Cedar Multi’s

Rupert Daly

Why Passivhaus?

Woodside Estate: Background

- 4000 residents (approx)
- Diverse range of nationalities
- 32 languages

- Tenants consist of single people, families, asylum seekers, young people from the care system, those who have been homeless, elderly, disabled.

- Community has issues with high unemployment, poverty, isolation, mental health and people with addictions

- High unemployment
- Benefit dependency
- Income deprived

- Fuel Poverty

- Food Poverty

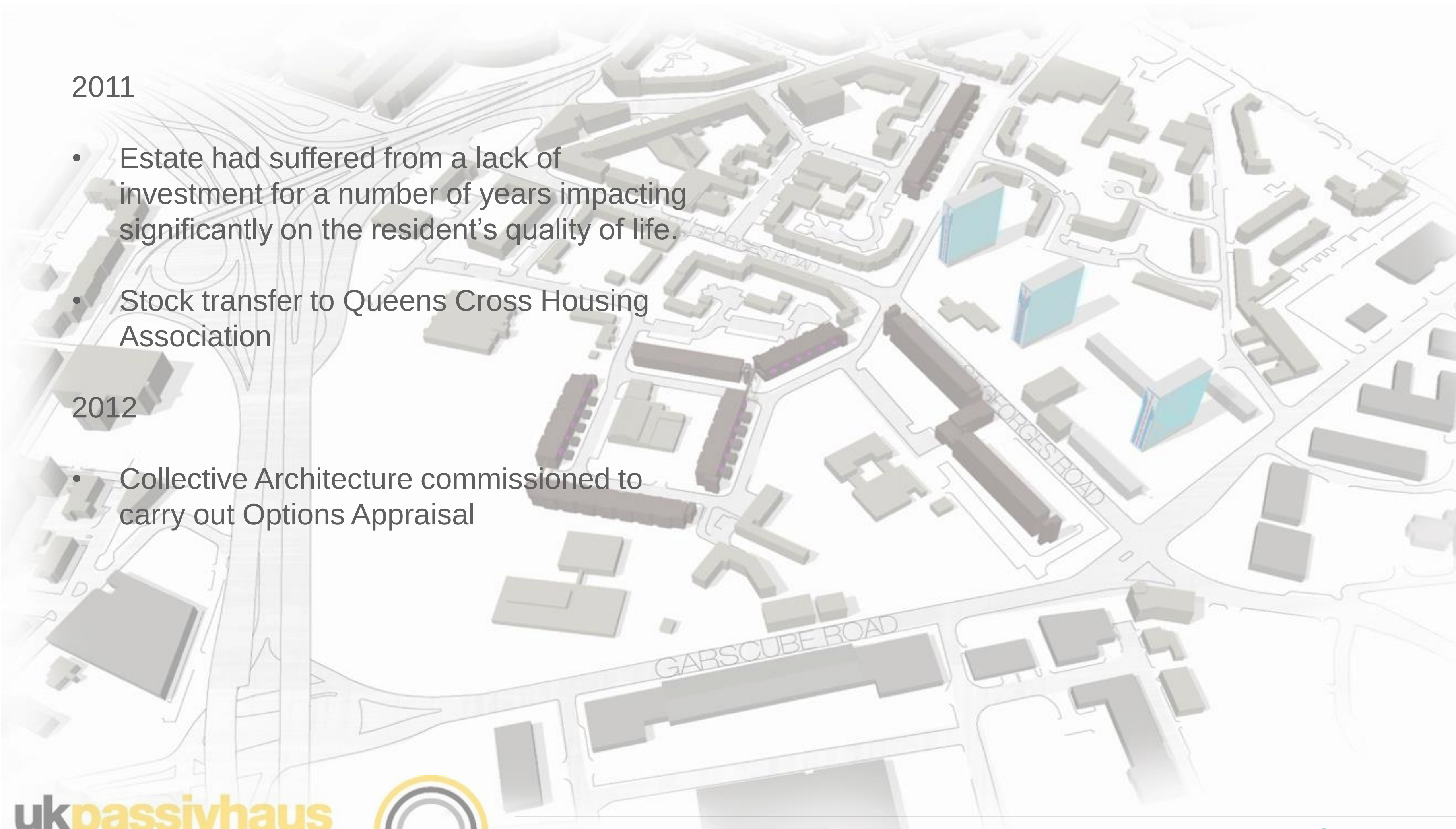
Woodside Estate: Background

2011

- Estate had suffered from a lack of investment for a number of years impacting significantly on the resident's quality of life.
- Stock transfer to Queens Cross Housing Association

