

Glazing Options Matrix Report

18.05.22

The Glazing Options Matrix is a live document which has been updated throughout the design-development process. The purpose of the matrix is to ensure that the team has robustly assessed and considered the available options. It should be read in conjunction with the application as a whole.

The Options Matrix has been informed by Wintech's condition survey of the curtain walling, as appended here. As relevant the technical review has been supported by standalone technical notes and which form part of the appendices here.

The list of supporting appendices are:

- Wintech's Condition Report
- Ramboll's Energy and Carbon Note
- Bruntwood's Lifecycle Note
- Bruntwood's Cost Note
- Savill's Market Requirement for Sustainability
- Implications of Bay Removal and Bay Removal Investigation Report

Pall Mall Court, Manche Row 9 (18/05/22)																	
Glazing Options Summary																	
Key																	
Poor / Fair / Good																	
Improvement / Moderate harm																	
Good / No to Minor harm																	
Option	Description	Feasibility	Public Benefits	3A	3B	Aesthetics (Internal)	Heritage Impact	Thermal/Energy implications	Sustainability/Embodied Carbon	Health & Safety	Programme Impact	Brutwood					
Option 1	Do nothing	N/A	Environmental Minor public benefit associated with improved aesthetics of the building due to consistent glazing approach and colour. There are no environmental performance improvements. Social As it is unlikely to meet occupier demands, the proposal would not secure the long term use of the building which in turn would enhance activity and pedestrian footfall in the area - reducing anti-social behaviour and providing onwards connections to the wider CDO. Economic Due to this being unlikely to help attract future occupiers there are no public benefits associated with the long-term viability or occupation of the building. Therefore, this option fails to make a positive contribution to job creation or supporting economic growth of the city region. Heritage If the building is to attract occupiers it would not be commercially viable for a developer then the building will likely fall into further disrepair, and will ultimately not bring about the optimum viable use of the building, meaning the heritage benefits are not fully realised. The lack of maintenance means that the building is not fulfilling its potential in making a positive contribution to the conservation area.	3A - System in a poor state of repair. Poorly applied paint finishes c.1990s. Visibly deflected transoms to inactive sash windows.	3B - System in a poor state of repair. Poorly applied paint finishes c.1990s. Visibly deflected transoms to inactive sash windows.	Aesthetics (Internal) - Poorly applied paint finishes c.1990s	Heritage Impact No change to historic fabric or appearance, but does not improve or remedy the existing, deteriorated condition, appearance or performance. No impact	Thermal/Energy implications Single glazing (frame not thermally broken) and poor levels of air tightness, therefore resulting in high heat losses and heating energy consumption - 133kWh/m2/annum of heating and cooling energy	Sustainability/Embodied Carbon Zero upfront carbon, but high energy consumption and whole life carbon.	Health & Safety Parts of the frame falling away due to corrosion/loose parts and with potential repairs. Note frame is beyond life expectancy and parts to repair are not available. Existing glazing does not meet current building reg in relation to Doc K (Guarding). However, as an existing building with no works being carried out then there isn't a statutory need to meet the current building regulations. However, there is an expectation by modern occupiers that the buildings will meet the relevant health and safety building regulations.	Programme Impact N/A	Brutwood Current system already beyond life expectancy and was installed over 50 years ago. Significant amount of defects and performance issues. Unable to maintain to an acceptable standard.	Brutwood Existing framing system not recognised, spare parts such as glazing beads, transoms and gaskets etc not available. Windows would be cleaned quarterly with silicone sealant repairs likely required every 3-5 years.	Cost £500,000.00	Market / Sustainable Future for the building Confirmed by Brutwood's agents and internal sales team that this space would not be able to be let. Current system is already well beyond life expectancy and was installed over 50 years ago (1969). Significant amount of defects relating to weather tightness, corrosion, structural integrity and thermal performance. This includes areas of frame where daylight can be seen through openings. Brutwood would find it difficult to let the space with the window frames remaining as they were. If we were to let the space it would be at a significantly reduced rental level. This in turn would result in Brutwood having to review and reduce the extent of refurbishment to the building with the proposed pioneer scheme unlikely to be delivered. Energy bills would be significant, and Brutwood's sustainability credentials/requirements would not be met. Brutwood as a company has set out ambitious targets for reduce carbon emissions, and has used industry standards such as Part L improvements or EPC ratings to benchmark energy improvements and there is a market expectation towards sustainable commercial space. However, there is technically not a regulatory requirement to meet environmental credentials where there are no works proposed. In addition, the internal environment would not be acceptable.	Insurance and Warranty No warranty from glazing contractor. Existing building reinstatement insurance would be obtainable. Public liability insurance not impacted. No professional indemnity as there is no design relating to this scheme (i.e. for errors in design of the original building)	GMI / Brutwood N/A
Option 2	Replace single glazed unit	Environmental Minor public benefit associated with improved aesthetics of the building due to consistent glazing approach and colour. There are no environmental performance improvements. Social As it is unlikely to meet occupier demands, the proposal would not secure the long term use of the building which in turn would enhance activity and pedestrian footfall in the area - reducing anti-social behaviour and providing onwards connections to the wider CDO. Economic Due to this being unlikely to help attract future occupiers there are no public benefits associated with the long-term viability or occupation of the building. Therefore, this option fails to make a positive contribution to job creation or supporting economic growth of the city region. Heritage If the building is to attract occupiers it would not be commercially viable for a developer then the building will likely fall into further disrepair, and will ultimately not bring about the optimum viable use of the building, meaning the heritage benefits are not fully realised. The lack of maintenance means that the building is not fulfilling its potential in making a positive contribution to the conservation area.	3A - System in a poor state of repair. Poorly applied paint finishes c.1990s. Visibly deflected transoms to inactive sash windows.	3B - System in a poor state of repair. Poorly applied paint finishes c.1990s. Visibly deflected transoms to inactive sash windows.	Aesthetics (Internal) - Poorly applied paint finishes c.1990s	Heritage Impact No change to historic fabric or appearance, but does not improve or remedy the existing, deteriorated condition, appearance or performance. Negligible adverse impact	Thermal/Energy implications New single glazing, but still a poor U-value. Therefore resulting in high heat losses and heating energy consumption - 133kWh/m2/annum of heating and cooling energy (22% reduction over option 1)	Sustainability/Embodied Carbon Low upfront carbon to produce new single glazing only. Small improvement in energy consumption and operational carbon. Carbon payback circa 29yrs.	Health & Safety Replacement glazing on a like for like basis will not meet current building reg in relation to Doc K (Guarding). Item HST Toughened Glass at high level. Frames would remain as existing and therefore H&S issues relating to the frame due to deterioration remain. This would include parts of the frame falling away due to corrosion/loose parts. Note frame is beyond life expectancy and parts to repair are not available.	Programme Impact 5 months	Brutwood Current system already beyond life expectancy and was installed over 50 years ago. Significant amount of defects and performance issues. Unable to maintain to an acceptable standard.	Brutwood Existing framing system not recognised, spare parts such as glazing beads, transoms and gaskets etc not available. Replacement glazing would be secured with existing beads and silicone sealant with new sealant likely required at the end of warranty period (10 years). Windows would be cleaned quarterly.	Cost £300,000.00	Market / Sustainable Future for the building Current system is already well beyond life expectancy and was installed over 50 years ago (1969). Significant amount of defects relating to weather tightness, corrosion, structural integrity and thermal performance. This includes areas of frame where daylight can be seen through openings. Confirmed by Brutwood's agents and internal sales team that this space would not be able to be let with the window frames remaining as they were. If we were to let the space it would be at a significantly reduced rental level. This in turn would result in Brutwood having to review and reduce the extent of refurbishment to the building with the proposed pioneer scheme unlikely to be delivered. Energy bills would be significant, and Brutwood's sustainability credentials/requirements would not be met. Brutwood as a company has set out ambitious targets for reduce carbon emissions, and has used industry standards such as Part L improvements or EPC ratings to benchmark energy improvements and there is a market expectation towards sustainable commercial space. However, there is technically not a regulatory requirement to meet environmental credentials where there are no works proposed. In addition, the internal environment would not be acceptable.	Insurance and Warranty No warranty from glazing contractor. Existing building reinstatement insurance would be obtainable. Public liability insurance not impacted. No professional indemnity as there is no design relating to this scheme (i.e. for errors in design of the original building)	GMI / Brutwood Full external scaffold access required. Replacement internally not possible given existing system is loaded externally. Gaskets and seals also require replacement as they have exceeded their life expectancy of 25 years. Removal of asbestos units also required. Existing single glazed unit likely to be removed using mechanical aids and reinstatement would follow the same principle. Safety concerns regarding using vacuum methods on single glazed unit and the potential of obsolescence further increases risk and difficulty. This may mean units would have to be removed manually which would introduce significant manual handling risks. Moderate difficulty.	
Option 3	Replace single glazed unit and add secondary glazing	Environmental Secondary glazing would help enhance the environmental attributes of the building, as well as improve water tightness and thermal bridging. This would be an environmental benefit. Externally the consistent approach to glazing would have a minor improvement to the aesthetic building, however, this would be counteracted by the potential negative visual appearance of secondary glazing. Social As it is unlikely to meet occupier demands, the proposal would not secure the long term use of the building which in turn would enhance activity and pedestrian footfall in the area - reducing anti-social behaviour and providing onwards connections to the wider CDO. Economic The poor environmental performance and aesthetics may mean it is difficult to attract future occupiers and therefore could be significant viability challenges due to the limited rental returns. This potential challenge around the letability of the scheme would be a substantial commercial risk. Heritage There is a risk that if it is not commercially viable for a developer then the building may fall into further disrepair and thus not securing the heritage benefits. The poor aesthetics mean that the building is not fulfilling its potential in making a positive contribution to the conservation area.	3A - System in a poor state of repair. Poorly applied paint finishes c.1990s. Visibly deflected transoms to inactive sash windows. - Secondary glazing may impact sightlines within existing framing system	3B - System in a poor state of repair. Poorly applied paint finishes c.1990s. Visibly deflected transoms to inactive sash windows.	Aesthetics (Internal) - Poorly applied paint finishes c.1990s - Line of secondary glazing complicated geometry, resulting in challenging internal detailing, impacting sight lines Potential maintenance/cleaning issue with an untested system	Heritage Impact The addition of a secondary structure internally could cause substantial changes in the appearance of the windows externally from street level, and would not improve or remedy the existing, deteriorated condition, appearance or performance of the frames. Moderately/substantial adverse impact	Thermal/Energy implications A second level of glazing will help to reduce heat loss but existing frames will mean higher infiltration rates, and increased energy consumption for lighting - 250kWh/m2/annum of heating and cooling energy (22% reduction over option 1)	Sustainability/Embodied Carbon High upfront carbon to produce new frames for secondary glazing, but with significant improvements to energy consumption reducing operational carbon. Carbon payback circa 2yrs.	Health & Safety Barrier loading requirements to meet Part K will be met due to the secondary glazing system acting as the barrier internally. Frames would remain as existing and therefore H&S issues relating to the frame due to deterioration remain. This would include parts of the frame falling away due to corrosion/loose parts. Note frame is beyond life expectancy and parts to repair are not available.	Programme Impact 11 months	Brutwood While secondary glazing system offers improvements in relation to thermal performance and meets some statutory requirements, the issues with the existing system still remain. Lifecycle of secondary glazing system likely to be 50-60 years but does not address any of the issues relating to the existing system (i.e. water ingress, structural defects etc).	Brutwood Existing framing system not recognised, spare parts such as glazing beads, transoms and gaskets etc not available. Replacement glazing would be secured with existing beads and silicone sealant with new sealant likely required at the end of warranty period (10 years). Windows would be cleaned quarterly.	Cost £1,300,000.00	Market / Sustainable Future for the building Although the secondary glazing system would offer a much improved thermal performance and this would in turn make the space more appealing than options 1 and 2 in the market, the secondary glazing would result in a reduction in the natural light levels coming into the space (which is already significantly reduced by the bronze to the external windows), poor daylight levels in the spaces can lead to poorer health and wellbeing of occupants. The aspect is important for Brutwood's tenants. Secondary glazing often feels lower in quality is just having a well performing external skin to the building. The rental levels in the building would have to be reduced to reflect this.	Insurance and Warranty No warranty from glazing contractor. Existing building reinstatement insurance would be obtainable. Public liability insurance not impacted. No professional indemnity as there is no design relating to this scheme	GMI / Brutwood Secondary glazing would be installed from within the building which, from a sustainability perspective, is considered to be fairly straightforward. However, replacement of the single glazed unit would encounter the same risks, challenges and access requirements as noted above for full scaffold being required externally. Further consideration is also required to internal fixtures (and maintenance off within the void that would be created).	
Option 4	Replace single glazed unit and frame	Environmental Would help enhance the environmental attributes of the building, as well as improve water tightness and thermal bridging. This would be an environmental benefit. Externally the consistent approach to glazing would have an improvement to the aesthetic building, again an environmental benefit. However, this option would not create the environmental benefits to the extent that it would meet modern occupier demands. Social As it is unlikely to meet occupier demands, the proposal would not secure the long-term use of the building which in turn would enhance activity and pedestrian footfall in the area - reducing anti-social behaviour and providing onwards connections to the wider CDO. Economic Due to the environmental considerations set out above, there could be a difficulty in attracting tenants and thus a viability challenge. Heritage As above, where there are viability challenges there may be challenges in financing the maintenance of the building, thus not securing heritage benefits. However, the improved aesthetics would make a positive contribution to the conservation area.	3A - Provides a like for like replacement. Aesthetically would be an improvement. Refer to thermal, acoustic, lifecycle, market	3B - Provides a like for like replacement. Aesthetically would be an improvement. Refer to thermal, acoustic, lifecycle, market	Aesthetics (Internal) - Provides a like for like replacement. Aesthetically would be an improvement. Refer to thermal, acoustic, lifecycle, market	Heritage Impact Although this will include the removal of all original historic fabric, this option allows for the original appearance, detailing and colouring of both frames and glass to be accurately recreated, thus retaining the original, intended appearance/character of the building. However, this option does not significantly improve current thermal performance. Moderate adverse impact	Thermal/Energy implications New frame may help to improve heat loss but a minimal improvement and still poor performing in terms of heat losses and energy consumption - 257kWh/m2/annum of heating and cooling energy (20% reduction over option 1)	Sustainability/Embodied Carbon High upfront carbon to produce new frames, small improvement in energy consumption and operational carbon. Carbon payback circa 14yrs.	Health & Safety New bespoke framing could accommodate a thicker glass panel as a tried laminated glass could be used to meet Doc K requirements and remove toughened glass at height.	Programme Impact 5 months	Brutwood Lifecycle likely to be 50-60 years however issues still relating to thermal performance and comfort.	Brutwood Windows would be cleaned quarterly and silicone repairs carried out with new sealant likely required at the end of warranty period (10 years).	Cost £2,862,828.00	Market / Sustainable Future for the building Single glazed system does not meet U-value requirements of Approved Doc L and also does not support Brutwood's Net Zero Carbon targets for 2030 and beyond. Tenants are well represented in the market and the due diligence would reflect the low standard of U-value in the windows and non compliance with Part L. This may lead to other tenants not taking the space as it does not meet their own standards or requirements or alternatively a likely reduction in the rental levels. M&S Regulations and EPC targets of a minimum of a C by 2027 and B by 2030 would be difficult to meet which again would have a market impact.	Insurance and Warranty Warranty achievable (10yrs). Existing building and insurance would be obtainable. Public liability and professional indemnity achieved	GMI / Brutwood Full external scaffold access required. Replacement internally not possible given existing system is loaded externally and the entire frame requires replacement with this option. Removal of asbestos units also required. Existing single glazed unit likely to be removed using mechanical aids and reinstatement would follow the same principle. Safety concerns regarding using vacuum methods on single glazed unit and the potential of obsolescence further increases risk and difficulty. This may mean units would have to be removed manually which would introduce significant manual handling risks. Consideration also given to the fact that the existing frames are welded together meaning that these will need to be dismantled in situ and on site before being transported away from site. Moderate difficulty.	
