No. 9 George's Place & Former Wash House, Kellys Avenue, Dún Laoghaire

High-Level Strategy for Thermal Upgrade of a Heritage Building.

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EXECUTIVE SUMMARY

This report was commissioned by Laura Johnstone, Architects' Department of Dún Laoghaire-Rathdown County Council. It was prepared following the publication of an integrated urban study to find a suitable new use for the THRIVE George's Place project and preparing a Part 8 planning application, this is to facilitate a Strand 2 Application for Capital Works Funding. This report provides high-level expert advice on an appropriate approach to thermally upgrade the two historic protected structures – no. 9 George's Place, a former hotel built in 1831 and the Former Wash house on Kelly's Avenue c. 1912.

This report has been prepared following a site visit on the 15th of January and again on 28th January 2025.

Both buildings are in a poor condition due to the fact they have been vacant for 10 years and possibly longer. It is proposed to carry out works to both buildings with a proposed end use of a "Creative Centre" for the local community. The proposed adaptive reuse is very well-suited to the buildings in question.

Both buildings are of architectural and heritage value and all works to be carried out should follow the conservation and energy retrofit best practice guidelines and charters.

Once a Part 8 application has been lodged consideration should be given to tendering a further body of investigative work which will assist in a best practice conservation and energy upgrade to both buildings. This work will then feed into the detailed and construction package suitable for tendering to specialist conservation contractors.

As the integration of conservation and energy retrofit is relatively new not all recognised practices can offer the level of coordinated service that is required to achieve an exemplar project as this development should aim to achieve. Most conservation architects of a grade 1 status will not have the experience or expertise to deliver the required energy analysis and specification – very few if any mechanical & electrical consultants have the experience and expertise required to deliver the required level of specification for an effective and sympathetic energy retrofit.

Carrig as the leading experts in the cross field of conservation and energy retrofit of heritage and traditional buildings is very willing to attend an in-person meeting with the local authority at an early stage of the process to discuss an exemplar approach.

If the potential as set out in this document is to be realised a certain amount of flexibility in qualification, ability and experience will have to be weighed up against the most advantageous proposed advisory team.

1 Introduction and Report Aim

The plan for these two buildings is to conserve the buildings' character and heritage value and to upgrade them to improve energy efficiency and to bring the buildings back into use. It should also be an aim to use low carbon solutions in the conservation and energy upgrade process.

No. 9 George's Place is a two-storey over basement, four-bay building built in 1831 as a hotel building (484 sqm). There is a two-storey lean-to extension to the north-west of no. 9 George's Place which is in very poor condition. The existing two-storey lean-to extension to the north-west of no. 9 George's Place will be demolished and replaced with a new three-storey extension to accommodate the new use and to provide universal access.

The Former Wash house on Kelly's Avenue is a detached, two-storey, red-brick washhouse, built in 1915 on a tripartite plan with central staircase (161 sqm).

This report aims to provide the client with high-level information on the relevant material, structural and architectural characteristics of the buildings following an on-site inspection. The buildings' capacity for retrofit measures is then assessed, to allow for the development of a retrofit strategy for the buildings between the client and Carrig.

Following the recommended procedure for developing a retrofit plan outlined in *Irish Standard EN 16883: 2017: Conservation of cultural heritage – Guidelines for improving the energy performance of historic buildings and "Improving Energy Efficiency in Traditional Buildings – Guidance for Specifiers & Installers" published by DHLGH 2024* it is the aim of the local authority to create an exemplar project in the energy upgrade of these two historic structures.

This report determines to:

1) Understand the existing buildings through an assessment of the current buildings condition including the impact of past alterations.
2) Determine complexity by establishing the statutory status of the buildings, as they are Protected Structures, lie within an Architectural Conservation Area, or have features of significance, establishing whether the retrofit works are likely to be complex.
3) Set retrofit objectives and targets that can be achieved in a heritage building and value its embodied carbon.
4) Develop long list of retrofit measures and assess risk: Determine risks relating to condensation, ventilation, thermal bridging and the impact of the measures on the building's heritage significance. 5) This document will assist the local authority in a Part 8 Planning application.

