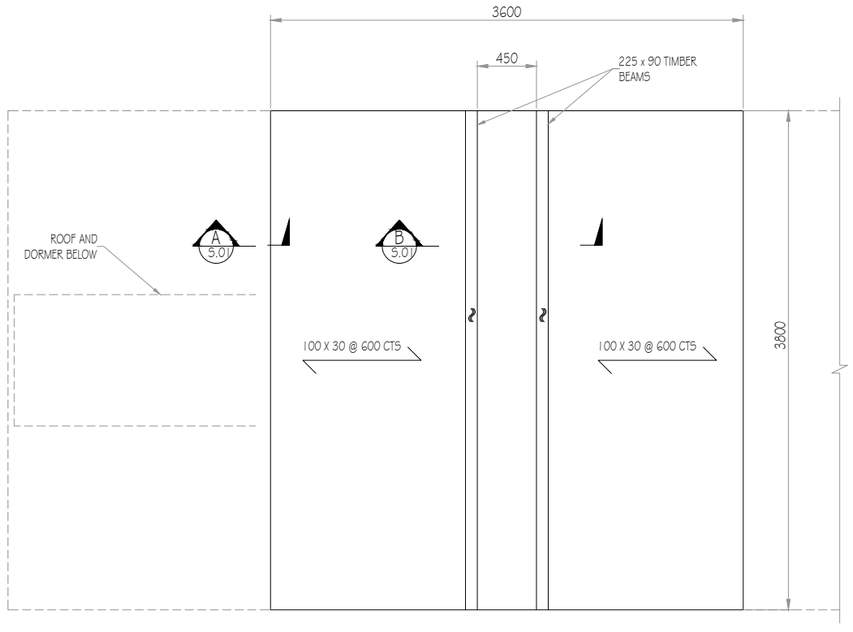
The detailed ground floor construction has been assumed. Further information required on its construction needs to be established to justify disruptive investigation works at this stage.



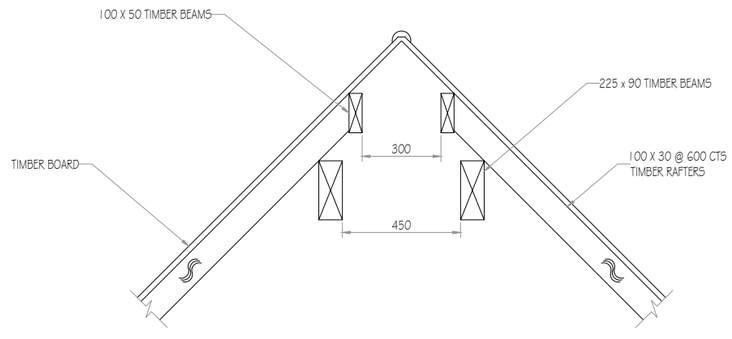
ELEVATION
SCALE 1:20



SECTION A - A
SCALE 1:10



PLAN
SCALE 1:20



SECTION B - B
SCALE 1:10

NOTES

1. This drawing is copyright. ©
2. The drawing shall be read in conjunction with all relevant drawings and the specifications.
3. The drawing shall not be scaled; use only figured dimensions. All dimensions are shown in millimetres and levels in metres.
4. Dimensions and conditions shall be verified on site. Any discrepancies between the drawing and site conditions shall be brought to the attention of the Engineer for resolution prior to placing orders or to construction.
5. All work shall comply with the Building regulations and the requirements of the local authority, current Codes of Practice and British Standards.

PRELIMINARY

REV	DRN	CHK	DATE	DESCRIPTION

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Architect / Client
ROYAL BOROUGH OF KENSINGTON & CHELSEA

Job Title
LANCASTER WEST ESTATE
54 VERITY CLOSE

Drawing Title
ROOF PLAN, ELEVATION AND SECTIONS

Scale	Drawn	Date	Chkd
1:20 & 1:10 @ A1	RA	28/01/2022	TJS

Job No.	Drawing No.	Revision
5657	SK.01	P

Status	Sheet Size
	A1

5.0 MECHANICAL & ELECTRICAL REPORT

TACE

Mechanical and Electrical Outline Specification for
PA1611 RBKC – Lot 2 Verity Close
House / Flat Fit Out

Client
RBKC
Baseline Studios
Whitchurch Road
London

Consulting Engineers
TACE
75 Cowcross Street
London
www.tace.co.uk

Ref: PA1611
Revision: Rev T1
Date: April 2022

CONTROLLED DOCUMENT

TACE Project No:	PA1611		
Status:	Stage 2	*Copy No:*	
	Name	*Signature*	*Date*
Prepared by:	Nigel Griffiths		01/04/2022
Checked:	Nick Thomas	N Thomas	01/04/2022
TACE Approved:	James Massey		01/04/2022

Revision Record					
Rev.	Date	By	Summary of Changes	Chkd	Aprd
A	28/11/2021	NG	Initial issue	NT	JM
T1	01/04/2022	NG	Stage 2 issue	IJ	NT

Contents

1.0 Introduction

1.1 General

This report describes and records the Mechanical heating distribution systems available currently at the Lancaster West Estate (LWE) London. The LWE estate is part of the Royal Borough of Kensington and Chelsea borough (RBKC). LWE is a mixture of properties with differing tenures and construction methods (6.9% owner occupied).

The following sets out the scheme design for the refurbishment and potential extension of the existing District Heat Network (DHN) along with the fabric improvements to dwellings and internal refurbishment of each dwelling. It should be noted that individual houses/flats will be undergoing pilot scheme proposals which introduce different options such as air source heat pumps.

A DHN is a system for distributing heat generated in a centralised location through a system of insulated pipes for residential and commercial heating requirements such as space heating and water heating. The scheme is approaching RIBA Plan of Work Stage '3' which is concept design.

1.2 Approach to Services Concept

This document provides the design of the heat generation plant up to the heat interface within each residential property for heating and hot water services .It sets out the internal refurbishment scope within each property.

There are a number of system boundaries and responsibilities across the scheme proposal.

1. The primary network is the network that generates heat and distributes the heat to each building perimeter connection
2. The secondary network is the network that routes the heat from the primary network connection point to the residential connection. In this case it is the system from the building perimeter to the heat interface unit in each residential property.
3. The domestic network which accepts the heat from the secondary network in each property and distributes the heat to the radiators and hot water outlets.
4. MVHR installation (Mechanical ventilation with heat recovery)
5. Electrical re-wiring and general upgrades.

The concept however, to achieve a high level of energy performance through a combination of passive and energy efficient measures will be indicated within this document. The proposal follows the energy hierarchy which is explained in more detail later in this report but is summarised as follows :

- Be Lean
- Be Clean
- Be Green

Lean

The building will minimise its energy use by improving the thermal properties of the buildings

Clean

The buildings will have new LED lighting, energy efficient ventilation, energy efficient heating systems and controls.

Green

Further carbon emission reductions will be made through on-site renewable energy generation. The required extent of this generation will depend on the effectiveness of the first two processes in the energy hierarchy and the energy target set for the building.

The primary network has undergone a detailed analysis to develop the most energy and carbon efficient heat generation equipment. A separate report is available on the technical and economic viability of the options considered.

The service engineering approach has kept the healthy living at its core where the living spaces are warm in the winter, cool in the summer and safe all year round.

The heating distribution will connect into each core of each building allowing interconnection with each level.

1.3 Outline Project Description

1.3.1 Existing Heating System Description

The LWE comprising 795 existing residential flats and houses, the accommodation is provided with a mix of 1 to 5-bedroom dwellings and mainly be set around existing hard landscaping and access roads.

Verity Close accommodation types as below:

Lancaster West Estate		Bedroom Split					
	Total Units	1	2	3	4	5	Studio
Verity close 26 - 43	18	18					
Verity close 8 - 25	18	18					
Verity close houses	32		8	17	7		

The residential dwellings are set over multiple storeys.

The flats and houses are fully serviced independently with gas fired boilers

It is proposed to change the heating and hot water from gas boilers and provide them a District heating system. The changeover of these systems will need to take place during summer as we are advised that residents are generally to remain in-situ.

In advance of this major refurbishment pilot houses are being tested for individual heating systems being replaced with heat pumps.

Consideration of temporary plant to maintain services Is discussed later in this document. The heat losses have been calculated for each building which will set allowances for any temporary plant requirements.

The following sets out the high-level concept design for the internal refurbishment of the residential flats.

Building fabric improvements, building common area upgrades and access re-configurations as a simple overview will be developed by the Architects, this internal work will be carried out as part of a tender process and in conjunction with the LWE fit out teams. The final design responsibility will remain with those parties. This document provides the conceptual design of the residential properties. The scheme shall achieve a high level of energy performance through a combination of passive and energy efficient measure which will be indicated within this document. The service engineering approach has kept healthy living at its core where the living spaces are warm in the winter, cool in the summer and safe all year round.

