



Retrofit Coordination and Management

HND / BSC CONSTRUCTION MANAGEMENT

By Aaron Griffiths (2223674) | **ACBA5026** | 10/01/25

Context Page:

Introduction.....	
Occupancy Assessment.....	
Fuel Data.....	
Condition Survey.....	
Building Elements.....	
Floor Types.....	
Wall Types.....	
Roof Types.....	
Openings Schedule.....	
Radiator Schedule.....	
Floor Plan.....	
Carbon/Energy Use.....	
Potential Of Retro Fit Upgrade?.....	
Ventilation Strategy.....	

Introduction

14 Norgans Terrace, Pembroke is a terraced house built in “1906 which is the last map in which the house was last seen on” - (Maps.nls.uk. (2025). *Map Finder - with Marker Pin - Map Images - National Library of Scotland*. [online] Available at:

<https://maps.nls.uk/geo/find/marker/#zoom=18&lat=51.6728&lon=-4.9229&f=o&z=1&marker=51.6728> [Accessed 8 Jan. 2025])

The House has 600mm thick walls which are made from stone. The house has 12mm double glazing, which is in poor condition, and a lot of the seals/mastic has been worn away. There are no extraction fans in the property, however there are trickle vents above the windows which provide passive ventilation. The property is heated by a gas boiler and is connected to a hot water cylinder in the attic space. This proves heat to the rads located in the property, in which they are controlled by TVR's and a thermostat.



Property Address	14 Norgan's Terrace, Pembroke, Pembrokeshire, SA71 4EX
EPC Score	No EPC carried out on the property
Floor Area (m2)	61.1 m2
House Type	Terraced House
Bedrooms	3 Bedrooms
Listed Status	No
Conservation Area	No
TPOs	No
Other Constraints	No

Research found from - Service.gov.uk. (2021). *13 EPCs for SA71 4EX – Find an energy certificate – GOV.UK*. [online] Available at: <https://find-energy-certificate.service.gov.uk/find-a-certificate/search-by-postcode?postcode=SA71+4EX> [Accessed 8 Jan. 2025].

The intended outcome of this exercise is to create ideas/suggestions of how adapt the current building with respect to retro fitting, radon protection and other improvements in the property. The advantages of the report to the homeowner will allow them to cut fuel

bills and ensure the building is efficient with energy use. Also, if the property has adequate ventilation and air quality in the property with current building regulations.

The limitations of the survey:

This survey is mostly a visual survey that concentrates on the thermal performance and external conditions on the property. By being a visual survey no action is taken to access the covered areas of the property. To see the unseen structural element only included visual exposed sections of the property. Therefore, building services there is no inspection taken to find these, only rough guidance of where the stop tap is and gas meter location regarding the service's location

Occupancy Assessment

Name of Occupant	Mr. A Griffiths
Occupancy Status	Homeowner
No of Occupants in the property	4

By knowing this information, we can tell how much condensation and humidity is produced from the bathroom location. In the bathroom there is no mechanical ventilation, only passive ventilation with the opening of a window. This would mean the humidity is very high in this location. "Humidity is simply the concentration of water vapor present in the air, while relative humidity measures the amount of water in the wait in relation to the maximum amount of water vapor it can hold" - Bannister, M. (2023). *How humidity damages your home — and how to fight it*. [online] [www.airthings.com](https://www.airthings.com/resources/home-humidity-damage). Available at: <https://www.airthings.com/resources/home-humidity-damage>. The reason why having high humidity in the property is bad is it allows mold growth and spores which can pass through the air and around the house. In a typical 3-bedroom house the moisture content is typically 1.3litres of airborne moisture, which is calculated by:

$$RH = 100 \times \left[\frac{e^{\frac{17.625 \times D_p}{243.04 + D_p}}}{e^{\frac{17.625 \times T}{243.04 + T}}} \right]$$

Fig 1 - www.omnicalculator.com. (n.d.). Omni Calculator. [online] Available at: <https://www.omnicalculator.com/>.

Shower Type	Bath with a mixer shower
Showers Per Day/Week	4 Showers Taken Daily – 28 Showers Taken Weekly
Baths Per Week/Day	None

By having mold on a property, the common causes are condensation, rising damp and penetrating damp.

