

MULTI UNIT RESIDENTIAL RETROFIT RESEARCH CASE STUDY

FAÇADE ANALYSIS

Roof Upgrade

- Insulate between rafters
- Insulate to inner side
- Target U Value 0.11W/m2K

Mansard Upgrade

- Insulate between rafters
- Insulate to inner side
- Target U Value 0.11W/m2K

External Wall Upgrade

- Assume Lime plaster
- Remove existing paint
- Repair plaster
- Apply IWl. Options: Calsitherm, Woodfibre or PIR
- 15mm lime plaster
- Target U Value 0.61W/m2K

Internal Wall Insulation (IWI)

OPTION 1
50mm Calcium silicate
Wall U Value: 0.68

OPTION 2
60mm Woodfibre
Wall U Value: 0.38

OPTION 3
60mm PIR
Wall U Value: 0.27

Window Upgrade

- Repair existing sashes
- New double glazed secondary glazing
- Target U Value 1.6W/m2K

Air Tightness Upgrade

- Window repair to include seals
- New IWl taped at all joints
- Remove all vents.
- Provide MVHR
- Target Value 0.15 ac/h

Ground Floor Upgrade

- Remove existing slab
- New glasscrete screed on
- Limecrete floor on
- Recycled, insulating loose filled aggregate
- Target U Value 0.25W/m2K

OVERVIEW & ISSUES

SURVEY & STRATEGY

TESTING & ANALYSES

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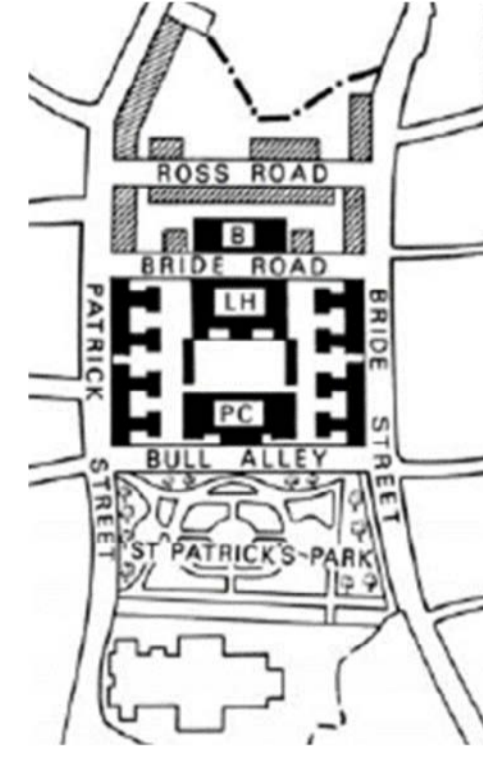
OPTIMAL SOLUTION

SITE



URBAN BLOCK

- 8 T-Shaped Blocks
- Five stories each
- Blocks A-D completed in 1901
- Blocks E-H completed in 1904
- Recreational buildings—Iveagh Baths & The Iveagh Play centre
- Distance between blocks 10 to 11.4m