It should be noted that specifications are provided for guidance and Client approval shall be sought to standardise across the estate. It should also be noted that the fabric is to be improved in line with package 2 as detailed within the Carbon trust report 2020.This work in most cases will be carried out after the internal refurbishment and therefore the systems must operate and perform as the existing build arrangements.

The following list of standards shall be addressed however, this list is not exhaustive:

- CIBSE Design Guides, Application Manuals, Energy Guide and Commissioning Codes. British and European Harmonised Standard Specifications and Codes of Practice
- IEE Wiring Regulations and Recommendations
- HVCA Design guides and Installation Recommendations
- Water Regulations Water
- Research Centre Codes Health and Safety Executive Guidance
- CIBSE Design Guides ENCODE 1 and 2
- CDM Regulations
- Disability Discrimination Act
- Health and Safety at Work etc. Act and Regulations
- The Electricity at Work Regulations
- The Electricity Supply Regulations and requirements of British Telecom and the local electricity and water supply companies
- Local Authority Regulations Fire Authority requirements Building Regulations (where applicable) 'Disability Access', 1997 Local Water Board Requirements and Regulations 1990 (Amended)
- The Clean Air Acts
- The Local Authority Building Regulations 2010 and Subsequent amendments thereto, subject only to the relaxations sanctioned by the Department of Environment.
- Specific requirements of the Utility Supply Local Authorities and Local Planning Authorities.
- Clients ER's

1.4 Contractors Deliverables

The contractor shall produce an installation drawing for each flat which shall represent the scheme. CAD drawings will be provided for each Archi type by TACE. The contractor shall keep a marked-up drawing during the installation that reflects any changes in any individual flat. This drawing should be flat specific and shall form part of the O& M manual at handover.

2.0 Sustainability and Energy Strategy

2.1 Introduction

This section sets out the approach to the sustainability and energy strategy for the scheme. The scheme shall be designed to reduce energy demand through passive design measures lowering energy bills for occupiers.

2.2 Planning Policy

The following Planning Policy and energy targets are applicable and have been targeted for the proposed development:

- Building Regulations Part L 2013

2.2.1 Building Regulations 2013 Part L1B (New Domestic)

1. Achieving the DER (dwelling emission rate)
2. Limits on thermal fabric design
3. Limiting the effects of solar gains in summer
4. Building performance consistent with DER
5. Provisions for energy efficient operation of the building

2.3 Other Low Carbon Policy Drivers

RBKC have several grants associated with carbon saving from this scheme. It should be noted that any changes must be approved by the client team at RBKC.

To be eligible for HNIP funding, the network must take sufficient heat from low carbon heat sources. All heat networks must meet one of the following heat source requirements:

- 75% of the heat from Combined Heat and Power (CHP) (which can include non-renewable fuels)
- 50% of the heat from a renewable source
- 50% recovered heat or
- 50% of the heat from any combination of renewable/recovered heat and non-renewable fuelled CHP

2.4 Energy Strategy

An SAP report document has been initially produced which assessed the available compliance strategies for Part L1B compliance.

The guiding philosophy for the energy strategy is to follow the energy hierarchy, reducing the energy demands of the development through passive design and energy efficiency measures where possible, before meeting the reduced demand via a low carbon technology.

The design approach adopted needs to include the following:

- Target energy efficiency measures to reduce resource demand through best practice design and passive design strategies.

- Locally offset the minimised resource demand through effective supply from Low and Zero Carbon (LZC) technologies.

The approach to including the measures above will follow the energy hierarchy as shown below:

Figure 3.1: Energy Hierarchy Approach

2.4.1 'LEAN' – Design Measures

'Lean' design measures include those which affect the thermal performance of the fabric design. The following has been considered:

- Maximise the use of natural ventilation, via opening windows and doors
- Incorporate solar control treatment where possible on effected elevations
- Include high thermal performing fabrics beyond 2013 Part L limits-Passivhaus
- Maximise daylight where possible
- Increased airtightness of the building
- Consider use of developing technologies where technically and economically feasible

2.4.1.1 Building Fabric

Whilst it is accepted that the building form is existing the individual design teams should consider living areas and bedrooms should be south facing to take advantage of low winter sun heat gain. Solar shading via balconies, should be considered and if possible, provided to minimise any unwanted solar heat gain during summer but not too large to impact on daylighting gains to living / kitchen spaces. Glazing should be selected on balance to minimise unwanted solar gain and maximise daylighting.

The target, provisional U-values will assist in the overall energy savings and carbon emission reductions of the scheme.

Please see Arrchitects proposals to be confirmed within PHPP model

U values -are the rate of transfer of heat through a structure divided by the difference in temperature across that structure

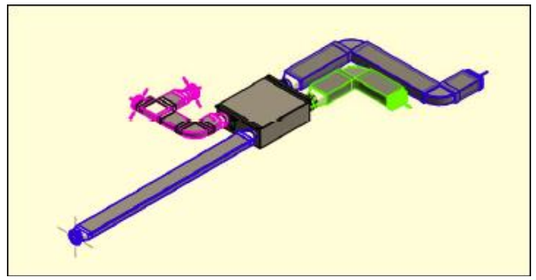
2.4.1.2 Air Permeability

The buildings construction should maximise air tightness. An air permeability in order of 1 $m^3/m^2/hr$@50pa is recommended. This has assumed that every dwelling will be air tested on practical completion.

This means that heat losses from the building at a rate of 1m3 of air for every 1m2 of areas at 50pa differential pressure will be allowed within the heating calculations

2.4.1.3 Ventilation

Dwelling living areas and bedrooms to be naturally ventilated via openable windows during the cooling season and highly efficient mechanical ventilation with heat recovery (MVHR) for the heating season. The (MVHR) will have minimum efficiencies of 0.56 W/l/s and Heat Recovery efficiencies of at least 80 %.MVHR shall have volt free contacts and shall be interfaced with the Aico fire alarm.



2.4.1.4 Daylighting and Lighting

Daylighting should be optimised to reduce reliance on artificial lighting. Energy efficient lamps and LED lighting will be used throughout the residential scheme.

2.4.1.5 Controls

Automatic controls should be provided as appropriate in conjunction with energy efficient equipment.

3.0 Services

3.1 Heating

Heating shall be provided from the new district heating network. Individual pilots are being trailed which will use air source heat pumps

Pre-insulated pipes 2 x 25mm shall be routed from the store where the calorifier is located to the internal wall / corridor side wall of the property. This pipework shall be left blank at both ends for future connection.

This pipework shall be insulated to avoid heat loss and shall be valved outside of the house/flat with lockable vales.

A new insulated distribution pipe network shall follow the existing pipe routes {unless they are embedded in the floor which should be avoided and shall connect to new panel radiators.

The apartment domestic hot water and space heating system HIU will be supplied complete with their own fully automatic 'packaged' controls or ICU unit.

Each dwelling's controls will be independent for each property. An automatic 2 port valve controlling the amount of LTHW passing through the dwelling plate heat exchanger will be controlled automatically based on the temperature of the return to the heat exchanger and the 'demand' signal from the dwelling heating system. This will ensure that the heat supplied is consistent and managing the flow and return temperatures maximises the energy efficiency of the system.

Each habitable room will be provided with an adjustable temperature sensor to permit local occupant control (TRV). A centralised controller will be provided in each Utility Cupboard complete with multi-time channel programming timer to initiate the heating system. A number of central solutions such as HIVE, SWITCHEE and NEST are being considered. The optimum solution for a resident's interface will be selected later.

The radiators shall be single or double panel radiators with TRV and matching LSV. The radiators shall have Danfoss horizontal RAS D2.

All pipework where not visible shall be insulated.

The minimum control requirement will be a multi-channel time clock allowing thew heating to stop and start at pre-determined times.

Area	Heating (°C)
Living Room	21 °C- no summertime control
Bedrooms	18 °C - no summertime control
Bathrooms	21- no summertime control
Kitchens	18 °C - no summertime control
Hallways	18 °C - no summertime control

3.2 Domestic Hot Water

Will be provided from the primary hot water side of the HIU which shall generate domestic hot water.

To provide complete, sterile, safe, and fully working hot and cold-water systems.

- Avoidance of Legionnaires' Disease.
- Design and specify all domestic water services in accordance with the guidance contained in CIBSE Technical Memorandum 13 (TM13) and Health & Safety Executives (HSE) Approved
- Code of Practice and Guidance L8 - Legionnaires Disease: The control of legionella bacteria in water systems.

