original FIELD.
architecture & landscape

Design and Access Statement

Replacement of mechanical plant and building work measures, including replacement windows and insulating roof, to reduce heat loose and energy use at **Wolfson College Post Graduate College Oxford.**

January 2020

rev	date	note
A	22.01.2020	Planning application issue

Unit 5 Standingford House
26 Cave Street
Oxford OX4 1BA

t: +44 (0)1865 723 083
e: mail@originalfield.com
w: www.originalfield.com

Contents

Appendices

1.0 Introduction

Original Field of Architecture and Landscape (OFAL) has been appointed by Wolfson College to prepare a Planning and Listed Building Application for works associated with the decarbonisation of the campus including replacement of roofs and windows to the original buildings A, B, C, E, F, G, and H Blocks, and replacement of heating systems for the entire campus.

Fig 1. Original buildings and proposed work areas shaded in red.

1.1 PROJECT BACKGROUND

This Design and Access Statement is in relation to the 1970's listed buildings throughout the whole college, ie. Blocks A, B, C, D, E, F, G, and H; but also with respect to service upgrades to the more recent 2004 and 2009 Catherine Marriott and M residential Block which are not listed.

The strategy and approach of the college to previous refurbishments and new build works has always been to consider the college campus as a whole with the principal design approaches and details remaining consistent. Therefore, much of the information in this document will be similar to the supporting information submitted with both the more recent applications and pre-applications referred to in this submission, and the six listed building submissions made since the college was listed in 2011.

Within this context the process of completing previous refurbishment works has provided additional knowledge about how the buildings were put together and their condition. This has informed the detailed design for this submission. This document and drawings will describe how and why the specifics of the proposed works differ from the previous proposals. This document will be supported by the Heritage Statement – Refer to Appendix 01 assessing how these proposals impact on the listed buildings and their setting.

1.2 CONSULTANT TEAM

Members of the design team have worked at Wolfson College for a number of years; Marion Brereton of Original Field has been project architect working on the college buildings since 1999; Price and Myers, who will deal with any structural queries have worked with Marion at Wolfson since 2005 and both Cathlin Beaumont quantity surveyor, and Nicholas Worlledge heritage consultant have worked more recently at Wolfson. All have gained an understanding of the challenges with the existing buildings, while developing an appreciation of their attributes

1.3 PROJECT BRIEF

Max Fordham Partnership mechanical and electrical consultants were engaged by college in 2020 to work with the design team to produce an energy report for the whole college. This has resulted in a list of proposals that will be most effective in reducing the heat loss of the buildings and so reduce the college carbon footprint. Their conclusion is that if effective measures are taken to reduce the heat loss, energy use can be generated by electrically driven heat pumps replacing the existing gas boilers to provide the remaining heat required. This electricity is to be sourced from renewable supplies making the energy net zero carbon.

Recently the opportunity for the college to obtain government funding for the upgrading work has arisen and has prompted this application. Max Fordham Partnership have shown that if the works proposed in this submission are implemented the college would be eligible for this funding. This application formalises the proposed works to compliment the grant application. Max Fordham has calculated carbon quantities the college is currently producing and the reductions necessary to be eligible for the grant, refer to Appendix 05 Energy Statement.

This document and the drawings submitted will describe the specifics of the works necessary to lower the carbon footprint as recommended in the Max Fordham energy report. This proposal differs from previous refurbishment works at Wolfson where the central plant, consisting of gas boilers was not proposed for replacement.

Fig 2. View of C Block

1.4 COLLEGE HISTORY

Wolfson College was founded by Isaiah Berlin in 1966 following donations from the Wolfson Foundation and the Ford Foundation. It was designed by Powell and Moya one of Britain's most significant post-war architectural practices. Work started in 1968 and was completed in 1974, the same year Powell and Moya's practice won the Royal Medal for Architecture. It is an important example of the architecture of its period; the buildings are carefully detailed and are referred to by the 20th Century Society as: 'a classic piece of low-key modern architecture of high quality and particular elegance'. The college was listed Grade II in 2011. Built on the site of what was a large house and garden the building form and arrangement within its green setting clearly reflects the founders vision; to create a college that 'opens its arms to the landscape' as can be seen in the aerial view above. Refer to the Appendix 01 Heritage Report for more information on the history of the college.

Today Wolfson College is the largest graduate college in Oxford and consists of the eight original blocks – A to E, two new residential blocks built in the late 1980's known as 'The Robin Gandy Buildings' designed by Oxford Architects, followed by two more residential blocks in 2004 and 2009, Catherine Marriott and M Block. The Leonard Wolfson Lecture Theatre and the academic wing including a new porters lodge were completed in 2016. These four later buildings were all designed by Berman Guedes Stretton Architects – BGS Architects.

The college also owns a number of properties in the neighbouring Linton, Chadlington and Garford Roads, mainly living accommodation for students.

Although over the years repair, refurbishment and replacement have been dutifully undertaken by the college, now after 45 years of constant use some major elements of the original building fabric require upgrading and in the case of the windows we are proposing they should be replaced. Clearly any works must be sensitively undertaken, and the refurbishment work the college has undertaken to date demonstrates this commitment. The Max Fordham assessment has identified a number of proposals for the reduction of the college's carbon footprint including window replacement and replacement of the gas boilers, both of which are included in this application.