Option 5	Replace single glazed unit and frame and add secondary glazing	Environmental Secondary glazing would help enhance the environmental attributes of the building, as well as improve water tightness and thermal bridging. This would be an environmental benefit. Externally the consistent approach to glazing would improve the aesthetic of the building, an environmental benefit. Social As it is unlikely to meet occupier demands, the proposal would not secure the long-term use of the building which in turn would enhance activity and pedestrian footfall in the area - reducing anti-social behaviour and providing onwards connections to the wider CDO. Economic Due to this being unlikely to help attract future occupiers there are limited public benefits associated with the long-term viability or occupation of the building. It therefore fails to contribute to job creation or the economic growth of the city region. Heritage As above, where viability is a challenge it may be difficult to finance the necessary maintenance of the building, thus not securing heritage benefits.	3A - Secondary glazing may impact sightlines within existing framing system - Refer to thermal, acoustic, lifecycle, market	3B - Secondary glazing may impact sightlines within existing framing system	Aesthetics (Internal) - Line of secondary glazing complicated geometry, resulting in challenging internal detailing, impacting sight lines Potential maintenance/cleaning issue with an untested system Refer to thermal, acoustic, lifecycle, market	Heritage Impact The addition of a secondary structure internally could cause a visual impact from street level, would involve the replacement of historic frames and would create an adverse visual impact of the secondary glazing system from street level. Moderately/substantial adverse impact	Thermal/Energy implications A second level of glazing will help to reduce heat loss and air tightness, but may impact on daylight levels in the spaces resulting in poorer health and wellbeing of occupants and increased energy consumption for lighting - 253kWh/m2/annum of heating and cooling energy (40% reduction over option 1)	Sustainability/Embodied Carbon High upfront carbon to produce new frames for external and secondary glazing, significant improvement in energy consumption and operational carbon. Carbon payback circa 7yrs.	Health & Safety This system would be compliant from a H&S perspective with barrier loading requirements met through the secondary system	Programme Impact 9 months	Brutwood Lifecycle likely to be 50-60 years	Brutwood Windows would be cleaned quarterly and silicone repairs carried out with new sealant likely required at the end of warranty period (10 years). Secondary glazing maintenance would be dictated by lease events (typically 5 years) and would include evening/adjusting of mechanisms and re-orientation.	Cost £3,800,000.00	Market / Sustainable Future for the building Although the secondary glazing system would offer a much improved thermal performance and this would in turn make the space more appealing than options 1 and 2 in the market, the secondary glazing would result in a reduction in the natural light levels coming into the space (which is already significantly reduced by the bronze to the external windows). The aspect is important for our tenants. Secondary glazing often feels lower in quality is just having a well performing external skin to the building. The rental levels in the building would have to be reduced to reflect this.	Insurance and Warranty Warranty achievable (10yrs). Existing building and insurance would be obtainable. Public liability and professional indemnity achieved	GMI / Brutwood Same methods as noted above for external works. Same considerations as noted in Option 1 relating to secondary glazing.	
Option 6	Replace single glazing with double glazed unit	Environmental Improved environmental performance and this has the potential to meet occupier requirements about not meeting the current market demands on sustainability targets. There would be limited aesthetic enhancements and thus the building is unlikely to appeal to potential occupiers. Therefore, due to the building unlikely to appeal to occupiers, there is a potential risk of this building being unviable and thus making it difficult to finance the maintenance of the building. Social As it is unlikely to meet occupier demands, the proposal would not secure the long-term use of the building which in turn would enhance activity and pedestrian footfall in the area - reducing anti-social behaviour and providing onwards connections to the wider CDO. Economic As it is unlikely to meet occupier demands, the proposal are unlikely to secure the long-term occupation of the building. Helping to facilitate job creation and economic growth of the city region. Heritage If successfully occupied, this would secure the long-term preservation of the building. However, given that the building is unlikely to appeal to occupiers due to poor aesthetics and environmental performance it is potentially unviable to carry out the necessary maintenance, thus not securing the heritage benefits. The poor aesthetics mean that the building is not fulfilling its potential in making a positive contribution to the conservation area.	3A - System in a poor state of repair. Poorly applied paint finishes c.1990s. Visibly deflected transoms to inactive sash windows. - Glazing installation may impact existing finishes.	3B - System in a poor state of repair. Poorly applied paint finishes c.1990s. Visibly deflected transoms to inactive sash windows.	Aesthetics (Internal) - Poorly applied paint finishes c.1990s - Sightlines impacted by stepped edge unit	Heritage Impact This option will remove all remaining original listed glass panels and would require the alteration of all existing frames (if feasible) to accommodate wider units, and would not improve or remedy the existing, deteriorated condition, appearance or performance of the frames. Low/moderate adverse impact	Thermal/Energy implications Double glazing will help to reduce conduction heat losses, however, keeping the frames will still result in a leaky façade. Therefore, overall energy consumption for lighting - 273kWh/m2/annum of heating and cooling energy (13% reduction over option 1)	Sustainability/Embodied Carbon Low upfront carbon to produce new frames and glazing, but with significant improvements to energy consumption reducing operational carbon. Carbon payback circa 3yrs.	Health & Safety Existing frame would not be able to take the weight of a double glazed unit. The frame is already in poor condition and additional weight is likely to cause the frame to fail. Therefore, the window would likely come loose and fall out.	Programme Impact 5 months	Brutwood Current window frame system already beyond life expectancy. Significant amount of defects and performance issues. Unable to maintain to an acceptable standard.	Brutwood Existing framing system not recognised, spare parts such as glazing beads, transoms and gaskets etc not available. New windows would be cleaned quarterly with silicone sealant repairs likely required every 2-3 years. Due to the additional weight of the double glazed unit within the existing single glazed frame system, frequent repairs to the frame would also be required.	Cost £2,400,000.00	Market / Sustainable Future for the building Current system is already well beyond life expectancy and was installed over 50 years ago (1969). Significant amount of defects relating to weather tightness, corrosion, structural integrity and thermal performance. This includes areas of frame where daylight can be seen through openings. Brutwood would find it difficult to let the space with the window frames remaining as they were. If we were to let the space it would be at a significantly reduced rental level. This in turn would result in Brutwood having to review and reduce the extent of refurbishment to the building with the proposed pioneer scheme unlikely to be delivered. We would also suffer from a significant amount of complaints and this would likely result in our tenants wanting to leave the building. The H&S risk is something Brutwood as a responsible landlord would not accept and would not expose our tenants to the public.	Insurance and Warranty Risk of insuring the building being difficult as the loading of the glass into existing frames has a high chance of defects occurring. New warranty will be provided by the contractor. Public liability cover and professional indemnity cover will not be granted due to the high risk of defects and damage to buildings or people.	GMI / Brutwood Full external scaffold access again required as works would need to be completed externally. Double glazed unit would not fit into existing single glazed frame without significant modifications including strengthening walls (likely change in frame size) and the use of structural sealants and adhesives. High level of difficulty to achieve this option.	
Option 7	Replace single glazed unit and frame with standardized double glazed unit and frame system	Environmental Improved environmental performance will meet occupier requirements. However, aesthetically the proposal would be poor and therefore be potentially off-putting to occupiers. Social If successfully occupied this would secure the long-term use of the building which in turn would enhance activity and pedestrian footfall in the area - reducing anti-social behaviour and providing onwards connections to the wider CDO. Economic The proposals may secure the long-term occupation of the building, thus facilitating job creation and supporting the economic growth of the city region. Heritage The proposals may secure the long-term use of the building, a heritage benefit. However, the poor aesthetics may reduce the contribution of the building to the conservation area.	3A - Existing market cannot provide a standardized system which will match like for like. - Visual aesthetic will be compromised.	3B - Existing market cannot provide a standardized system which will match like for like. - Visual aesthetic will be compromised.	Aesthetics (Internal) - Existing market cannot provide a standardized system which will match like for like. - Visual aesthetic will be compromised.	Heritage Impact Standardized units will not be able to match the original detailing or appearance of the many varying frame and bay types across the facade, and would destroy after the character and appearance of the building. Substantial adverse impact	Thermal/Energy implications By replacing the frames to thermally broken units and replacing the single glazing with double glazing the heat losses and air tightness will be significantly improved, resulting in lower energy consumption - 273kWh/m2/annum of heating and cooling energy (47% reduction over option 1)	Sustainability/Embodied Carbon High upfront carbon to produce new frames and glazing, but with significant improvements to energy consumption reducing operational carbon. Carbon payback circa 4yrs.	Health & Safety This would meet H&S and statutory requirements	Programme Impact 5 months	Brutwood Lifecycle likely to be 50-60 years	Brutwood Windows would be cleaned quarterly and silicone repairs carried out with new sealant likely required at the end of warranty period (10 years).	Cost £2,862,828.00	Market / Sustainable Future for the building This option should meet all the requirements from a tenants perspective aesthetically and performance. Brutwood's EPC and energy performance targets should be achieved.	Insurance and Warranty Warranty achievable (10yrs). Existing building and insurance would be obtainable. Public liability and professional indemnity achieved	GMI / Brutwood Installation from full external access scaffold. Standardized system would likely be in "box" form due to heights and spans. This would be constructed on site and glazing installed using mechanical aids. Operatives would be specifically trained to install the system and be familiar with given it is an off the shelf system which has been used on previous projects in varying scenarios. Low difficulty of installation when compared with other available options.	
Option 8	Replace single glazed unit and frame with newly designed double glazed unit and frame system	Environmental Improved environmental performance and will meet occupier requirements. Aesthetically it will be a substantial improvement to the building through a new frame and consistent approach, enhancing the perception of the area. Social Would secure the long-term use of the building which in turn would enhance activity and pedestrian footfall in the area - reducing anti-social behaviour and providing onwards connections to the wider CDO. Economic The proposals are likely secure the long-term occupation of the building, thus facilitating job creation and supporting the economic growth of the city region. Heritage The like-for-like design would improve the aesthetics of the building and make a positive contribution to the conservation area. As the proposals are likely to attract occupiers it will secure the long-term future of the building, thus securing heritage benefits.	3A - Bespoke option to closely match existing installation - Opportunity to influence bespoke design with curtain wall manufacturer. - Opportunity to match original aesthetic/colour	3B - Bespoke option to closely match existing installation	Aesthetics (Internal) - Bespoke option to closely match existing installation - Opportunity to influence bespoke design with curtain wall manufacturer. - Opportunity to match original aesthetic/colour	Heritage Impact Although this results in the removal of all original historic fabric, this option allows for the original appearance, detailing and colouring of both frames and glass to be accurately recreated, thus retaining the original, intended appearance/character of the building, whilst also improving the performance of the windows. Moderate adverse impact	Thermal/Energy implications By replacing the frames to thermally broken units and replacing the single glazing with double glazing the heat losses and air tightness will be significantly improved, resulting in lower energy consumption - 273kWh/m2/annum of heating and cooling energy (47% reduction over option 1)	Sustainability/Embodied Carbon High upfront carbon to produce new frames and glazing, but with significant improvements to energy consumption reducing operational carbon. Carbon payback circa 3yrs.	Health & Safety This would meet H&S and statutory requirements	Programme Impact 5 months	Brutwood Lifecycle likely to be 50-60 years	Brutwood Windows would be cleaned quarterly and silicone repairs carried out with new sealant likely required at the end of warranty period (10 years).	Cost £4,100,000.00	Market / Sustainable Future for the building This option should meet all the requirements from a tenants perspective aesthetically and performance. Brutwood's EPC and energy performance targets should be achieved.	Insurance and Warranty Warranty achievable (10yrs). Existing building and insurance would be obtainable. Public liability and professional indemnity achieved	GMI / Brutwood Same methods as noted above however the system would be bespoke and not a standardized off the shelf solution as noted above. This would likely therefore increase the difficulty of the installation in the early stages of the project due to the operatives not having used the system before. That being said, the method of fixing back to the building would likely be similar, if not the same, to that of a standard system. Difficulty of installation considered to be moderate taking the above into account.	
Supporting Report		Public Benefits Statement	Section 4 of Design and Access Statement	Section 4 of Design and Access Statement	Heritage Statement	Appendix: Energy and Carbon Note; and Energy Statement	Appendix: Energy and Carbon Note; and Energy Statement	MEES: High green buildings which have EPC's. Given listed buildings don't need to have EPC's (in some circumstances) it can be argued that the MEES reg don't apply. However, this isn't always the case and a lot of the legislation and guidance is ambiguous. For example, a listed building is only exempt from an EPC if it can be demonstrated that the energy performance requirements would unacceptably affect the building. For Pall Mall, we are replacing the windows (hopefully) which will improve the energy performance without altering the aesthetic / nature of the building's heritage significance. It could therefore be argued that an EPC exemption wouldn't apply to Pall Mall and that an EPC is needed. If an EPC is needed, the following ratings need to be achieved in order for the building to be let.	N/A	Appendix: Lifecycle considerations; Appendix: Witches Condition Report	N/A	Appendix: Cost Memo	Appendix: Savill's Market Report (Sustainability)	N/A	N/A		