Performance Requirements

- Maximum hot water storage and distribution temperature 60 - 65 °C.
- Maximum hot water delivery temperature to all outlets 43 °C.
- Maximum water velocity in pipework 2.0 m/s.
- Minimum system operating pressure 1.0 bar
- Dead legs shall be kept to a minimum
- Fixed water flow devices shall be provided on all sanitary ware to control water usage.
- Leak detection valves shall be priced as an optional extra to be advised by the client.
- Hot and cold water shall be provided by the existing system on site. Water use will be minimised by the installation of low usage taps, dual flush WC cisterns.
- Thermostatic blending valves will be fitted to wash basins/showers/baths to control outlets at a maximum temperature of 43º C for safety (where mixing taps have not been specified).
- All pipework will be thermally insulated, and sufficient isolation and commissioning valves will be fitted to enable the system to be capable of being fully commissioned and isolated for maintenance.
- The water distribution system shall include:
- Fail-safe-anti-scald thermostatic mixing valves and devices on all wash hand basins, showers (all hot water outlets shall be set at 43°C to prevent scalding, with dead legs keep to a minimum from the mixing valves); - Except Sinks.
- Pressure reducing valves and strainer on the incoming supply.
- All pipework shall be thermally insulated, and frost protected.

Compliance Requirements

Approved document Part G	Building Regulation (England & Wales) – Sanitation, Hot Water Safety and Water Efficiency
BS-EB 806-2	Specifications for installations inside buildings conveying water for human consumption. CIBSE commissioning codes WRAS Water Regulations Guide The Water Act

	Local Water Authority Requirements Equipment manufacturers' recommendations and instructions on selection, installation, commissioning, and maintenance.
HSE ACoP L8	The Control of Legionella Bacteria in Water Systems
BSRIA AG 4/94	Guide to Legionellosis
BS 5433	Guide to the design, installation testing and maintenance of services supplying water for domestic use within buildings and their curtilages – complimentary guidance to BS EN 806
CIBSE Guide C	Reference Data (and other CIBSE Guides) The Pressure Equipment Directive (PED) 97/23/EC Minimum pressure at apartment connection valves 2.0 bar

2.3 Soil & Wastewater System

A foul water drainage system shall be installed to the building sanitary installations using cast iron and PVC-U pipework dependent upon location. The soil vent pipework (SVP) stack is installed external & internally, connected to the internal soil connections from the toilet and waste connections from the sanitary ware, wash hand basins, sinks and WC's.

New above ground drainage shall be provided to all sanitary outlets, condensates drains and all above ground drainage and waste system.

- To convey foul and wastewater quietly to the foul drain whilst maintaining appropriate water trap seals.
- Design to meet Building Regulations requirements.
- The system shall comprise cast iron and uPVC (depending upon location) soil and waste stacks connecting to the below ground drainage system.

Compliance Requirements

Approved document Part H	Building Regulation (England & Wales)
EN 12056-1	Gravity drainage systems inside buildings – Part 1: General and performance requirements
EN 12056-2	Gravity drainage systems inside buildings – Part 2: Sanitary pipework, layout, and calculation. Use system III – Primary ventilated single discharge stack system with fully filled branch discharge pipes

EN 12056-5	Gravity drainage systems inside buildings – Part 5: Installation and testing, instructions for operation, maintenance, and use
BS 8000-13	Workmanship on building sites. Code of practice for above ground drainage and sanitary appliances
All manufacturer's recommendations and instructions	Specified above ground drainage pipework manufacturer. Requirements of the hot water equipment manufacturer

3.4 Dwelling Ventilation Systems

Each dwelling will be provided with a Mechanical Ventilation Heat Recovery System (MVHR) which will extract air from all bathroom and kitchen areas and the utility cupboard and supply filtered fresh air to the bedrooms and living area. The system air intake / exhaust will be via louvres located on the façade (or alternative locations as agreed).

The system shall have also work with 10 mm undercut doors to the internal rooms to allow airflow as Building regulations Part F.

Each dwellings ventilation unit operates continuously on a background ventilation basis. A boost facility activates automatically when either the bathroom light is activated or manually with a control switch within the kitchen or humidistat within the Utility Cupboard. A summer/winter mode is also provided to alter the level of ventilation flow rate and extent of heat recovery. The boost facility will also incorporate adjustable run-on timer.

The utility cupboard is to be vented via the MVHR located within the utility cupboard with extract ventilation and make-up supply ventilation in acoustic sensitive locations.

A summer winter switch shall be available to ensure the system operate correctly in each season.

Dwelling living areas and bedrooms to be naturally ventilated via openable windows during the cooling season and highly efficient mechanical ventilation with heat recovery (MVHR) for the heating season.

The current system has been developed with Zehnder or Brink products which included pre-insulated ductwork, air valves and controls. Zehnder or Brink will provide installation drawings for the system.

Please note that ductwork shall be designed and sized to allow the future connection of cooling units. It is envisaged that the current models will be replaced in future with new ventilation units that have cooling incorporated. This Is to meet the 2050 and 2080m weather files The ductwork shall be metal with fire dampers on all compartment walls in line with the fire engineers report.

Insulation shall be class O and vapour sealed.

The minimum air volumes shall comply with the below table:

Area	Continuous Extract (l/s)
Living Area	15l/s
Bedrooms	15l/s
Bathrooms	8 l/s
Kitchens	13 l/s increased to balance supply and in line with the thermal model.

These shall be further evaluated by way of thermal modelling

Minimum requirements- See AD Part F where EnerpHitt applies please refer to higher ventilation rates for larger flats.

The system shall isolate on initiation of a smoke/heat detector within the flat. A volt free contactor or similar shall interface with the fire alarm within the flat.

Table 5.1a Extract ventilation rates

Room	Intermittent extract	Continuous extract	
	Minimum rate	Minimum high rate	Minimum low rate
Kitchen	30 l/s adjacent to hob; or 60 l/s elsewhere	13 l/s	Total extract rate should be at least the ***whole dwelling ventilation*** rate given in Table 5.1b
Utility room	30 l/s	8 l/s	
Bathroom	15 l/s	8 l/s	
Sanitary accommodation	6 l/s	6 l/s	

Table 5.1b Whole dwelling ventilation rates

	Number of bedrooms in dwelling				
	1	2	3	4	5
Whole dwelling ventilation rate [a, b] (l/s)	13	17	21	25	29

Notes:

a. In addition, the minimum ventilation rate should be not less than 0.3 l/s per m^2 of internal floor area. (This includes all floors, e.g. for a two-storey building add the ground and first floor areas.)

b. This is based on two occupants in the main bedroom and a single occupant in all other bedrooms. This should be used as the default value. If a greater level of occupancy is expected add 4 l/s per occupant.

Compliance Requirements

Approved document Part B	Building Regulation (England & Wales) – Fire Safety
Approved document Part F	Building Regulation (England & Wales) – Means of Ventilation Requirements of the acoustic engineer. System to operate at NR 30 under normal operating condition and NR35 at boost condition.

Approved document L2B	Building Regulations (England & Wales) – Conservation of Fuel and Power in Existing Building other than Dwellings
HVCA DW/143	Ductwork Leakage Testing
HVCA DW/144	Ductwork Specification for Sheet Metal Ductwork
HVCA DW/145	Installation of Fire and Smoke Dampers All other relevant BS and Codes of Practice CIBSE Guides BSRIA Commissioning Guides Relevant HSE Approved Codes of Practice and Guidance Notes Non-Domestic Building Compliance Guide 2010 Manufacturers' recommendations

