

The Scottish Government's
Net Zero Public Sector Buildings Standard

Retrofit of the Historic Estate

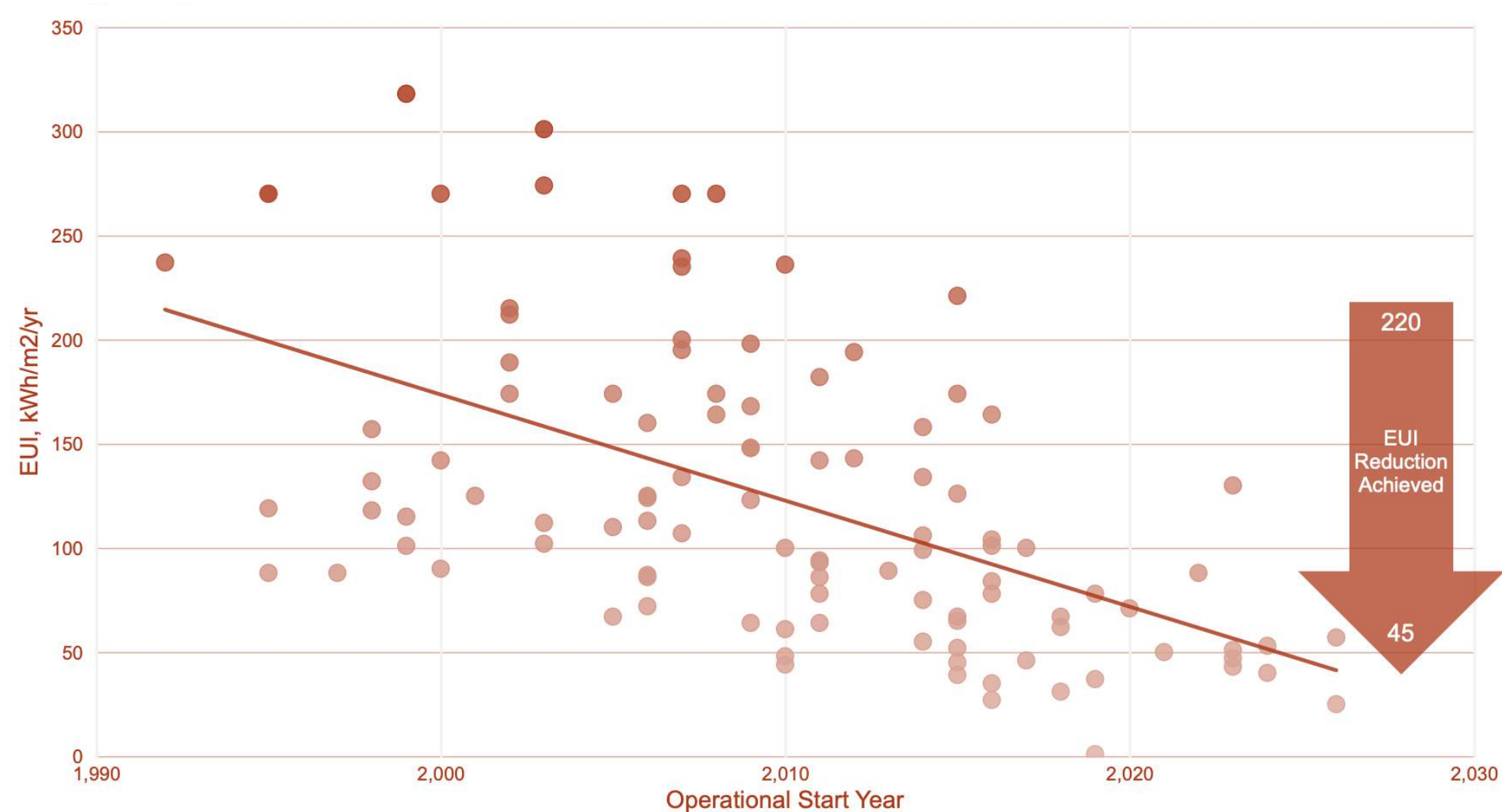
Ann-Marie Fallon
Associate Director
Architype