Further steps to follow: the detailed design of the retrofit strategy for the buildings:

6) Best practice is to fully understand your building and its current thermal performance. With this in mind dlr should undertake full risk mitigation measures: Appoint specialist consultants and/or commission specialist surveys (e.g. heritage impact assessments, true U Value measurements, thermal bridge modelling, condensation risk assessments, etc. (see section 6.2 of this document)).
7) Create a short list of retrofit measures and review their impact: Determine whether the proposed measures will meet the retrofit objectives and targets. Consider different retrofit measures or materials. Revise retrofit objectives and targets, if necessary, based on the risk assessment.
8) Evaluate all upgrades to ensure they are low carbon solutions.
9) Develop detailed specifications: Ensure materials and measures comply with heritage and energy efficiency best practices.
10) Tender for qualified contractors: Contractors should have an understanding of traditional buildings and experience working on them for a minimum of five years.
11) Inspect works.

This report has been prepared based on research, site visits, opening-up works, and with particular reference to the following: *Irish Standard EN 16883: 2017: Conservation of cultural heritage – Guidelines for improving the energy*

performance of historic buildings and "Improving Energy Efficiency in Traditional Buildings – Guidance for Specifiers & Installers" published by DHLGH 2024. Architectural Heritage Protection – Guidelines for Planning Authorities 2011.

2 History

The Wash House was originally designed by Joseph Berry for Kingstown Town Council.[1] He was a civil engineer and architect who was appointed town surveyor to Kingstown Urban District Council, a post which he held for 35 years. The Wicklow Newsletter, 1891 wrote of him, '*In particular, the contrivance of the rock gardens running down to the sea, and the last work, the fine Marine road, a magnificent boulevard connecting Kingstown with Sandycove…In the design and construction of the shelters along the sea, Mr. Berry was in advance of his time in the intelligent and logical use of concrete direct from the forms, without stucco or mouldings of any sort, the marks of the shuttering being judiciously disposed, a method subsequently adopted in the Wembley Exhibition buildings*.' [2]

There are two subject buildings being considered:

2.1 No. 9 George's Place (known as Kelly's Hotel)

A two-storey over basement, four-bay building built in 1831 as a hotel building (484 sqm). There is a later two-storey lean-to extension to the north-west of no. 9 George's Place which is in very poor condition and is not of heritage value.

2.2 The Former Wash house on Kelly's Avenue

A detached, two-storey, red-brick washhouse, built in 1915 on a tripartite plan with central staircase (161 sqm).

The plan for these two buildings is to upgrade them to improve energy efficiency and to bring the buildings back into use.

Fig.1: 9 George's Place, Dun Laoghaire

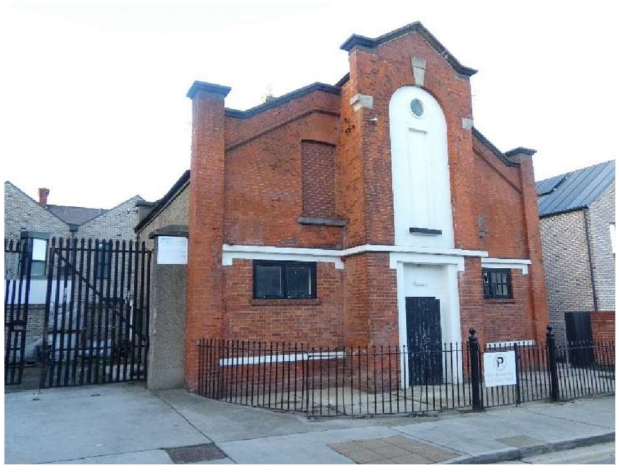

Fig.2: Former Wash House, Kelly's Avenue.

[1] Irish Builder 40, 1 Jan 1898, 8.

[2] *Wicklow Newsletter*, 15 Aug,5 Sep 1891.

2.3 Building Typology

9 George's Place is constructed of a solid masonry outer wall, a double A pitched slate roof, timber sash windows and all external walls are rendered with a cementitious render and some walls are painted. The wash house is built with solid brick walls, a red (possibly Portmarnock) brick and a Dolphin's Barn brick to the other three walls.