	MVHR	MEV	Decentralised MVHR	Opening Windows	Smart Bricks	Trickle Vents
						
Positives	• Controlled balanced supply and extraction of air • Negates the majority of ventilation heat losses • All habitable rooms have filtered outside air	• The air is extracted from kitchens and bathrooms only. This limits ductwork • Operated via humidity sensor, PIR sensor or manual switching • Low maintenance as no filters are included	• Ceilings may not be compromised in most instances (save internal bathrooms and kitchens) • More flexible – pick and choose which rooms from a resident's perspective • No cupboard spaces are required • Cost effective	• Most cost effective system • Familiar use	• Improves air tightness • Can in winter months reduce heating bills	• Cost effective • Easily controlled
Negatives	• Higher installation costs • Requires space internal cupboards and ceiling space • Regular filter maintenance needed • Can be difficult for users to understand operation • If not used may require costs to be added to other fabric improvements / equipment to meet required	• Trickle vents in habitable rooms are needed • Air quality reduced as no filters or insect guard of supply air	• You need an outside wall for each supply and each extract unit, where we have internal bathrooms and kitchens this could be a technical issue as the fan may not overcome the resistance associated with the length. • Volumes are low and appear not to meet the min kitchen volumes for the new Part F due to distance to external wall. • There is no boost facility where we may want to increase volumes for cooking but also overheating assistance. • Will not meet EnerPHitt standards	• Uncontrolled heat loss • Cold drafts • Poor indoor air quality	• Would not meet Building Control Part F alone • Will require windows or fans for kitchens and bathrooms • Reliant on natural pressure differentials across a building or wind velocity • Requires a smart device	• Does not meet building control standards without openable windows • Cannot ventilate an internal space such as a kitchen or bathroom
Ventilation Rates-Statutory for Intermittent Extract	• Kitchen – 13 l/s • Bathrooms – 8 l/s • WC – 8 l/s	• Kitchen – 13 l/s • Bathrooms – 8 l/s • WC – 8 l/s	• Kitchen – 13 l/s • Bathrooms – 8 l/s • WC – 8 l/s	• Kitchen – 13 l/s • Bathrooms – 8 l/s • WC – 8 l/s	• Kitchen – 13 l/s • Bathrooms – 8 l/s • WC – 8 l/s	• Kitchen – 13 l/s • Bathrooms – 8 l/s • WC – 8 l/s
Statutory for Intermittent Extract	• Kitchen – 30 l/s • Elsewhere in kitchen – 60 l/s • Bathroom – 15 l/s • WC – 6 l/s	• Kitchen – 30 l/s • Elsewhere in kitchen – 60 l/s • Bathroom – 15 l/s • WC – 6 l/s	• Kitchen – 30 l/s • Elsewhere in kitchen – 60 l/s • Bathroom – 15 l/s • WC – 6 l/s	• Kitchen – 30 l/s • Elsewhere in kitchen – 60 l/s • Bathroom – 15 l/s • WC – 6 l/s	• Kitchen – 30 l/s • Elsewhere in kitchen – 60 l/s • Bathroom – 15 l/s • WC – 6 l/s	• Kitchen – 30 l/s • Elsewhere in kitchen – 60 l/s • Bathroom – 15 l/s • WC – 6 l/s
Whole Dwelling Supply	• 13 l/s – 29 l/s	• Trickle Vents Required	• N/A	• Trickle Vents	• N/A	• Windows
Ranking	As No. 1 meets all ventilation requirements and energy improvements.	As No. 2 meets all ventilation requirements but increases energy.	As No. 3 meets ventilation requirements but cannot ventilate internal spaces such as bathrooms in most buildings. Will require extract fans to comply with building control.	As No. 4 is uncontrolled ventilation cannot guarantee ventilation rate. Internal bathrooms/ Kitchen will require extract fans to comply with building control.	As No. 5 is uncontrolled in terms of meeting ventilation rates required. Bathrooms and Kitchens will require extract fans to comply with building control.	As No. 6 will not meet any of the required ventilation criteria.

3.5 Fire

Particular attention shall be paid to the ductwork which cross the main corridor from the kitchen and the fire engineer shall approve the layouts. It is suggested that this ductwork should be boxed in place with a double plaster board to meet the fire compartment requirements or alternatively be in metal ducts or have fire /smoke dampers installed. The arrangement shall be approved prior to installation.

Typical Client Mechanical Equipment Requirements

1	Cylinder	Travis Perkins	719878 GLEDHILL STAINLESSLITE PLUS DIRECT 150 EE UNVENTED CYLINDER
		Travis Perkins	914458 GLEDHILL STAINLESSLITE PLUS INDIRECT 150 EE UNVENTED CYLINDER
2	Radiators		STELRAD
4	Cylinder	Travis Perkins	(66) *150L Evocyl Indirect Unvented ThermaQ Cy
5	Cylinder	Travis Perkins	295959 MEGAFLO ECO 150 SLIMLINE INDIRECT 7034089
		Travis Perkins	101890 MEGAFLO ECO 150 SLIMLINE DIRECT 7034084
6	MVHR	Zehnder Brink	Generally, Q series, Flair or Sky models to Passivhaus standards

3.6 Daylighting and Lighting

Daylighting should be optimised to reduce reliance on artificial lighting. Energy efficient lamps and LED lighting will be used throughout the residential scheme.
Low energy general lighting shall be provided throughout, emergency and security lighting shall be provided to comply with the sample SAP calculations, the relevant British Standards, CIBSE recommendations and Secure by Design .Fittings shall be LED and have separate replaceable lamps.

The contractor is to supply, install, test, commission, set to work, demonstrate, and maintain during the defects liability period a complete and fully functional general lighting systems as described below and as shown on the system drawings, in accordance with the Mechanical & Electrical Subcontract Prelims.

The lighting installation is to be efficient, fully functional, and complete with all lighting controls fully proven and demonstrated.

Carry out tests and issue certificates. Test and commission the installation and issue certificates prior to covering up parts of the installation which will be below floor, in above ceiling or concealed in walls. Provide drawings and provide main contractor with builder's work requirements. Issue record drawings and O&M manual - See the M+E additional

preliminaries. These are to include record drawings, a full description of this system, set-up, operation, and modifications. Provide staff training, complete with full and clear instructions for the building staff.

Note that the design Parameters for Work apply here also. In addition to the relevant clauses of specification , install lighting systems in accord with:

- Building Regulations
- BS7671 Wiring Regulations 18th Edition (BS 7671:2018)
- BS 5266: 1 Code of practice for the emergency lighting of premises
- BS EN 1838 Lighting Application - Emergency Lighting
- CIBSE
- Code for Lighting and Lighting Guides LG4, LG6 & LG7
- SLL
- Code for Lighting
- Health and Safety Legislation
- Manufacturer's recommendations
- Local Authority Building Control Requirements

Luminaires in ceilings are generally to be connected to the relevant circuit cabling via individual connector blocks or proprietary ceiling "clix" or Flex 7 type connectors. Where luminaires are mounted on walls or fixed ceilings, containment and wiring are to loop in and out of the luminaire from above the ceiling or behind the wall with no more than 2 bends between luminaires or between luminaires and the first accessible point on the system to allow cable replacement.

Provide all transformers and drivers necessary for the correct functioning of the lighting installation. Ensure that all transformers and drivers are compatible with the lamp, luminaire, switching and dimming requirements of the relevant circuit.

Provide positive setting out dimensions for each luminaire prior to first fix and second fix installation. The Design Team and client is to be allowed to comment on the locations of the light fittings.

Ensure that all elements of all lighting systems including lamps, lamp holders' luminaires and control components are compatible with all contractors designed electrical, electronic and radio frequency installations. Carry out site tests and demonstrate compatibility in co-operation with other system suppliers, as necessary.

Dwelling Areas	
Living room	Multi switching.
Kitchen	Multi switching. Separate switching for general and task lights.
Master Bedroom	Manual On/Off 2-way control @ bedhead.
Bedroom	Manual On/Off
Corridor	Manual On/Off Two ways switching
Bathroom / Toilets	Manual On/Off (Switching operates MVHR boost function)

	Separate switching for feature and task lights where a dwelling has a bath. Dwellings with no bath and are shower only, will be controlled via single switch only.
Storerooms	Manual On/Off

3.7 Small Power

Small power shall generally be fed from a new consumer unit.

General purpose outlets (GPO) within the dwellings shall be supplied upon ring circuits. A separate dedicated single ring circuit shall serve the kitchen outlets. The electric cooker hob and oven shall be supplied by dedicated radial circuits.

The system start point shall be a new consumer unit.

The contractor is to provide a fully working 230V distribution system for each flat in the development from the main electrical distribution system provided.

- Deliver a complete working installation that is safe, serviceable, robust, reliable, easy to maintain, and fit for purpose.
- Provide a fully working earthing and bonding system within each apartment.
- Carry out the installation, construction, and testing of all electrical systems in accordance with the Electrical Safety Council / NICEIC Technical Guide.