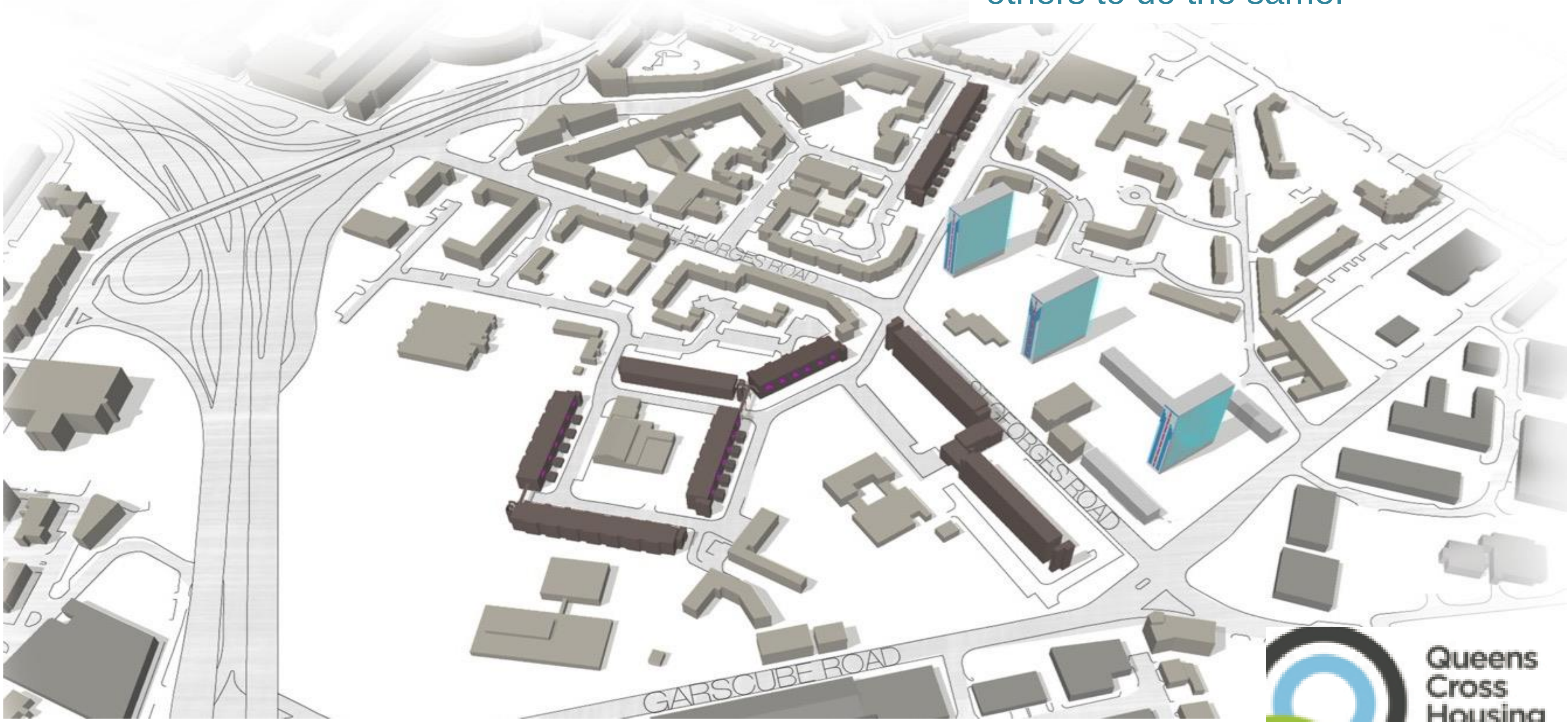
2012

- Collective Architecture commissioned to carry out Options Appraisal

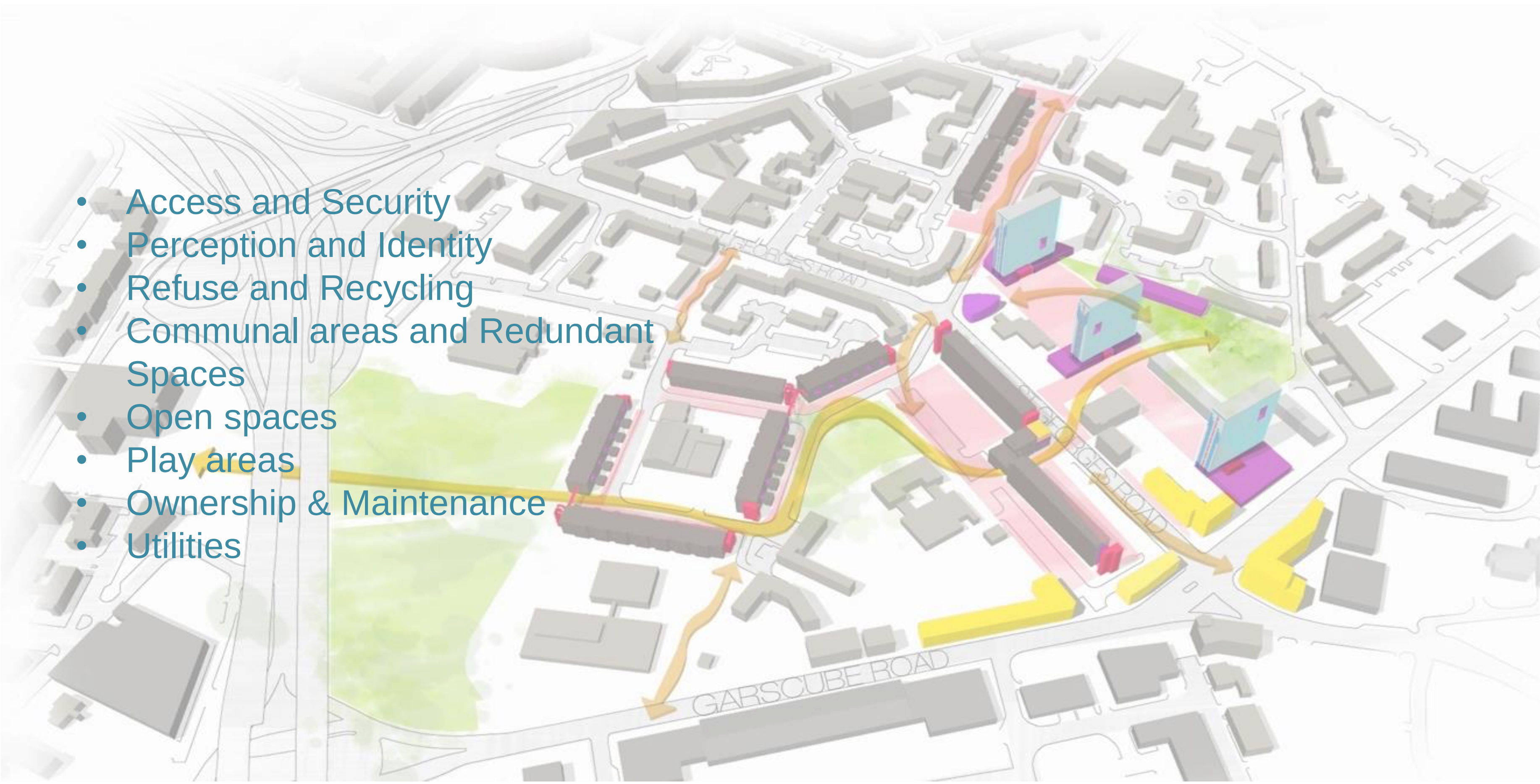


Woodside Estate: Client Vision

''To be recognised as a leader in providing excellent housing and community services. To create and sustain vibrant communities and to inspire others to do the same.'



Woodside Estate: Options Appraisal



- Access and Security
- Perception and Identity
- Refuse and Recycling
- Communal areas and Redundant Spaces
- Open spaces
- Play areas
- Ownership & Maintenance
- Utilities

Woodside Estate: Vision

Woodside Estate: Vision

Creating a sustainable community

- Live, Play, Work & Grow
- Reduce, Reuse, Recycle & Recover
- Enhance the existing
- Improved Energy performance

"This options appraisal explores the ambitions of people living in Woodside for their homes and their future. They want to transform their area from a post-industrial corridor between the city centre and the north to a desirable, high quality, vibrant and sustainable local community that draws people in and makes them want to stay."

Shona Stephen
Chief Executive