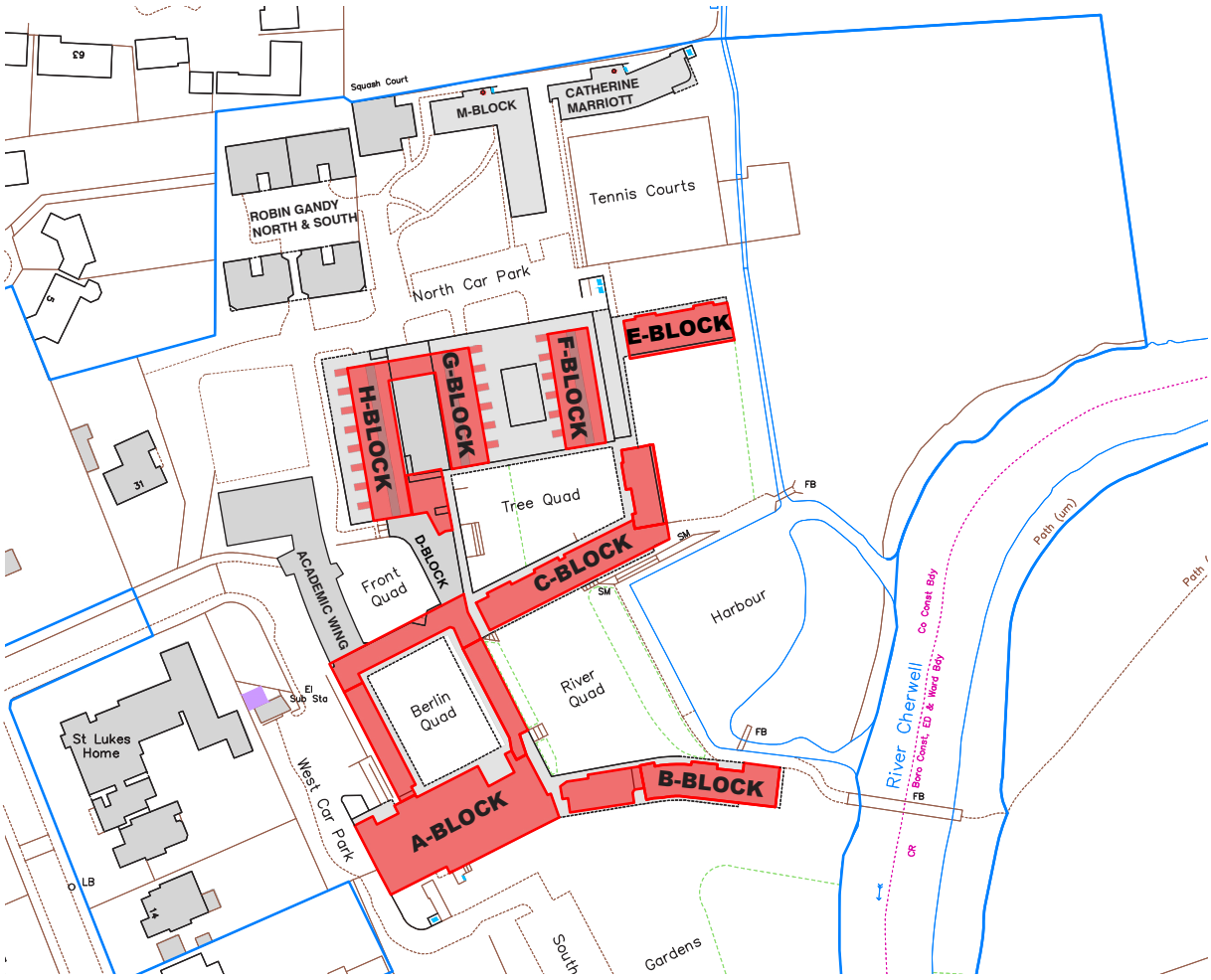

Fig 2. Site plan of Wolfson College – proposed work area shaded in red.

1.5 COLLEGE BUILDINGS

The original 1970's Wolfson College consists of eight distinct buildings – Blocks A to H, all connected forming one complex, providing undercover access to all buildings at upper ground level. The layout is formed by both types of historical typological models which have developed for Oxford Colleges. The inward-looking quad form, often cloistered so turning its back on its neighbours and, the partially closed model: one side open to the landscape a more outward looking form which embraces the landscape. It can be seen from the aerial view that Powell and Moya have linked these types together in a sequence of spaces.

The original lodge entrance leads into the first closed colonnaded quad, A block and Berlin Quad, which along with the adjacent D Block contains all the shared collegiate functions- academic studies, library, seminar rooms, common rooms, administrative offices and the Hall. From this enclosed quad, arms of accommodation stretch out into the landscape, open towards the river and the views beyond. Throughout the design process the team have been aware of the architectural significance of the buildings.

This application proposes upgrading, refurbishment and replacement works to all the original buildings except for D Block which was refurbished (roof lights and sliding screens replaced with double glazed units and roof insulated) in 2019.

2.0 Design

2.1 SCOPE OF WORKS

A full description of the works included within the scope of the project is outlined in more detail further in the report, but in summary the works will address shortcoming in the existing buildings, highlighted by the fact regulations have changed over the last 40/50 years which means the building is below current energy and thermal performance standards. Besides the low levels of insulation, a poorly sealed envelope resulting in heat loss, low levels of comfort for students and high energy bills for the College, there is also upgrading required to comply with the regulations in terms of guarding and security. In summary:

a. The roof waterproofing has been failing for many years and endless leaks have been repaired. The time has come for the waterproofing to be totally replaced, removed down to slab level and the current low levels of insulation, where this exists at all, to be replaced with more efficient insulation, where perimeter detailing and falls allow, at an increased depth. This was successfully completed on D Block roof in 2019 as part of the approved submission referred to previously.

b. Complete replacement of all windows adding triple glazed units where possible. All fixed windows are either single or double glazed (although with very slim cavities, not to current standards), and all opening windows are single glazed. There are some exceptions to this across the site.

c. Replacement and upgrading of external doors fitting weather strips.

d. Installing insulation to external walls where possible to reduce thermal bridging.

e. Replacement of gas-fired boilers in the central plant room with air source heat pumps.

f. Electrification of the heating supply will require a larger electricity supply, so the submission also includes possible enlargement of the existing substation.

Inherent in any works to the existing buildings will be the intention to ensure the architectural character and integrity of the building is retained.