Provide final circuit distribution and interfaces for all electrical plant and equipment in each flat, including sockets outlets and connection points for loose appliances, loose electrical equipment, and fixed equipment within the building to provide:

- 25% spare capacity for future expansion
- power outlets as required, to be set out in conjunction with the Design Team and client
- all mechanical plant and equipment with power
- containment to suit the small power, lighting, fire alarm, data, AV, ELV, controls, etc. systems where necessary.
- containment and back boxes for the access control system
- power to the MVHR units

Compliance Requirements

- Statutory Acts
- The Electricity at Work Regulations 1989 (EAW Regulations)
- The Memorandum of guidance on the Electricity at Work Regulations 19891 (the Memorandum)
- The Building Regulations (England & Wales)
- Approved Documents Part M
- Domestic Building Services Compliance Guide
- Non-Domestic Building Services Compliance Guide
- Utilities Requirements of Distribution Network Operator (DNO)
- Industry Standards
- Chartered Institute of Building Services Engineers (CIBSE)
- Guide K: Electricity in Buildings

- Commissioning Code L: Lighting
- Lighting Guide 09: Lighting for Communal Residential Buildings 2013 (SLL LG9)
- Building Services Research and Information Association (BSRIA)
- Design Checks for Electrical Services (BG3/2006)
- BSRIA Power Quality Guide (AG2/2000)
- NIC/EIC technical guidance
- British Standards
- BS 6701 Telecommunications equipment and telecommunications cabling. Specification for installation, operation, and maintenance.
- EN 50174
- BS EN 50085-1:2005 Cable trunking systems and cable ducting systems for electrical installations. General requirements +A1:2013
- BS EN 50085-2-1:2006 Cable trunking systems and cable ducting systems for electrical installations. Cable trunking systems and cable ducting systems intended for mounting on walls and ceilings+A1:2011
- BS7671:2018: IET Wiring Regulations 18th Edition
- BS 9991:2015: Fire safety in the design, management, and use of residential buildings. Code of practice
- BS 9991- Code of practice for fire safety in the design, management, and use of buildings.
- BS EN 60439: Low-voltage switchgear and control gear assemblies
- BS EN 50173: Information technology - Generic cabling systems. General requirements
- Manufacturer's installation instructions and requirements, in particular
- Switchgear & Protection manufacturer
- ISO / IEC 11801: Principal design standard for structured cabling systems
- ANSI / TIA / EIA 568 standards
- NICEIC Technical Guidelines
- Installation practices are to also meet all applicable local and national codes, standards, and ordinances.
- European Committee for Electrotechnical Standardisation (CENELEC)
- Telecommunications Industry Association (TIA/EIA)
- International Organisation for Standardisation (ISO)
- Ensure that the structured cabling system is fully compliant with the fibre optic industry association (FIA) code of practice for the installation of fibre cables.
- Identify any instances where the proposed solution is not compliant with the above
- Carry out work in accordance with the manufacturer's requirements, guidelines, and recommendations.

Accessories are detailed in the schedule below.

3.8 Fire Alarm

The fire alarm system requirements have been detailed by Aico which has been appended to this specification.

Provide a full NICEIC test and inspection Installation Certificate for the system including all installed final circuits.

All testing and commissioning shall be properly and safely executed in accordance with sound practice, Health and Safety considerations and the Electricity at Work Regulations.

The contractor shall include for the complete testing and commissioning of the installations which must be to the complete satisfaction of the client's representative, fully demonstrating the performance of the installed systems.

All testing and commissioning shall be carried out in accordance with British Standards and with the relevant section of this document in the presence of the client's representative, on site, and were requested at the place of manufacture. Throughout testing and commissioning the contractor shall use certified calibrated and instruments and apparatus supplied by the contractor.

Where test parameters are not given results obtained equal to or better than the minimum standards set out in the British Standard shall be deemed satisfactory.

The client's representative shall have access at all reasonable times to such parts of the contractor's or his sub-contractor's works as may be necessary for the purpose of inspection, examining and testing of materials, workmanship, and performance of plant.

Except where stated in the specification or in the contract documents the Contractor shall provide all labour, materials, power, fuel test and access equipment for carrying out the tests specified.

Within six weeks of the contract works being let to the contractor he shall provide, for the agreement and approval of the client's representative, a comprehensive commissioning dossier giving full details of all tests to be carried out. The proposed method of recording of test information in respect of the plant and installations to be installed in the contract.

Prior to the anticipated commencement of commissioning works, the contractor shall resubmit the commissioning dossier, augmented and revised to suit any alterations or additions/deletions to the Scope of Works, which have been implemented during the contract period, for final approval of the client's representative.

The contractor shall give the client's representative a minimum of seven days' notice of his intention to carry out tests.

Additional tests may be carried out as requested by the client's representative during the Defects Liability Period. Tests shall only be requested in this period if equipment is not performing as specified. Should it be found, after re-testing, that the acceptance test criteria have not been maintained, then any additional costs incurred shall be borne by the contractor.

3.9 Inspection and Tests at Manufacturer's Works

Works tests shall be carried out such that due consideration is given to the conditions under which the equipment is required to function. The test certificates shall give all details of such tests.

All plant shall be subject to inspection and/or test at the manufacturer's works, as may be required by the engineer, insurance office or other body duly appointed by the client.

3.10 Inspection of Equipment

The contractor shall inspect all plant and equipment immediately on delivery and shall not accept any of it which is damaged.

Any plant, equipment and accessories found to be unduly marked by tools or damaged, corroded or distorted by any cause, shall be rejected by the client's representative and must be replaced by the contractor at his own expense.

Any damage considered repairable must be notified to the engineer for inspection before any remedial work commences. Remedial work shall only be carried out on the authority of the client's representative.

The contractor shall be responsible for protection of his work during the execution of the contract.

3.11 Test Certificates

Manufacturers and other Test Certificates are to be provided in duplicate for all systems, plant and equipment shall be submitted to the engineer during the testing and commissioning process. Additional copies shall be incorporated in the maintenance manuals as detailed elsewhere.

3.12 General

All testing and commissioning shall be properly and safely executed in accordance with sound practice, Health and Safety considerations and the Electricity at Work Regulations.

The contractor shall include for the complete testing and commissioning of the installations which must be to the complete satisfaction of the client's representative.

All testing and commissioning shall be carried out in accordance with British Standards CIBSE Guides and with the relevant section of this document in the presence of the client's representative, on site, and were requested at the place of manufacture. Throughout testing and commissioning the contractor shall use properly calibrated and certified instruments and apparatus supplied by the contractor.

Where test parameters are not given, results obtained equal to or better than the minimum standards set out in the British Standard shall be deemed satisfactory.

The client's representative shall have access at all reasonable times to such parts of the contractor's or his sub-contractor's works as may be necessary for the purpose of inspection, examining and testing of materials, workmanship, and performance of plant.

Except where stated in the specification or in the contract documents the contractor shall provide all labour, materials, power, fuel, and test equipment for carrying out the tests specified tests shall be on the site and/or off site as applicable to the test specified.

The contractor shall ensure that all test equipment utilised by himself or his representatives for carrying out the tests is adequately maintained and calibrated, and carefully handled and transported.

The contractor shall give the client's representative a minimum of seven days' notice of his intention to carry out tests.

The contractor shall allow for carrying out these testing and commissioning of the installation in sub-sections as may be necessary for technical purpose or to suit the construction programme.

Additional tests may be carried out as requested by the client's representative during the Defects Liability Period. Tests shall only be requested in this period if equipment is not performing as specified. Should it be found, after re-testing, that the acceptance test criteria have not been maintained, then any additional costs incurred shall be borne by the contractor.

Where commissioning tests are required to be carried out on specialist equipment and installations, the attendance of the Specialist Manufacturer/Installer, together with any specialist test equipment, shall be provided as part of this section of the works.

All commissioning personnel shall be properly trained and competent in the use of the instruments they are using.

3.13 Handover

Operation and Maintenance Instructions

Before the Date of Practical Completion, the Contractor shall provide three sets of Operating and Maintenance Instructions for all the installations included in the Contract.

These sets shall be adequately bound with board covers to withstand continual usage using a binder system which permits information to be removed for upgrading and allows new information to be added. The manuals shall contain an index and be divided into appropriately titled logical sections to the Client Representatives approval.

Each set shall incorporate a detailed description of the operating procedures for each installation and item of equipment, together with details of the regular maintenance routines recommended by the Manufacturer. Each item of equipment, together with typical fault-finding routes and a description of emergency action which should be taken in the event of breakdown of equipment. In addition, for reach item of equipment, a list of spare parts shall be given which the manufacturers recommended should be kept in store.

The manuals and instructions shall contain, though not be limited by the following information:

- Index
- Set of reduced A3 size prints from the "As Fitted" record drawings
- General description of the systems, equipment used and method of control systems.
- Schematic diagrams and control diagrams
- Schedule of routine maintenance
- Schedule of period maintenance for specialised equipment
- Schedules of method of adjustments, typical fault-finding routine.
- Wiring diagrams of plant etc
- Service manual for all specialised plant giving details as listed above.

- Separate from the service manual shall be duplicate sets of manufacturer's catalogues relating to specialised plant.
- Schedule of equipment giving name, address and telephone number of manufacturers, serial number of plants, horsepower electrical supply
- Description of emergency action which should be undertaken in the event of breakdown of equipment. Telephone numbers of essential contacts to include.
- Test and Performance Data
- Test Certificates
- Equipment and component characteristics such as C.T. curves, etc.
- Recommended spare's part list giving item description, part number and replacement time scale
- Health and Safety notes, advice, and declaration

3.14 Record Drawings

The Contractor shall provide, before the Date of Practical Completion, three paper prints. In addition, the contractor shall provide disks containing the drawings fully compatible with the latest version of Autocad to BS 1192.