Queens Cross Housing Association

So why Passivhaus again?

- Compared to alternative solutions including available grant funding (Feed in Tariff, Renewable Heat Incentive etc.) It is the most financially viable

- A fabric first approach ensured the main capital investment works are future proofed.

- We are improving the fabric anyway so why not make it count?

- Standards demand quality from holistic detail design consideration to onsite implementation. Funding often considers packages in isolation.

- There is no point in putting lots of renewable energy into a building that leaks energy like a sieve.

- There is no point in putting high quality thermal components into a building if the value is being lost through the junctions/ interfaces.

So how do we do it?

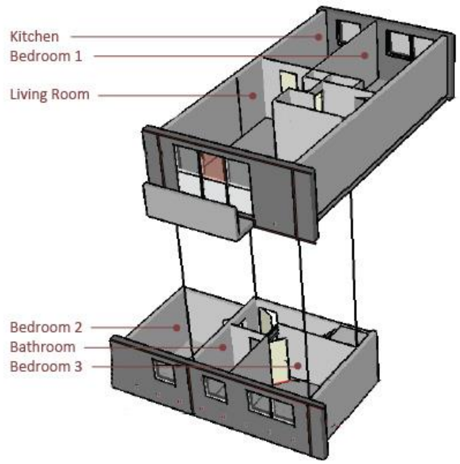
Passivehouse Principles: Perception vs Reality

- Form Factor (Wow!)
- MVHR (client concern)
- Airtightness (surprisingly good already)
- Loads of Insulation (only 120/160mm rockwool actually)
- Minimise Thermal Bridges (okay but some will be costly)
- Orientation (predetermined but consider solar gain)

Specification: MVHR - what are the issues.