Condition Report

Pall Mall Court, Manchester

Non-Intrusive Condition Survey into the Glazed Façade Elements Report

Prepared on behalf of:

Sam Markowicz Union,
Albert Square,
Manchester,
M2 6LW

Date of Visit:

20th January 2022

Document reference:

07055/HB/RS/54314/WL/02



This report applies only to the façade construction observed on the day of the visit. No responsibility or liability whatsoever is accepted for defects or defective work covered up by prior works which were unobservable on the day of the visit or for areas of the façade not made available for observation.

The extent of this report is limited to the observations of the façade which may reasonably be made from the access provided by the Client or otherwise agreed to be provided by Wintech under the Client's instruction. No responsibility or liability whatsoever is accepted for defects in façade areas which could not be reasonably observed due to the limitations of access and/or the access equipment provided or agreed to be supplied.

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This report is provided strictly subject to Wintech's standard terms and conditions.

The report is not a guarantee or warranty, but a professional opinion on the condition of the subject property façade.

Issue No.	Report Issue Date	Contributors	Issue Notes
1	2 nd February 2022	HB/AJH	
2	11 th February 2022	HB/AJH	Amended to comments and section 7 updated.

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Associate Director

In the capacity of Façade Engineer

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1.0 Introduction

- 1.1 This report has been prepared by Harvir Bansal of Wintech Limited, following instruction from Mr Sam Warkiwicz of Bruntwood.
- 1.2 This report has been prepared following a one-day visit to the property on Thursday 20th January 2022, by Harvir Bansal of Wintech Limited. Weather conditions were generally dry with a temperature of approximately 9°C.
- 1.3 The purpose of the visit was to carry out a non-intrusive condition survey of the various glazed façade elements used in the property, together with a review of the available operation and maintenance (O&M) documentation, in an effort to evaluate the construction details and current condition of the glazed façades, together with their current performance-in-service and to identify any long-term durability or maintenance issues.
- 1.4 The survey included all the external glazed system façades incorporated on the building, which included glazed systems and glazed entrance doors. The survey was undertaken externally on foot from the ground level pavements and internally from accessible office areas on each floor.
- 1.5 This report has been prepared solely for the use of Bruntwood and their client, and the contents of the report must not be reproduced or disclosed to any third party without the written permission of Wintech Limited.
- 1.6 The author was introduced to the plan of the building for each floor level by the building manager's representative of Pall Mall, Manchester.
- 1.7 There was very little O&M documentation for the building regarding the glazed façade elements. The information received was solely illustrating elevations of Pall Mall Court along with reports carried out covering the inspection of the condition. No information based on the glazing units installed or how the glazing system has been installed was readily made available for review. The information in this report is solely based on a review on the day of the site visit and previous experience of the surveyor.