2.4 Historical Development of the Site and its Environs

Fig.3: First Edition 6 Inch OS map of area surrounding the site with the approximate location of No. 9 George's Place shown (orange dot). Sheet DN023 surveyed 1836, published 1843 *[source: www.geohive.ie/mapviewer].*

Fig.4: 25 inch edition OS map of area surrounding the site with the approximate location of No. 9 George's Place shown (orange dot). Sheet DN023-06+02 surveyed 1907, published 1911 [source: www.geohive.ie/mapviewer].

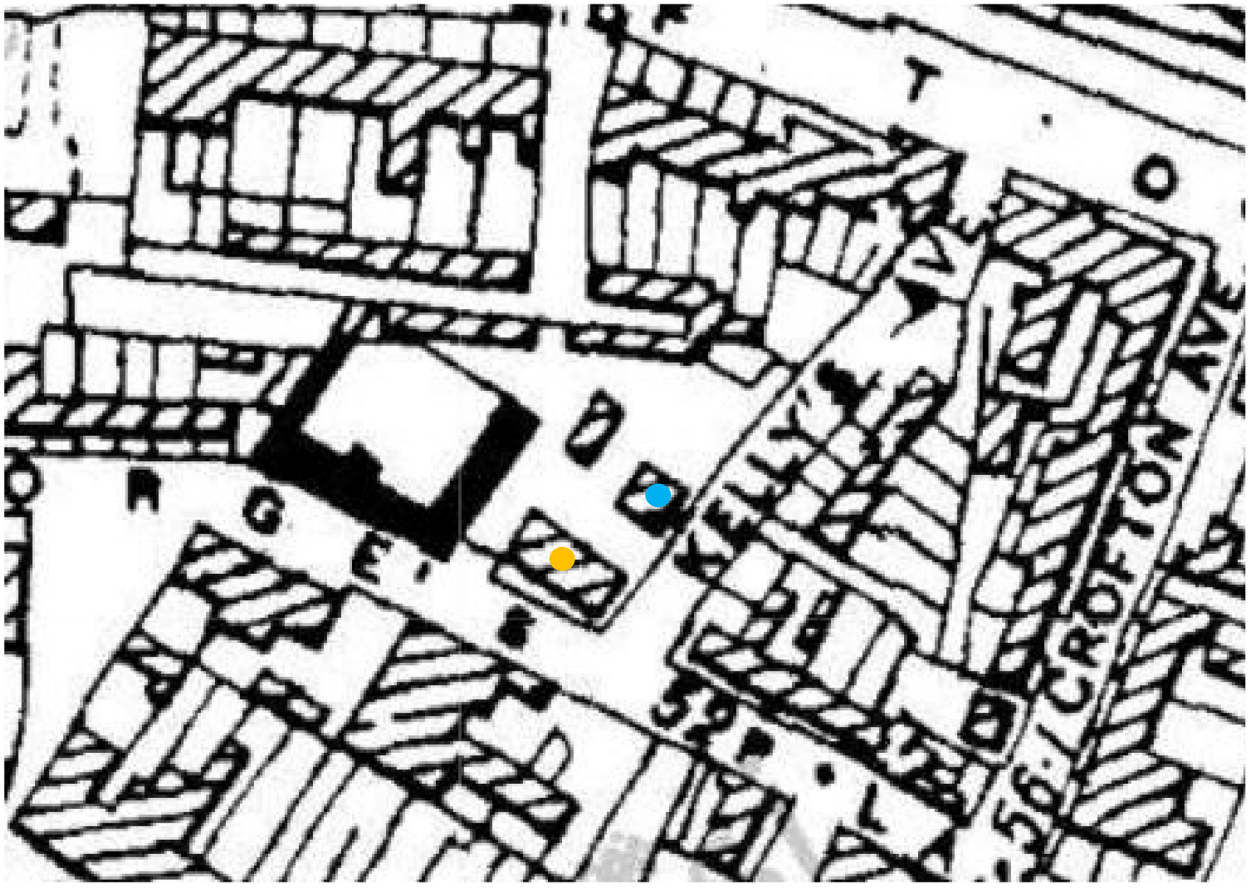

Fig.5: Last edition OS map of area surrounding the site with the approximate location of No. 9 George's Place shown (orange dot) and Former Wash House in blue dot. Sheet DN023 surveyed 1937, published 1940 [source: www.geohive.ie/mapviewer].