3. Flat, Occupants and Ventilation

Flat and Occupants



- Concerns over capital cost – unit/ ducting/ infrastructure
- Concerns over gaining access for maintenance
- Concerns over filter costs and replacement interval
- Why can't we use industry standard?
- What's to stop Tenant switching it off?
- Why is it needed?
- What's wrong with flat duct?
- Why, Why, Why?
- Why do we need silencers?
- Why do we need preheaters?

And so begins the insightful journey!

Specification: MVHR options

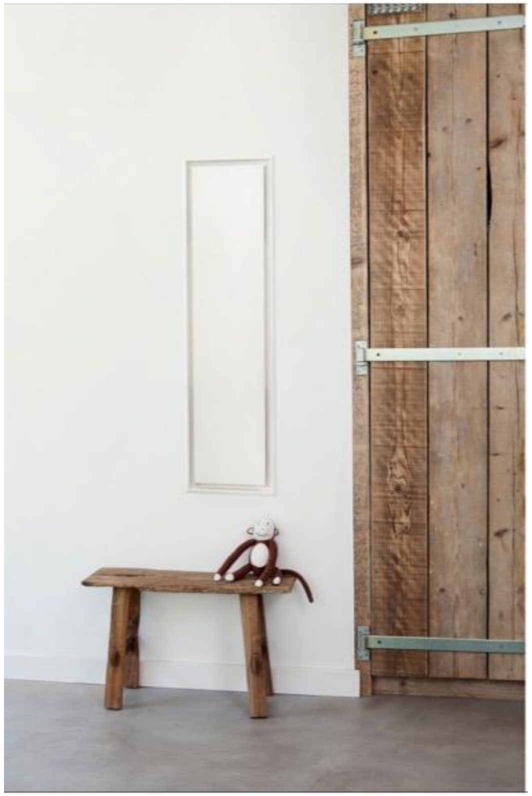
- Centralised MVHR not practical for distribution
- Operating range for conventional MVHR too high for small apartments
- What are the alternatives?

Specification: MVHR - alternatives

fresh-r®

BY Vaventis

Specification: MVHR



Heat transfer coefficient is >1000x better than polyethylene

=

Much more compact unit

fresh-r®

Specification: MVHR

- Wi-fi enabled

    Potential to signal Housing association is there was an issue and to monitor remotely

- Demand controlled – Humidity/ CO2

    Does not require tenant interaction but simple controls available for temporary boost

- Heat exchanger/ Primary filter can be washed instead of replaced

    Saving of £100k over 10 years on this project compared to replacing filters on 6 month basis

- Additional filters optional
- Reduced infrastructure cost

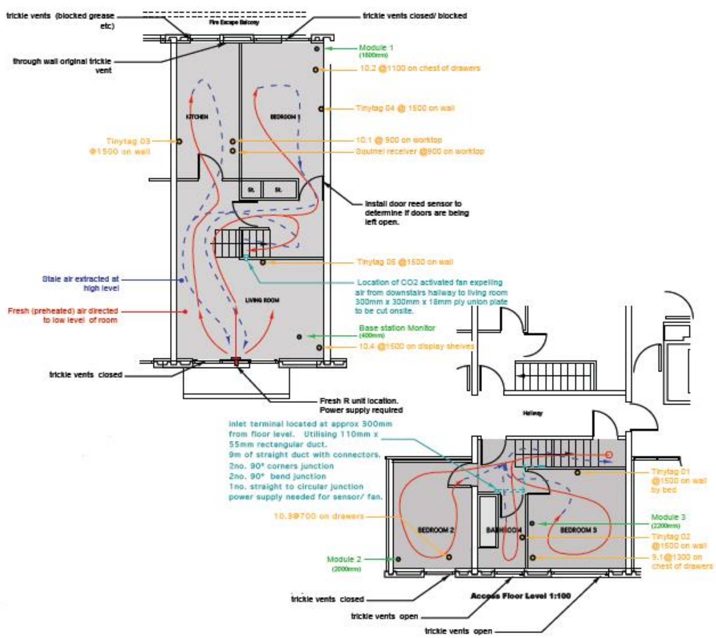
    Less coring for ducts, bulkhead, decoration