To prevent damp from happening in the property would need to increase the awareness of occupants in the property by, airing the home, check trickle vents are open, dry washing outside, air room regularly when drying and use bathroom and kitchen extractor fans

Other ways to prevent damp are: Retrofit works, improve ventilation, passive, mechanical, resolve cold bridges, consider re-insulating and improve heating

Energy Usage in The Property:

This table will show what the occupancy's set the temperature to in the winter months. This is the season in which this report was carried out.

Room stat temp (*C)	18*c Room Temperature
Thermostat Location	Landing

By measuring the occupancy's heating pattern, it will allow us to see when the heating is turned on and off with in the property. Thid information will allow us to see when the heating is being used. The thermal parameters of the building which is the features of the heating system in use, and how the behaviour of the occupants can influence, how much energy is used for space heating. The way people utilise and manage their heating systems to keep their homes warm has a big influence on how much energy is used overall.

Heating Pattern	On 1	Off 2	On 3	Off 4
Normal	6am	10am	2pm	10pm
Alternative				

Household Appliances:

No. of fridges:	0
No. of freezers	1
No. of fridge-freezers	1
Cooker Type	Gas
Gas	Normal
Electric	Normal
Range Fuel (operates 12/8/months)	0
Tumble Dryer	Yes
Space for outside drying?	Yes
Unusual Energy Use Items	No

Fuel Data

This property runs on mains gas and electricity. This is because this house is in a town, which means it has a mains supply running through. The house has a smart electric and gas meter fitted to the property. The client has asked how to reduce energy bills in the property.

The primary heating source of the house is a regular Vaillant boiler which provides heat and hot water to the property. The heat emitters are radiators with TRVs. Moreover, there is a hot water tank located in the loft space which distributes the hot water to the property. A secondary source is an electric fireplace located in the lounge.

The bulbs in the property are all low energy lighting bulbs, which ensure that the minimum electricity is used to generate lighting in the property.



Condition Survey

“Important note: We carry out only a visual inspection. This means that we do not take up carpets, floor coverings or floorboards, move furniture or remove the contents of cupboards. Also, we do not remove secured panels or undo electrical fittings.

We inspect roofs, chimneys and other surfaces on the outside of the building from ground level and, if necessary, from neighboring public property and with the help of binoculars. We inspect the roof structure from inside the roof space if there is safe access (although we do not move or lift insulation material, stored goods or other contents).

We examine floor surfaces and under-floor spaces so far as there is safe access to these (although we do not move or lift furniture, floor coverings or other contents). We are not able to assess the condition of the inside of any chimney, boiler or other flue.

We note in our report that we are not able to check any parts of the property that the inspection would normally cover. If we are concerned about these parts, the report will tell you about any further investigations that are needed.

We do not report on the cost of any work to put right defects or make recommendations on how repairs should be carried out”

Rics.org. (2023). Available at: <https://www.rics.org/profession-standards/rics-standards-and-guidance/sector-standards/building-surveying-standards/home-surveys>.

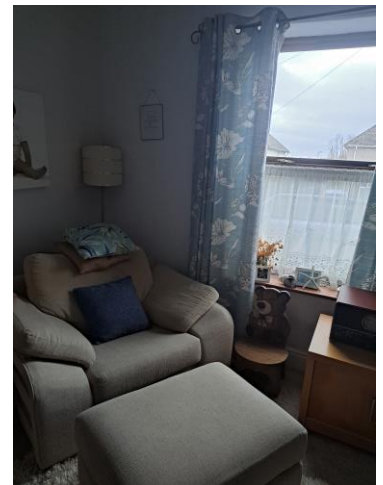
Building Elements

The building is constructed from stone and has a plaster finish in the internal envelope of the building. At the front of the property the bottom half of the building has an exposed stone finish, and the top half has a render finished applied. The render finish completes the whole rear end of the property. All walls in the property have no defect and are in good condition from a visual inspection. The external walls are approx. 600mm thick and internal walls are approx. 100mm thick. Looking at the external walls I can't visualize any cracks or defects which would produce damp in the building

The external doors to the front and rear of the property are old-fashioned timber doors which are not very well sealed and very drafty. However, the condition of the doors is good.