The "As Installed" drawings shall show the following:

- 1:100 or 1:50 scale drawings and a system diagram of the complete installation showing all pipework and duct work distribution with the appropriate code letters and identification marks.
- The system diagrams shall record the values within the installation where appropriate.
- The location of the Supply Authorities connections provided within the Sub-Contract whether carried out by the Contractor or by the appropriate Authority, together with the points of origin and termination, size, and type of cables.
- The detailed layout of the plant rooms, meter rooms, tank rooms etc. Showing where appropriate all existing as well as those items installed under this Sub-Contract. The "As Installed" schematic diagrams of all circuits, pipework and duct routes etc. including all sizes and references.
- Complete schedules
- Manufacturer drawings showing the arrangement and assembly of component parts of all machines and any piece of equipment which may need servicing.
- Diagrams illustrating the principles of operation of automatic controls and of instrumentation, present in combination with any foregoing item.
- Manufacturers internal wiring diagrams for each piece of electrical equipment supplied under the Sub-Contract, together with physical arrangement drawings where necessary to locate and identify the component parts.
- Interface details with existing equipment or equipment installed separately from these works.

Two prints of each "As Installed" drawing shall be issued to the client's representative for approval prior to final issue.

The contractor shall provide reproduced "A3" size copies of all Record Drawings, perforated, and incorporated in rigid loose leaf type bindings with protective coverings, for inclusion in the Operating and Maintenance Manuals.

3.15 Employer's Training

The contractor shall include for training the client's designated personnel in the function, use and maintenance requirements of the systems. The training for each system must be carried out by persons having an in-depth knowledge of their function, operation, and maintenance.

The training shall be provided in two parts as follows:

- Outline demonstration of the key functions and operation of each system prior to handover.
- Detailed training and instruction on each system within three months of handover. The contractor should allow for a minimum of one-half day's training for each system as defined in the headings of Section 4 of this specification. Additional time should be allowed for complex or large systems.

The training should demonstrate all aspects of the installations to the satisfaction of the client's designated personnel.

The contractor shall be responsible for scheduling and programming the pre- and post-handover training to suit the client's designated personnel.

3.16 Maintenance Equipment and Special Tools

One complete set of all special spanners, tools, necessary for maintaining in good order the whole of the contract plant and equipment shall be supplied by the contract plant and equipment, shall be supplied by the contractor together with one suitably fitted container for the client's maintenance staff. The container shall be provided with a strong lock, for which four keys shall be supplied.

The spanners, tools, etc., supplied under this clause shall not be used during the erection of the plant, otherwise they will be rejected.

All heavy parts of plant shall be provided with some convenient means of slinging or handling during erection or overhaul, and items requiring extraordinary arrangements for removal for maintenance purposes shall be clearly identifiable, and the client's maintenance staff instructed on the procedures required to carry out such works.

The contractor shall allow in his tender for ensuring that all equipment which may require dismantling for normal routine maintenance purposes can be readily so done and the contractor may be required to prove to the client representative that dismantling and re-assembling can be carried out with a minimum amount of external work.

3.17 Spare Parts

A list of Spares recommended for one year's operation must be submitted by the contractor for inclusion in the Operation and Maintenance Manual.

3.18 Warranty and Maintenance

Warranty

It shall be deemed that warranty on the plant equipment and installation shall commence at the date of Practical Completion of the Contract Works (Building Works and Services Installations) unless specifically otherwise agreed by the client's representative in writing.

The contractor shall warrant all materials, plant, equipment, and systems installed against fault, failure and incorrect or inadequate performance for a period of twelve calendar months from the date of practical completion.

The warranty shall include all replacement parts, equipment, and labour. The contractor shall allow for carrying out warranty work outside normal working hours as necessary to suit the client's operation of the building. The contractor shall provide a single point of contact for reporting faults and problems which occur on all systems.

Typical Client Equipment Requirements- All subject to samples and client approval.

Intercom	Travis Perkins	ENTROTEC ED3 DOOR ENTRY HANDSET
Wireless doorbell	Travis Perkins	DOOR CHIME KIT WIREFREE PORTABLE 6 TUNES C/W HALO LIGHT 150M GREY DC315NG
Fire Alarms	TBC	Aico Fire alarms
Switches/Sockets	CEF	13A 2G Ingot Sw Sock 2X2.1A Usb(4.2A) Brushed Ch
	CEF	13A Ingot 2 Gang Dp Switched Socket Brushed Ch
	CEF	13A Ingot 1 Gang Dp Switched Socket Brushed Ch
	CEF	Single Coaxial Outlet - Brushed Ch
	CEF	10AX Ingot 1 Gang 2 Way Plate Switch Brushed Ch
	Toolstation	Axiom Switched Socket 2 Gang Single Pole Brushed Ch
Spotlights	CEF	10 W LED GU 10 TBC
LED lights	CEF	230V Gu10 Twin Bar Spotlight- Brushed Ch
		230V Gu10 Quad Bar Spotlight - Brushed C
Nest	Travis Perkins	(722877) NEST 3RD GEN THERMOSTAT T3028GB ST STEEL- optional add on costs below the tender line.
Stainless steel plate for nest	Amazon	Round 6" Wall Plate Cover
Intercom	Travis Perkins	ENTROTEC ED3 DOOR ENTRY HANDSET-TBC by client team.

Please note that the intercom and lighting shall be confirmed by the client and technical submissions will be required from the contractor for approval.

Appendix I

Client Details	Lancaster West – LD1 with Gateway Program
System Overview	A fire detection system to a grade D1 category LD1. Using 3000 series alarms including a control switch and SmartLINK Gateway all connected via RF interconnection.
Property Type	General needs
System Type	FIRE DETECTION AND ALARM SYSTEM - To be carried out in accordance with BS 5839-6:2019 Installation of Fire/ Detection and Alarm Systems in Dwellings. - The system shall be installed with the purpose of providing an appropriate level of protection to occupants. - Grade D1 systems shall be installed within all properties providing that no floor level exceeds 4.5m in height above ground level, and unless otherwise specified. - All systems shall be installed to meet the level of protection afforded by a type LD2 system, unless otherwise specified. - Smoke/ Heat alarms shall be manufactured to satisfy the requirements of BS EN 14604: 2005 and BS 5446: Part 2:2003, respectively. CARBON MONOXIDE ALARMS - The Carbon Monoxide alarms shall be manufactured to satisfy the requirements of BS EN 50291-1:2018 - The Carbon Monoxide alarms shall be installed in accordance with the requirements of BS EN 50292: 2013.
Level of Protection	Minimum Protection Category - LD1
Alarm Power / Back-up	Mains Powered with Lithium Back-up - Grade D1 - Alarms are powered from the mains power supply but will automatically switch to Lithium Rechargeable back-up cell if the mains power fails. The Lithium cells will last the life of the alarm (10yrs) and are completely tamperproof.
Alarm Interconnection	Radio-Frequency Interconnection - Uses radiofrequency (RF) signals to link the alarms instead of having to run cabling between them. - A SmartLINK Module shall plug into the back of each alarm. This shall allow the alarms to communicate wirelessly, sending a RadioLINK transmission to each alarm in the property and trigger them in the event of activation or Test. With the SmartLINK Module in each device you shall have the ability to receive information on a tablet or laptop giving information on the health of the alarm, run time, and other key information. - SmartLINK Module – Ei3000MRF