3 Statutory Status

3.1 Record of Monuments and Places

No. 9 George's Place is not listed on the Record of Monuments and Places.

The Former Wash House, Kelly's Avenue is not listed on the Record of Monuments and Places.

3.2 Record of Protected Structures

No. 9 George's Place is listed as a protected structure (Ref. 1958) under DLRCC Development Plan (2022-2028).

The Former Wash House, Kellys Avenue is listed as a protected structure (1959) under DLRCC Development Plan (2022-2028).

Previously these protected structures have been occupied as a hotel, a wash house, council stores and offices.

Fig.6: Development Plan 2022-2028 - Protected Structures DLR showing No. 9 George's Place and the Former Wash House (orange highlight) and other Protected Structures (blue outlines) in the area *[source: Development Plan 2022-2028 - Protected Structures DLR - Dataset - data.gov.ie]*.

3.3 Architectural Conservation Area

The buildings do not lie within an Architectural Conservation Area.

3.4 National Inventory of Architectural Heritage

The National Inventory of Architectural Heritage for this area has not yet been published for this part of the county.

4 Energy Efficiency Strategy Overview

Existing buildings account for a large proportion of our built heritage and most require a specific approach to an energy efficiency upgrade as most buildings prior to 1960 are what can be described as "Traditionally Built" and the main feature is they are of solid wall construction – thicknesses and materials used vary but this is a classification that needs a particular approach so as not to introduce "Maladaptation" which can result in damaging the fabric of a building, endangering the occupants' health and if an energy upgrade is not done properly the improvement in energy efficiency is not realised. Maladaptation can also damage or destroy our built heritage.

This approach is based on a review of current national and international standards, guidance, data sources and software applications relating to the whole life carbon assessment of buildings, with a particular focus on the retrofit of historic or traditionally built solid-walled structures to improve their energy efficiency whilst eliminating potential damage to the building fabric.

4.1 BER (Building Energy Rating)

The current BER system in Ireland is not fit for purpose when dealing with a solid wall construction typology. The BER automatically gives a "Default" U Value of 2.2 for any solid wall – our experience in carrying out in-situ U Value tests on such structures is that the majority perform much better then envisaged therefore it is very important to carry out the full technical evaluation specified later in this document.

4.2 Proposed Adaptive Reuse

The phrase coined by American Architect, Carl Elefante, "*The Greenest Building is the one that's already built*" points the way to the adaptive reuse of our older building stock. The fact that these two buildings are protected structures adds weight to the benefits of the proposal to use 9 George's Place and the Washhouse as a new multi-purpose community facility as the optimum in sustainability.

The value of embodied carbon cannot be expressed enough and by conserving these two buildings, striving to do a deep energy retrofit with best practice should result in an exemplar project. The whole life cycle analysis is also important so to add low carbon interventions in preserving and finding a new use for these buildings is essential.

This document sets out a high-level strategy for both conservation and energy retrofit best practice.

The proposal to convert these buildings into a new "Centre for Creative Lifelong Learning" is ideal for this type of building and will bring life back into the buildings and this part of Dún Laoghaire.

4.3 Low Carbon Solutions

When considering products and systems as part of conservation and/or energy retrofit we must seek low carbon solutions and as mentioned above whole life cycle carbon analysis has to be considered for example – roofing slates are available in Ireland again through Valentia Slate Company rather than using an imported slate with high transport carbon cost.

4.4 Current Condition

The current condition of both buildings is poor as they have been vacant for some years – there are also later and modern interventions that are not in keeping with the building and may be causing irreparable damage to the building fabric. A proper conservation condition survey should be carried out recording what is original and what is not. Defects should also be recorded and specified for sympathetic conservation repair.

When conserving heritage or traditional buildings one should follow the ICOMOS (international council of monuments & sites) Venice and Burra Charters, the Department of Environment, Local Government & Heritage (DELGH) Architectural Heritage Protection - Guidelines for Planning Authorities 2011 and in relation to the energy retrofit the DHLGH (department of housing, local government & heritage) guidelines for the energy retrofit of traditional buildings 2024.