2.2 SUSTAINABILITY AND PREVIOUS WORKS.

College has been committed to reducing its carbon footprint since 2009, proposing and undertaking refurbishment works to reduce heat loss and energy consumption. In 2013 (13/00506/LBC) and 2017 17/01893/LBC submissions addressed window and fabric heat loss problems, reducing the reliance on mechanical plant for cooling and the installation of onsite renewables. Previous relevant applications are summarised below:

- Pre-application advice for replacement windows to F, G and H blocks (F, G and H Pre-app ref: 19/03174/LBPAC dated 25th February 2020 and Historic England advice ref: PA01101585 dated 16th March 2020)
- 2017 17/01893/LBC, D Block Buttery – Replacement of 16.5m of single glazed rooflights with double glazed units, replacement of 7.2m single and slim double glazed (10mm) horizontal sliding and fixed screen and entrance door; insulating and resurfacing flat roofs, insulating inner leaf of external walls.
- 2013 13/00506/LBC - 50sq metres of photovoltaics on A block, north wing roof, replace existing window with double glazed units and install solar reflective film to south facing library and office windows to reduce the need for mechanical plant for cooling.
- 2009 09/02578/FUL - New extension to the college to provide new academic offices, seminar rooms, auditoria and new porters lodge and foyer. The brief from the college was for this extension to be highly insulated to reduce energy use to a minimum. Air source heat pumps provide the heating and hot-water, and the spaces are all naturally ventilated including the 150 seat auditoria, with night-time cooling of the concrete slabs. The buildings received an RIBA South Regional Award and the South Conservation Award in 2016.

The brief for the academic wing, new lodge and auditoria, completed in 2013, was for naturally ventilated spaces throughout. The energy source installed for heating and hot water was an air source heat pump linked to the 50sq metres of photovoltaic cells installed on A block north roof. A sedum roof was laid on the academic wing roof and entrance canopy to stabilise temperatures in the spaces below. A night-time ventilation strategy was adopted with windows intended to be left open at night in the summer to cool the concrete slabs within the building.

A sustainable brief was also adopted for the works to D Block - the refurbishment of the Buttery and old lodge completed in June 2019, where rooflights, sliding screens and external doors were replaced and the roof coverings were renewed and insulated.

In 2019 the college submitted a pre-application for replacing the windows in F, G and H Blocks. Meetings at Wolfson took place with the conservation office and the 20th Century Society – Refer to Appendix 13 – Pre-Application Responses. At the same time the conservation officer and 20th Century Society gained an understanding of the issues with the leaking terrace roofs to F, G, and H Blocks.

A Listed Building submission was made following the written pre-app response, however existing elevations required for the submission for F G and H were not available and the application was withdrawn. These have since been produced for all the elevations and are included in this document. The college also elected to commission the low carbon study for the whole site, this follows the officer's comments that:

'it needs to be demonstrated that the buildings are being considered and looked at in their entirety in terms of their overall performance and that all available improvement measures are being addressed, to demonstrate the contribution that the replacement windows would make to the overall performance '

The opportunity for funding the replacement of fossil fuel burning gas boilers with more sustainable air source as part of the works became a possibility, as well as funds to replace all the windows. This holistic upgrading to the site is preferable to many small-scale refurbishment projects over many years gradually dealing with heat loss and replacement of boiler plant.

2.3 DESIGN TEAM PROPOSALS AND OBJECTIVES

ENVELOPE

Powell & Moya's buildings at Wolfson College have an assembly of distinct components. A journal at the time referred to the materials used which: *'…complement the relative informality and fluidity within the plan'* as having *'carefully measured materials and finishes in muted colours provide an even finish to the elevations which are set out on a rigid grid within a common aesthetic of white and grey concrete'*

Awarded the Concrete Society Award in 1974 Powell and Moya, like many architects of this period were under the influence of the international modern movement using concrete in their buildings as a structural material not a cladding. Its use allowed large open floor spaces to be created and accommodation to be raised above ground floor level on columns. At Wolfson this can be appreciated most strikingly in the Berlin Quad of A Block and D Block facing onto the contrasting informal Tree Quad at an intimate level and in contrast on a large scale in the Hall.

An element of the building that is not generally appreciated is its beams and panels which are not faced with concrete but with Cornish blue granite. (Cornish Granite fines and exposed 40mm Cornish granite aggregate)

In contrast there are the whiter painted surfaces of blockwork and contrasting areas of glass in what would have been once, now faded, black metal frames. The extent of visible concrete is limited to the columns which provide the strong structural rhythm, made with a Portland cement in the concrete mix with a dash of white pebbles to give an even whiter appearance with a sparkle effect.

The overall effect are facades that have rich and varied compositions within a simple discipline of elements. Large areas of blank walls are balanced with glass areas that are divided by narrow transom and meeting stiles, glazing that is forward or suppressed in different places.

There are no proposals in this submission to alter any areas of granite panels or building envelope other than windows. In connection with accommodating the air source heat pumps there is a need to insert ventilation grilles in one area of blockwork wall in the lower ground level of B Block and add grilles to an under-stair cupboard in lower ground level of Block C. This is referred to in the section on services.

Previous investigations and issues with insulating the external walls.

Previous investigations were undertaken as part of listed building applications for alteration work to the north wing of A Block - 2013 13/00506/LBC and to Block D, Buttery - 2017 17/01893/LBC.

Block A
A camera survey was undertaken of the cavities between the blockwork inner leaf and the pre-cast panels of the external walls to check whether the cavities at Wolfson could be filled with insulation. There is no evidence that insulation was installed in the external walls at Wolfson. It is not shown on original drawings or found during previous refurbishment works.

The report from the installers following the camera survey advised against filling these cavities, which they could not guarantee would not be the cause of damp to the inner blockwork in the future. There was no sign of a damp proof course/cavity tray type at the base of these cavities which would have been good practice and directed any water that did get behind the panels out at low level through the gaps between the panels. The gaps were identified as an issue as they are not completely sealed, and the insulation could not be retained. There was also concern about robustness and regularity of ties between the outer panels and inner leaf and whether tightly packing insulation would put pressure on the two leaves. This latter became more of a concern with the potential for ties at the head between the inner leaf of block and the slabs not being tied together. The structural engineer specified straps that were installed as part of the works.