TACE
Lancaster West Estate – Verity Close
Stage 2 Report House / Flat Fit Out

	- USB dongle and software enabling initial programming of RF smart link modules. Also enables subsequent remote diagnostics/data extraction without requiring access to the dwelling.
Alarm Types	All alarm types (Multi-Sensors and Heat) shall include the following features: - Alarms shall be radiofrequency interconnected - Multi-Sensor Fire Alarm, Multi-Sensor Heat & CO and Heat type, mains with rechargeable lithium cells as specified – Ei3024 + Ei3000MRF, Ei3028 + Ei3000MRF EI3014 + Ei3000MRF - Ei3024 + Ei3000MRF is to be installed in the principle habitbale room (Living rooms), circulation spaces of the escape routes and bedrooms - Ei3028 + Ei3000MRF is to be installed in the kitchen with a gas applience, if there is no gas applience a Ei3014 + Ei3000MRF is to be installed, - Alarms are to be suitable for interconnecting with at least 10 other units. - A full function test, locate and hush button either on unit or as well as a wireless wall mounted RF unit – Ei450 - Remote Test/Hush button to be fitted in hall on main escape route and be in full view. This should not be installed in the cupboard without prior confirmation from the Contract Administrator. - The Multi-Sensor Fire Alarm, Multi-Sensor Heat & CO and Heat alarms must be capable of producing a sound level which measures 85 dB(A) at a distance of 3 metres from the source. - Carbon monoxide alarms must be capable of producing a sound level of which measures 85 dB(A) at a distance of 1 metre from the source. - The product life cycle should be sufficient to ensure at least 10 years of life from manufacture date code - All Multi-Sensor Fire Alarm, Multi-Sensor Heat & CO, and Heat alarms in the 3000 series shall include Audio LINK data extraction technology which via the AudioLINK APP allows real time data to be sent to a smart Phone or tablet. This will be in the form of a colour coded alarm status report. - The alarm should monitor for loss of battery voltage, giving a visual and audible alarm both with and without AC power, for 30 days, where applicable from a fully charged status otherwise 72Hrs to comply with BS 5839-6:2019 as a minimum. - A continuous green AC mains indicator is to be fitted along, where applicable, with a red alarm status indicator. - All Multi-Sensor Fire Alarm, Multi-Sensor Heat & CO and Heat alarms shall be installed in accordance with manufacturer's instructions and shall be placed away from corners and walls by at least 300mm and away from light fittings or decorative objects which may obstruct smoke from entering the smoke alarm. – If there is a specific requirement to wall mount alarms, prior consent shall be necessary from the Contract Administrator. - The Multi-Sensor Fire Alarm, Multi-Sensor Heat & CO and Heat alarms, where applicable, shall be provided with a surface mounted base plate with integral terminal block and cable cover and incorporate a foam gasket fitted to base plate to prevent dust ingress into the unit, the alarm should connect automatically as it locates on to the base plate without the requirement for a lead and connector.

	- The supply for the mains powered alarms shall be taken from an electrically protected, regularly used local lighting circuit at the nearest source except for when the house is being rewired, then the supply will be taken back to the consumers unit and connected to the same MCB as the local lighting circuit, confirmation of connection method shall be provided from the Contract Administrator. - All detectors and ancillary components shall have an RF interconnect capability for wireless interconnection and control. - All cabling shall be as specified in Clause 411 and shall be installed in accordance with the requirements of BS 7671:2018 18th Edition IEE Wiring Regulations and connected in accordance with the manufacturer's recommendations.
SmartLINK Gateway	GSM Gateway device to be installed capable of sending alarms signals offsite – Ei1000G - Gateway unit power to be derived from the public electricity supply to the premises. - Gateway unit should be fitted with a battery backup capable of powering unit for 72 hours in absence of mains power. - All digital communication sent remotely from gateway to feature AES 128 encryption. - Gateway unit to feature a regular heartbeat message to ensure connectivity to internet. - Gateway unit to feature mains power indicator. - Gateway unit to feature GSM connectivity indicator. - Gateway unit to feature House Coding RadioLINK indicator. - SIM protection should be enabled to stop malicious use of the SIM card within the Gateway. - Gateway unit should be capable of roaming over all UK mobile telecoms networks. - Gateway unit should be capable of sending real-time Fire notifications via SMS and email - Gateway unit should be capable of sending real-time CO alarm notifications via Email and SMS. - All Gateway unit events to be securely stored in cloud-based storage. - Gateway unit should be capable of working in mesh RF network. - Gateway unit should feature an installation app allowing complete installation and historic installation details. - Gateway unit installation app should be capable of sending installation reports. - Gateway unit should feature a 5-year manufacturer's warranty. - Gateway unit should feature an external antenna for improved GSM signal. - Gateway unit should feature an external reset switch

	- Gateway unit should be capable of receiving OTA firmware updates - Gateway unit should allow battery backup to be enabled via physical switch.
Technical Specification	Type 1 – Open plan with Gas Location 1 – All forms of circulation spaces and escape routes - Multi-Sensor (Model Ei3024) with SmartLINK Module (Ei3000MRF) Location 2 – Kitchens (open plan) - Multi Sensor Heat & CO Audio/ Smart Link (Model Ei3028) with SmartLINK Module (Model Ei3000MRF) Location 3 – Habitbale room (Open plan / Living room) - Multi-Sensor (Ei3024) with SmartLINK Module (Ei3000MRF) Location 4 – Bedrooms - Multi-Sensor (Ei3024) with SmartLINK Module (Ei3000MRF) Location 5 – Hallway - Alarm Controller (Model Ei450) Location 6 – Hallway - Aico Gateway (Model Ei1000G) powered 230volt permanent supply ideally by an unswitched spur Type 2 – Open plan no Gas Location 1 – All forms of circulation spaces and escape routes - Multi-Sensor (Model Ei3024) with SmartLINK Module (Ei3000MRF) Location 2 – Habitbale room (Open plan) - Multi-Sensor (Ei3024) with SmartLINK Module (Ei3000MRF) Location 3 – Bedrooms - Multi-Sensor (Ei3024) with SmartLINK Module (Ei3000MRF) Location 4 – Hallway - Alarm Controller (Model Ei450) Location 5 – Hallway - Aico Gateway (Model Ei1000G) powered 230volt permanent supply ideally by an unswitched spur Type 3 – Dwelling with separate rooms Location 1 – All forms of circulation spaces and escape routes - Multi-Sensor (Model Ei3024) with SmartLINK Module (Ei3000MRF) Location 2 – Kitchens If Gas cooker and Boiler is present in the kitchen area (open plan/separate kitchen) - Multi Sensor Heat & CO Audio/ Smart Link (Model Ei3028) with SmartLINK Module (Model Ei3000MRF) - Or Heat Alarm (Model Ei3014) with SmartLINK Module (Model Ei3000MRF) if Gas is not present

	Location 3 – Habitbale room (Living room) - Multi-Sensor (Ei3024) with SmartLINK Module (Ei3000MRF) Location 4 – Dining room - Multi-Sensor (Ei3024) with SmartLINK Module (Ei3000MRF) Location 5 – Bedrooms - Multi-Sensor (Ei3024) with SmartLINK Module (Ei3000MRF) Location 6 – Hallway - Alarm Controller (Model Ei450) Location 7 – Hallway - Aico Gateway (Model Ei1000G) powered 230volt permanent supply ideally by an unswitched spur To include for the setting up of the interconnection of the Radio Links between all devices (House Coded) to follow instruction on SmartLink App (available free App Store). UPRN and login prior to commencing work.
System Installation	TRAINING - All Installers will have to been trained by the manufacturer and be registered on their Expert Installer Trained scheme, familiar with all products as required for the scheme. Any project specifics shall be confirmed by the Contract Administrator prior to Installation works commencing. INSPECTION AND TESTING: - After satisfactory completion of tests relevant test documentation should be submitted. - Electrical Certificates to be as the current version BS 7671 or as amended. - Copies of Electrical Test Sheets to be left alongside the consumer unit for the installation. INSPECTION AND TESTING OF FIRE ALARM SYSTEM: - To BS 5839-6:2019 and in accordance with the manufacturer's recommendations. - Give not less than 24 hours' notice before commencing tests. - After satisfactory completion of tests relevant test documentation should be submitted. - Certificates to be as BS 5839-6:2019 Annexe E for smoke/heat alarms. - Provide user instructions in accordance with BS 5839-6:2019 Clause 24. INSPECTION AND TESTING OF CARBON MONOXIDE ALARM - Carbon monoxide alarms should be tested in accordance with the manufacturer's instructions. - User instructions should be provided for the occupier.

TACE
Lancaster West Estate – Verity Close
Stage 2 Report House / Flat Fit Out

Appendix II - SAP Report on Pilot House 54

FULL SAP CALCULATION PRINTOUT
Calculation Type: New Build (As Designed)

KAMELEON Building Analysis

Property Reference	54 Verity Close			Issued on Date	01/04/2022
Assessment Reference	Opt 8 ASHP+Min PV+Amended U-Va			Prop Type Ref	54 Verity Close
Property	54 Verity Close, W11 4HE				
SAP Rating	92 A	DER	9.36	TER	24.48
Environmental	93 A	% DER<TER	61.76		
CO_2 Emissions (t/year)	0.63	DFEE	61.97	TFEE	48.90
General Requirements Compliance	Fail	% DFEE<TFEE	-26.73		
Assessor Details	Mr. Andrew Hart, Kameleon Building Analysis Ltd, Tel: 07985 477 976, a.hart@kameleonbuildinganalysis.com			Assessor ID	T126-0001
Client	Tace				

Minimum PV = 2.3kWp to achieve an EPC A

Appendix III - Drawings

Please refer to appendix A14 for TACE's drawing package.

6.0 CDM

6.0 CDM

Report prepared by Mark Allen of Derisk UK.