5 Proposed Energy Efficiency Measures

5.1 Roof

One has to decide if you wish for a hot roof or a cold roof this then dictates the best way to insulate the roof of a building. The choice may be made easy if the roof covering has to be replaced.

5.1.1 HOT ROOF

Remove the existing slates from the roof, inspect the timbers to ensure they are in good condition, some timbers may need repairs. Once the roof timbers are secure and fit for purpose place, a woodfibre sarking board to the skyward surface – place a breathable membrane – place your counter battens and fit new slates.

A woodfibre or lose material insulation can be installed between rafters to give extra insulation and thermal performance – one cannot over insulate a roof when using suitable and breathable insulation products.

5.1.2 COLD ROOF

If the decision is to go with a cold roof the main roof should be made water and wind tight and when choosing a membrane always use a breathable membrane.

When the top floor joists have been examined and repaired it is recommended that a full joist depth of natural wool fibre insulation is fitted. As an extra layer it is recommended that a 40mm woodfibre board is then placed over the joists to create a full floor. If the attic floor is to be used for storage a plywood timber walkway system should be installed.

Risk: If there are coved ceilings it is very important to ensure full insulation is placed in the coved areas as if not this can become a cold bridge.

The lower roof of the Former Wash House is to be replaced with a natural slate roof to match the upper roof.

5.2 Floors

5.2.1 SOLID FLOORS

In 9 George's Place, the basement appears to have a concrete floor – this is unlikely to have any insulation and may have a damp issue. It is recommended that all concrete ground floors are removed and consideration be given to installing an underfloor heating system with a high level of insulation.

The Former Wash House also has a concrete floor at ground level and first floor level. The heating strategy here should be to replace the ground floor, installing an underfloor system as above. As it would be disruptive to replace the first floor, a slim underfloor heating system could be considered, or a more traditional radiator system employed.

5.2.2 SUSPENDED GROUND TIMBER FLOORS

Where there are suspended timber floors at ground level the timber should be inspected and repaired where necessary with the timber planking retained for reuse. Once inspected, consideration should be given to using a sustainable insulation to all suspended floors – Geocell Recycled Foam Glass is a good example of a sustainable and

effective product. Where concrete ground floors are to be replaced Limecrete should be used as a replacement material.

5.2.3 SUSPENDED UPPER FLOORS

There is usually no need to thermally insulate suspended upper floors, however, should there be a demand for noise insulation then we would suggest a wood fibreboard between the joists allowing a suitable air gap and ventilation.

5.3 WINDOWS

Whilst the windows are most interesting in No. 9, we believe the windows are not original. We have not encountered horizontal pained sash windows. Consideration should be given to retaining the windows, restoring them and using perhaps a secondary glazing solution for a thermal upgrade. Following a condition assessment non-original glass may be replaced with slimline double glazed units. Proposed new windows to Wash House will be timber sliding sash with slimline double glazing designed to reflect the original fenestration.

5.4 DOORS

There are no original doors in 9 George's Place although there are original timber surrounds and architraves. Where possible, new doors should be as close to what would have been original in the building. Door frames can be thermally upgraded where required.

5.5 EXTERNAL WALLS

The entire external walls of 9 George's Place are rendered with a cementitious render. This should be removed back to the sub-structure and a lime insulated render applied to the same thickness as the render that has been removed. The insulated lime render should also go on reveals.

To the southwest façade (main façade) to 9 George's Place there is a semi-raised external ground – this will cause damp and perform a high-risk cold bridge. The external ground level should be reduced to just below the internal ground level if possible – if this is not feasible for any reason consideration for internal insulation and a possible tanking system employed.

The external walls of the Former Wash House are all brick finished so external insulation is not a consideration.

5.6 CLIMATE RISK

With the onslaught of the climate crisis many roof water systems are now under sized and not managing the new volumes of water in extreme weather events. It is recommended that consideration be given to increasing the size of rainwater goods and to ensure downpipes and disposal drainage can cope with these increased volumes of rainwater.

5.7 INTERNAL WALLS

As the buildings have been vacant for a considerable period of time, most of the internal plaster to walls is nonfunctional and non-performing. The recommendation is to carefully remove all internal plaster to the interior of external walls and apply a suitable depth of lime insulated plaster. Where external walls meet cross walls, the lime insulated plaster should extend to a minimum of a metre on the cross wall to eliminate the potential for cold bridging.