SCOTTISH
FUTURES
TRUST



40 years of sustainable design and data

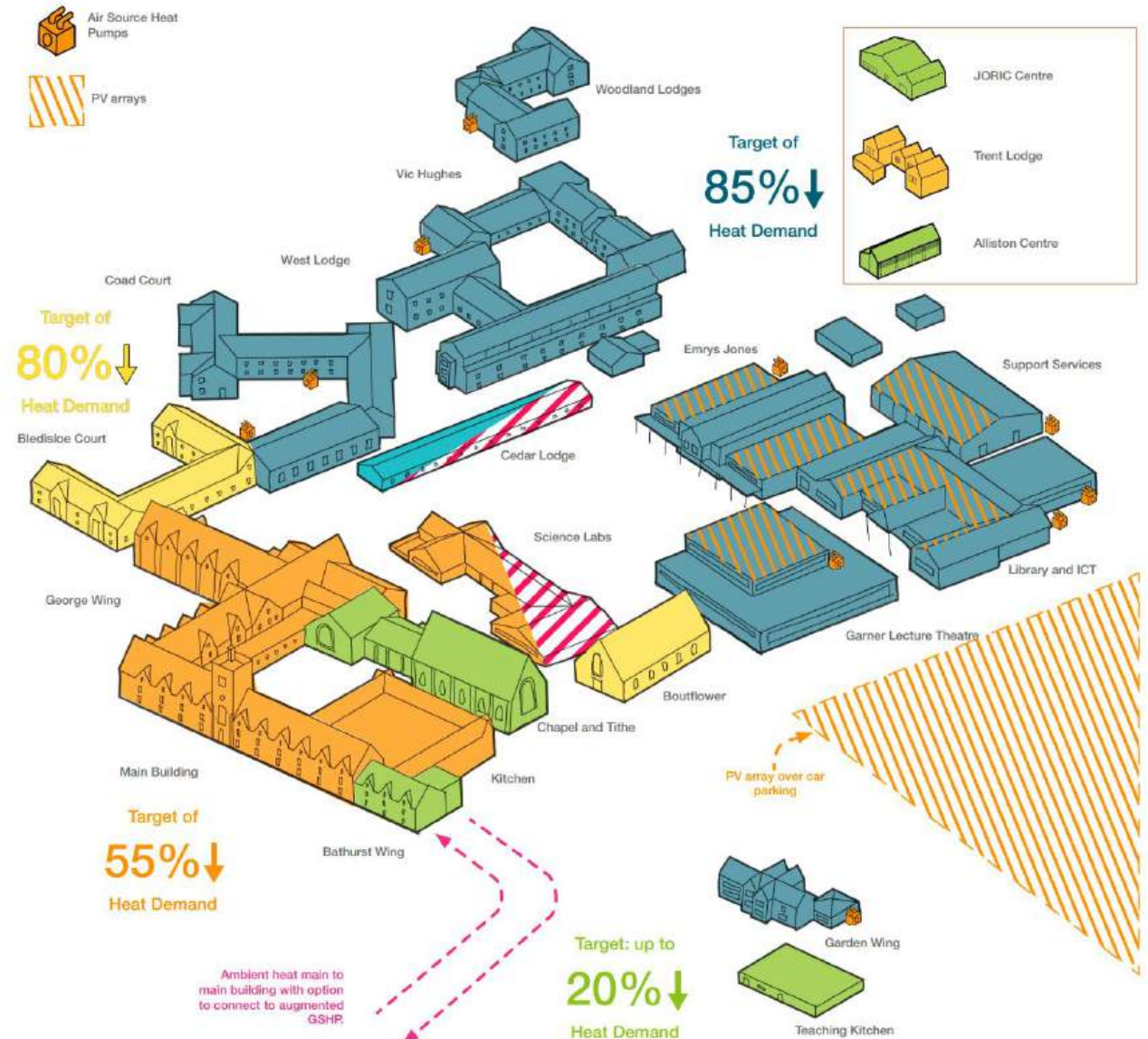


Archetype EUI reduction – 162 buildings over 40 years

Centralised Estates

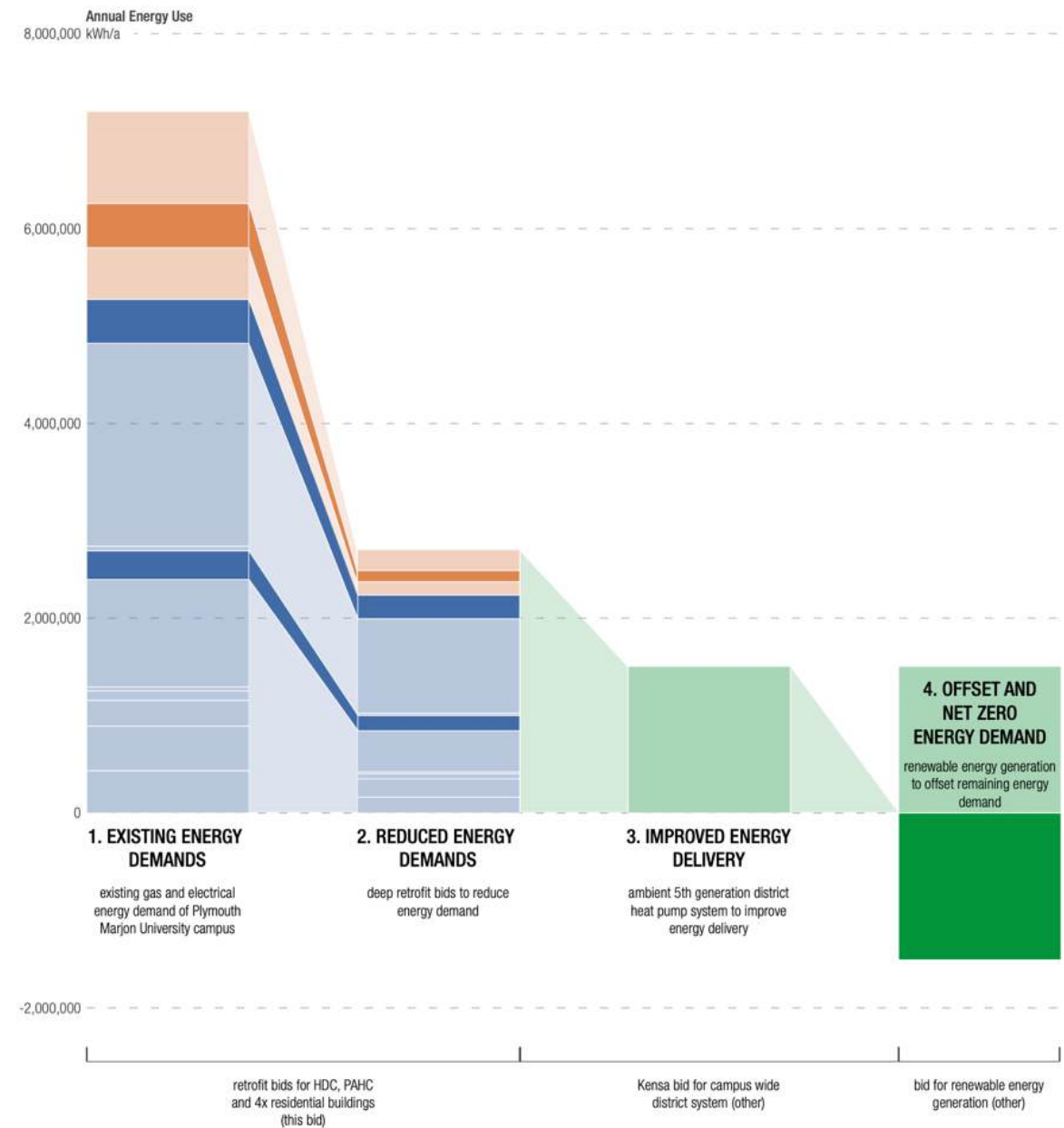
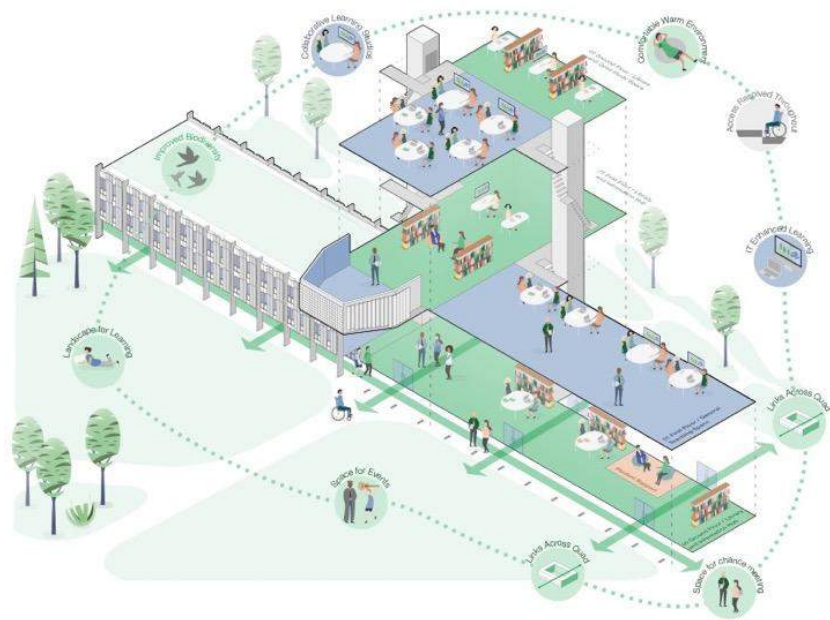
Royal Agricultural University - Cirencester

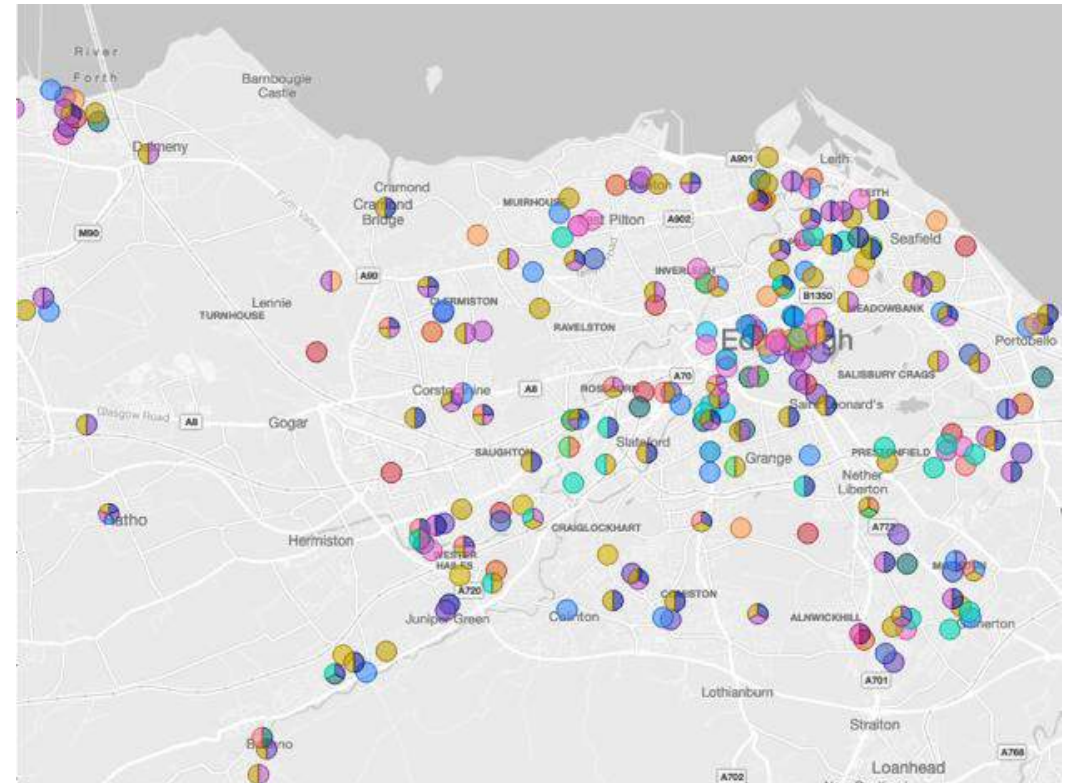
- 1/ As Is** - 13% of Floor Area
Some buildings on the estate are of such significant architectural merit that proposing alterations is unrealistic. Performance of these buildings can be improved through reconsideration of their seasonal use patterns, and existing heating and cooling solutions / controls.
- 2/ Re-cladding** - 1% of Floor Area
One identified building is structurally sound and of a form and format that is conducive to ongoing use, but the building fabric is poor. It is understood this building will receive additional insulation in forthcoming works, acknowledging that the building may be replaced in due course.
- 3/ Over-clad (EnerPHit)** - 48% of Floor Area
The majority of buildings are of structure, form and building fabric that can be clad over the top of the existing to achieve a very high-performing fabric that could target the EnerPHit standard.
- 4/ Internal Insulation (towards Enerphit)** - 7% of Floor Area
Many buildings carry sufficient architectural merit and site positioning that it is desirable to retain the external appearance, however, internally are suitable for progressive levels of retrofit, and could target the EnerPHit targets for dramatic improvements.
- 5/ Internal Insulation** - 31% of Floor Area
Some buildings are of sufficient architectural merit that it is not desirable to impact the external appearance of them. In these cases thermal efficiency can be improved by providing additional insulation and often secondary glazing to the interior face of the building envelope.
- 6/ Demolishing**
Some buildings on campus are at the end of their useful life, or are not appropriate to retrofit and need demolishing.



Centralised Estates

Plymouth Marjan University





De-centralized estates

2021 EnerPHit informed retrofit study

2021

- CEC estate wide study leading to building level assessments
- Green growth accelerator funding - led to 3 pilot projects

2022-2023

- Similar studies 6 other Local Authorities – 35 buildings including pools

2024

- Angus estate wide study – 96 buildings

East Ayrshire



Hub East Central



Renfrewshire



Perth and Kinross



Midlothian

Moray



Edinburgh – Initial 12 building study



De-centralized estates

2021 EnerPHit informed retrofit study

2021

- CEC estate wide study leading to building level assessments
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2022-2023