The Internal doors are wooden with smokey glass inserted with the doors. These are located at every entrance within the internal envelope of the property. All internal doors are in excellent condition.

The condition of the paint on the building is in poor condition and needs to be repainted. This is the same with the condition of the waste pipes and soil pipes which need to be painted to protect the pipes from harsh weather conditions.



Floor Types

On the ground floor level of the property towards the back of the house and into the garden the house has concrete flooring below. However, in the two living rooms at the front of the house, there is a floating timber floor which creates a void below. This void below is vented by air brick installed at the front of the property. At the rear path of the property there is an ACO drainage system which runs into the kitchen gully where the waste pipe from the gully runs into as well. This might cause an overload on the water gully and create a backlog of water.

However, from the UK government radon map it shows that the property is in high area of radon detected. But by visual inspection and talking to the occupant there has been no radon protection applied to the building.

Also, looking at the flood map on the natural resources Wales website it shows that the property is not in risk of flooding. This is because the property is elevated from the main road, which puts it in the category of low risk of flooding

The first floor of the building is a suspended wooden floor with floorboards and carpet. This would be because of the age when the property was constructed. The floorboards create sound below and let a draft through the elevation from ground floor to first floor. This is because of the age of the floorboards.

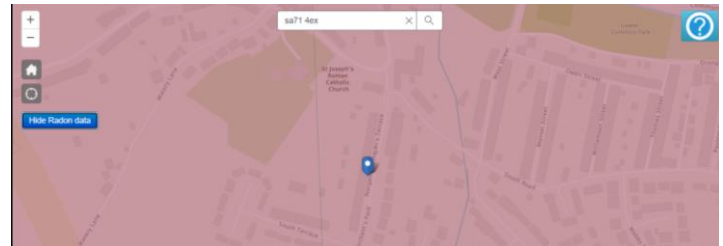


Fig 2 - Public Health England (2022). UKradon - UK maps of radon. [online] Ukradon.org. Available at: <https://www.ukradon.org/information/ukmaps>.

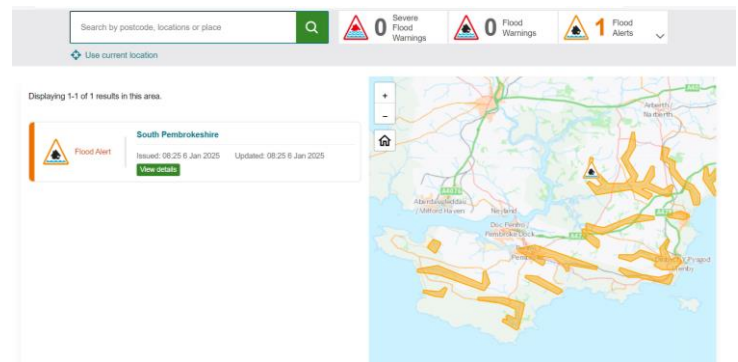


Fig 3 - Naturalresources.wales. (2020). Flood warnings and alerts. [online] Available at: <https://flood-warning.naturalresources.wales/?centre=eyJlIjpbNTEuNjkzMzUzMDE4OTMyMjgsLTQuODkoNTY3NTIzMjIyODAoXSwieiI6MTYuMjV9> [Accessed 8 Jan. 2025].

Roof Types

Regarding the roof, it is made from slates from visual inspection. The property has wooden fascia and soffits. The guttering and downpipes are all made from PVC and are all in good condition.

There is an opening in the roof space for a chimney which the brick works it's not in good condition and would need to be repointed. The lead in which the chimney connects to the roof section is in poor condition as well and needs to be replaced and renewed. Another opening on the roof is a valex window. This window is in poor condition and the seal around the window needs to be resealed as when I was on the property could feel a draft coming through.



The loft has wooden rafters to hold the structure of the roof up with about 150mm of insulation. Looking into the loft there are no problems which could damage the property over time. The felt is in good condition and there are no water marks or limescale on the gable ends of the property within the blockwork.