2.0 Limitations

- 2.1 Access to carry out the survey externally was only available from the ground floor.
- 2.2 Access to all floor levels were made available to the author during the site visit. Pall Mall Medical Practice was not made available for the survey to be carried out. This was located on the ground floor level of Marsden Block.
- 2.3 Information received for review were elevation drawings. No information regarding the single glazed pane specifications or the system installed was readily available for review.
- 2.4 The report does not consider which contractor carried out the remediation works. The report is solely based on what was observed on the day of the site visit.

3.0 The Property

- 3.1 Pall Mall Court, Manchester, is a multi-storey office building which is surrounded by one main road (King Street) and two side roads (Brown Street and Marsden Street). The main entrance for accessing Pall Mall Court is the South elevation along King Street. It is understood that the building was built circa 1969.



Figure No. 1 – 3D view of the front of Pall Mall Court, Southwest view
(Courtesy of Google Earth 2022)

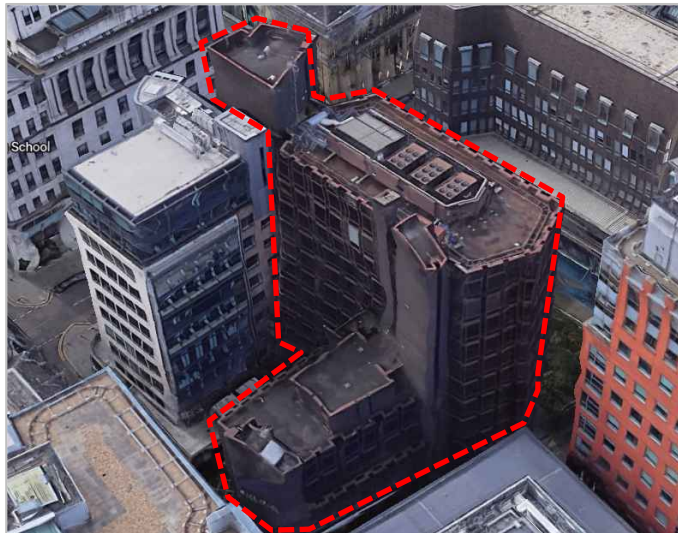


Figure No. 2 – 3D view of the rear of Pall Mall Court, Northeast view
(Courtesy of Google Earth)

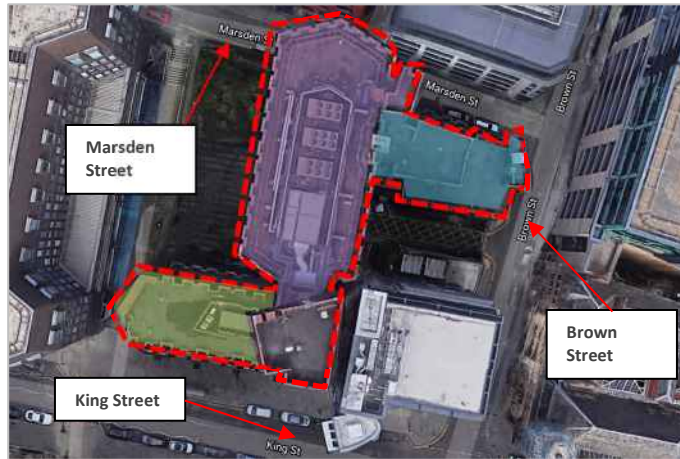


Figure No. 3 – Plan view of Pall Mall Court

- 3.2 Pall Mall Court is occupying an 'S' shaped footprint with two annexes connected to the centre of Pall Mall Court. The annex located on King Street, highlighted green in Figure No. 3 above, has five floor levels including the ground floor. The ground floor of the King Street block is occupied by Pall Mall Medical. The second connecting annex highlighted blue has six floor levels, including the ground floor, which are unoccupied. Finally, the centre block highlighted purple has eleven floor levels, including the ground floor level, which is also unoccupied. The King Street block is accessible via the lobby connected to the centre block of Pall Mall Court (see Figure No. 4). Marsden Block is accessible via the main block, highlighted purple above, through the ground floor to Level 5.

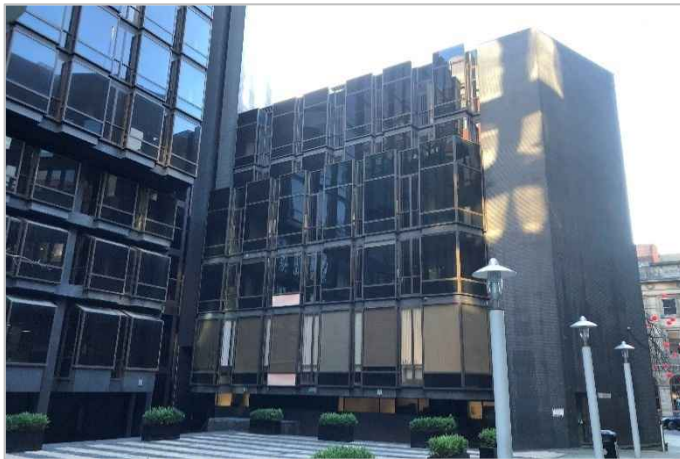


Figure No. 4 – Lobby location highlight

The images below depict the elevations for Pall Mall Court, Manchester.



Photograph No. 1 – South elevation – King Street Block – King Street



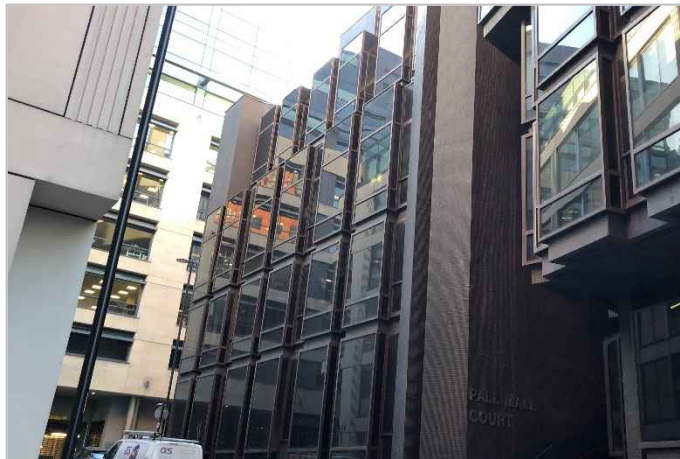
Photograph No. 2 – North elevation – King Street Block (Rear of King Street Block)



Photograph No. 3 – West elevation – Pall Mall Court – Courtyard view



Photograph No. 4 – North elevation – Pall Mall Court Block – Marsden Street



Photograph No. 5 – North elevation – Marsden Block – Marsden Street



Photograph No. 6 – East elevation – Pall Mall Court Block – Delivery entrance Brown Street

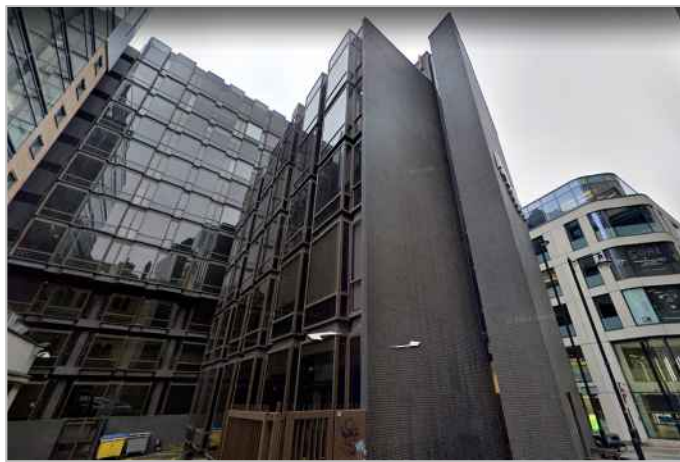


Figure No. 5 – South elevation – Marsden Block – Brown Street (courtesy of Google Maps 2022)

4.0 Description of External Façade Elements

- 4.1 The glazed façade on Levels 1-3 to Pall Mall Court Block comprises of two small projected glazed pods believed to be a shop front system. The remaining floors for Pall Mall Court Block are also believed to be a glazed shopfront system, these are not glazed pods but a glazed strip which spans from floor to ceiling around all elevations. King Street and Marsden Block do not span the same length as these blocks are smaller and connected to Pall Mall Court Block as annexes.
- 4.2 The system installed appears to be a bronze PPC coloured, shopfront based, externally beaded system. The manufacturer of the system is unknown. It is connected to the topside and underside of the slab on every floor level and mimics the outline, creating a zig-zag effect on each elevation to all three blocks.



Photograph No. 7 – Underside of slab exposed revealing the installation methodology of aluminium shopfront system



Photograph No. 8 – Continuous bays along elevation with removable partitions – Level 4

- 4.3 The glazing system installed appears to be a bronze PPC coloured framing system which is likely to be a non-thermally broken system due to the glazing pane being a of single glazed pane and the predicted age of the system installed.



Photograph No. 9 – Aluminium shopfront system installed to all glazing areas

- 4.4 The building is comprised of approximately 90% of glazed façade which displays a hint of bronze to the external side of the glazed pane. The ground floor to Level 3 of Pall Mall Court displays a different pod design around the property. The glazed pod has a sloped glazed roof which differs to Level 4 and above.



Photograph No. 10 – Two small bay areas on Pall Mall Court Block – Level 1



Photograph No. 11 – Two small bay windows on Pall Mall Court (highlighted red) and continuous windows on King Street Block (Blue) and Pall Mall Court Level 4 and above (Yellow)

- 4.5 The façade is single glazed, and using the Merlin glazing equipment, measured approximately 6mm. An engraving or sticker was also observed to the corner of the glazed pane which displayed (Madico Film – BS 6206 CLASS B).



Photograph No. 12 – 6mm glazed pane measured

- 4.6 The 6mm single glazed pane installed has a film applied to the inside face which has been applied as a separate element. The 6mm glazing panes installed are annealed glass. In some locations, the film was observed to be peeling away at the edge of the glazed pane. With this being said, the film does not appear to be glazed into the system.