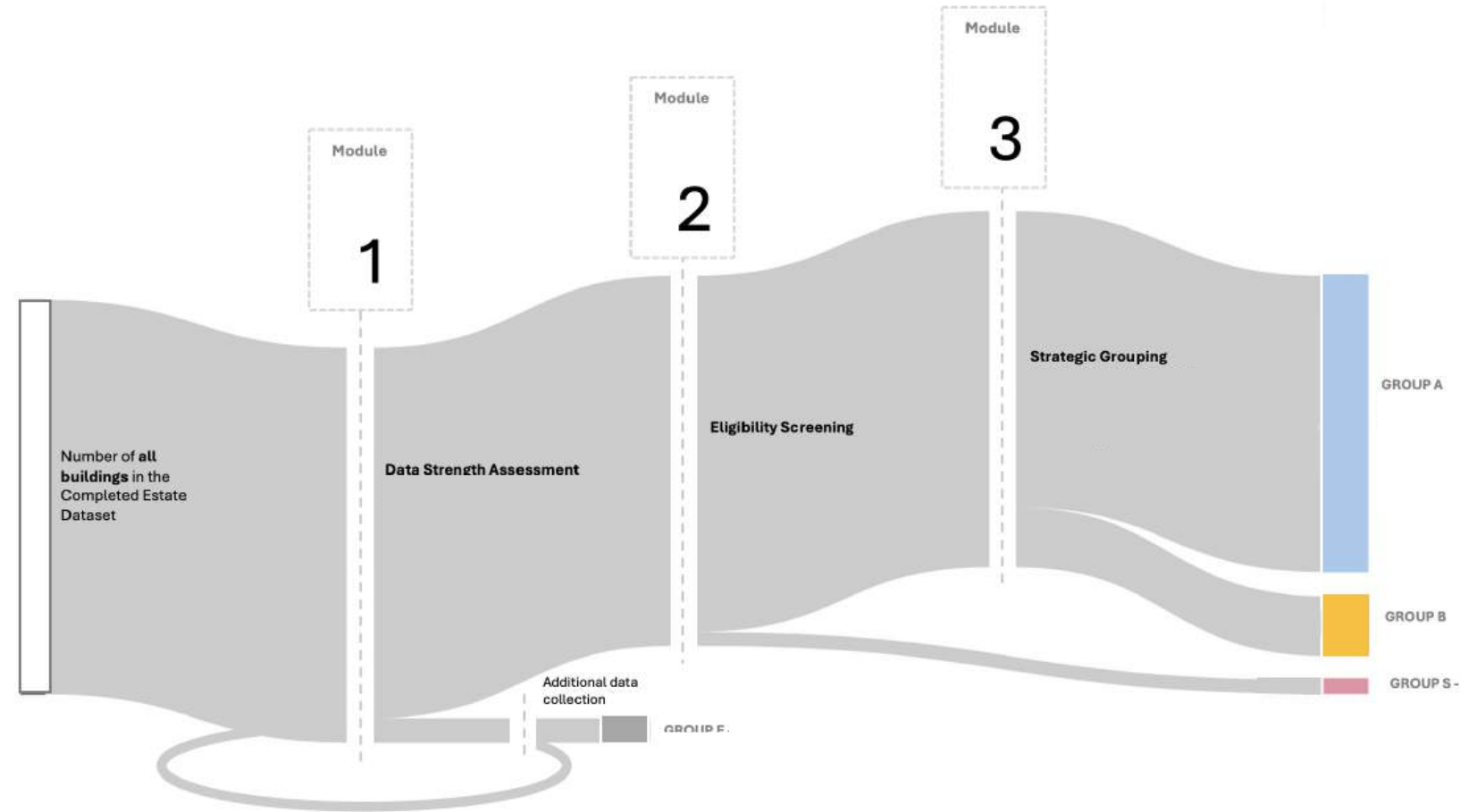
- Similar studies 6 other Local Authorities – 35 buildings including pools

2024

- Angus estate wide study – 96 buildings

2025

- Toolkit for estate decarbonization and retrofit – all estates



Liberton Nursery Retrofit

Client: City of Edinburgh Council

Contractor: Maxi Construction

Appointment: Architype as Architects
(incl CA role), Lead Designer,
Passivhaus Designer, PD

Current Stage: RIBA Stage 7

Design Team: New Acoustics G3
Harley Haddow

ARCHITYPE PERFORM⁺



Liberton Nursery Retrofit

Existing Building Analysis



[illegible]

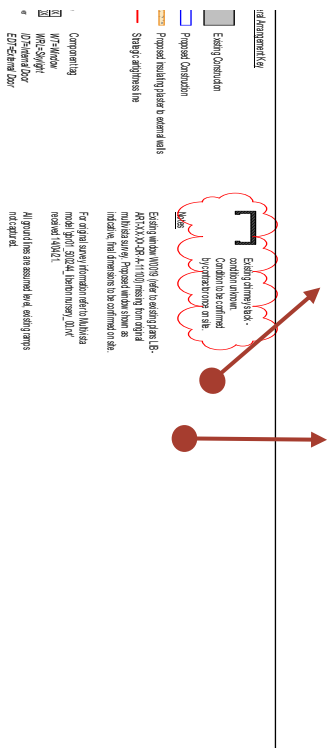


Legend

- Existing Condition
- Proposed Condition
- Proposed Condition to be removed
- Proposed Condition to be added
- Proposed Condition to be removed
- Proposed Condition to be added

Existing Condition -
Condition to be removed
Condition to be added
Condition to be removed





Liberton Nursery Retrofit

Existing Building Analysis

Air Permeability
13.2 m3/hr/m2

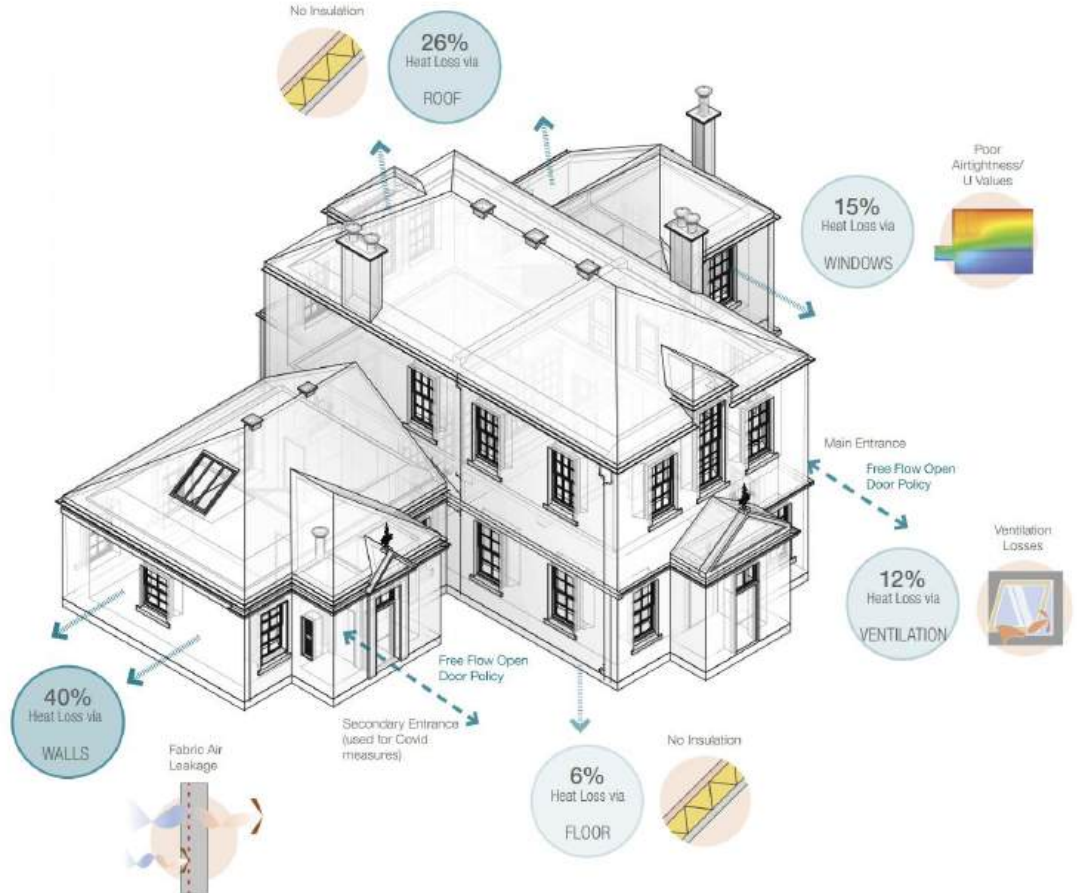
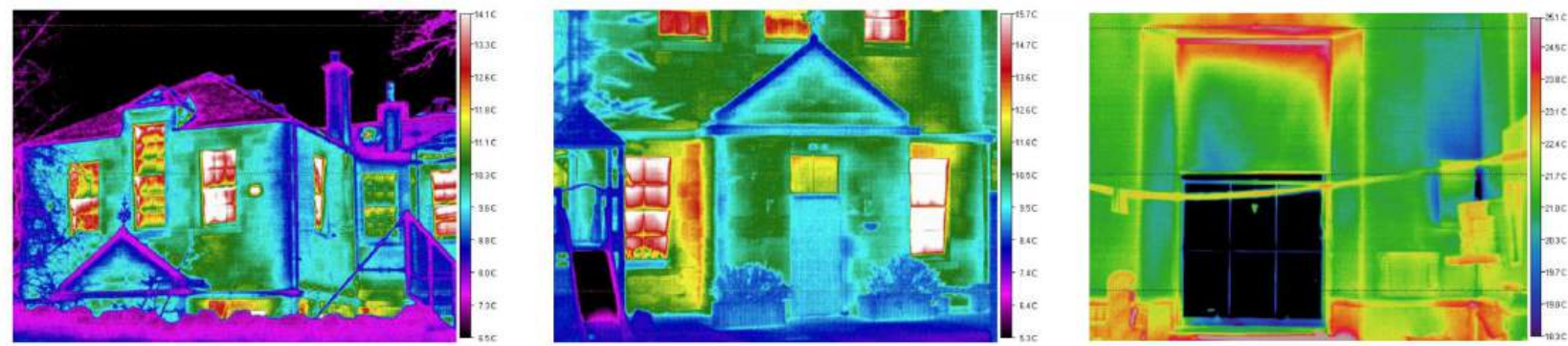


Fig. 112 / Heat loss distribution by building component in Liberton Nursery.