Opening Schedule

Location	Door Openings	Window openings
1 st Living Room	930mm (w) x 1849mm (h)	1476mm (w) x 1733mm (h)
2 nd Living Room	920mm (w) x 1849mm (h)	1511mm (w) x 1733mm (h)
Kitchen	1079mm (w) x 1849mm (h)	1440mm (w) x 1037mm (h)
Utility Room	743mm (w) x 1849mm (h)	1653mm (w) x 1013mm (h)
Hall	1079mm (w) x 1849mm (h)	N/A
Master Bedroom	850mm (w) x 1849mm (h)	1476mm (w) x 1762mm (h)
1 st Bedroom	900mm (w) x 1849mm (h)	1510mm (w) x 1762mm (h)
2 nd Bedroom	900mm (w) x 1849mm (h)	1511mm (w) x 1762mm (h)
Bathroom	816mm (w) x 1849mm (h)	1440mm (w) x 700mm (h)

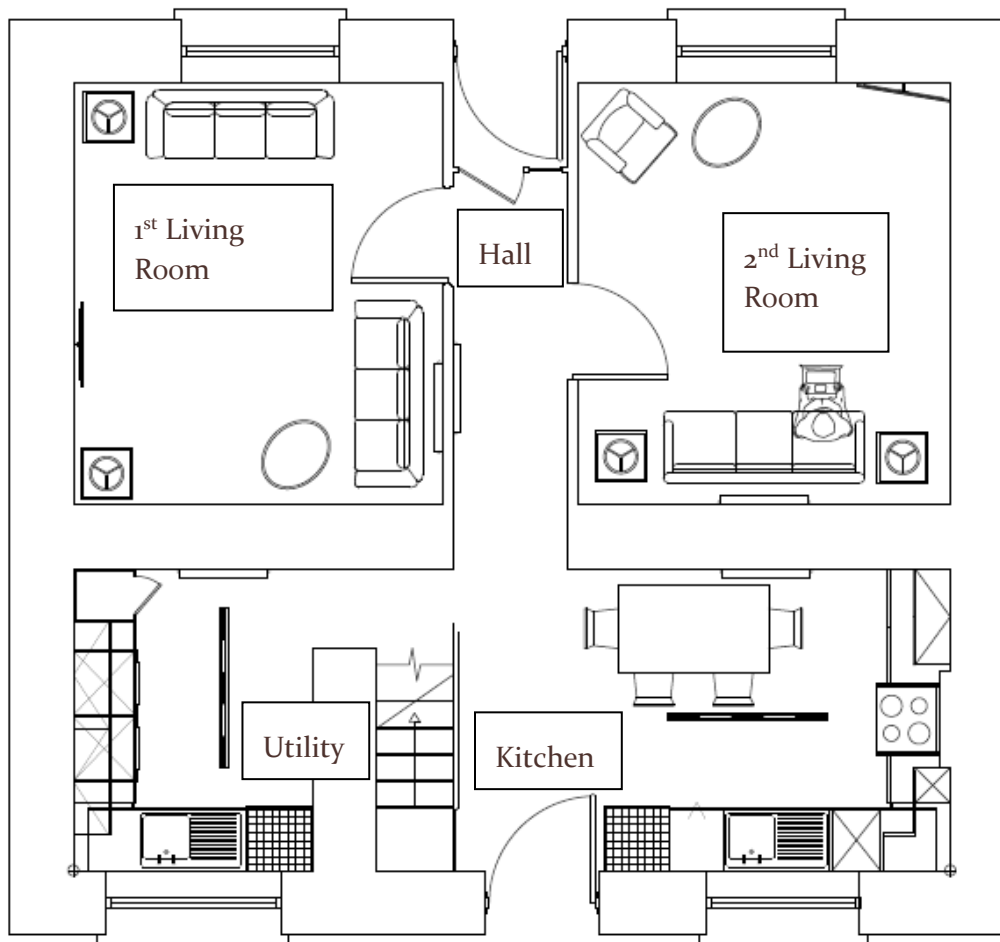
*All windows and doors are openable to use