BLOCK

BLOCK D

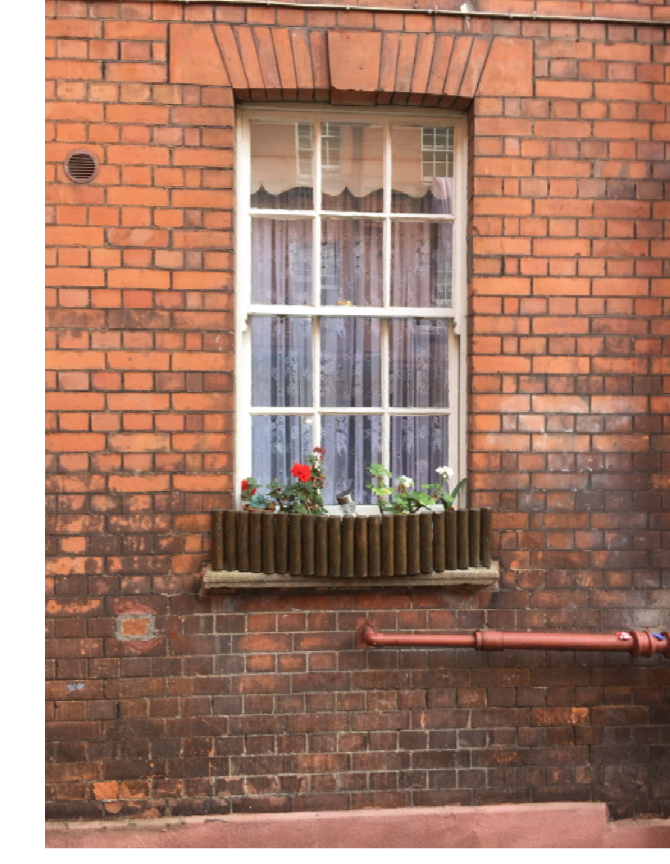
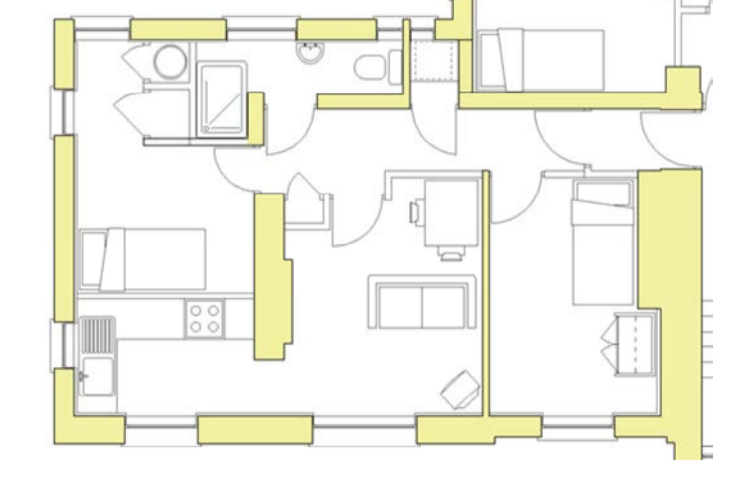
- 3 Commercial units(Ground)
- 29 Apartments units
- 35m2 to 49m2
- 20no. 1 bed; 9 no. 2 bed
- 2 entry points
- Stair access only
- No central service risers
- No Basement



- Orientation determined by site plan
- 2no. Single orientated apartments
- Vehicle hierarchy on site
- Little communal space
- No services strategy hierarchy for site or block
- Minimal plant space under roof