5.8 DECORATIVE PLASTER CEILINGS

In 9 George's Place there is an ornate and important lime plaster decorative ceiling with cornice in the main entrance hall. This should be protected during all proposed work and inspected from above. If insulation is required in this area it should be of a natural material and should not put the safety of the decorative ceiling at risk. Any repair to the

decorative ceiling should be carried out prior to any work being carried out and particularly prior to installing the insulation.

5.9 Basement External Ground Finish

Around both buildings there are hard surfaces right up to the walls of the buildings – this can cause damp issues within the walls and should be avoided – it is recommended that a French drain is installed around both buildings and the potential water directed away from the building. Hard surfaces close to walls can also cause splash back in heavy rain events and cause saturation and staining of the lower section of wall.

5.10 New Construction Elements

Where possible all new construction should be based on low carbon construction and the use of low carbon materials. Where new elements meet or adjoin the protected structures consideration for a light touch is required but also attention to detail so there is no risk of fabric damage, incompatibility or cold bridging between old and new.

5.11 Heating

It is agreed that the current heating system is to be fully replaced with a new system. Where possible we should be promoting a non-fossil fuel solution. Consideration should be given to the use of a heat pump. With the planned energy upgrade to the building fabric of the two protected structures this is possible. Experience shows that if the building fabric of a heritage or traditional building can be improved, thermally by a minimum of 30% a heat pump can produce sustainable and effective heating. It is recommended that one heat pump be designed to work for both buildings.

5.12 Cooling

Cooling a building is more challenging than heating an older building – where possible natural ventilation should be used rather than carbon rich mechanical systems. If the building fabric of a building is thermally efficient it will keep the building cool as well as warm.

5.13 Ventilation

When thermally improving an older building it is very important to get a ventilation strategy that is compatible with the historic fabric.

5.14 BMS

A building management system that can easily control all elements of a traditional building is important – often such systems are either not understood or they are designed for modern buildings. The building fabric of a historic or traditional building is best kept at a constant temperature ranging between a low of 14 degrees and a high of 20 degrees. If the building is to be used by many groups a simple but effective operational manual should be left on site.

5.15 Monitoring

In the strive to convince more people to go the route of sustainable and low energy older buildings we need hard evidence case studies and as these buildings are local authority owned and managed a monitoring strategy should be implemented so that the performance of the buildings can be recorded and published on an annual basis and over a minimum of five years.

5.16 Renewable Energy

Carrig believes that all forms of renewable energy should be considered from solar panels to geothermal and the use of an efficient heat pump. If our built heritage is to be repurposed, then consideration for fully reversible solar PV Panels on historic roofs must be accepted by the heritage sector. On this particular project we have a new element of construction adjoining the protected structure and the flat roof of the new building can be used to install PV Panels. As 9 George's Place is a double-A roof PV Panels can be placed within the valley as they will not be seen.

On the Wash House the roof is not original and as the roof will have to be replaced we believe this is also an opportunity to place PV Panels on the lower section of the new slate roof to the south.

5.17 Product Suitability

As the subject buildings are of heritage significance and are built in a traditional way the building fabric is deemed to be open pore and therefore all products considered for use on the conservation and energy upgrade must also be of an open pore structure. The products listed below are suggestions and in all cases suitable equivalent products can be used.

- Roof Insulation Ensemble

Woodfibre Board; Sheep's Wool; Gutex Multiplex Sarking Board; Tyvek solute; Knauf Omnifit Roll Glasswool; Rothobliss Clima Control Net 160 membrane.

- Wall Insulation

Diathonite; Calcium Board, Gutex Woodfibre board.

- Floor Insulation

Geocell Recycled Foam Glass, woodfibre board, cellulose.

- Windows

Existing window refurbishment, and secondary glazing.

Note: Products and systems will become more specific following the further thermal analysis of the building.

6 Technical Evaluations Prior to Final Tender Documentation

6.1 Conservation Specification

The buildings will require a detailed conservation condition survey and report in order to comply with conservation best practice and to ensure that traditional products and systems are employed in the conservation of these protected structures. A competent conservation practice with a minimum of grade 2 conservation architect should be employed to carry out this work prior to tendering the work to suitably qualified contractors.