Radiator Schedule

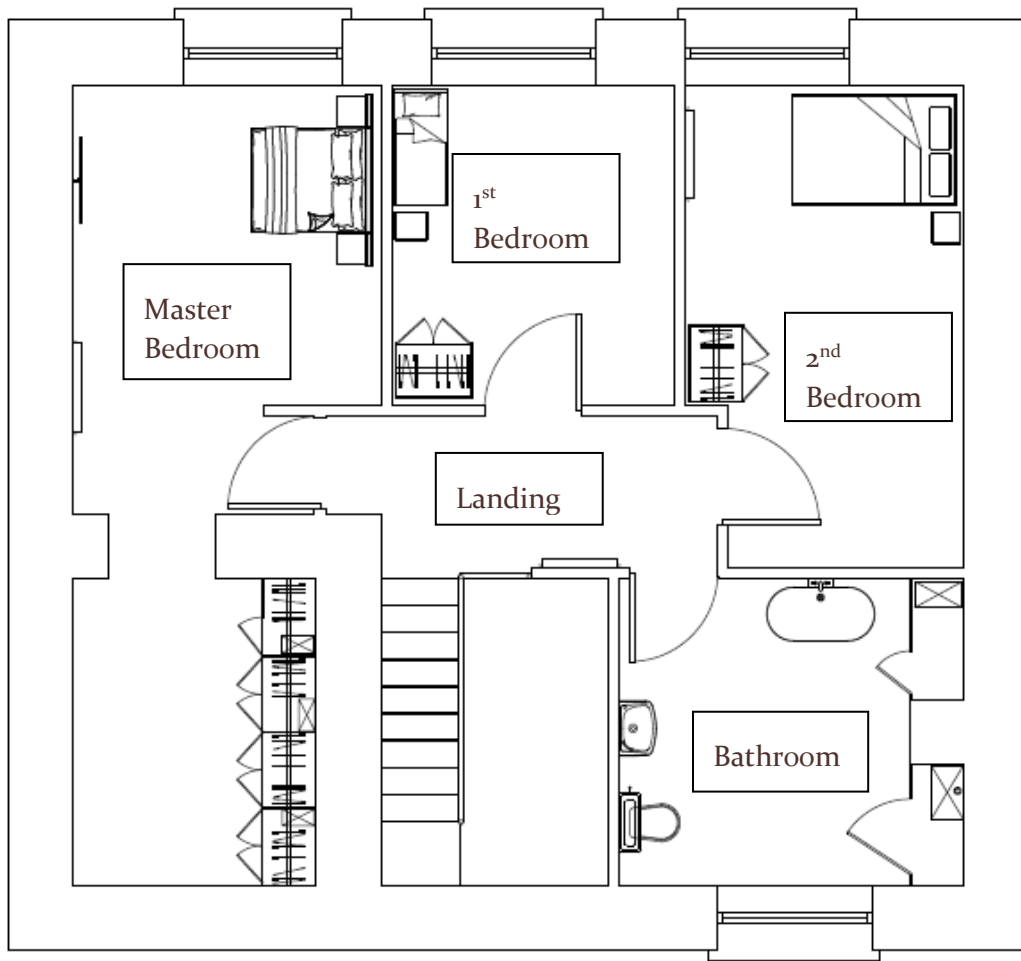
Location	Dimensions of Radiator
1 st Living Room	1400mm x 540mm double convector
2 nd Living Room	1400mm x 540mm double convector
Hallway	1400mm x 620mm double convector
Kitchen	1500mm x 610mm double convector
Utility Room	1500mm x 620mm double convector
Landing	1500mm x 610mm single convector
1 st Bedroom	1200mm x 540mm single convector
2 nd Bedroom	1200mm x 540mm single convector
Master Bedroom	1219mm x 5400mm double convector
Bathroom	N/A

Floor Plan

Ground Floor Plan:



First Floor Plan:



Carbon/Energy Use

From completing the report above I have gained the knowledge of that the building has a high energy usage, which means It has a large carbon footprint. The occupant has enquired on how to reduce the energy consumption/heating bills of the property.

A suggestion to cut energy bills within the property would be the use of solar panels to be installed onto the property. Information to be taken as the solar panels do a scheme in which more information is found on - Energy Grant Access. (2024). *Free Solar Grants Wales*. [online] Available at: https://energygrantaccess.co.uk/free-solar-grants-wales/?utm_source=google&utm_medium=cpc&utm_term=solar%20grant&utm_id=20281573153&adgroup_id=150848131392&utm_content=662499241143&utm_campaign=EGA%20 [Accessed 9 Jan. 2025]. The advantages of using solar panels in the property are that it will increase the properties value and reduce the carbon footprint of the property as its clean



energy being produced. You can also make money off solar panels as the power which you don't use from the battery storage will be sold back to National Grid, it is not a lot of money but it's something which helps. This would mean that over the solar panels lifetime it would make its money back.