Block D and opening up works for the Buttery refurbishment.
The cavities were investigated to check for insulation and whether adequate ties were in place following experiences with north wing. The pre-cast panel and inner blockwork west facing curved wall is 4.45m tall; the cavity was not insulated and the number of restraint ties between the two skins were inadequate. The depth of the cavity in this location made it possible to add partial insulation, rather than full fill, as there was no guarantee there would not be water ingress through the gaps in the precast panels causing the inner leaf etc to become damp. See Figure 3. Sketch through existing external wall and beam.

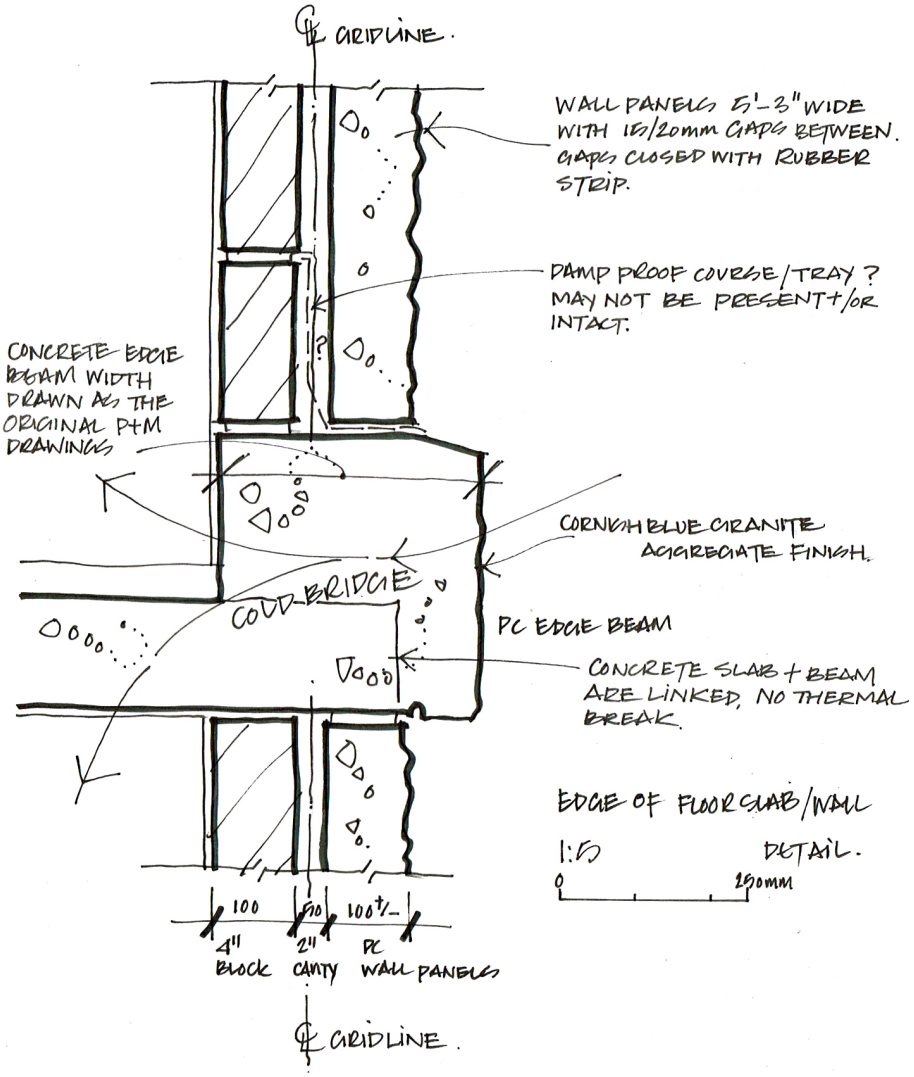

Fig 3. Sketch through existing external wall and beam

The pre-cast panels at Wolfson are in effect rainscreens with the possibility if the filler between the panels fails, that water will not leak through to the inside. It is not possible to ascertain how effective the DPC is at the base of these cavities or if they are continuous. To date there are no reports of water ingress.

The college keep a close check on any signs of cracking, deformation, spalling and any localised stress failures /movement in the precast panels, engaging Price and Myers structural engineers to monitor the buildings.

In view of the particular external wall build-ups as described above and the issues with installing cavity insulation it was decided to exclude this from this submission.

The alternative of adding insulation to the inner lining of blockwork and concrete soffits of upper floors has been explored. This has been reviewed by the team and a compromise solution of dealing with thermal cold bridging is proposed; this is greatest around the windows, at heads, jamb and cills where both concrete floors, roof slabs and blockwork walls pass from inside to outside without a thermal break. This can be seen clearly at floors and roof slabs where the slab runs through to the outside pre-cast beams that run around at floor and roof level forming overhangs. Most noticeably at upper ground level in the colonnaded areas, at penthouse level where the large canopy overhangs are more visible and all the B and C Block residential balconies. These overhangs are all part of the *'rich and varied compositions' allowing the 'forward and suppressed'* areas of façade referred to above; the strong beam lines emphasise the horizontal lines of the wings that reach out into the landscape, but it results in thermal bridging and inevitable heat loss.

Today these elements would require: a thermal break in line with the wall insulation, stainless steel reinforcement to connect the internal slabs with the external beams, the thermal conductivity of stainless steel being much less than steel reinforcement.

Blockwork walls are present between library carrells in A Block, end walls to family houses F, G and H, party walls between single study bedspaces and living rooms in Blocks C, B, and wherever walls go from inside to out there are no thermal breaks. They are not indicated on the original drawings and have not been uncovered during refurbishments works.

Given the above issues and considering the need to deal with the heat loss and potential condensation and mould growth that could result from replacing leaky windows with airtight triple-glazed units; it is proposed to deal with the most vulnerable areas internally. These are the very cold wall areas immediately surrounding the windows.

To achieve the necessary reductions in its carbon footprint, the installation of insulation around the window to a depth of at least 500mm is required. It has the least impact on the listed fabric with the most effective result in keeping the coldest area of block warm. Its impact on the sizes of the window apertures and thus the frame depth of the replacement windows is addressed in the window section of this document. A possible result of sealing what are currently not airtight spaces, is future condensation on the cold areas of these wall, insulating these areas combined with adequate background ventilation will reduce this risk.