Photograph No. 13 – Film application bubble at window edge

- 4.7 The corners of the glazing installed bared a small print illustrating the glazing performance, 'Madico BS 6206 Class B'. A phone number was also present on the sticker, believed to be the manufacturer of the film applied. The film appears to have been applied in an effort to help see that the glass panes installed are a Class B safety glass. With the small print and film applied the author believes the film to be a safety film for the glazed pane rather than a solar control film.
- 4.8 However, the film application does not appear to be rebated into the glazed system but applied and cut short around the edge of the opening. It also appears that the logo was applied before the film application as an air bubble around the sticker is evidently behind the film.



Photograph No. 14 – Madico Film BS6206 Class B

- 4.9 The building glazing system does not meet the current building regulations in terms of efficiency. No in situ u-value calculation has been made available and one could not be carried out due to the lack of O&M information. The current regulations (AD L2 2021) in relation to the amount of heat that can pass through the glass and framework, which is measured as a U-Value, should not be exceeded U-value 1.6 w/ (m²K). A 6mm glazing pane would typically generate a U-value of approximately 4.7 w/m²K. See section 7.0 for a detailed analysis.

5.0 Observations (External)

5.1 Degradation of Bronze PPC

- 5.1.1 The surface finish to the framework appears to be a bronze PPC. The black PPC applied to the top surface of the framework was found peeling/flaking away from the edges. The cause of this is unknown. However, the system installed is 50+ years and has reached the end of its service life, which includes the PPC illustrated in Photograph No. 15. Wintech believe that moisture has seeped in between the paint application and the surface and over time, has begun to flake near the edges.



*Photograph No. 15 – Paintwork deteriorated on top of framework
(Level 6 – West elevation – Pall Mall Court)*

- 5.1.2 The image below illustrates a number of areas which display signs of flaking. The flaking, of what appears to be the original paintwork application, was found predominately to the edges highlighted red in Photograph No. 16.



*Photograph No. 16 – Paintwork applied to framework observed
peeling from edges on framework (Level 3 – East elevation – Pall Mall
Court)*

- 5.1.3 The author was unable to get a closer view of the cloudy white staining to the framework observed on the external side of the building. However, the author believes that adverse weather conditions over time have affected the framework throughout the years, allowing hard residue to build up and leaving heavy staining to the horizontal joint between the framework and the mitred corner joints of the framework.



Photograph No. 17 – Water staining observed to framework (Level 4 – South elevation – Marsden Block)



Photograph No. 18 – Water damage to framework (Level 2 – North elevation – Marsden Block)



*Photograph No. 19 – Excess water staining observed to corner bay
(Level 3 – West elevation – Marsden Block)*

5.2 Spandrel Panels

- 5.2.1 The spandrel panels, located at the bottom of each section, were found to be glazed into the framework. The spandrel panels were principally covering the slab/cill levels and also the roofing level (Level 10 only). The spandrel panels were found to be a single 6mm glazed pane with a black coating to the inside face acting as a blanking/feature panel.
- 5.2.2 The ground floor level presented a spandrel unit with the bottom edge clear, exposing the materials behind, i.e. the internal plasterboards, insulation and the materials behind it. The cause for the black coating failing is unknown without a full intrusive investigation; however, due to the glass installed being a single glazed pane, there is a high risk of condensation forming on the inside face. The author believes that condensation occurring on the glass pane could have impacted the degradation of the black coating applied.
- 5.2.3 Another factor in the degradation process of the black coating could be that the application is not UV stable. Meaning the applied coating as applied may not have been long term resistant to the presence of ultraviolet light from the sun's rays. Thermal cycle is another factor where differential temperatures have an effect on the application and cause it to degrade through heating and cooling (the expanding and contracting causes small cracks in the black coating which will slowly break away).



Photograph No. 20 – Spandrel panel on the ground floor (Ground floor – South elevation – King Street)



Photograph No. 21 – Black coating to spandrel panel degraded, exposed materials behind it (Ground floor – South elevation – King Street)

- 5.2.4 The black coating to the glazed pane (spandrel panel) was observed from the outside of Pall Mall Court. There were a number of panels which displayed a large amount of degradation to the black coating applied to the inside face. A number were observed from the ground floor level, with the majority observed on Level 10, East elevation, facing Brown Street.



Photograph No. 22 – Spandrel panels at roof level exposed due to degradation of black coating on inside face (Level 10 – East elevation – Pall Mall Court facing Brown Street)

- 5.2.5 Another was located on the North elevation, Marsden Block, Level 5, facing Marsden Street. Without an intrusive survey and testing, the author believes that the condensation forming on the inside face of the glazed pane has over time degraded the black coating. It is not common for one to degrade whilst others have remained intact. Therefore, the author believes that the application of the black coating may not have been applied correctly, meaning the surface it was applied to was not clean and free of debris or grease.



Photograph No. 23 – Black coating to spandrel panel deteriorated over time (Level 5 – North elevation – Marsden Block)

- 5.2.6 On the ground floor level, one glazed pane was found to be without any black coating. This happened to be the only glazed pane with the black coating entirely diminished, rendering the area completely exposed. The reason for this could be due to the application quality of the black coating, i.e, the application was not as specified, or the surface was not clear of debris and grease. This could also be condensation related, as mentioned within Section 4.2.



Photograph No. 24 – Ground floor exposed spandrel glass panel with black coating diminished – (Ground floor – North elevation – Marsden Block)

5.3 Missing Glazed Spandrel Units

- 5.3.1 Two 6mm glazed panels were missing from the glazed façade system. The missing glazed panes acting as spandrel panels were replaced with timber boards. The timber boards were installed within the framework and secured via fasteners and timber boards, as well as silicone sealant, to the edges.



Photograph No. 25 – Glazed spandrel panels replaced with timber boards (Levels 1 & 2 – North elevation – King Street Block)

- 5.3.2 The bottom edge of the replacement timber board was installed behind the horizontal framework and then silicone sealed along the span.



Photograph No. 26 – Timber board installed behind framework and silicone sealed (Level 1 – North elevation – King Street Block)



Photograph No. 27 – Timber panel installed, and silicone sealed around the jamb edges (Level 1 – North elevation – King Street Block)



Photograph No. 28 – Timber spandrel panel (Level 1 – North elevation – King Street Block)

5.4 Loose Gasket

- 5.4.1 An impregnated foam material which measured a depth of approximately 15mm was found dislodged from the underside of the projected pod. With this gap present, heat will escape and affect the thermal performance of the building.



Photograph No. 29 – Impregnated foam found loose between façade and glazing system (Level 1 – West elevation – Marsden Block)

5.5 Glazed Pane Thermal Crack

- 5.5.1 On Level 1, a fracture in the glazing pane was observed. The fracture appears to be thermal related due to the location; the fracture extends from the left jamb towards the middle of the cill.



Photograph No. 30 – Internal view of cracked glazed pane (Level 1 – South elevation – King Street Block)

- 5.5.2 The cause of this fracture is most likely to be a thermal one. The film application introduced to the inside face of the glazed pane is likely to have increased the solar energy absorbance, creating a differential in temperature. Due to the differential temperatures in the glass pane, the glass expands and contracts at different rates and the unexpected temperature change creates a thermal shock on a molecular level and causes certain parts of the glass to contract while other areas are expanding. With this stress occurring within the glass pane, cracks appear. There is a possibility that edge damage to the glass pane may have occurred, causing this fracture.

6.0 Observation (Internal)

6.1 Degradation

- 6.1.1 The gaskets used between the single glazed pane and the internal framework were found to be deformed in a number of locations. This appears to be a result of age hardening which also indicates that the seals have reached their service life and should be replaced.



Photograph No. 31 – Deformed seal as a result of age hardening between the glazed pane and framework (Level 2 – South elevation – King Street Block)

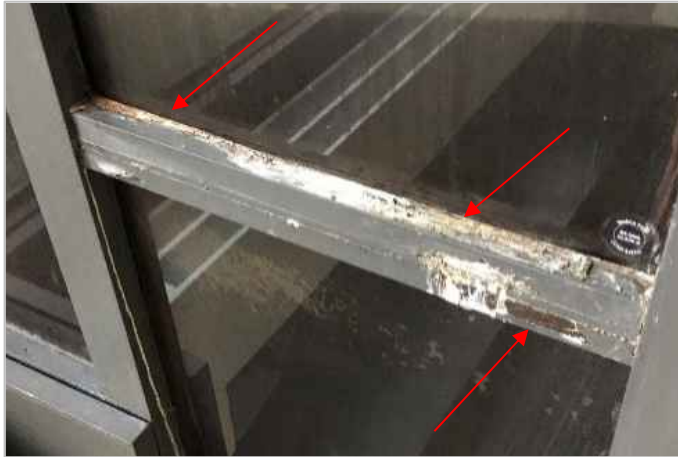
- 6.1.2 In a number of locations within Pall Mall Court, heavy degradation to the paintwork was found to the internal cill framework.



Photograph No. 32 – Degradation of paint and sealant applied (Level 1 – South elevation – King Street Block)

- 6.1.3 It appears that the internal frame for the system has been painted as brush strokes were evident. The paint work application has degraded over time, exposing the internal aluminium finish of the framework installed. This is most likely due to the water ingress, with water trickling down the inside face of the glazed pane and pooling on the cill profile. The sealant between the framework and the glazed pane used can also be found broken (highlighted blue).

- 6.1.4 Heavy degradation of the paintwork was observed to the entire length of the horizontal aluminium framework on Level 3. This particular window section has been susceptible to a large amount of water ingress, due to the level of corrosion observed to the framework. The author believes that the water pooling on top of the framework has eventually seeped out between the internal paint application and over time degraded, exposing the original bronze coloured PPC.



Photograph No. 33 – Heavy amount of staining to paintwork application on framework (Level 3 – South elevation – King Street Block)

- 6.1.5 Water found sitting on top of the framework has eventually trickled down the front of the horizontal members and has tracked along the connection joint/line (highlighted blue). The water has eventually traversed its way along the joint and has seeped out in between the applied paintwork and the PPC bronze framework, causing the paint to peel away over time.