Moreover, I would suggest installing an air source heat pump which could be located and fitted at the rear of the property. The reason which I would suggest is this method of energy source because it is the same as the solar it produces a clean energy source, which is cheaper and more efficient than your typical gas boiler, will last longer, safer to use, will work in all weather and doesn't need planning permission to get one installed. The cost of these air source heat pumps can also be covered by a government scheme.

All these suggestions would improve the house and reduce the carbon/energy efficiency in the properties. It will also help the community with creating green energy jobs to maintain the suggested equipment.

I would like to suggest that the windows in the property need to upgrade. This would be to triple glazing because it is the most efficient way to reduce heat loss within window openings as triple glazing windows usually have a surface temperature of 17°C which is higher than double glazing. This can be tested by using a heat signature gun, which can also help to see if the heat is escaping from the seals of the window. To ensure the window is correctly fitted it would suggest in fitting an air-tight barrier to the reveals of the windows then plastering over the barrier to ensure its airtight. Regarding the window frame I would suggest installing a passive house standard frame which has a low u-



value of 0.85. Having low u-values in the property is eccentric as it will allow for a better EPC score.

Potential Of Retro Fit Upgrade?

To improve the houses' thermal capabilities, I am implying that the occupant installs internal wall insulation on the property. The advantages of internal wall insulation are that it's much cheaper than external wall insulation so it's more cost-effective on the performance which you would achieve with this. However, it doesn't have a higher u-value

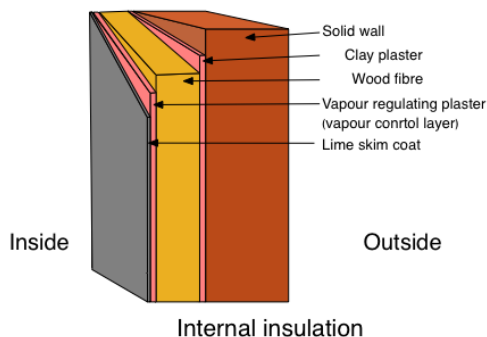


Fig 4 - Eco-Home-Essentials.co.uk. (n.d.). *Is Internal Wall Insulation Worth Installing?* [online] Available at: <https://www.eco-home-essentials.co.uk/internal-wall-insulation.html>.

helps maintain thermal performance. Without this, your window could be letting air and in turn energy escape.” - Intelligent Membranes. (2025). *Airtight Tape*. [online] Available at: <https://www.intelligentmembranes.com/p/airtight-tapes> [Accessed 9 Jan. 2025]. The reason why I have chosen IWI over EWI is because the property is a terraced house and has limited space to apply the EWI to the rear of the property. This also applies to the front of the property as well as cars will not be able to pass through the street.

Ventilation Strategy

In the property it is crucial to have in a building because it ensures that the correct amount of air changes is happening to get rid of moisture, heat, smells and quality air. This you will be comfortable regarding your human comfort.

Due to the property being in a high radon area. Radon protection is key to being installed on the property. Which I would like to imply is that a radon protection barrier to be

rating as external wall insulation. But by installing internal wall insulation it will prove an air tightness barrier which will stop and prevent any cold bridges from happening. Good practice as well is to have a service void for electrics and pipework, which will also stop any cold spots from appearing on the walls. As a service void will act as a cavity.

When installing internal wall insulation, the seal around the details on the building (doors, windows and other intricate details of the building) is the most important part of the installation. This is because “Airtightness tape is used around your windows to create a durable seal, which

installed on the ground floor of the property. This would insist on filling in the void at the front of the property and digging up the floor at the rear. This would allow you to install the radon membrane to the floor, I would also recommend that the membrane is secured to the wall at skirting level to ensure the radon below is encapsulated and not penetrated by any air gaps. This membrane will have to be airtight using airtight tape and to ensure the detail is accurate and fit securely with no air bubbles.