Insulated reveals.

The insulation proposed is Aerogel from Supertherm. Its thermal conductivity is one of the most efficient on the market, at 0.015 W/(m.k) It is expensive and more efficient compared to say a Kingspan K118 board, whose overall thickness including finish would need to be 50mm as opposed to 32mm for Aerogel. Minimising the depth of insulation will ensure the least impact on the window opening sizes. Because it comes in 5mm increments it will be incorporated to reduce heat loss even where there are very small gaps. It is proposed behind the flat and louvred panels adjacent to the vertical, sliding windows and those windows whose panels cross in front of party walls between units.

The 32mm insulated panels are supplied with a 6mm finish and will be mechanically fixed directly to the blockwork and concrete panels supplied ready to fix with a finish is important to minimise builders work and disruption to the residents during the works.

WINDOWS

Background

We do not have any specific information on why Powell & Moya chose aluminium windows as opposed to bronze for instance, at Wolfson College. They had specified bronze for the Cripps Building at St Johns halls of residence in Cambridge, completed in 1967 and bronze has a longer life span than aluminium. However, aluminium was an obvious choice for architects at the time, a modern material available in slender sections and not as expensive as bronze, which may have been a factor.

The slender sections for the meeting stiles would have been an important part of the original design. Archivist, Liz Baird, has advised that a graduate student researching archive material last year, for a dissertation on Wolfson's architecture recalls:

'sight lines being a key focus of P&M - hence e.g. the glass balconies on south-facing B Block rooms, angled to provide privacy for those in rooms by reflecting the sky when observed from outside building' - but he also recalled, as Powell & Moya were keen to integrate the college into the landscape as much as was possible, they placed a significant emphasis on glass faces as a means of reflecting trees etc. in college buildings, as a means of blending the college into its surroundings. One can imagine a narrower material was also used in order to limit the size of interruptions to reflections of the environs, and facilitate use of wider and unbroken panes of glass. This could also be the root cause of the unusual opening system: bigger windows = more uninterrupted reflections of arboreal surroundings = better aesthetic 'fit' of a building into a natural environment. It cannot be overstated how important it was for P&M to maximise the sense of an intimate relationship between the college and its location which was, of course, significantly more rural than the Brasenose/Christ Church buildings etc.

We are very aware of the fine balance to be struck between maintaining this relationship with the landscape and replacing the existing windows with what will inevitably be windows with deeper frame sections and in some cases wider frames. This latter is necessary to significantly reduce heat loss and improve the comfort and safety of all at college, however the replacements must be as close as possible in appearance to the existing.

Window alterations since 1974:

- All the aluminium anodized windows at Wolfson are original from 1968-1974, although some exceptions are listed below. Notes on original Powell & Moya drawings in the archives at Wolfson suggest they were manufactured by a company called Archital using the 'Luxifer' range but this company no longer exists. The archives have some original drawings of the vertical sliding sashes, one section through a horizontal slider but no top hung open out or screens. These do vary from some of the dimensions at Wolfson as there is some inevitable variation but the frame dept, and meeting stile with extruded fins for what this submission refers to as the Type 2, are very similar. Refer to full size details attached redrawn in metric for this submission.

The exceptions to the original windows now installed at Wolfson are:

- To the upper ground converted guest rooms on the east side of the Berlin Quad. Both the virtually full height windows and the top hung open out onto the west carpark are likely to have been installed in the 1980s. The east side large panes do not have framed meeting stiles but glass-to-glass joints with mastic. There is no precedent for this detail at Wolfson, with quite heavy frames to the top hung ones on the west side which contrast with the original top hung open out on this same façade.
- Two vertical sliders, that are not original have been installed in the room labelled 'Computers' on the original plans -sandwiched between H Block family houses and D Block. This work would have been done sometime prior to 1998.
- The gardener's office, adjacent to F Block, which has the only timber windows in college and as it is completely out of keeping with all the windows they will be replaced.
- As part of the installation of ensuites in the single study bedspaces to C Block (prior to the listing of the college in 2011) and the same works to B Block, (11/03289/LBC) after the college had been listed, involved works to the vertical sliding windows. Adding clear glass panels to replace solid panels and replacing clear glass for opaque glass. The installation of ensuites in each single study bedspace freed up shared bathroom facilities and the space allowed very small shared kitchens to be enlarged and two extra single study bed spaces with ensuites to be created on the 1st and 2nd levels. The alterations to the glazing and glass pane arrangement were necessary for this. These alterations did not include upgrading to adequate double-glazed units.
- In 2015 the Hornick Library was remodelled (13/00506/LBC) as part of the new academic wing extension; two double glazed fixed windows were installed into existing openings with sightlines that matched the existing. A new opening was inserted on the north side of the north wing overlooking the new front quad. This maintained the 50mm frame sizes of the screen Type 9 windows at college but with deeper sections to accommodate double glazed units.
- Listed building consent was granted (12/00177/FUL) for the replacement of two windows for two full height sliding doors to match the existing sliders. This was to open the college student bar at lower ground level to the grass area on the west side of B Block but was not carried out.
- The most recent refurbishment works were to D Block Buttery and the old lodge, (2017 17/01893/LBC) and included the replacement of 16.5m of single glazed rooflights with double glazed units, the replacement of 7.2 m sliding and fixed single and slim double glazed horizontal screens and a new entrance door to the Buttery. These replacements matched as closely as possible the sightlines of the existing, particularly the appearance and sightline of the meeting stile of the sliding and adjacent fixed screen and the full height extruded handle. The view of the Tree Quad has not been compromised. We are proposing to use horizontal sliders for the replacements to the remaining ones at college.