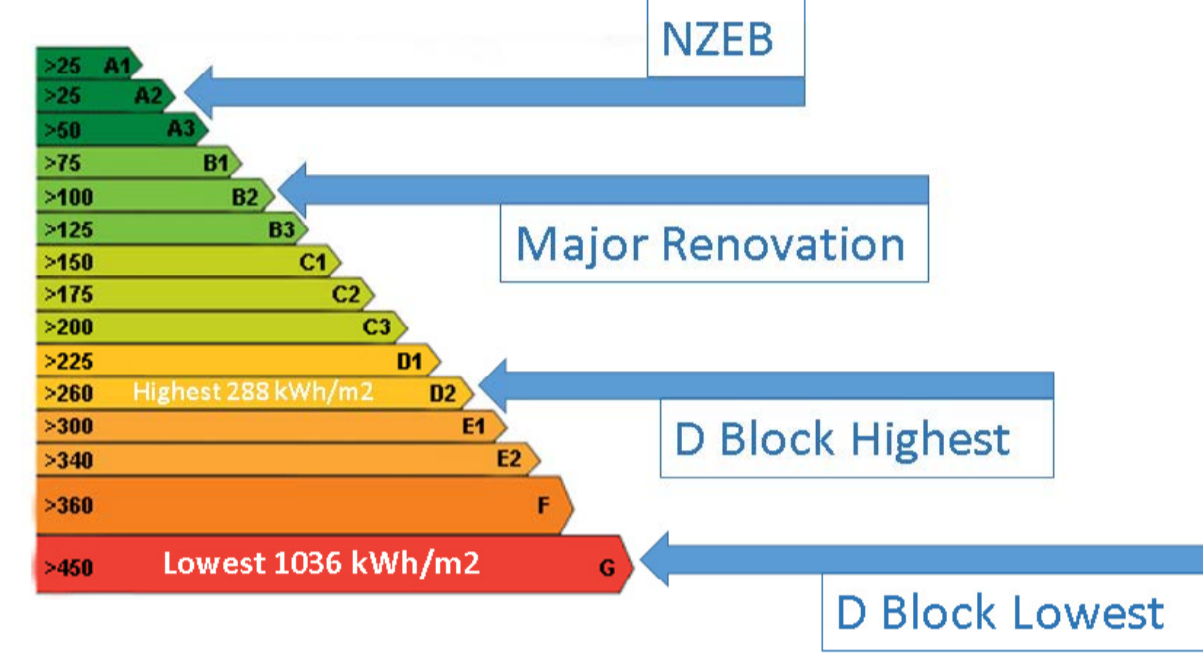
APARTMENT

- Less than current minimum design standards
- Modern living in old building
- Air quality
- Noise
- Services predominantly electric



- Façade—damage to brickwork
- Walls—significant detailing
- Windows - partially original
- Roof—slate mansard features
- Uninsulated ground floor slab

ENERGY SURVEY



Elemental U Values W/m² K

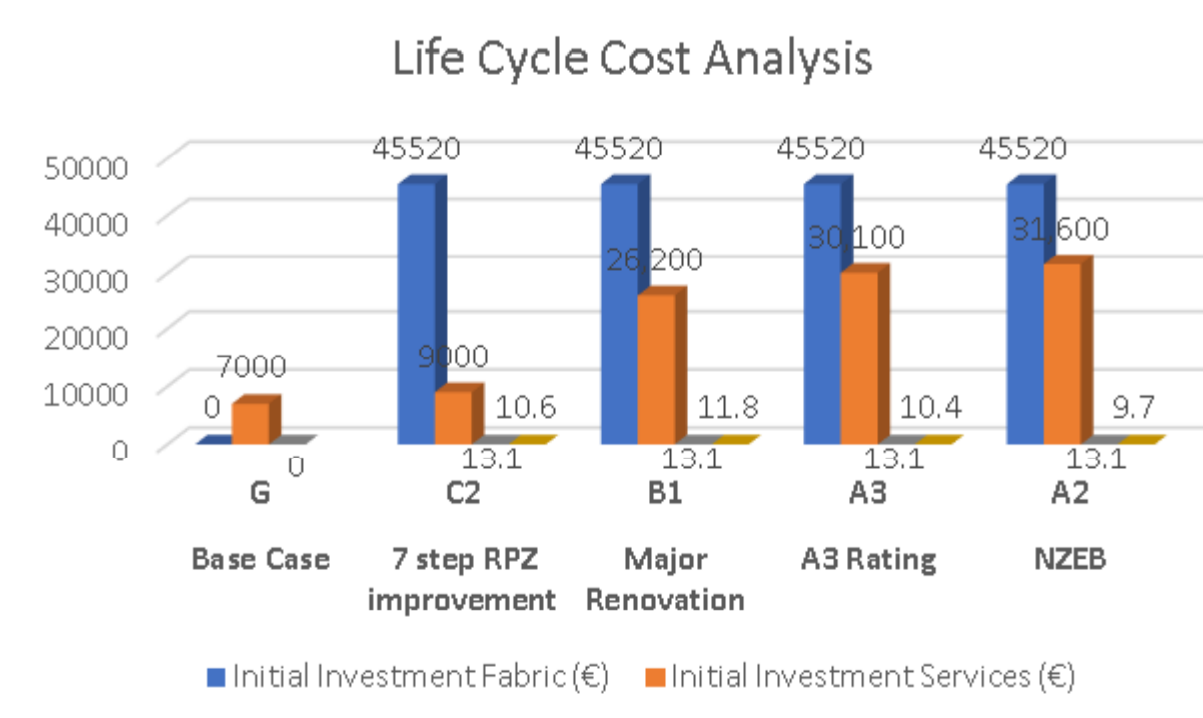
Element	U Value (W/m ² K)
Top Floor Mansard	1.95
Roof	2.3
Windows	4.8
Mid Floor Walls	1.6
Windows	4.8
Ground Floor Walls	1.6
Floor	0.8
Windows	4.8