Photograph No. 34 – Paint application peeling away from the framework (Level 3 – South elevation – King Street Block)



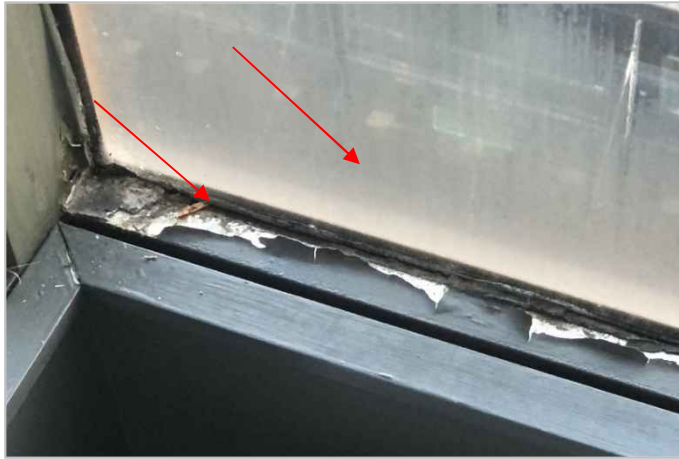
Photograph No. 35 – Paint peeling away from framework (Level 3 – South elevation – King Street Block)

- 6.1.6 In some locations, the degradation was observed to be heavy, exposing the bronze PPC entirely. This is most likely due to the condensation which forms on the inside face of the glazed pane as well as water ingress through the top seals. Water/moisture has pooled on the horizontal frame and over time has degraded the internal paint application, exposing the bronze PPC framework and the aluminium framework.



Photograph No. 36 – Degradation to internal paint application exposing bronze PPC (Level 4 – North elevation – King Street Block)

- 6.1.7 The water pooled onto the framework has eventually seeped out between the sealant and the glazed pane. Thus, allowing water to penetrate under the paintwork application and peel it away. In some locations, the bronze PPC can be seen and in others, the aluminium framework.



Photograph No. 37 – Paint application peeled away from edge closest to glazed pane (Level 9 – West elevation – Pall Mall Court)



Photograph No. 38 – Sealant applied degraded with paint work flaking (Level 9 – West elevation – Pall Mall Court)



Photograph No. 39 – Heavy degradation to framework (Level 9 – West elevation – Pall Mall Court)



Photograph No. 40 – Sealant degraded between the glazed pane and framework – (Level 10 – West elevation – Pall Mall Court)



Photograph No. 41 – Adhesion failure of sealant applied to framework and glazed pane (Level 10 – East elevation – Pall Mall Court)

- 6.1.8 On Level 10, a clear sealant was observed to the edge of the framework in an attempt to seal any gaps between the glazed pane to the framework. This is likely to be a remediation attempt to seal the glazed pane to prevent any further water ingress. The silicone sealant applied does not appear to be compatible with the frame or the glazed pane as the adhesion has evidently failed in Photograph No. 43.



Photograph No. 42 – Clear silicone sealant applied (Level 10 – West elevation – Pall Mall Court)



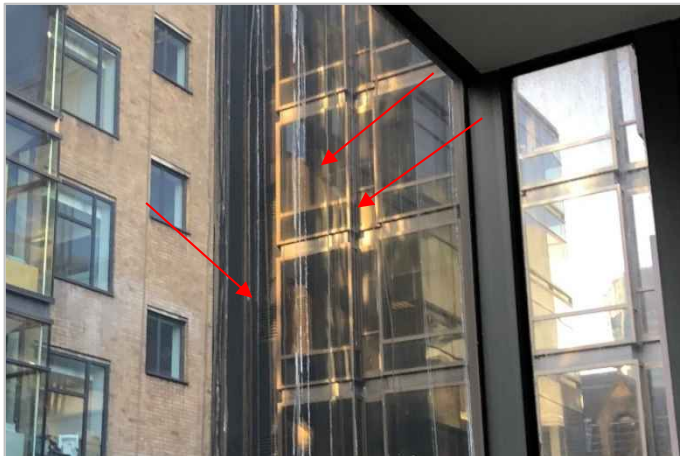
Photograph No. 43 – Clear silicone sealant showing signs of adhesion failure (Level 10 – West elevation – Pall Mall Court)

6.2 Water Staining

- 6.2.1 Streaks of water stains were found on the inside face of the single glazed pane on various floor levels. A number of these appeared to be through the internal top seal between the glazed pane and the framework.



Photograph No. 44 – Water streak from under glazing seal (Level 2 – North elevation – Marsden Block)



Photograph No. 45 – Water streak on window unit (Level 2 – North elevation – Marsden Block)



Photograph No. 46 – Water streaks on glazed pane (Level 2 – North elevation – Marsden Block)



Photograph No. 47 – A number of water streaks on glazed pane (Level 2 – West elevation – Pall Mall Court)



Photograph No. 48 – Water streaks observed to glazed pane (Level 4 – South elevation – King Street Block)



Photograph No. 49 – Water staining found on the framework (Level 10 – North elevation – Pall Mall Court)



Photograph No. 50 – Heavy water staining to framework and glazed pane (Level 10 – West elevation – Pall Mall Court)

- 6.2.2 Signs of damp were observed to the underside of the ceiling panels. The projected pods are installed floor to ceiling with a glazed infill piece as a spandrel panel in front of the slab. As the floor slab is masked with a single glazed pane with the black coating application to the inside face, it is likely that condensation is forming on the inside face of the glazed pane in front of the slab and over time, pooling onto the ceiling panels, creating stains and mould.



Photograph No. 51 – Water staining to ceiling (Level 4 – West elevation – Marsden Block)



Photograph No. 52 – Excessive water damage to ceiling (Level 10 – East elevation – Pall Mall Court)

- 6.2.3 Black mould was observed to the ceiling around the glazing system, indicating that the system at the head is no longer watertight as the majority of the staining was observed on Level 10.



Photograph No. 53 – Black mould observed to ceiling around glazing system (Level 10 – West elevation – Pall Mall Court)

7.0 Summary and Recommendations

- 7.1 This report has highlighted several items in Sections 4.0 and 5.0. The existing maintenance regime for the glazed elements, should one exist, should be carried out regularly to ensure that the defects mentioned in this report are reduced to a minimum.
- 7.2 The building was built circa 1969 with what appears to be a bronze PPC coloured, shopfront based, externally beaded system. The shopfront system installed is believed to be a non-thermally broken system, which does not meet the current regulations for glazing U-value. The current regulations (AD L2, 2021) in relation to the amount of heat that can pass through the glass and framework, which is measured as a U-Value, should not be exceeded U-value $1.6 \text{ W/ (m}^2\text{K)}$. A 6mm glazing pane (currently installed) would typically generate a U-value of approximately $4.7 \text{ m}^2\text{K}$.
- 7.3 Section 4.5 States 'New fabric elements should meet the limiting standards in Table 4.1. This includes all of the following.

- a. Elements in new buildings.*
- b. New elements in extensions to existing buildings.*
- c. New or replacement elements in existing buildings.*

Guidance on when a new or replacement element in an existing building must meet the requirements in this table is given in Section 10.'

- 7.4 Section 4.6 states 'If windows or fully glazed pedestrian doors cannot meet the requirements of Table 4.1 in an existing building because of the need to maintain the character of the building, either of the following should be met.
- a. These fittings should not exceed a centre pane U-value of $1.2 \text{ W/ (m}^2 \cdot \text{K)}$.*
 - b. Single glazing should be supplemented with low-emissivity secondary glazing.'*

Table 4.1 Limiting U-values for new or replacement elements in new and existing buildings and air permeability in new buildings

Element type	Maximum U-value ⁽¹⁾ W/(m ² ·K) or air permeability
Roof (flat roof) ⁽²⁾	0.18
Roof (pitched roof) ⁽²⁾	0.16
Wall ⁽²⁾⁽³⁾	0.26
Floor ⁽⁴⁾⁽⁵⁾	0.18
Swimming pool basin ⁽⁶⁾	0.25
Windows in buildings similar to dwellings ⁽⁷⁾⁽⁸⁾	1.6 or Window Energy Rating ⁽⁹⁾ Band B
All other windows, ⁽⁸⁾⁽¹⁰⁾⁽¹¹⁾ roof windows, curtain walling	1.6
Rooflights ⁽¹²⁾⁽¹³⁾	2.2
Pedestrian doors (including glazed doors) ⁽¹⁴⁾	1.6
Vehicle access and similar large doors	1.3
High-usage entrance doors	3.0
Roof ventilators (including smoke vents)	3.0
Air permeability (for new buildings)	8.0m ³ /(h·m ²) @ 50Pa

NOTES:

- Area-weighted average values, except for new windows, rooflights and doors in existing buildings.
- For dormer windows, 'roof' includes the roof parts of the windows and 'wall' includes the wall parts (cheeks).
- If meeting such a standard in an existing building would reduce by more than 5% the internal floor area of the room bounded by the wall, a lesser provision may be appropriate.
- The U-value of the floor of an extension may be calculated using the exposed perimeter and floor area of either the whole enlarged building or the extension alone.
- If meeting such a standard in an existing building, would create significant problems in relation to adjoining floor levels, a lesser provision may be appropriate.
- The U-value of a swimming pool basin (walls and floor) calculated according to **BS EN ISO 13370**.
- For example, student accommodation, care homes and similar uses where the occupancy levels and internal heat gains are essentially domestic in character.
- If other performance (e.g. wind load, safety, security or acoustic attenuation) requires thicker glass to be used, an equivalent window unit with standard thickness glazing should be shown to meet the required standard.
- The methods for calculating Window Energy Rating are set out in the Glass and Glazing Federation's Glazing Manual Data Sheet 2.3, Guide to the Calculation of Energy Ratings for Windows, Roof Windows and Doors.
- No maximum U-value is set for display windows and similar glazing. There are no limits on the design of display windows and similar glazing, but for new buildings their impact must be taken into account in the calculation of primary energy and CO₂ emissions.
- In buildings with high internal heat gains, the average U-value for windows can be relaxed from the values given above if this can be shown to be an appropriate way of reducing overall CO₂ emissions and primary energy. However, values should be no higher than 2.7W/(m²·K).
- U-values for rooflights or rooflight-and-kerb assemblies should be based on the developed surface area of the rooflight (U_d values), which is often greater than the area of the roof opening. Further guidance on U_d-values is given in the Building Research Establishment's BR 443 and the National Association of Rooflight Manufacturers' Technical Document NTD02.
- The limiting value for rooflights also applies to kerbs that are supplied as part of a single rooflight-and-kerb assembly sourced from the same supplier and for which the supplier can provide a combined U_d-value for the assembly. An upstand built on site should have a maximum U-value of 0.35W/m²·K.
- For external fire doorsets, as defined in Appendix A of Approved Document B, Volume 2, in new and existing non-domestic buildings, a maximum U-value of 1.8W/(m²·K) is permissible.

Figure No. 6 – Table 4.1 (extracted from AD L2 2021)

7.5 Section 10.2 states 'The minimum standards in paragraphs 4.5 and 4.6 and Table 4.1 should be met for both of the following.