Scope and Problems with existing windows

The submission is for all the windows to be replaced for the following reasons and as part of the colleges ongoing effort to reduce their carbon footprint:

a. The glazing units in the existing windows are a mix of fixed windows which are single, or double glazed, (although with very slim cavities and not to modern standards) with all opening windows being single glazed. One can appreciate that the additional weight of even slim 10mm double glazed units would have precluded the use of them in the vertical sliding and top hung open out windows given the slender sections of aluminium the architects wanted. Some of the THOO (top hung open out) are 2.88m wide.

b. The U-Value of the existing windows range from 5 to 6.5 W/m2k, the table in the Energy Statement, appendix 05, estimates the large amount of heat lost through the windows at Wolfson.

c. Their overall poor thermal performance is made worse because they are now 47 years old and the resultant wear and tear on the seals, means the windows are 'leaky' resulting in increased heat loss from the building.

d. None of the original windows have thermally broken frames which represents a considerable thermal bridge.

e. Comfort levels are compromised. Among the reasons college put forward for replacing all the windows to F, G and H Blocks family houses in 2019 was to start improving the low levels of thermal comfort for the families as a priority and reduce energy consumption and so energy bills.

f. Many of the vertical sash windows are difficult to open and close. Sash catches do not engage because many meeting stiles no longer align so they cannot be closed properly.

g. Locks are inadequate for the security of the residents and some have been retro fitted since 1974 to improve security and make windows safer in the family units in children's bedrooms. Retro fitted guarding has been fitted on the inside of F, G and H 1st floor bedrooms.

h. All the vertical sliders whose bottom sash is openable are below 800mm above finished floor level without guarding.

i. There is concern that the bottom sashes are not safe, and that pressure should not be applied to the single glazing. Notices request that users should not sit on the benches under the vertical sliding windows which stops users leaning against the windows. These notices can be seen in the carrells.

Upgrading/secondary glazing the existing windows

a. Following investigations prior to the Buttery works application it was established that there were no specialists who could renovate and upgrade the existing aluminium windows. The feedback was that if they had been Crittal or bronze it would have been possible and worthwhile particularly for bronze windows as there were sub-contractors who were experienced in doing this work. Bronze also has a much longer life span than aluminium and renovation would be advisable and something worth doing even if costly. This view was taken at the Cripps Building at St Johns where many of the original 1967 windows could be renovated.

b. Secondary glazing was also investigated but was not progressed for the following reasons.

   - This would not achieve the thermal performance of new triple or even double glazed units required of 0.4W/m2K centre pane for triple glazed and overall u-value of 1.2W/m2K.
   - Condensation between the existing openable sliding windows and new secondary could not be guaranteed.
   - The existing frames would not support the weight of secondary glazed units, if the secondary glazing was independent of the existing frames it would be necessary to add a support framework internally for the secondary glazing. This would be visible from the outside but unlike new windows would also be visible from the inside to a greater extent than new windows.
   - To open windows would require users to slide two panes back or down; top hung open out windows would require sliding secondary units to be fitted on the inside so they could slide out the way to access the opening out window.

For the reasons above we believe installing secondary glazing is not an option. The proposal in order to optimise the performance, is to replace all the windows with tripled glazed windows. With the associated works proposed in this application it is estimated this will reduce the college carbon footprint significantly as indicated in the Energy Report attached.

Existing Window Types

The 'Window Types and Photo Study' in Appendix 02, indicates the four main window types (plus rooflight), the initial sketches on the Photo Study page investigates how the thermal bridging could be reduced and the impact on the window sizes.
Quantities and locations of each window type can be found in the Window Schedule, Appendix 03 and the site-wide floor plans, PA-02 to 06 attached. Drawings PA- 07 to 09 are measured surveys of all the buildings elevations.

The main types of window at Wolfson are as follows, within each type there are variations:

Type 1 – horizontal sliding windows.

a. Type 1 and 1a; horizontal sliders with generally one fixed and one sliding pane, almost always above the bench seats in all single study bedspaces to B and C residential Blocks; as well as to the living room and bedroom of the one-bed flats in B and C Blocks; to the living rooms of the Family Houses, F, G and H. The exception is the full height sliders to the six Penthouses.

b. Type 1b; to bedrooms of F, G and H and 1d to Penthouse bedrooms. Two different sizes of horizontal slider with fixed frames.

Type 2 - vertical sliding windows.
The majority of these are multiples of 1.6m, the structural grid across college being 3.2m. As with Type 1 they are predominately above bench seats and for differences between Types 2d, 2e, 2f and 2f1 refer to the 'Types' drawing. This type is always clear glazed to A Block communal areas and administrative offices but with lower opaque panels to the residential Blocks B and C to accommodate kitchens, dining and bathrooms layouts.

a. Type 2, 2a (with front door and fixed sidelights), 2b, 2c and 2g, are vertical sliders that are incorporated into aluminium louvred panels, to the kitchens, bathrooms and toilets to all the residential accommodation.

b. Type 2h; of which there are only two in G and H Block bedrooms are a narrow version of type 2e.

Type 3 - top hung open out window.
These are high level over the landings in F, G and H Blocks but also in the staff room adjacent the kitchen. Sizes as the Schedule, appendix 03.

Type 4 and 4a - fixed windows of different sizes in all the Blocks.

Type 5 – bathroom windows
Originally a window in the bathrooms of F, G and H which has been removed since 1974 to install an extract fan. It is proposed this fan is replaced by a louvred panel which incorporates a new fan and sits behind a proposed louvre which will be a vast improvement on the current ply painted panel the extract fan is fixed to.

Type 6 - glass louvres
These vary in size and can be found in all Blocks except D Block. There thermal performance is virtually non-existent and because of their narrow width, in the case of those in toilet and bathrooms the height of the individual glass louvre is too narrow to be replaced with louvres that are double glazed and framed. This would reduce the size of the glass to an unacceptable extent. We propose replacing these with triple glazed fixed units, in the case of the very narrow openings, and incorporate trickle vents where there are no other means of ventilation.

There are some exceptions where the glass louvres are to be replaced with vertical sliding windows where the opening is larger. An example of this is the upper ground floor of C Block where the L-shape of the block results in a large louvred window to a bathroom which must be very cold.

Type 7 - high level top hung open out windows with adjacent louvred panels.
Predominantly bathroom and WC windows.

Type 8 - high level top hung open out
To lower ground level areas, to Block B and C.