6.2 Energy Consultants

Mechanical & Electrical consultants are all not qualified to carry out the level of testing that is required as set out below and above and it is of the utmost importance that the conservation architect and the energy consultant are aligned to deliver the outcomes recommended below. In an ideal world the conservation consultant and energy

consultant should be appointed prior to engaging an M&E consultant and the resulting documents can then become the brief for the appointment of an M&E consultant.

6.3 Energy Service Inspection

The above appointed energy consultant will work with the appointed M&E consultants to review the energy efficiency of the current systems and the suitability of the proposed energy system improvements in terms of their impact on the fabric and heritage significance of the building. Low carbon renewable energy systems will be prioritised.

6.4 Energy Surveys

The following energy surveys would provide essential data to inform the detailed Fabric Retrofit Strategy for the tender documents and specification. The information gathered from these surveys will assist in producing detailed specifications and will ensure that unintended consequences or undue risks are avoided with the thermal upgrade of the building fabric.

- In-situ U-value Measurements

While more costly to carry out than calculated u-value assessments, in-situ u-value measurements will provide more accurate measurements of the thermal efficiency of representative wall types found throughout the building. U-value measurements must be compliant with ISO 9869-1:2014 to be used in NEAP to ascertain a more representative BER for the building.

- Indoor Air Quality Monitoring

IAQ monitoring is best carried out when the building in its existing condition and should be conducted again for comparison purposes after the building has been retrofitted and re-occupied. However, the existing buildings have been vacant and unheated for a number of years.

On completion of works, Indoor Air Quality monitoring should be conducted in a variety of internal spaces. IAQ monitoring will measure temperature and relative humidity, as well as a number of airborne pollutants.
Condensation Risk Analysis

A condensation risk analysis to be conducted on 2 wall types to assess the hygrothermal risks associated with the potential thermal upgrade options for the building fabric using WUFI. Opening up works will be required to ensure a thorough understanding of the building.

- Thermal Modelling

Data from the previous surveys can be used to assess the risk of thermal (cold) bridging posed by the potential thermal upgrade options for the building. Up to 12 thermal models to be conducted for areas of potential risk. Detailed drawings and specifications will be required for this assessment.

- Thermal Bridge Strategy

Based on the thermal modelling, a Thermal Bridge Strategy will be developed to inform the final Fabric Retrofit Strategy for construction. This will ensure that the recommended fabric upgrades are low risk in terms of post-retrofit moisture accumulation and the appearance of cold spots.

- Best Energy Adaptive Capacity Evaluation

Having gathered all the above technical information from both the energy upgrade and conservation of the building fabric a best energy adaptive capacity evaluation can be carried out and this will then influence the final strategy for the energy efficiency upgrade of the buildings.

7 Impact Assessment of Retrofit Measures

An impact assessment of possible retrofit measures will follow the format recommended in I.S. EN 16883:2017 to quantify the level of risk versus benefit for each. Each retrofit measure will be reviewed against their technical compatibility and impact on heritage significance. The proposal of retrofit measures will be based on the latest research and best practice guidance.

The selection of potential retrofit measures will be based on limitations presented by the building fabric, layout, historic features, local environmental conditions, projected impacts of climate change, etc. The appointed specialists, with their knowledge of the material attributes of traditional building fabric and understanding of the hygrothermal challenges of introducing increased insulation, will evaluate all potential measures to improve the thermal performance of the building whilst not compromising the historic or aesthetic significance of the building. It will be the intent to preserve as much historic fabric as possible while still improving the thermal efficiency of the building.

7.1 Technical Discussion

Prior to the development and finalisation of the Fabric Retrofit Strategy for construction, the appointed specialists will meet with the Design Team and dlr to discuss their findings, and what can be achieved within the building constraints.

7.2 Project Contractors

All contractors appointed should have experience of both working on protected structures with a proven record in traditional skills and carrying out sympathetic energy retrofits of historic or traditional buildings.

7.3 Signing Off

A system of site management and signing off all elements of conservation and energy retrofit should be agreed and designed for the project prior to tender.