ENERGY RESULTS

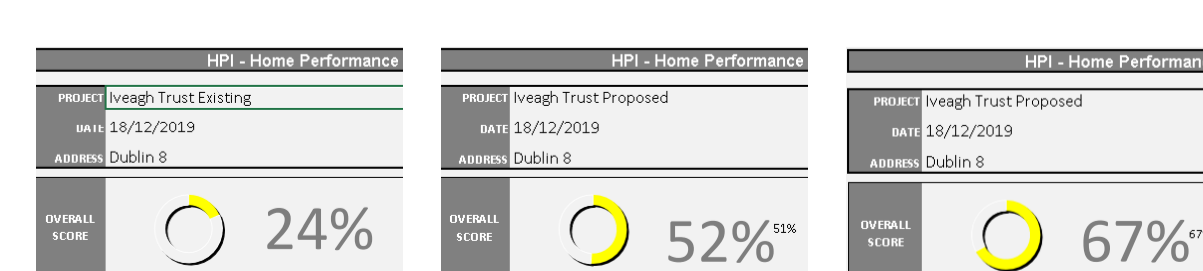
Step	Description	2 AD	12 D	27D	Average
1	Window upgrade				
2	Wall Upgrade				
3	Floor				
4	Roof				
5	Ventilation				
6	Heating				
7	Hot Water				
8	Renewables				
Existing BER Rating		513	312	843	556 G

Option	2 AD	12 D	27D	Average
OPTION 1				
After fabric upgrade (Steps 1 to 4)	273	210	274	252 D1
Add MVHR (Step 5)	208	172	213	198 C2
Install Combi Boiler (Step 6 to 7)	140	110	135	128 C1
Add PV (Step 8)	123	91	120	111 B2
OPTION 2				
After fabric upgrade (Steps 1 to 4)	273	210	274	252 D1
Add EAHP (Step 5 to 7)	75	82	96	84 B1
Add PV (Step 8)	38	34	43	38 A2