Type 8a - combination of top hung open out and fixed high-level windows to the Penthouses linked by aluminium panel to hide internal partition.

Type 9 - fixed windows forming various lengths of screens to Block A circulation spaces and Haldane and Hall.

Type 10 - rooflights to A Block main library, to D Block Buttery roof
The latter were replaced with double glazed units in 2019 and are not part of this application.

Proposed windows to optimise performance.

Detailed discussion have been held with a number of window manufacturers to gain an understanding of whether they can adapt their standard windows to match as closely as possible the sightlines and detailing of those at Wolfson. We are currently working closely with a company called Fenster.

One issue has been identifying the companies that can not only supply and fit the Type 1 horizontal sliders with slender stiles but also the Type 2 vertical sliders. The latter also need to be combined with aluminium flat and louvred panels to match the existing profiles.

A number of British based companies market and install aluminium windows, mainly horizontal sliders but some can also procure vertical sliders which are less common. However, they are unable to obtain guarantees from the manufacturers in Germany or Spain for these windows if they adapt them in anyway.

Proposed Windows

'Detailed Window Drawings' PA-70 to PA-78 are included in this submission and show the proposed window frames overlaid on the existing window frames at the cill, head and jamb, This clearly illustrates the impact of the new depth of frame at internal partitions and the insulation to the perimeter. These drawings also highlight:

- Insulation (Aerogel) when added to the blockwork walls and slabs that become external to reduce the effects of cold bridging.
- In all case the frame sizes to the head and jamb of all the windows allow insulation to be added to the blockwork walls at cill and head and still have adequate frame visible on the inside.
- It is proposed to only remove the internal plaster where it is necessary as part of the replacement windows and installation of insulation. Removing plaster to blockwork at Wolfson is problematic. To reduce the impact of the works on the fabric and the disruption to the residents in particular, the plaster is shown as being retained.
- The triple glazed units proposed are CUIN insulated units with a centre pane u-value of 0.4W/m2K. The technical data information is attached. This unit although triple glazed is 32.1 mm deep and incorporates an insulated interlayer which is 1mm thick and is effectively the third sheet of glass. This makes the unit lighter than the traditional triple glazed unit which means it can be installed in all the openable windows; vertical sliding, top hung open out, as well as the horizontal sliders.
- For sightline comparison drawings for Types, 1 - horizontal sliders, 2 – vertical sliders, 8 - top hung open out and Type 9 – fixed screens, refer to Appendix 04.
- The colour of the original window frames was black with all replacement windows also being black.
- Condensation is possible consequence of replacing 'leaky' windows and windows to the residential units will be fitted with trickle vents to comply with Part F of the Building Regulations. The installation of insulation to reduce the cold bridging is also essential to eliminate the effects of condensation.

Conclusion.

We propose that the choice of windows and triple glazed units optimise performance and with the associated works to the envelope, roof and doors will deal with the heat loss, comfort, health and safety and security issues at Wolfson. At the same time the window frames are as close as possible in appearance to the existing in terms of the particular details that make the original windows unique.

ROOF

The original flat asphalt roofs at Wolfson College do not seem to have been totally satisfactory, there is a continual record of water ingress and remedial/patch repairs over many years. Only two roofs have been completely replaced, E Block some time ago and in 2019, as part of D Block refurbishment, the flat roof was completely stripped down to the reinforced concrete slab and insulated using cut to fall insulation.

The original roofs comprised of: - See figure 04

- Sand and cement screed laid to falls on roof slabs.
- A material known as 'pollmix' which is a crumbly bituminous material, that may have some insulating properties, - but there was no insulation to the roof of D Block when it was stripped back to the concrete roof slab.
- Waterproofing 20mm asphalt painted with solar reflective paint.

Problems

There are two issues that have most certainly contributed to the failure which has caused the roofs to leak and the difficulties when trying to locate these leaks:

- All the electrical cables at Wolfson were cast in. There are no suspended ceilings for service runs at ceiling level horizontally around the building; once there is a failure in the waterproofing layer and water ingress occurs it can travel under the waterproofing saturating the screed and pollmix build-up, finding any defect in the slab and a route to the inside via cable routes cast in the concrete.
- Another issue contributing to the breakdown of the original roofing system was the incorporation of service above the slab under the waterproof build-up. Some were found when the Balcony to the Common Room was resurfaced in 2020. These cables eventually are routed through the slab providing the route for water to find its way into the building.
- The lack of insulation; this has been highlighted in the Energy Statement in appendix 05, and the figures estimate that if the roofs were insulated to modern standards that the energy saved in heating would amount to 8% of the overall carbon reduction a year.

Proposal

- To remove the existing covering and build-up down to the slab
- Lay levelling screed as required to provide satisfactory substrate.
- Insulate to modern standards, using cut-to fall insulation to existing outlets.
- A waterproofing system comprising coverings of multiple layers of reinforced bituminous membranes laid and jointed using self adhesive and/or torch application as required. It includes vapour control layer, underlayer and capping sheet membrane in charcoal grey
- Refer to Proposed Roof Details sheet drawing PA-79.

Rooflights

The other cause of heat loss from the buildings at Wolfson is through the single glazed rooflights. There is a long run of sloping fixed rooflights on A block library roof and a number of individual ones across A Block some of which are were originally electrically operated.

The sloping ones consist of two panes of unsealed Georgian wired glass, so have very poor thermal performance.

Proposal

The proposal it to replace all these, effectively single glazed units, with triple glazing. The appearance to match the existing; this has been successfully done on D Block Buttery roof in 2019 where all the rooflights were replaced.

Fig 4 - Photographs of roofs and investigation hole prior to Block D re-roofing works

DOORS

There are a mix of external doors at Wolfson College and virtually all are original. The exception is the:

- Glazed frameless door and adjacent screen installed as part of the guest room conversion works to A Block upper ground east side, before the college was listed.
- New door to catering kitchen installed as part of listed approval works (11/03289/LBC) to upgrade the kitchen facilities in 2012.
- D Block Buttery (17/01892/FUL) new external aluminium entrance door as part of new horizontal sliding glazed screen, fire exit aluminium door to west side onto new front quad.