A cheap alternative would have more passive ventilation by opening the windows and trickle vents more often to create cross ventilation in the property. However, this is only a short-term solution

Moreover, an MVHR (Mechanical Ventilation Heat Recovery) system would be the efficient way to

have ventilation and a heating system in the property. This system could be installed in the attic space which would create an opening, however if sealed adequately it would not cause any problems with the weather elements. Then ducting will be installed in each room in the property and extract the poor-quality air and ins tract the air from outside. “MVHR extracts stale air and supplies clean filtered air that is warmed using the recovered heat from the extracted air. In return this helps reduce the risk of virus transmission and reduces the risk of a variety of respiratory and cardiovascular diseases, like asthma and strokes” - Sagoo, K. (2022). *5 Benefits of Installing an MVHR System*. [online] www.airflow.com. Available at:

https://www.airflow.com/about-us/blog/article?article_id=27&article_desc=5-Benefits-of-Installing-an-MVHR-System.

Therefore, this system has two benefits of reducing your energy consumption/bills and providing quality air ventilation to the building.



Fig 5 - Jones, S. (2022). Radon Barrier Membrane - Powerbase Radon Barrier Sheeting. [online] Industrial Textiles & Plastics Ltd. Available at: <https://itpltd.com/powerbase-radon-barrier/>.

References

Bannister, M. (2023). *How humidity damages your home — and how to fight it*. [online] [www.airthings.com](https://www.airthings.com/resources/home-humidity-damage). Available at: <https://www.airthings.com/resources/home-humidity-damage>

Research found from - Service.gov.uk. (2021). *13 EPCs for SA71 4EX – Find an energy certificate – GOV.UK*. [online] Available at: <https://find-energy-certificate.service.gov.uk/find-a-certificate/search-by-postcode?postcode=SA71+4EX> [Accessed 8 Jan. 2025].

Fig 1 - www.omnicalculator.com. (n.d.). *Omni Calculator*. [online] Available at: <https://www.omnicalculator.com/>.

Rics.org. (2023). Available at: <https://www.rics.org/profession-standards/rics-standards-and-guidance/sector-standards/building-surveying-standards/home-surveys>.

Fig 2 - Public Health England (2022). *UKradon - UK maps of radon*. [online] [Ukradon.org](https://www.ukradon.org/information/ukmaps). Available at: <https://www.ukradon.org/information/ukmaps>.

Fig 3 - [Naturalresources.wales](https://naturalresources.wales/). (2020). *Flood warnings and alerts*. [online] Available at: <https://flood-warning.naturalresources.wales/?centre=eyJljbNTEuNjk2MzUzMDE4OTMyMjgsLTQuODkoNTY3NTIzMjIyODAoXSwieil6MTEuMjV9> [Accessed 8 Jan. 2025].

Energy Grant Access. (2024). *Free Solar Grants Wales*. [online] Available at: https://energygrantaccess.co.uk/free-solar-grants-wales/?utm_source=google&utm_medium=cpc&utm_term=solar%20grant&utm_id=20281573153&adgroup_id=150848131392&utm_content=662499241143&utm_campaign=EGA%20 [Accessed 9 Jan. 2025].

Fig 4 - [Eco-Home-Essentials.co.uk](https://www.eco-home-essentials.co.uk/). (n.d.). *Is Internal Wall Insulation Worth Installing?* [online] Available at: <https://www.eco-home-essentials.co.uk/internal-wall-insulation.html>.

Intelligent Membranes. (2025). *Airtight Tape*. [online] Available at: <https://www.intelligentmembranes.com/p/airtight-tapes> [Accessed 9 Jan. 2025].

Fig 5 - Jones, S. (2022). *Radon Barrier Membrane - Powerbase Radon Barrier Sheeting*. [online] [Industrial Textiles & Plastics Ltd](https://itpltd.com/powerbase-radon-barrier/). Available at: <https://itpltd.com/powerbase-radon-barrier/>.

Sagoo, K. (2022). *5 Benefits of Installing an MVHR System*. [online] www.airflow.com. Available at: https://www.airflow.com/about-us/blog/article?article_id=27&article_desc=5-Benefits-of-Installing-an-MVHR-System.