- Small enough to be integrated into window frame

fresh-r ®

BY Vaventis

Specification: Testing



MACKINTOSH ENVIRONMENTAL ARCHITECTURE RESEARCH UNIT
THE GLASGOW SCHOOL OF ART

MEARU
CEDAR FLATS: 'FRESH-R' MVHR TESTING

C. Morgan

A. Poston

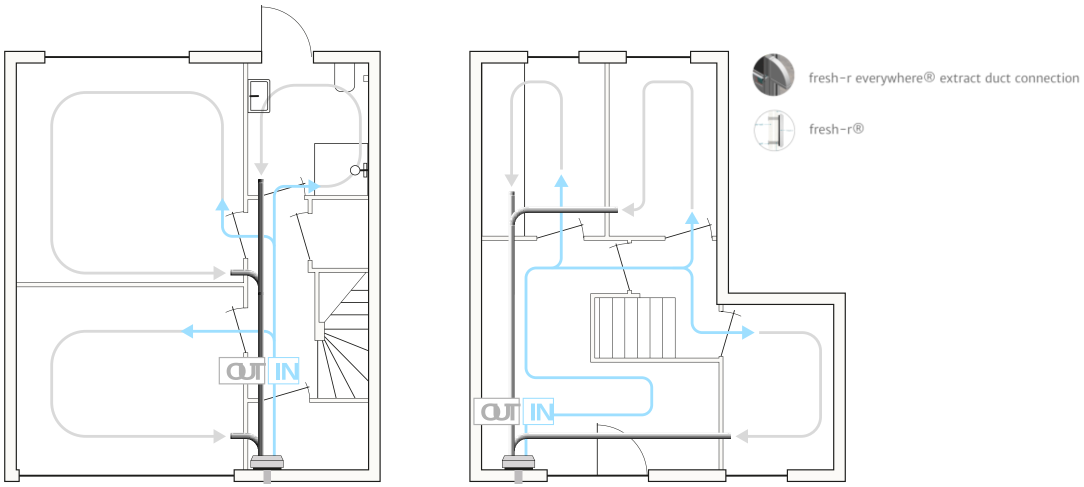
G. McGill

October 2015 Final Version

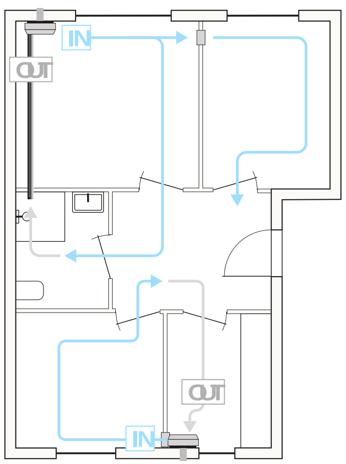
MEARU
The Mackintosh Environmental Architecture Research Unit
Mackintosh School of Architecture
The Glasgow School of Art

Specification: Results

example 3 example 4



example 6



one single fresh-r® can ventilate up to 80m^2
maximum duct length 10 meter, Ø125 mm

easy to plan

Specification: Result

COMPONENT
AWARD
2016

Vaventis

Cedar Multi's: Tendered Spec

Passivehouse EnerPHit Standard – PHPP V8

- Mitigate Fuel poverty
- Provide base heating and hot water load FOC
- Significantly reduce landlord running costs
- Improved Indoor Air Quality
- Improved Amenity

- Additional Insulation
- Triple glazing
- Solar thermal
- Mitigate thermal bridges
- Airsource heat pump – required to meet PE target?
- Improve Air Tightness
- Recover heat from ventilation systems – Conventional PH certified
- New lifts
- Change communal lighting to LED

Woodside: Value Engineering

EnerPHit
Zertifizierte Modernisierung
Passivhaus Institut
| classic | plus | premium |

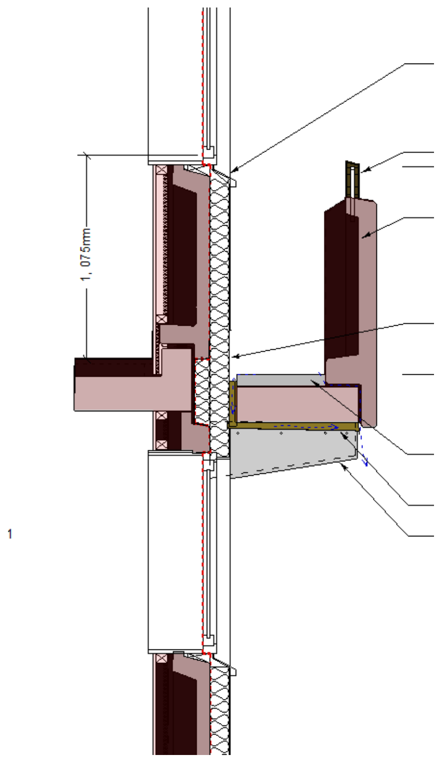
Passivehouse EnerPHit Standard – PHPP V8

- Mitigate Fuel poverty
- ~~Provide base heating and hot water load FOC~~
- Significantly reduce landlord running costs
- Improved Indoor Air Quality
- Improved Amenity