BACKGROUND ACTIVITIES

In addition to the surveys described in Section 1.5, localized asbestos surveys have also been undertaken to the communal areas within Verity Close. Further internal & external asbestos refurbishment surveys will be required to satisfy the requirements of the Control of Asbestos Regulations 2012 which will include individual properties.

During RIBA 1 & 2, Derisk has conducted several site walk rounds into the communal and public areas of Lot 6, with and without attendance of ECD Architects. Observations have been made and comments passed to the Project Team regarding the practicalities of carrying out the proposed works and ECD Architects have referenced a number of these within the RIBA Stage 2 report.

Derisk have chaired both Logistics and Working at Height workshops with ECD Architects to support them in considering the construction risks of their proposed materials and also to consider the impact of construction operations on the residents of Verity Close. Refer to appendix 8.1 for the Lots 3, 5, & Site Logistics Information document.

CDM / Health & Safety risk are currently being recorded in the Lot 4 Project Risk Register (Appendix A15) and separately within the Site-wide CDM Risk Register. The contents of this shall be extracted and developed further in a Lot 6 CDM Risk Register as RIBA 3 progresses.

General and focused design team meetings have taken place over the RIBA 2 period which includes specific fire strategy meetings chaired by IFC. A comprehensive Fire Classification / Material Non-Combustibility Tracker has been produced and appended to this report.

CONSTRUCTION RISKS

There are expected to be several contractors undertaking works concurrently once refurbishment works begin. ECDA will work closely with the LWE Team to ensure that they (a) cooperate with one another; (b) coordinate their work; and (c) take account of any shared interfaces between the activities of each project (e.g. shared traffic routes). It is of key importance that where there are shared interfaces (as there will be within the close) that one contractor is responsible for retaining control over these areas.

Interface with other projects (particularly the Internal refurbishment and void works) – all planned works that may impact upon these works (such as the refurbishment of voids within the close) are closely managed to prevent any clashes or interference. Derisk are involved with the separate Internal refurbishment programme and will assist the LWE Team to develop programmes and specifications that cause minimum disruption to the Lot 6 works and ultimately to the residents.

Residents remaining in their homes during the works. All works where possible will be carried out without requiring residents to leave their homes. Works to the services systems will include localised isolations so that residents retain power, water, lighting etc. as much as possible. Inevitably though there will be some aspects of the works carried out that are simply not safe enough to be undertaken with residents remaining in their homes, such as asbestos removals for example. The temporary relocation of residents is being discussed with the Estate team, with proposals developed over the coming weeks in full consultation with residents.

Asbestos containing materials are noted to be present within the buildings. Though currently being managed by the Estate team these are proposed to be removed during the refurbishment works unless it is deemed acceptable to retain (encapsulate) it through the process of risk assessment. Asbestos is an extremely hazardous material and for the safety of all persons on the estate all works will be carried out in strict accordance with the Control of Asbestos Regulations 2012.

All works where possible will be undertaken without the need for site operatives to work at height to reduce the risk of falling materials and tools around residents. However there are many elements of the works that cannot be undertaken from ground level and so suitable access platforms will be used. These are likely to include scaffold and tower scaffold systems, and traditional ladders and step ladders. All present different risks to residents and site staff, however construction methodologies will be considered during the design phases to ensure that the hazards and risks are outlined and controlled.

RBKC as the Client (for the purposes of CDM 2015) are required to ensure that the contractors put in place suitable welfare (toilets, hand washing facilities, changing areas, water supply, etc.) during their works. Due to the numbers of persons proposed to be undertaking these works it is unlikely that use of nearby void properties will be suitable, and defined welfare areas or cabins will be required. These will need to be sited close to the close and so parking spaces or small areas of the landscape may need to be temporarily closed to accommodate.

Larger construction works will require an area or compound to house offices, cabins, material storage, tools and plant etc. Due to the limited space available around the estate this may impact upon existing parking areas or the landscaping as discussed above.

Security – contractors are required to ensure that their sites are kept separated and secure from persons other than their own staff. This will require physical and electrical security measures to be installed around the close which may impact upon residents free movement around the estate. All proposals for alarm systems, herras fencing, hoarding, etc. will be reviewed by Derisk and the wider Project Team.

Logistics and waste removal. The works will increase vehicle traffic around the estate and the carrying of waste and other materials to the work areas will present a hazard to residents. Derisk and the Project Team will support contractors to develop their waste management and logistics plans to ensure that they impact upon residents as little as possible. All proposals will be considered by the Project Team and developed in consultation with residents.

600mm skirt around floor slab for External Wall Insulation -the excavation works are likely to be disruptive for residents. Works will be carefully controlled by contractors to ensure that the following key issues are duly addressed – persons falling into excavations // undermining nearby structures (properties) // contact with underground & adjacent services // inflow of surface water // damage to trees & gardens in addition to the references made by ECDA within this report.

Temporary roof – is likely to be required if stripping back and installation of external insulation is required. Scaffold is very likely to be required to the front, back and gable ends of properties. Where a roof is being worked upon that adjoins a neighbouring roof then additional guard rails spanning both roof elevations will also be required to provide edge protection for operatives.

General scaffold – is likely to be required to provide a safe working platform for operatives when working at height. The standards (vertical poles) and braces will be positioned within gardens and outside doors & windows, however the scaffold designer will ensure that the designs minimize impacts to residents. Scaffold is legally required to be inspected at a minimum of once a week, and protections will be in place to stop non-site personnel from accessing scaffold. Scaffold is costly and is a hazardous activity to erect, modify, and remove (strike) – therefore it is likely that the scaffold system will be in place for an extended period of time whilst the works are undertaken, however all works on site will be undertaken as quickly as can be safely undertaken.

Loft insulation – all loft rooms will need to be cleared prior to this aspect of the

works being undertaken. Lancaster West Neighbourhood Team and the eventual contractor will be able to provide support to residents who may be unable to do this themselves. As ECD Architects have advised, for safety reasons these rooms must be vacated during the internal loft insulation works. An assessment will also be made of access requirements for non-habitable loft voids, access hatches may need to be temporarily enlarged and other access equipment installed for operatives to safely access some loft spaces.

Window installation – operatives will require a clear route through properties to the internal areas of the rooms receiving new windows. Specialist manual handling tools will be used to reduce any risk of dropped windows however residents will need to temporarily stay clear of access routes and work areas during this activity. Though likely to be installed internally, new windows will usually require external access for sealing and 'making good'. It is anticipated that this is likely to be carried out by scaffold on storeys above the ground floor as ladders are not preferable to be used in this situation.

Photovaltaic panels (PV) – these will most likely be installed alongside the roof refurbishment, however installation, cleaning and maintenance of these is an activity that requires working at height. The manufacturers requirements will be adhered to, however ECD Architects as designers do have a legal responsibility for considering how they can be safely operated. ECD Architects are aware that access requirements need to be considered, not all PV locations may safely accommodate a mobile scaffold tower or mobile elevated work platform (MEWP) for example. Work at height equipment carries risk to both the user and residents of Verity Close, the methodology for these activities will be risk assessed by ECDA / Derisk and the project team.

Installation of MVHR units and pipework – access routes to and in the work areas will need to be kept clear, residents may be required to vacate the area temporarily during this activity.

7.0 NEXT STEPS

7.0 NEXT STEPS

This RIBA Stage 2 report builds on the findings and surveys undertaken during our RIBA Stage 1 and sets out our current design options.

This report also highlights and summarises the Initial Design Ideas co-design Phase 1 engagement events, and the Phase 2 – Emerging Preferences and choices events so far.

NEXT STEPS DURING RIBA STAGE 3

For the next steps ECD will need to develop the following items in association with LWNT, the residents and the deisgn team:

- Phase 3 Consultation Event
- Pre-Planning Application Meeting
- Confirmation of EWI system by LWNT to enable the team to prepre a planning submission
- Secure Party Wall Agreements particularly for No 54 Verity Close
- Update proposals to reflect comments made by the planners and the Phase 3 Consultation event
- Retrofit Assessments of all properties. LWNT to arrange access to properties to enable Keegans to undertake surveys.
- Plannng Application Submission
- H&S Workshop
- Programme update: LWNT to provide timescales for approvals and consultations and ECD to update accordingly.

Further Building Investigations:

- Confirm structure to properties- particularly roof structures-
- Confirmation of existing services routes
- Additional Fire Risk Assessments, Type 4, including Compartmentation and risers surveys
- Further Asbestos Surveys, as required for the Fire Risk Assessments or other intrusive investigations_
- Air permeability testing of a few homes will allow more accurate figures to be put into the PHPP models of the homes, giving a better understanding of both the current heat demand and how effective particular interventions might be at reducing this.

ECD Architects
ENERGY CONSCIOUS DESIGN