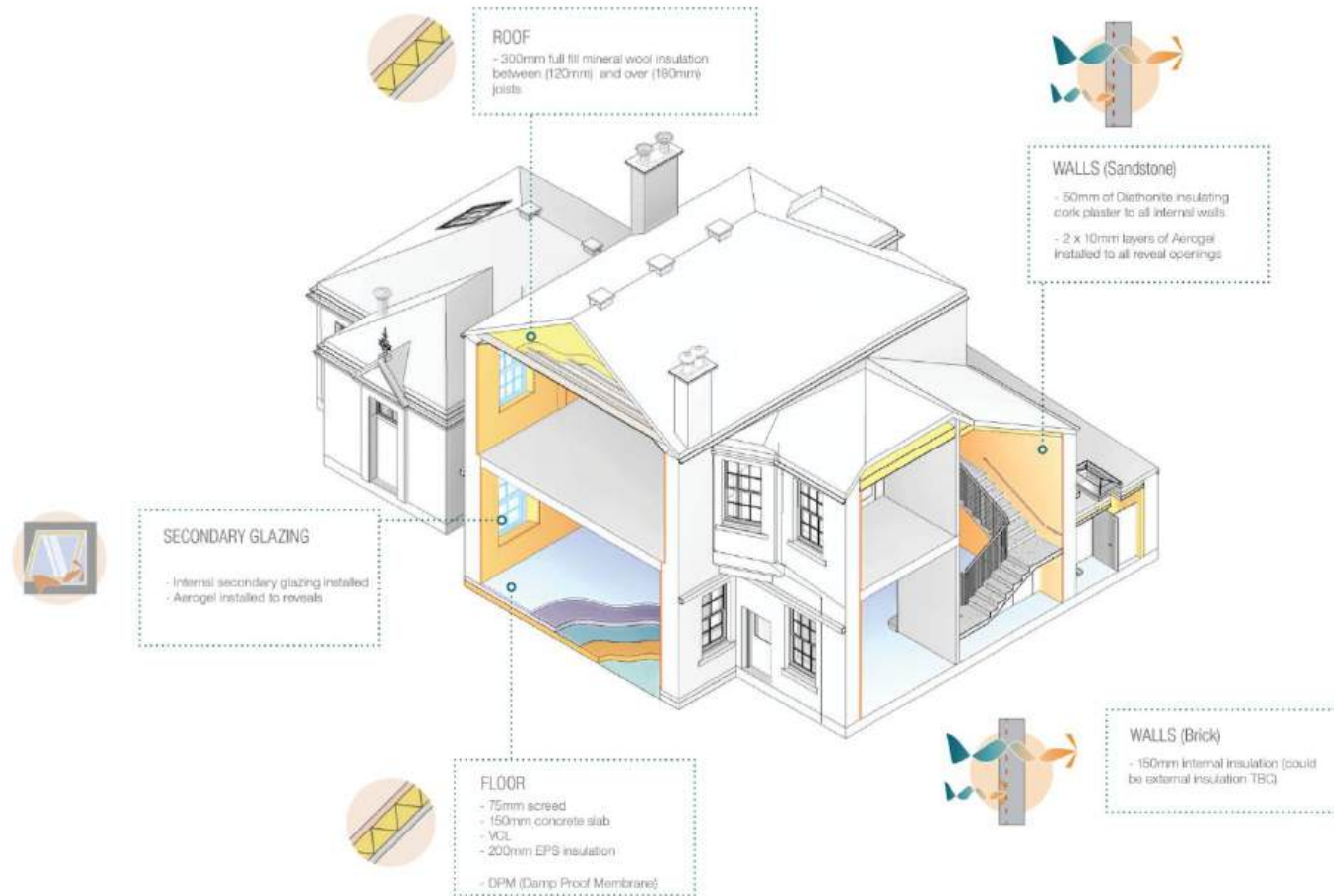
Liberton Nursery Retrofit

Existing Building Analysis

'Middle Road'
Better airtightness
+ MVHR / MEV
(Av. temp: 17.3 / 17.4°)

- Installation of ASHP
- Wall Insulation
(50mm to Sandstone,
150mm to Brick)
- Loft (300mm) & floor
(120-150mm) insulation
- Secondary glazing
installed
- Airtightness:
3 - 3.4 ach
- MVHR system (non-
certified unit) / MEV

Fabric Interventions Required



Liberton Nursery Retrofit

Existing Building Analysis



Liberton Nursery
(existing)

Heating
Demand

340
kWh/m²a

Heat Load

163
W/m²

Airtightness

13.2 m³/hr/m²
or
12.6 ACH

Liberton Nursery Retrofit

Existing Building Analysis



Liberton Nursery
(existing)

Heating
Demand

340
kWh/m²a

Target
Performance
at Stage 2-4

123
kWh/m²a

Target
Performance
at Stage 5

130
kWh/m²a

Heat Load

163
W/m²

48
W/m²

52
W/m²

Airtightness

13.2 m³/hr/m²
or
12.6 ACH

3.42 ACH

3 ACH

Liberton Nursery Retrofit

Existing Building Analysis



Liberton Nursery
(existing)

		Target Performance at Stage 2-4	Target Performance at Stage 5	
Heating Demand	340 kWh/m²a	123 kWh/m²a	130 kWh/m²a	62% reduction
Heat Load	163 W/m²	48 W/m²	52 W/m²	68% reduction
Airtightness	13.2 m³/hr/m² or 12.6 ACH	3.42 ACH	3 ACH	76% Improvement

Liberton Nursery Retrofit

Existing Building Analysis

Not just retrofit....

- Improve thermal comfort
- Improved operation of key architectural items such as doors and windows for end users
- Higher quality learning environment
- Building use longevity
- Adherence to BB101 and improved acoustic performance
- De-carbonisation of heat



Liberton Nursery
(existing)

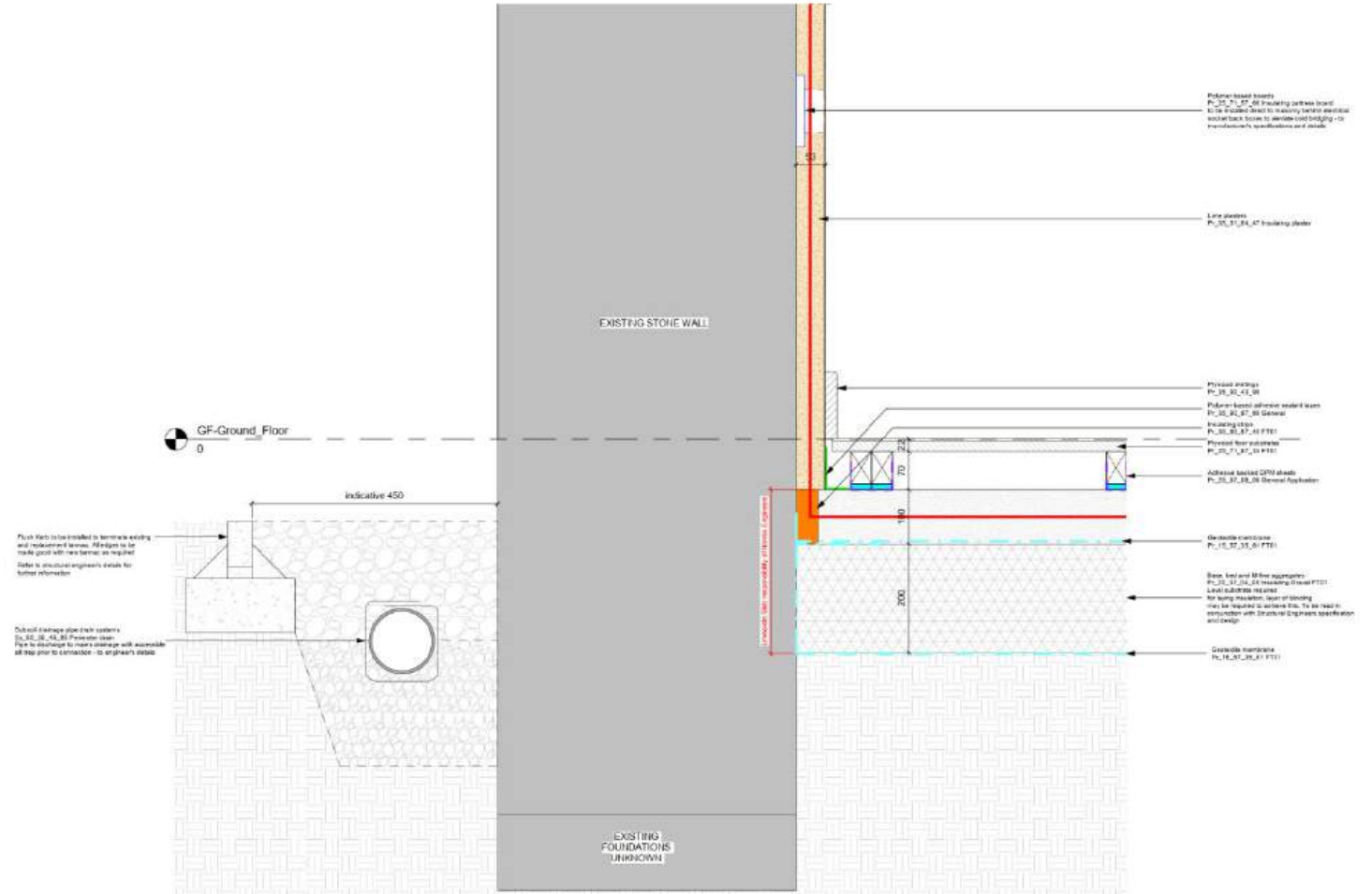
		Target Performance at Stage 2-4	Target Performance at Stage 5	
Heating Demand	340 kWh/m ² a	123 kWh/m ² a	130 kWh/m ² a	62% reduction
Heat Load	163 W/m ²	48 W/m ²	52 W/m ²	68% reduction
Airtightness	13.2 m ³ /hr/m ² or 12.6 ACH	3.42 ACH	3 ACH	76% Improvement