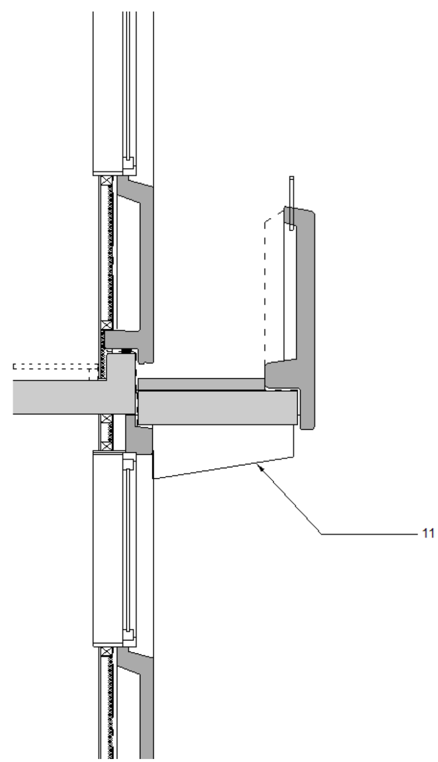
- Additional Insulation
- Triple glazing – PH certified? Contractors choice
- ~~Solar thermal~~ - Not necessarily a bad thing to omit
- ~~Mitigate thermal bridges~~ – Fire escape balcony affected
- ~~Airsource heat pump – required to meet PE target?~~
- Improve Air Tightness
- Recover heat from ventilation systems – Conventional PH certified
- New lifts
- Change communal lighting to LED

Requirement to meet EnerPHit certification omitted but Passivehouse standards and assessment to be maintained!