COST OPTIMALITY

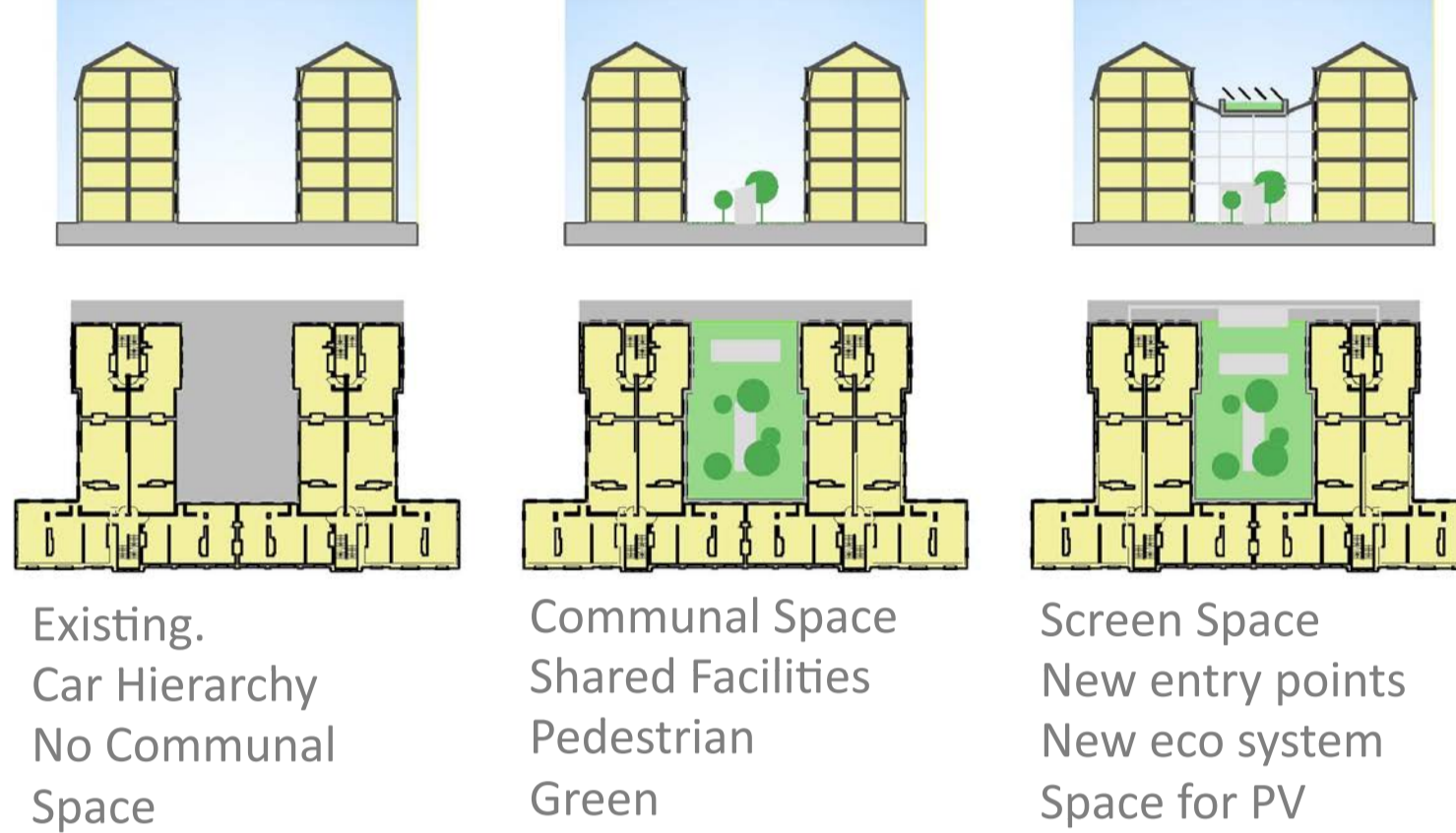


HOME PERFORMANCE INDEX



Case	ENEN 9202 Rating
Existing Base Case	Not Certified
Apartment Upgrade Focused	SILVER
Block & Site Upgrade Focused	SILVER