- a. New thermal elements installed in an existing building.
- b. Thermal elements constructed to replace existing thermal elements.'

7.6 As the building was built with the current glazing system circa 1969, the difference in years for the current regulations (AD L2 2021) is approximately 53 years. The System installed has exceeded it's service life.

7.7 A table below has been created to identify the faults raised in Pall Mall Court, the consequences from these faults and what possible action could be carried out to mitigate these faults.

<u>Fault</u>	<u>Cause and Consequence</u>	<u>Possible Actions and Why</u>
Crack Glazed Pane with Film Application	Cause: Some areas of the glass pane are heated up faster than other areas, which causes stress on the glass on a molecular level. Consequence: Further cracking for the glazed pane could occur with heat escaping through the crack, which means more energy will need to be used in order to reach the required temperature. The film observed does not appear to be glazed in. Therefore, if the single glazed pane was to break as a whole, it would fall out of the system as a whole due to the film application holding the sheards of glass in the place during its fall.	Possible Actions: Install double glazed units (DGU's). DGUs are likely to not fit within the existing framework due to the rebates and the system only securing 6mm glass. This will warrant a new system in order to hold the new DGUs in order to make the building more energy efficient and reduce some of the failures. Why: DGUs will help see that the differential temperatures in the glass panes are separated, allowing the inner plane to stay and the outer to remain cold. The Argon gas within the double-glazed unit helps keep the unit warm and reduce the energy required to heat/cool the building. Installed DGUs are most likely to warrant the entire system to be changed as the existing system is likely to not accommodate DGUs.

Weathered Seals	Cause: The seals are most likely to have exceeded their service life expectancy of 25 years, which has caused the seals to degrade, age harden and allow water to seep through. Consequence: Water will continue to leak through the top gaskets between the glazed pane in the framework and trickle down the internal side of the glazed pane, damaging paintwork and plasterboards installed at cill levels, as illustrated in Section 5.0 of this report.	Possible Actions: Gaskets should be changed with new gaskets. Why: The original gaskets have degraded over time, losing their elasticity of being compressed for almost 50+ years. The gaskets around the units will need to be changed to achieve weather tightness. Given that the system has exceeded its service life over 50 years, it will be difficult to find the replacement gaskets due to the age of the system installed. This is most likely to warrant the system as a whole to be replaced with a more energy efficient system.
Painting Flaking Away	Cause: Water ingress and condensation formed on the single glazed pane has pooled onto the framework. Consequence: Damage to the paintwork and causing it to degrade over time. Degradation will expose the bronze PPC coating further and eventually expose the aluminium framework as shown in Section 5.0.	Possible Actions: Install double-glazed units (DGU) Why: DGU will limit the occurrence of condensation which is evidently pooling and damaging the paintwork to the framework. Installing DGUs are most likely to warrant the entire system to be changed, as the existing system cannot accommodate DGUs DGU's should be installed as a replacement to limit the condensation risk along with new gaskets between the glazed pane and the framework to prevent further water ingress.

Exposed Spandrel Panels	Cause: Water/moisture has eventually degraded the black coating. Consequence: As more water leaks into the internals, as well as condensation, the black coating will slowly degrade and eventually expose the rubble and materials used in the construction to the public.	Possible Actions: Install thermal efficient spandrel panels. Why: Spandrel panels are used as feature panels to hide floor slabs or works behind the spandrel panel locations. Installing new spandrel panels will allow for the design to be thermally efficient and reduce the energy required to heat/cool the building. As the current spandrel panels are single glazed, heat is lost.
Single Glazed Panes	Cause: Condensation, heat loss, higher energy bills. Consequence: Condensation will occur more often which will pool onto the framework and slowly degrade the paintwork applied to the bronze anodised frame. Heat is lost through the glazed pane by allowing heat to escape and cold air to come in. It is less economical and gives a poor job of keeping the floor levels warm, which means more energy is used in keeping the area warm and therefore produces more carbon emissions. Having a single glazed pane provides low security which indicates that the 6mm glazed pane is more fragile.	Possible Action: Installed double glazed units. Why: Changing windows to double glazed units. Has its advantages, such as lower energy consumption as the argon gas within the air cavity helps reduce the amount of heat that is lost through the unit. DGU provides a better sound barrier for the office environment. It will massively help with the reduction of condensation which was observed on a number floor levels. Changing the single glazed panes to the DGUS is most likely to warrant a system change as the existing system currently hold a 6mm glazed panes, meaning the system is built for 6mm only.

Mould	Cause: Water ingress to internals. Consequence: Water will continue to leak into the internals and eventually create holes in the ceiling panels. Mould which is already present in some locations will continue to grow and the smell of damp will be more prominent.	Possible Action: New seals & membranes. Why: Water is leaking into the internals either through the roof or the top of the glazing system. This should be reviewed further. However, as water is evidently leaking into the internals and pooling on the ceiling, the author believes that the membranes installed are likely to have reached their service life and may have degraded over time, creating holes and gaps for water to leak in and pool, creating stains to the ceiling and mould growth.
Silicone Applied as Remediation	Cause: Water ingress and condensation. Consequence: Silicone, which is applied to the seals of the framework, as a remediation method, will need topping up over time. Condensation formed on the glazed pane will impact the silicone sealant used and eventually pull away from the framework and glazed pane. This is known as adhesion failure.	Possible Action: Weather seals to be replaced around the glazing system. Why: Silicone sealant used is not a remediation method. Condensation is getting in between the sealant and allowing the sealant to peel away from the glazing system. This process will repeat itself every time it is applied. The weather seals used for the internal side to the shopfront system on all floor levels should be replaced with new seals, which are compatible with the framework. This will help see that the seals in fact keep water out and not allow heat to escape through the system.

Water Ingress	Cause: End of life expectancy gaskets. Possible membrane degradation. Consequence: End of life gaskets will allow water to enter the internals as well as allowing cold air to flow through the tiniest gap between the framework and glazed pane. Water leaking into the internals, predominantly on Level 10 and a number of other floor levels, will continue to flow through and degrade the internals over time.	Possible Action: Weather seals and membranes to be replaced. Why: The seals have evidently degraded over time due to excess water ingress and condensation forming on the glazing. The moisture has degraded the seals, allowing water and cold air to come through. The membranes to Level 10 will need to be reviewed further to help see if the membranes are still intact. Given the glazing system has been installed for over 50 years, the membrane is likely to have degraded over time, allowing water to leak into the internals.
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In Wintech's opinion, based on the findings of this report, the glazed system currently installed should be replaced with a new system which meets today's building regulations in terms of thermal efficiency. The system currently installed has exceeded its service life and has been installed since circa 1969, estimating the system to have been installed for over 50 years. With gaskets and paint degradation observed, it is highly unlikely that replacement gaskets and seals will be readily available for a system of 50+ years.

The system installed is likely to have been discontinued along with gaskets and other glazing elements. Therefore, if the chosen route is to remediate, bespoke gaskets and glazing elements will need to be considered. This will likely be an expensive route and long lead time in production, as these items will not be readily available.

Energy and Carbon Note

TECHNICAL NOTE

Project name **Pall Mall**
Project no. **1620013339**
Technical Note no. **02**
Version **1.1**

Prepared by **S Moses/T Harley-Tuffs**
Checked by **M Bissell**
Approved by **M Bissell**

1 Introduction

This technical note is being produced to support the glazing matrix that has been produced for Pall Mall, Manchester regarding the various façade options. This report provides more detail on the impacts of the different options in terms of their energy demand and whole life carbon impacts.

This report is being produced to provide more context of the implications of the different façade options and to help with making an informed decision.

The glazing options currently being considered include:

1. Do nothing
2. Replace single glazing only
3. Replace single glazing and add secondary glazing
4. Replace single glazed unit including frame
5. Replace single glazed unit including frame and add secondary glazing
6. Replace single glazing with double glazing only
7. Replace single glazed unit and frame with standardised double glazed unit and frame system
8. Replace single glazed unit and frame with newly designed double glazed unit and frame system.

Each of these options have been reviewed in terms of energy demand and embodied carbon.

2 Energy Demand

Energy modelling software (IES Virtual Environment) has been used to help determine the performance, in terms of energy demand for heating and cooling, for the different glazing options.

The following assumptions have been made for the different option appraisals:

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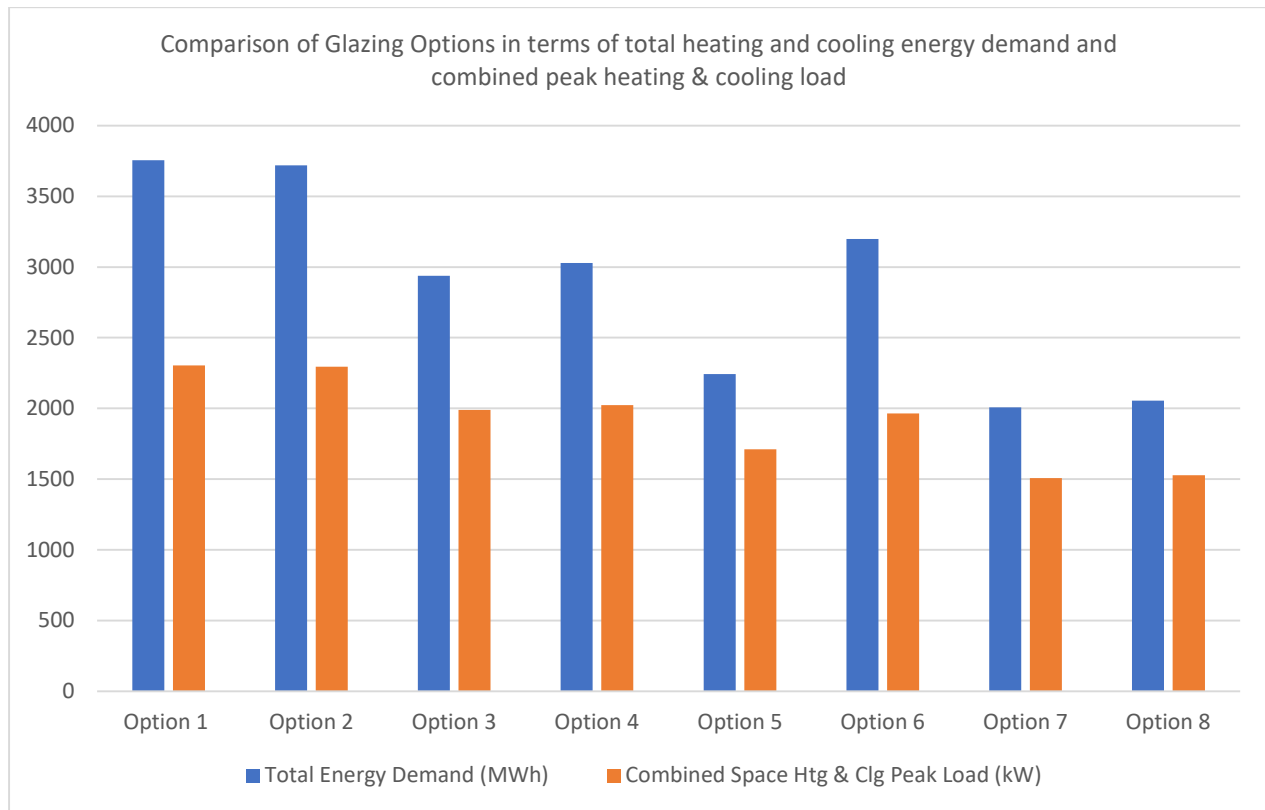
Ramboll UK Limited
Registered in England & Wales
Company No: 03659970
Registered office:
240 Blackfriars Road
London
SE1 8NW