Problems

- The existing external doors are predominately solid timber doors with hardwood lipping and hardwood frames. To offices, front doors to all residential units, to stores, games room college bar etc. They are not weather-stripped and because they are not lobbied but lead directly into the spaces from outside they too are 'leaky' and cause of heat loss.
- Many have single glazed vison panels another cause of heat loss.
- To A Block communal spaces, the entrance doors to as part of glazed screens are aluminium framed glazed doors of which there are three in A Block. These in particular have large gaps between the frames and the doors without adequate seals and so result in significant heat loss.

Proposal

- Refer to the Door Schedule, appendix 03 for upgrading to provide adequate seals to the existing timber doors.
- Refer to Window Type and Photo Schedule' appendix 02 for the only timber external doors to be replaced with aluminium as part of window and aluminium louvred screen replacement, Type 2a to E Block flats.
- The three 2 no. aluminium doors and frameless doors D12, D14 and D15 to be replaced with new external glass doors as part of the replacement works to adjacent screens and windows they are connected to. New doors to match frame sizes of the existing doors.

2.4 SERVICES AND SUSTAINABILITY

The measures to reduce heat loss and energy use at Wolfson College, as proposed in the previous sections, will significantly minimise the amount of heat pump power required to 600 KW of heat. The Energy Report undertaken by Max Fordham, and included in appendix 05, proposes replacing the existing gas boiler with air source heat pumps that make use of external air to provide heat for the building.

Proposals and impact on the fabric

As drawing in appendix 07 the plant equipment for the air source installation is proposed in the existing plant room and garages at lower ground level below F, G and H Blocks. Positioned here ensures the least impact on the listed buildings and they cannot be seen from the listed buildings. They are adjacent to the existing plant room and so service runs between the two are as short as they could be.

The existing garages at Wolfson are enclosed by metal powder coated vertical screens that Powell and Moya obviously intended would hide the view of the garages. The garages are accessible from all sides would have been particularly visible from Tree Quad, with the screens they are very successfully obscured.

These will therefore hide the equipment as indicated on services layout drawing in appendix 07 as well as the cylinders and heat pumps for F, G, H and E Blocks also to be installed in the garages so runs to service routes to the Family Houses above are also minimised.

It is proposed that where equipment is close to the existing screens that further screening will be installed in the form of powder coated mesh to match in colour the brown existing ones. Size of mesh openings to be agreed to ensure the view of the equipment is obscured.

Cylinders and heat pumps are also sensibly located locally to Blocks A, B C, and unlisted residential blocks Catherine Marriott and M Block; these are indicated in the 'Hot Water and Heat Pump Interventions' document in appendix 06. Placing these closer to the spaces that they heat reduces heat losses due to long runs.

In all blocks the existing services run horizontally in accessible ducts, below lower ground level, from the plant room to riser ducts that connect with all the accommodation. The pipework above lower ground level is not being replaced and the new connections will be made at lower ground level into these risers. This means there will be no service interventions above lower ground level.

Alterations to lower ground level listed fabric is indicated in the 'interventions' document appendix 07, and in summary includes forming openings for ventilation grills in the blockwork walls in B and C blocks. To extended service room adjacent the TV Room B112 and C Block Luggage Storeroom 101. The existing plate heat exchanger for B block is situated adjacent B112 that serves the rooms above and so this is the ideal position for the replacement equipment that can fee into the service routes that already connect to this space.

External equipment

M and Catherine Marriott residential blocks are also fed from the main plant room with plate heat exchangers in the under-stair pant rooms in these blocks. It is proposed these exchangers are replaced with cylinders and that the heat pumps are positioned outside for these. These are shown diagrammatically in appendix 07. Screening to be agreed will be provided for these units.

For A Block the heat pump is indicated in the brick lined well outside the A Block plant room. It is proposed that it is mounted on the north wall of this sunken area, so it is not visible from the B Block windows and south east garden adjacent the south car park.

Alternative options for air source heat pumps that may need to be considered.

It may be necessary, due to availability of the heat pumps identified above and details are included on pages 3 and 4 of the 'Interventions document'; to consider an alternative heat pump to these. Included in the document is the data sheet for this alternative – page 5, - as it is bigger and alternative positions have been indicted as 'Option 2' for these.

Both would involve building enclosures to hide them, to match the white painted blockwork in the case of those adjacent the bin area between Blocs F and E.

The enclosure to the one adjacent to the east of Catherine Marriott residential block to be agreed as this block is rendered and faces the flood plan and trees, but the building has aluminium panels and a aluminium louvred screen may be more appropriate.

Enlargement of the existing sub-station

The existing sub-station is at the front of college adjacent the west carpark to the west of A Block and it may be necessary, although, SSE have yet to confirm if the current capacity is enough. Drawing PA 01 Site Plan indicates in purple, if this was necessary where the current enclosure would be extended.

2.5 TRANSPORT

The proposed location of mechanical plant in the existing carpark undercroft will result in the loss of 7 car spaces – 2 below F Block and 5 below H Block. This is offset against the total number of existing car spaces on the main campus which is; outside 64 spaces, F, G and H Blocks – 42 spaces.

Apart from this the proposed works will have no impact on transport

2.6 FLOODING

The proposed works are not located in the flood plain nor will they contribute to increasing the potential of flooding

2.7 TREES

There are no trees affected by the proposed works

2.8 ECOLOGY

The requirement for an ecological bat survey was identified in the Pre-application. Refer to Appendix 12 Ecology survey.

3.0 Access

There are no proposed changes to access as a result of the proposed works

4.0 Conclusion

In the spirit of Historic England's promotion of 'actively managing change' in the adaptation of our historic assets, the project aims to support the adaption and preservation of an existing listed building in line with environmental initiatives. In proposing essential and enhancement works, the asset will be preserved for years to come supporting its continued use and make a positive contribution to carbon reduction. This submission complies with all statutory requirements for the preservation and treatment of a listed building. For all of the reasons set out we are seeking Planning and Listed Building Consent for works as outlined in this submission.