Liberton Nursery Retrofit

Delivery and on-site adjustments



Proposed Intervention and Key Details



Floor Detail – Limecrete Slab



Floor Detail – Limecrete Slab



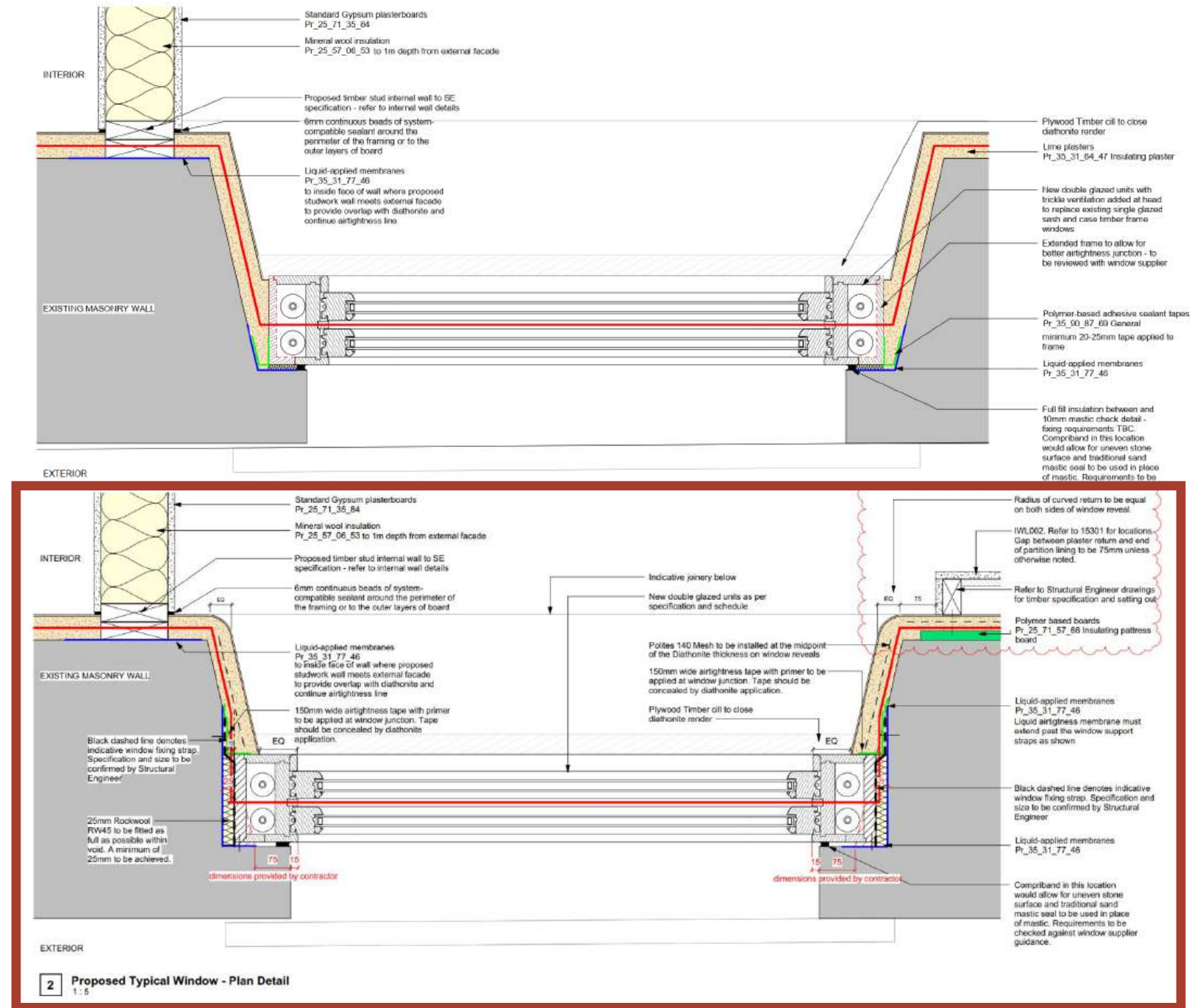
Floor Detail – Limecrete Slab



Floor Detail – Limecrete Slab



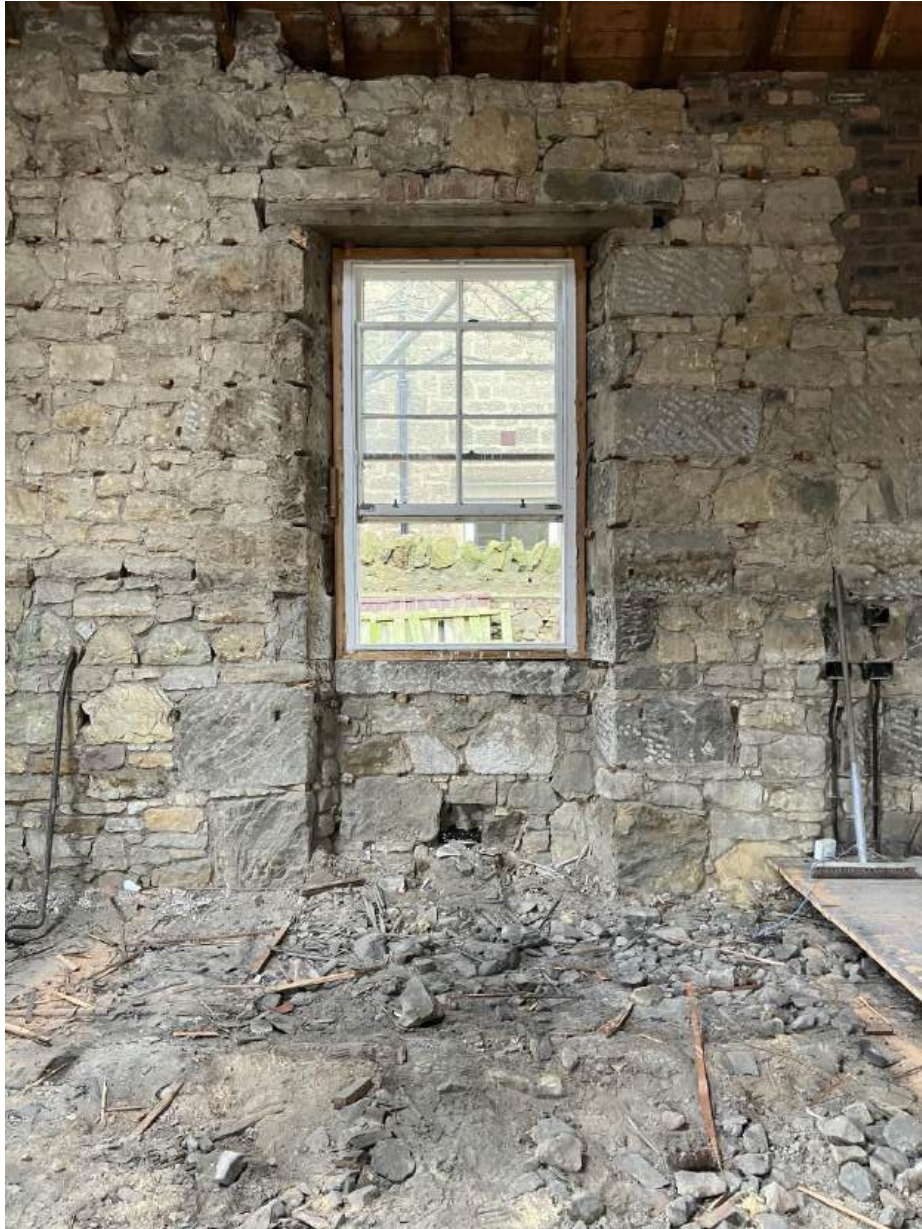
Proposed Intervention and Key Details



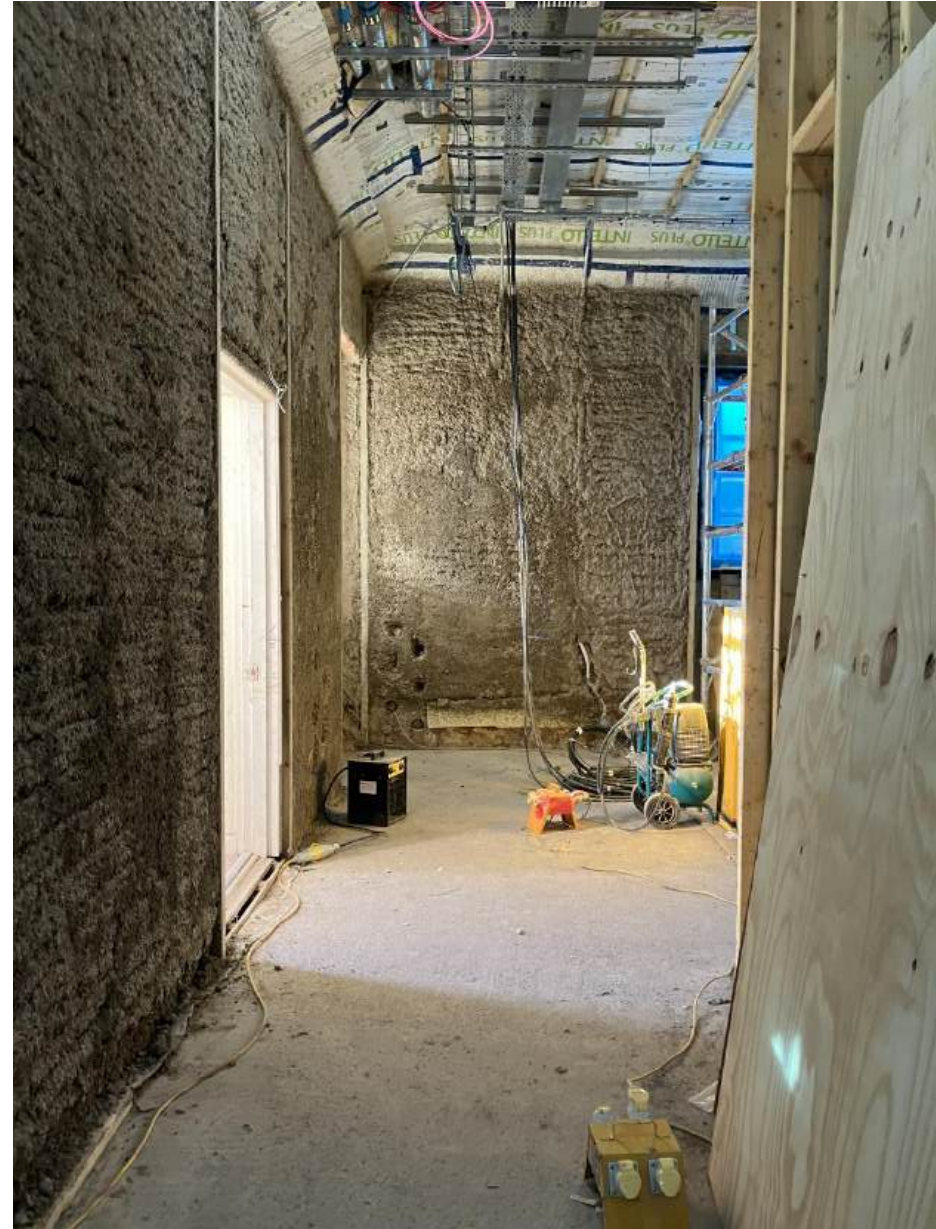
Window/IWI Detail – New S&C timber windows