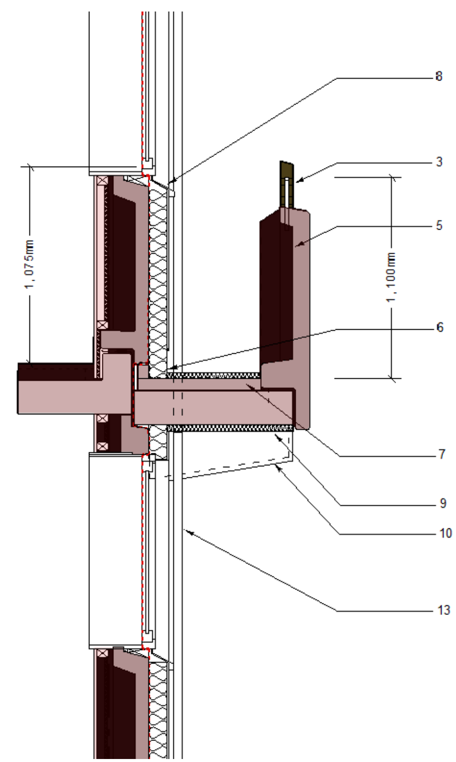
Value Engineering: Thermal Bridges



Tender



Existing



Contract

COLLECTIVEARCHITECTURE

Woodside: Aerial View

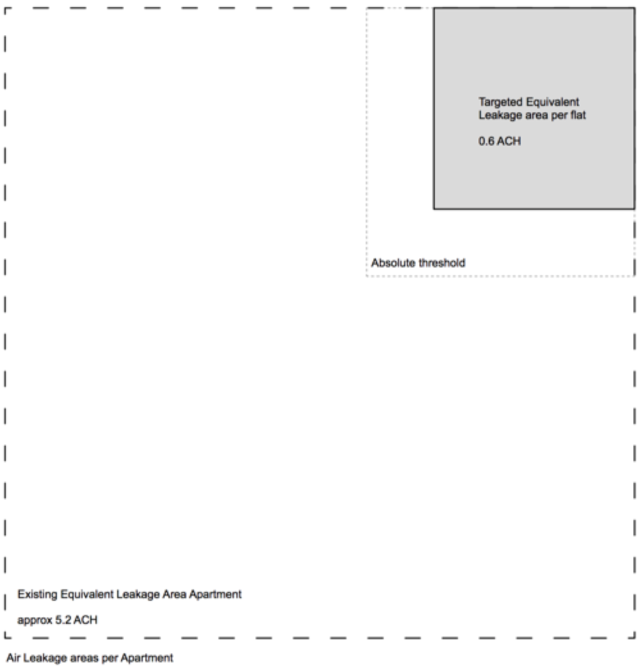
Woodside: Entrances

Woodside: Entrances

Woodside: Aerial View

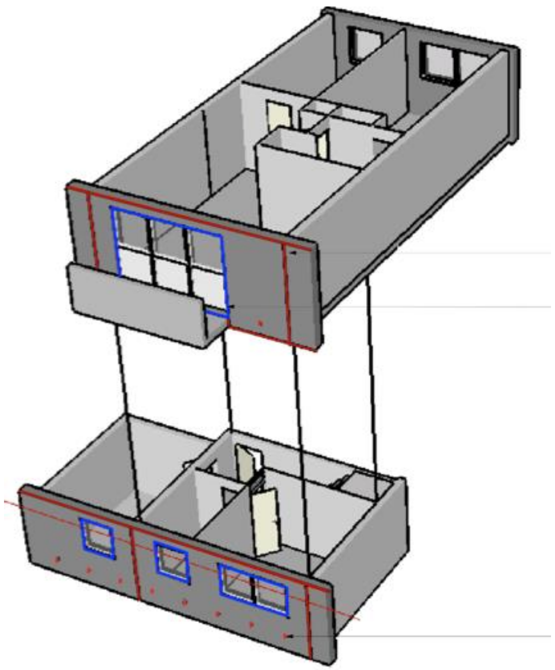
Woodside: Existing Photos

Woodside: Site Progress



Airtightness Target

Woodside: Progress



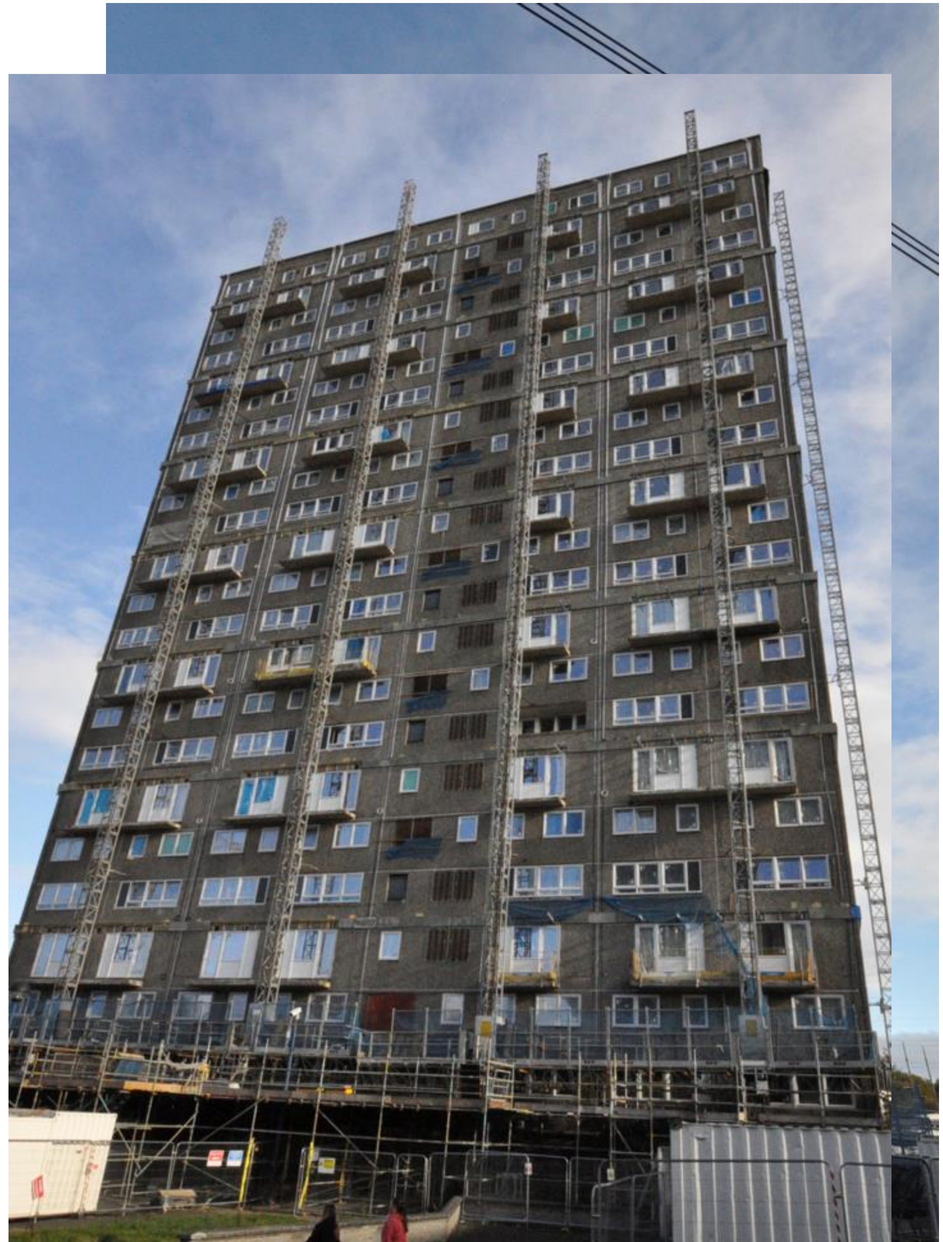
Airtightness interface

Woodside: Progress

Airtightness jointing – Precast panels

Woodside: Progress

- Thermal Break connection plates



So where are we?