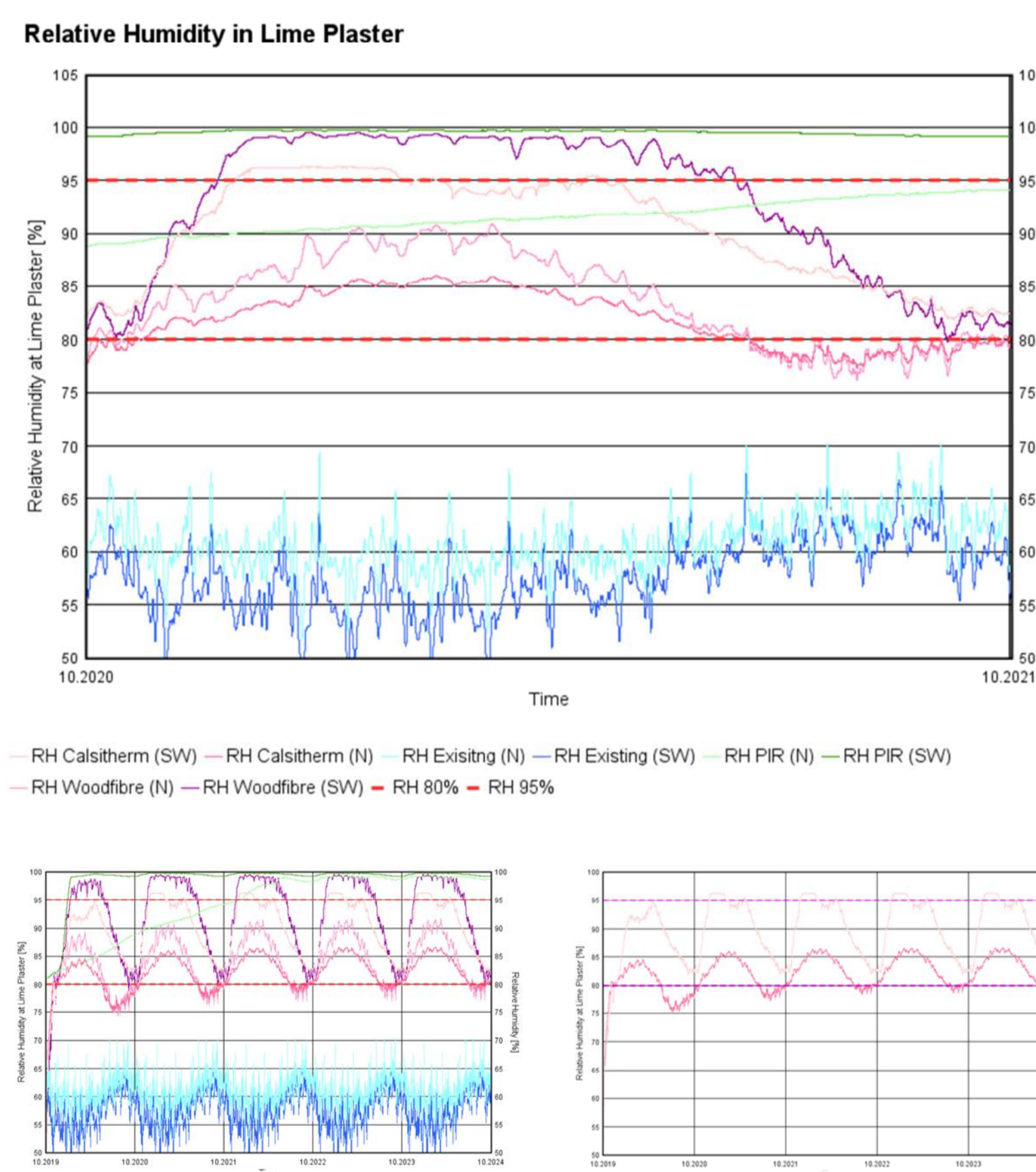
SITE OPTIONS



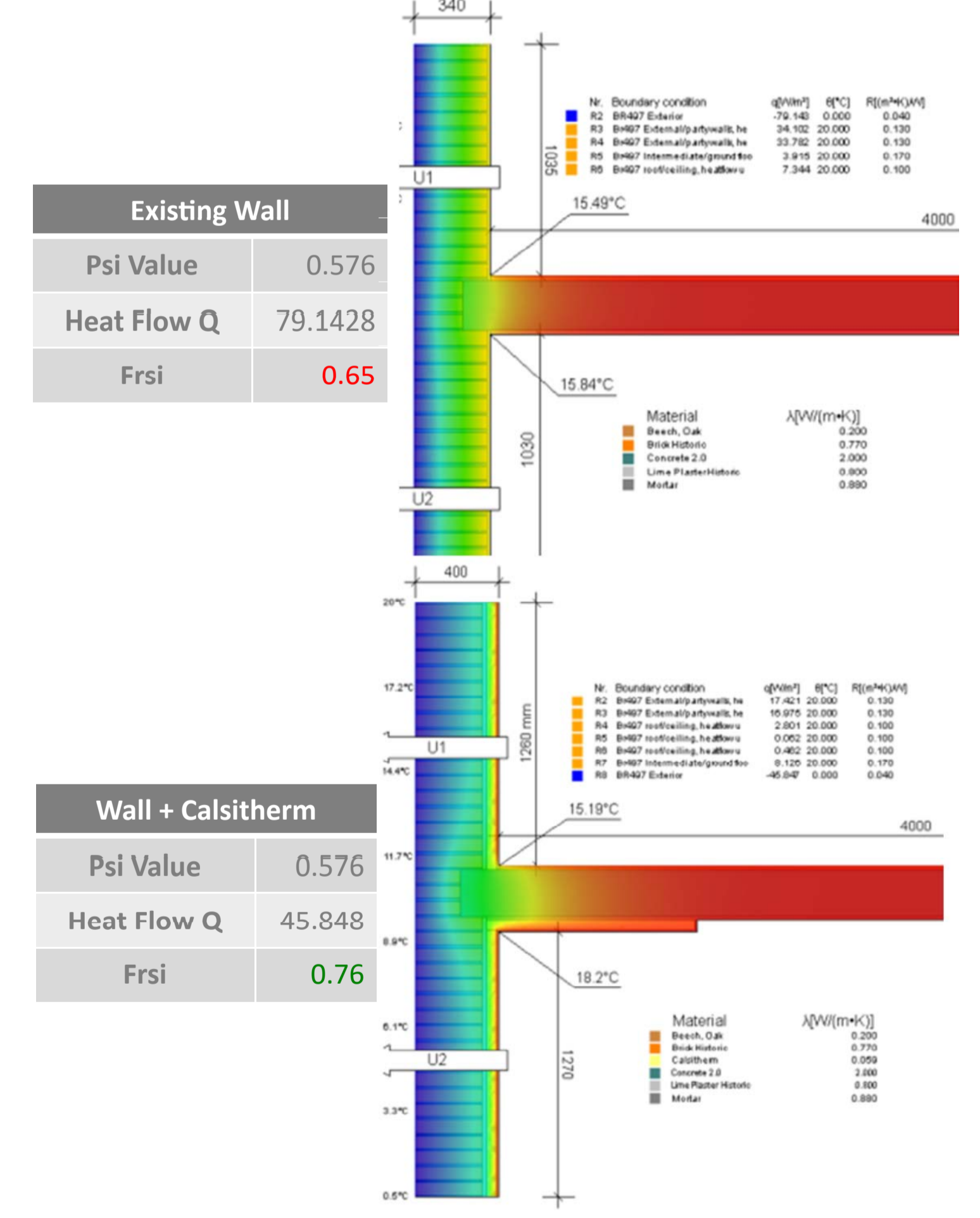
BLOCK OPTIONS

- Create better mix of apartment sizes
- More flexibility to cater for families & single dwellers in the one block
- Maintain structural layout
- More scope to create central risers
- Space for lift and to improve accessibility

HYGROTHERMAL



LINEAR THERMAL BRIDGE



OPTIMAL MATRIX

Case	U Value (Wall) W/m2K	Moisture Risk	Linear Thermal Bridge	Frsi	Carbon Kg CO2e /m2
Existing	1.64	LOW	0.576	0.65	0
PIR	0.27	HIGH	0.06	0.7	4.63
Calsitherm	0.68	MEDIUM	0.572	0.76	26.4
Woodfibre	0.38	HIGH			-9.56

	Site	Block	Unit	Primary Energy	Capital Cost
EAHP	No infrastructure required	No riser required	Single system Heat, vent & DHW	3,926 kWh	€26,200
Gas Combi +MVHR	Infrastructure required	New risers required	Separate system Heat & vent	12,019 kWh	€16,513

	2 AD	12 D	27D	Average
Existing	513	312	843	556 G
Optimal	57	58	73	63 A3

OPTIMAL SOLUTION