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Window/IWI Detail – New S&C timber windows



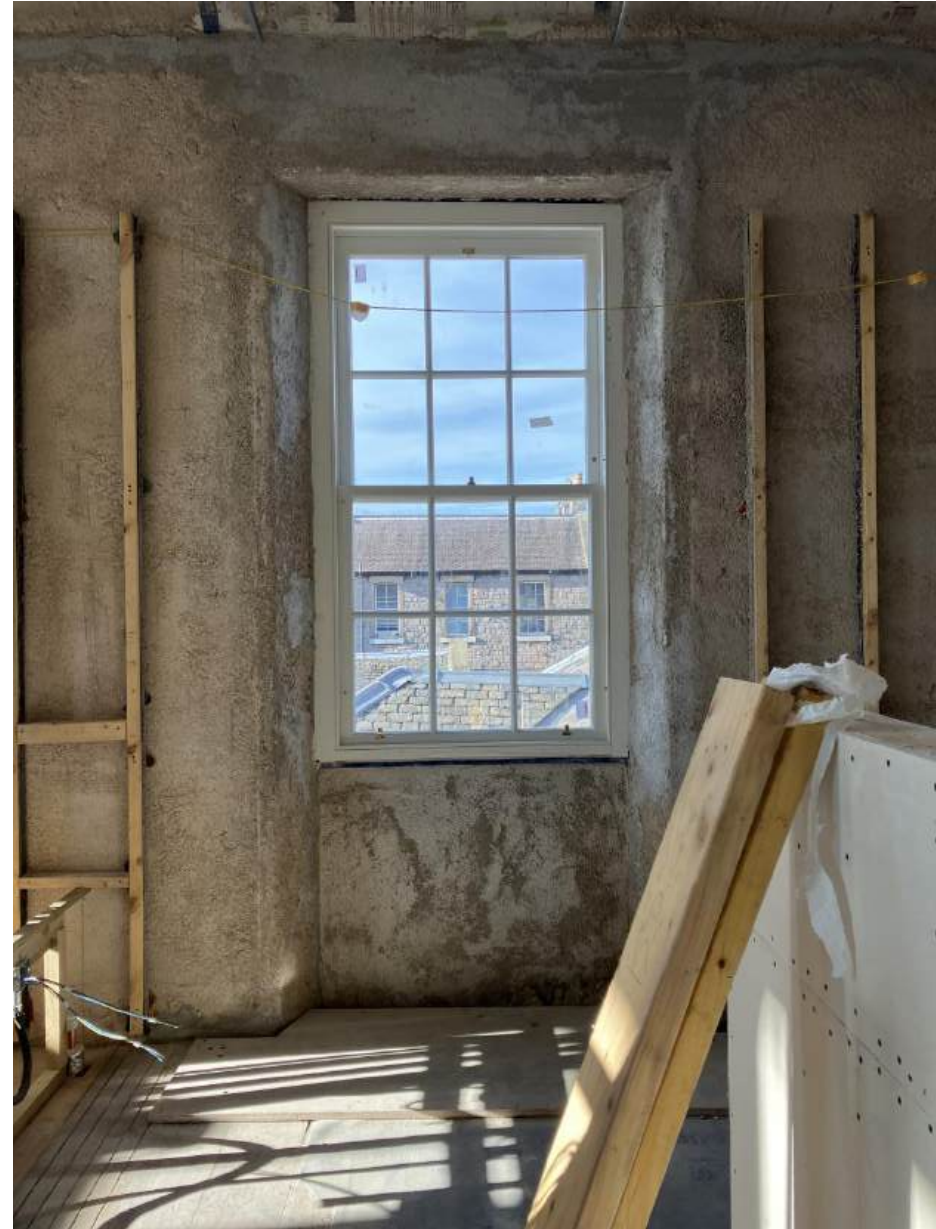
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Window/IWI Detail – New S&C timber windows