Nearer than we thought due to PHPP V9 and PER value !

Specific building characteristics with reference to the treated floor area

		Unit	Value		Criteria	Alternative criteria	Fullfilled?[2]
	Treated floor area	m²	8180.2				
Space heating	Heating demand	kWh/(m²a)	17	≤	30	-	yes
	Heating load	W/m²	13	≤	-	-	
Space cooling	Cooling & dehum. demand	kWh/(m²a)	-	≤	-	-	-
	Cooling load	W/m²	-	≤	-	-	
	Frequency of overheating (> 25 °C)	%	0	≤	10		yes
	Frequency excessively high humidity (> 12 g/kg)	%	0	≤	20		yes
Airtightness	Pressurization test result n_{50}	1/h	1.0	≤	1.0		yes
Non-renewable Primary Energy (PE)	PE demand	kWh/(m²a)	139	≤	-		-
Primary Energy Renewable (PER)	PER demand	kWh/(m²a)	69	≤	75	75	yes
	Generation of renewable energy (in relation to projected building	kWh/(m²a)	0	≥	-	-	

[2] Empty field: Data missing; '-': No requirement

I confirm that the values given herein have been determined following the PHPP methodology and based on the characteristic values of the building. The PHPP calculations are attached to this verification.

PHI Low Energy Building? yes

Task:	First name:	Surname:	Signature:
1-Designer	Rupert	Daly	
	Issued on:	City:	

But still not quite EnerPHit yet!

Woodside: Specification compromise

Storage heat losses

		Storage 1	Storage 2	Buffer storage tank (only heating)	Compact unit	kWh/a	kWh/(m²a)
Selection of storage tank		2-DHW only	0-No storage tank	0-No storage tank	0-No		
Storage necessary for HP Solar DHW connection							
Heat loss rate	W/K	187.0	3.0	2.0			
Storage volume	litre	18900			---		
Standby fraction	-						
Location of storage tank, inside or outside of thermal envelope		1-Inside	1-Inside	2-Outside			
Temperature of mechanical room	°C	20.0					
Typical storage tank temperature	°C	55.0					
Manual entry of storage temperature	°C						
Average standby heat losses storage tank	W	6545					
Additional heat losses storage tank, solar operation	W			---	---		
Possibly utilisation factor of heat losses		---	---		---		
Annual heat losses DHW storage tank	kWh/a	57334		---		57334	7.0
Annual heat losses buffer storage tank		---	---		---		

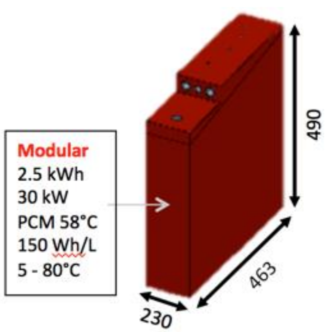
Auxiliary calculation - heat losses through storage tank according to EU efficiency classes

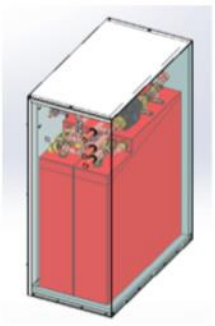
		Storage 1	Storage 2	Buffer storage tank
Storage volume	litre	180.0		
ErP class	-	C	C	C
Maximum permissible standby heat loss	W	83		
Heat loss ratio for PHPP calculation	W/K	1.8		

Too much!

Woodside: Storage Loss option offset

- Externally insulate poor performing HW Cylinder - – Under consideration
- Reduce size of HW tanks – Under consideration
- Omit tanks altogether – Not in tenants best interest as benefit to off peak tariffs
- Consider waste water heat recovery such as Recoup Pipe+ HE (PH Certified) Maybe next time
- Look at alternative storage options such as SunAMP Phase change material. Maybe next time





Sunamp heat batteries-0.579kWh storage losses per 24hrs

Woodside: Lessons Learned to date

- Form Factor – Makes a huge difference to energy performance and cost.
- Innovation – Great, but barriers due to perceived risk. Keep it simple.
- Challenge of refurbishment - Degree of cost uncertainty and flexibility but overall very suitable for upgrade
- Research – Critical to exploring options. Ask lots of questions…….all the time!
- Procurement – Design and Build – Opportunities to work as a team with Contractor and Client to provide effective solutions on a restrictive budget.
- Large Scale Passive House Refurb – On this project the challenge is more to do with M&E integration to the existing building than the building envelope.
- Cost Effective – Project cost to be confirmed but additional cost to PH standards are likely to be low.

Thank you for your time!

Rupert Daly

COLLECTIVE ARCHITECTURE

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