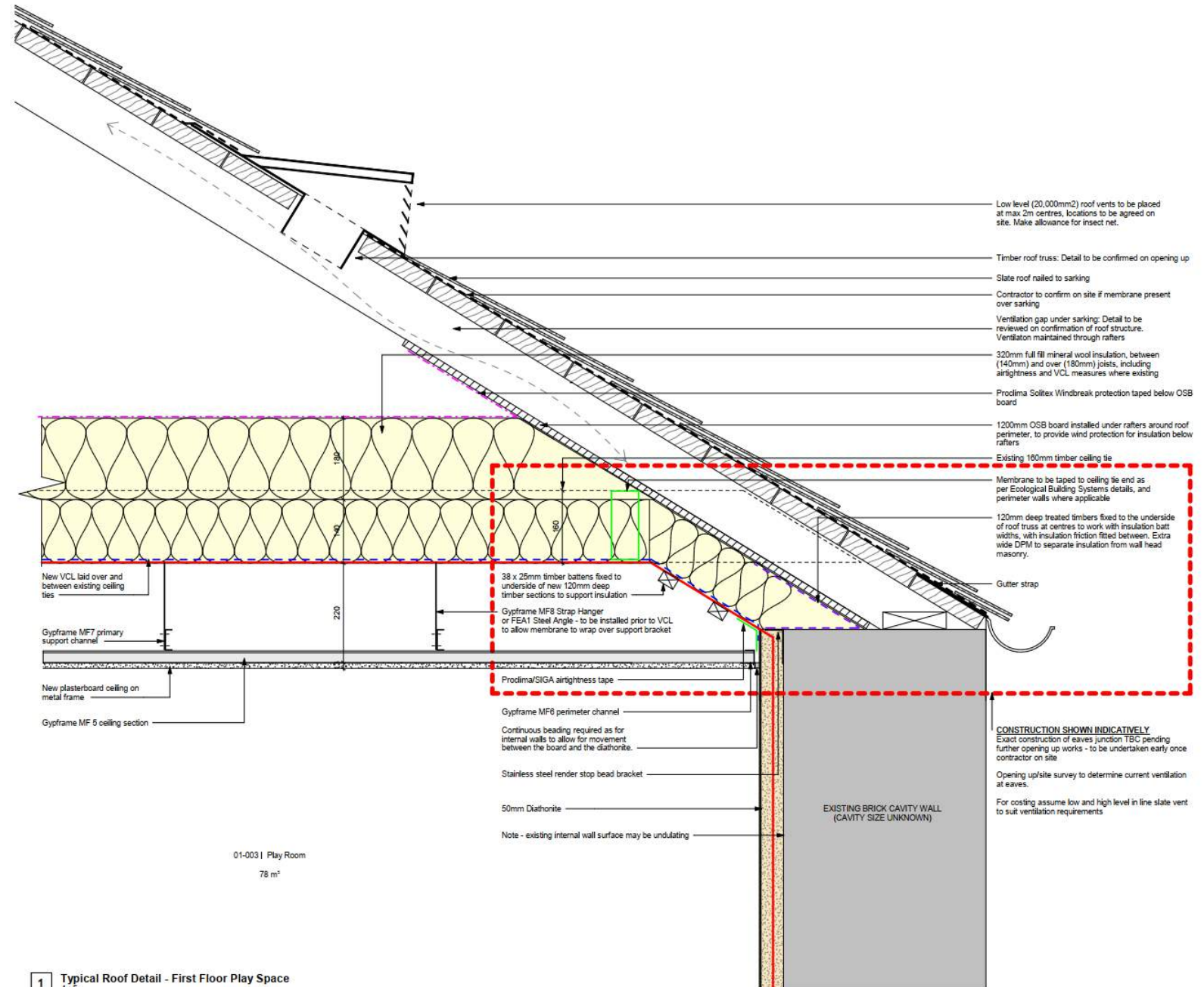


Window/IWI Detail – New S&C timber windows



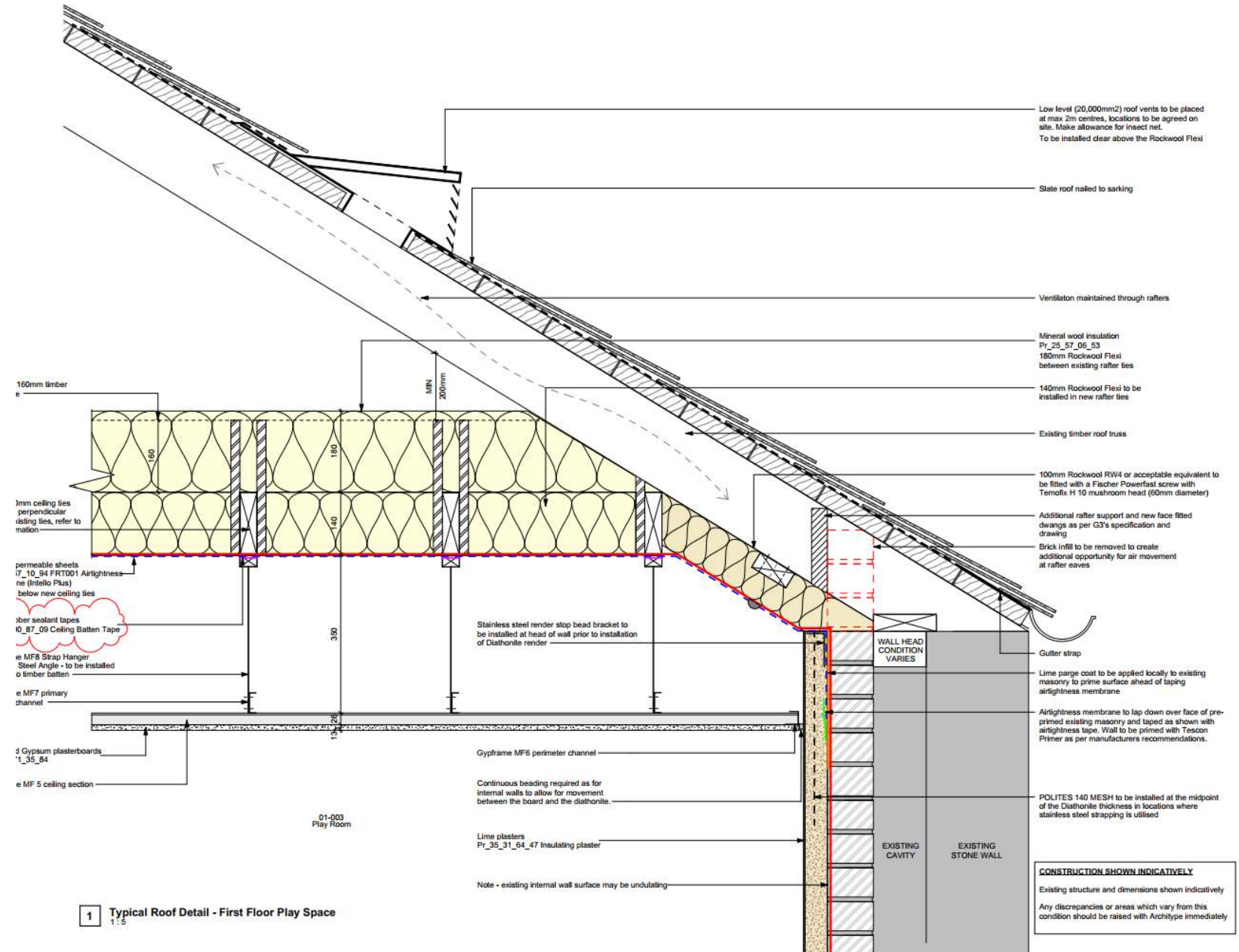
Liberton Nursery Retrofit

Proposed Intervention and Key Details



Liberton Nursery Retrofit

Proposed Intervention and Key Details



Roof Detail



Roof Detail



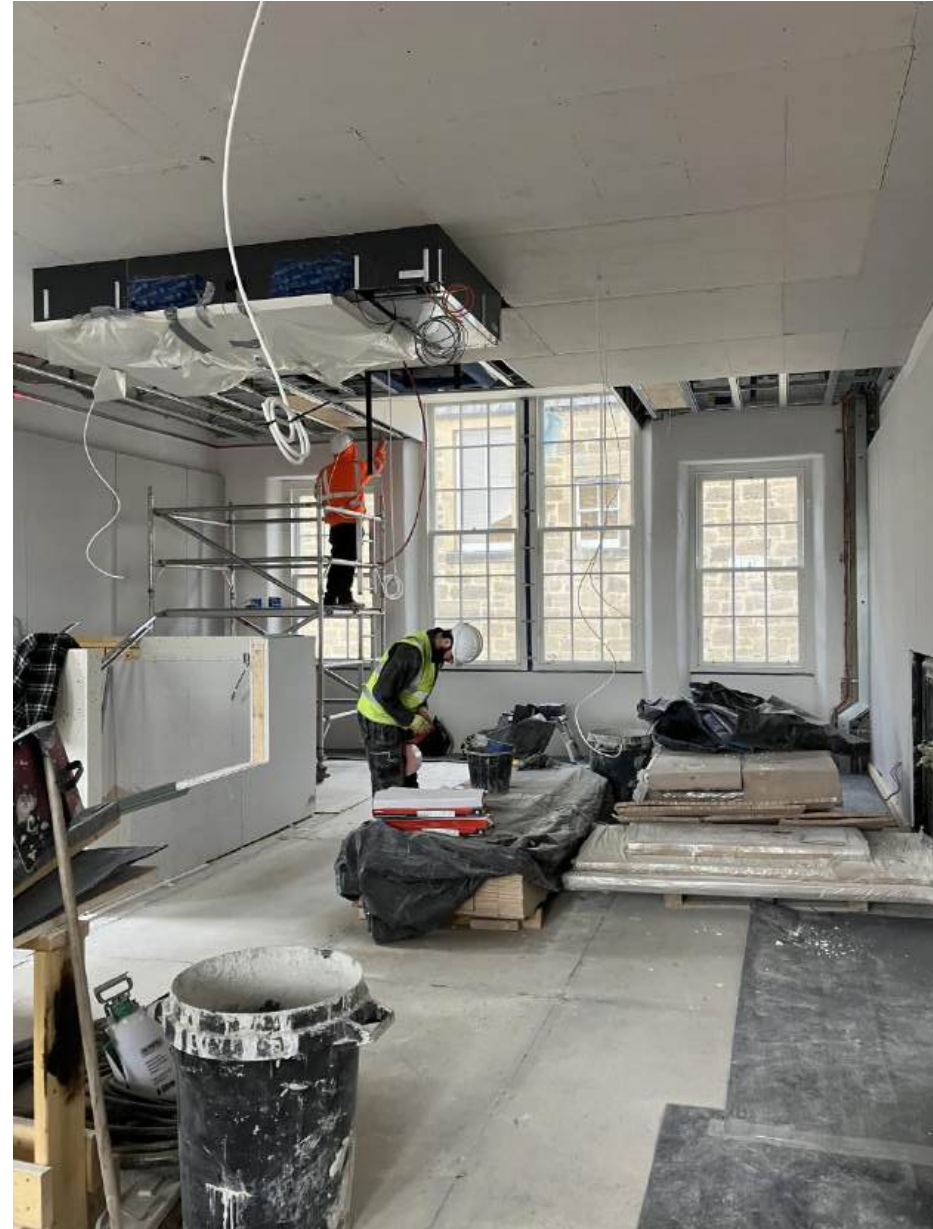
Roof Detail



Roof Detail



Roof Detail



Roof Detail



Roof Detail



General Palette

Inspiration Images



Kinderzimmer / 'scaleable design strategy' for German nursery group entering UK market in 10+ buildings and locations



Tulse Hill / New build extension and refurb of 1950's Grade II Listed Townhouse



Tulse Hill / New build extension and refurb of 1950's Grade II Listed Townhouse



Kinderzimmer / 'scaleable design strategy' for German nursery group entering UK market in 10+ buildings and locations



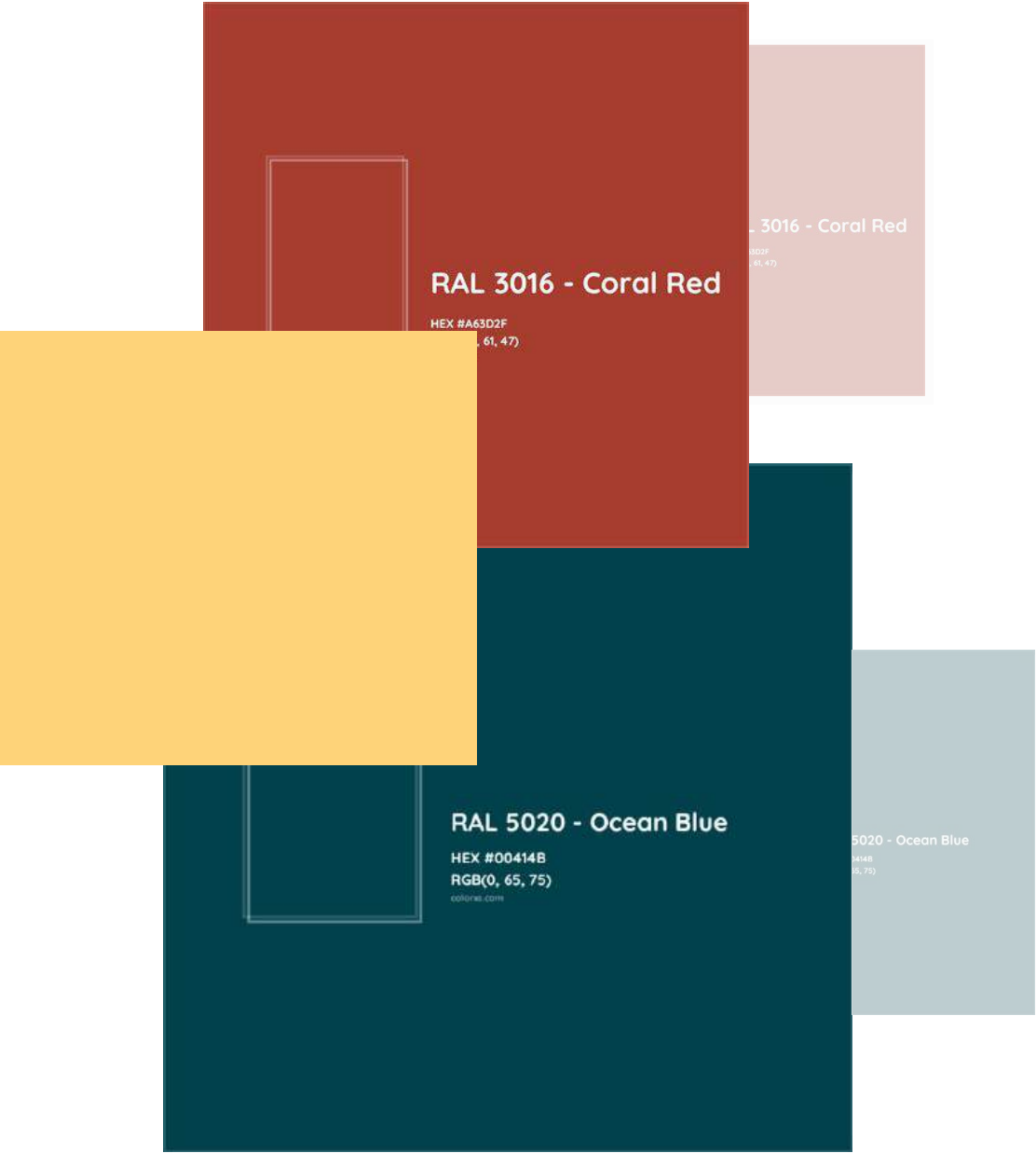
Kennedy Woods / Tulse Hill / Kinderzimmer



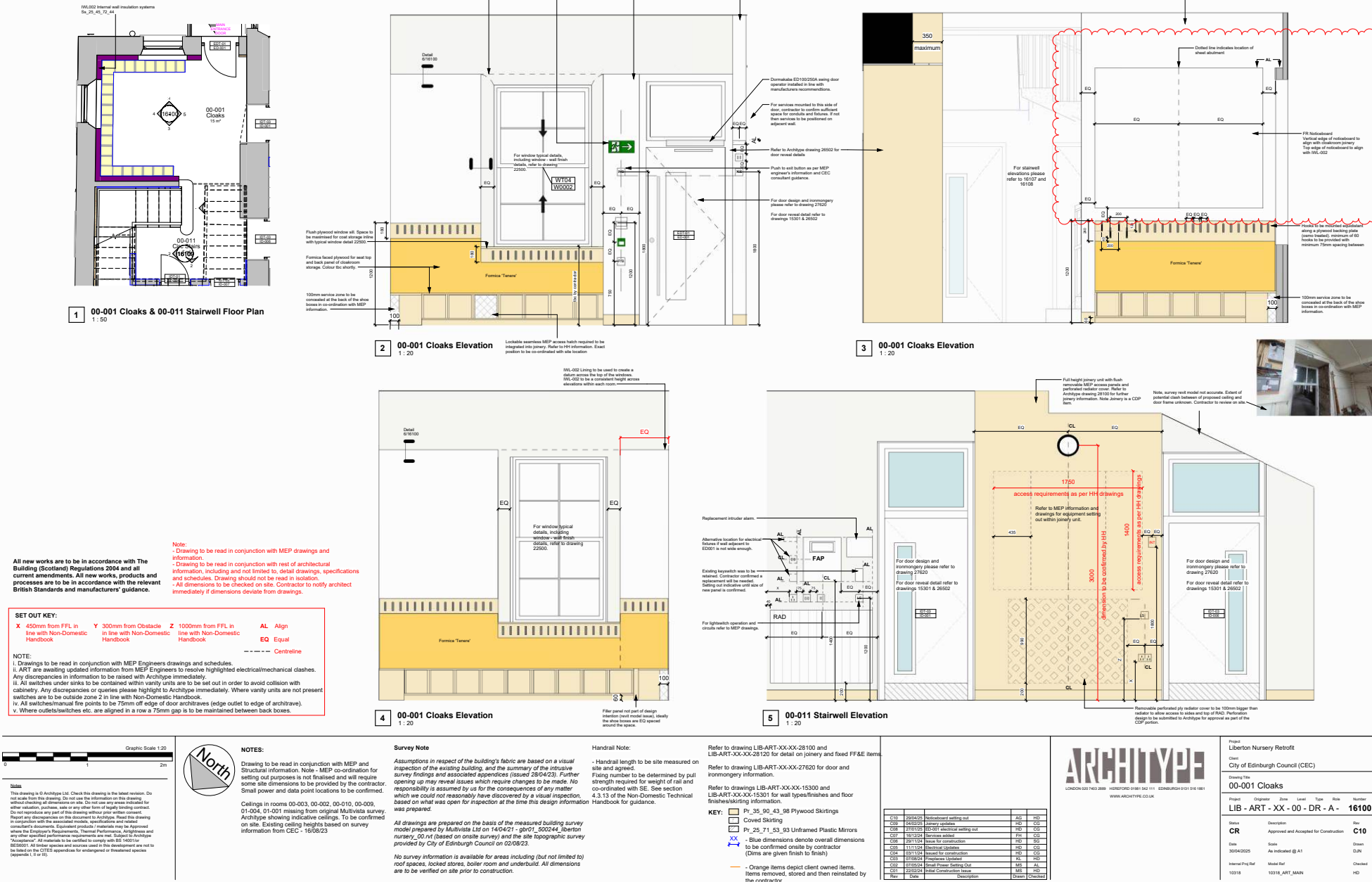
Kinderzimmer / 'scaleable design strategy' for German nursery group entering UK market in 10+ buildings and locations

General Palette

Playful, robust, versatile



Entry/Cloaks



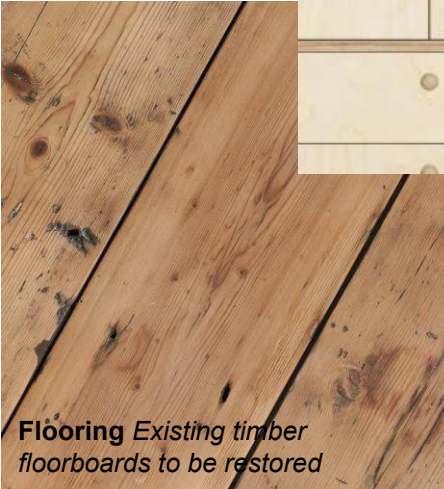
Entry/Cloaks



Entry/Cloaks



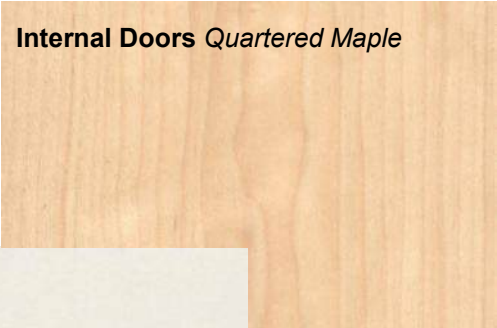
FF Playroom



Flooring Existing timber floorboards to be restored



Pitts FR Noticboard *Wheat*



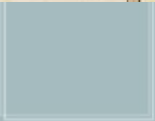
Internal Doors *Quartered Maple*



Diathonite Walls *off White clay paint*



12mm SGL Worktop *White Marble*



RAL 5020 - Ocean Blue
HEX #00414B
RGB(0, 65, 75)
RALFARW.COM

Diluted tone to be used more



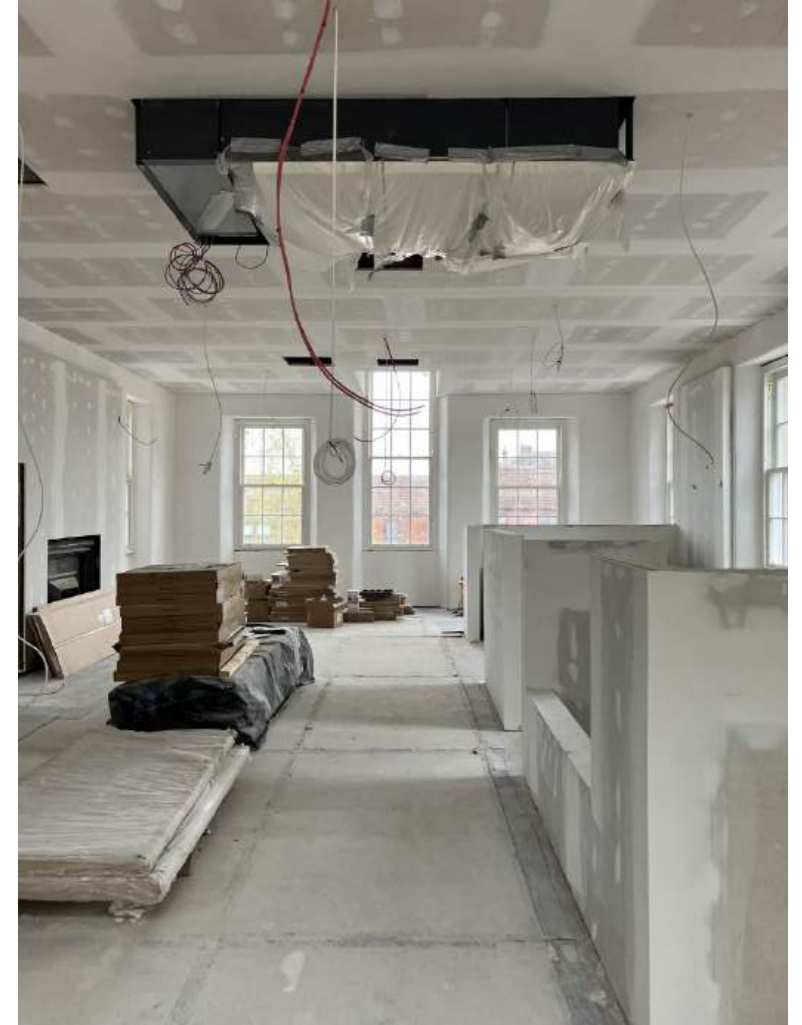
RAL 5020 - Ocean Blue
HEX #00414B
RGB(0, 65, 75)
RALFARW.COM

Plasterboard Walls *RAL 9010 White*



Howdens Kitchen *Dove Grey*

FF Playroom



FF Playroom





Liberton Nursery Retrofit

Practical Completion: August 2025

Existing Air Test pre-works:
12.6ACH

Interim Air Test result: 3.1ACH prior
to door install and all penetration
sealing

Final Air Test result: 3.6ACH



Liberton Nursery Retrofit

Lessons learned/further research

Ventilation: Fireplaces and deep retrofit

Form of contract: De-risking for the client

Hygrothermal materials: awareness in the supply chain

Performance gap: year 1 and 2 to review energy performance of targeted metric and in use operation

Estate de-carbonization: pilot project informing wider estate decision making



HES Technical Paper

Separate commission by HES for case study paper.

Wall in-situ hygrothermal monitoring
TBC