Option	Glazing (including Fame) U-value, W/m ² K	Glazing g-value and Light Transmittance	Building Air Permeability, m ³ /m ² /hr
1 Do Nothing	5.7	G=0.6, LT=50%	25
2 Replace single glazing only	5.4	G=0.6, LT=50%	25
3 Replace single glazing and add secondary glazing	3.5 (combined)	G=0.5, LT=35%	20
4 Replace single glazed unit including frame	5.0	G=0.6, LT=50%	15
5 Replace single glazed unit including frame and add secondary glazing	3.0 (combined)	G=0.5, LT=35%	10
6 Replace single glazing with double glazing only	2.9	G=0.25, LT=40%	25
7 Replace single glazed unit and frame with standardised double glazed unit and frame system	1.8	G=0.25, LT=40%	10
8 Replace single glazed unit and frame with newly designed double glazed unit and frame system.	2.0	G=0.25, LT=40%	10

Based on the above assumptions, these have been altered in the energy model to see the impacts of the various options on energy demand for heating and cooling. The following table summarises the results:

	Option 1	Option 2	Option 3	Option 4	Option 5	Option 6	Option 7	Option 8
Sensible Space Heating Energy Demand (MWh)	3660	3623	2833	2923	2118	3140	1927	1975
Sensible Space Cooling Energy Demand (MWh)	94	95	104	105	124	58	81	80
Total Energy Demand (MWh)	3754	3718	2938	3028	2242	3198	2008	2055
Reduction from Option 1	N/A	1%	22%	19%	40%	15%	47%	45%
Sensible Space Heating Peak Load (kW)	1560	1550	1292	1297	1030	1371	937	951
Sensible Space Cooling Peak Load (kW)	745	745	698	725	682	593	570	577
Combined Space Htg & Clg Peak Load (kW)	2305	2295	1989	2022	1711	1964	1507	1528
Reduction from Option 1	N/A	0.4%	14%	12%	26%	15%	35%	34%

This can also be seen graphically below:



Based on this assessment, it can be seen that there are significant energy benefits for changing to a double glazing system, particularly with improvements to the framing system being implemented at the same time. From the results, the most beneficial performers from an operational energy perspective would be the following:

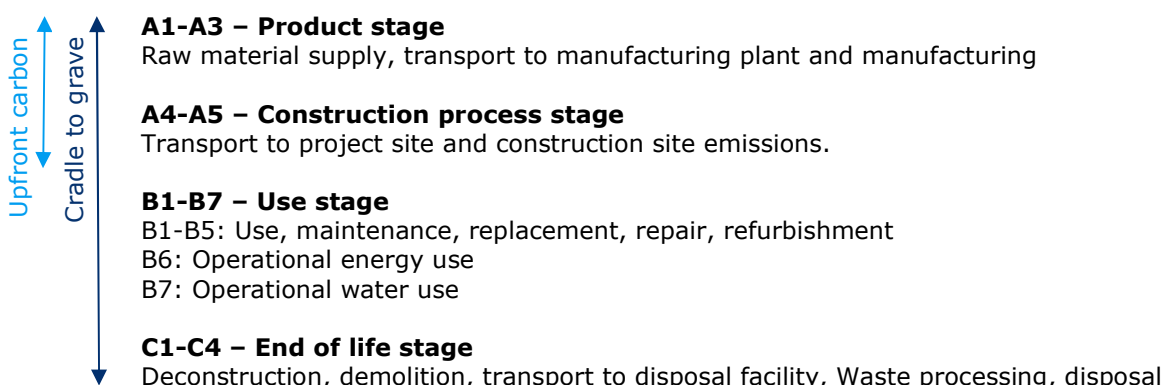
- Option 5 - Replace single glazed unit including frame and add secondary glazing – this offers a potential 40% annual heating and cooling energy saving and a 26% peak heating and cooling load saving compared with option 1 of do nothing.
- Option 7 - Replace single glazed unit and frame with standardised double glazed unit and frame system – this offers a potential 47% annual heating and cooling energy saving and a 35% peak heating and cooling load saving compared with option 1 of do nothing.
- Option 8 - Replace single glazed unit and frame with newly designed double glazed unit and frame system – this offers a potential 45% annual heating and cooling energy saving and a 34% peak heating and cooling load saving compared with option 1 of do nothing.

The best performer of these would be option 7, using a standardised glazing system, however, this would not provide the aesthetic sensitivity that the building deserves and break the architectural integrity. The next best performer would be option 8, which would help to deliver a more energy conscious building, providing significant energy savings over the 'do nothing' scenario and can be achieved whilst trying to maintain the original architectural intent and aesthetics of the building.

3 Whole Life Carbon

Building materials make up a significant share of the total environmental impact of buildings. Findings estimate that 11% of all global carbon emissions are related to building materials, making building assets a significant contributor to climate change. Embodied carbon is a term to describe the carbon footprint of a material and includes carbon emissions associated with the raw material extraction, manufacturing processes, transportation, use, deconstruction or demolition and end of life stages.

A whole life carbon approach considering both operational and embodied carbon can help identify the overall best combined opportunities for reducing life cycle emissions and helps to avoid any unintended consequences of focusing on operational emissions alone. In summary, a life cycle assessment covers the following life cycle stages:



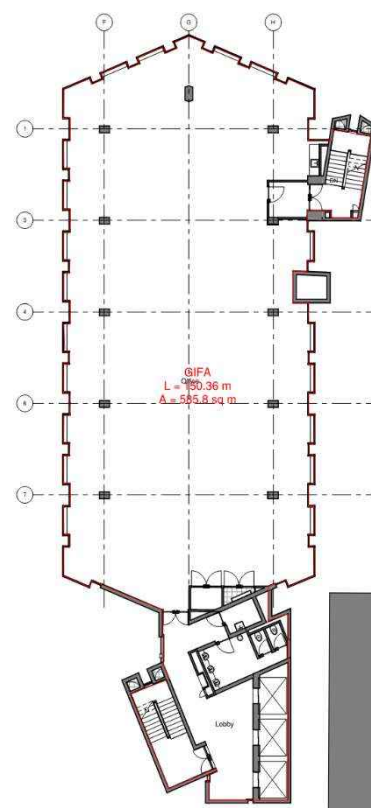
Module D – Benefits and loads beyond the project life cycle

A high-level assessment of the embodied carbon associated with the glazing improvement measures proposed for Pall Mall has been undertaken and key results are presented herein. The study looks at the windows on a single floor (level 8) and then extrapolates to provide an estimate of the whole building based on GIA. Key measurements are given in the table below:

Value	Measurement	Source
150 m	Total perimeter of 8th floor	Architectural drawings
3.6 m	Frame height	Glazing drawings
543 m ²	Façade area	Calculated
1763 m	Length of aluminium profile	Glazing drawings
326 m ²	Glazing area	Glazing drawings

In the absence of product specific details, generic data for glazing and aluminium framing is taken from OneClickLCA to estimate the embodied carbon impact. The rates for different components pro-rated by m² GIA are given below. These should be considered a rough estimate at this stage for initial decision making, and will be refined as the design develops.

As can be seen from the table, the majority of the upfront embodied carbon comes from replacing the aluminium frames.



<i>kgCO₂e/m² GIA</i>	Embodied carbon by LCA stage			
	A1-A3	A4	A5	Total
ICE: Single glazed 6mm	13.9	2.7	0.2	16.7
ICE: Double glazed 6mm x2	27.1	5.3	0.3	32.8
Kawneer: Aluminium frame	173.5	0.3	13.1	186.9

The operational carbon reduction from the previous section can therefore be compared to the associated embodied carbon increase, as shown in the table below.

Option	Energy Demand kWh/m ² /yr	Operational carbon: B6 kgCO ₂ e/m ² /yr	Reduction on option 1: B6 kgCO ₂ e/m ² /yr	Upfront carbon: A1-A5 kgCO ₂ e/m ²	Carbon Payback years
1 Do Nothing	319	74	N/A	0	0
2 Replace single glazing only	316	74	-1	17	23
3 Replace single glazing and add secondary glazing	250	58	-16	33	2
4 Replace single glazed unit including frame	258	60	-14	204	14
5 Replace single glazed unit including frame and add secondary glazing	191	44	-30	220	7
6 Replace single glazing with double glazing only	272	63	-11	33	3
7 Replace single glazed unit and frame with standardised double glazed unit and frame system	171	40	-35	220	6
8 Replace single glazed unit and frame with newly designed double glazed unit and frame system.	175	41	-34	220	7

Energy demand is calculated from the total energy demand divided by the GIA of 11750m².

Operational carbon is estimated using the SAP 10.0 electrical grid carbon factor of 0.233kgCO₂e/kWh.

Upfront carbon is estimated by summing relevant components in the previous table.

Carbon payback is the amount of time after which the initial upfront carbon emissions may be offset by the reduced operational carbon demand. As the electrical grid decarbonises it is expected that in practice these payback periods will be significantly longer, however the metric is useful as a comparison between options.

Based on this study it any option that avoids replacing the frames has a significantly shorter carbon payback period. If the frames are to be replaced a high performing double glazed system is recommended to maximise the operational energy reduction achieved.

4 Summary

Decisions relating to the façade should be taken holistically and account for the listed status, aesthetics, planning implications, cost and a multitude of other factors.

From an energy and carbon perspective this technical note shows that double glazing with new frames (option 8) or single glazing with new frames and secondary glazing (option 5) provide the best reduction in operational energy use whilst still minimising whole life carbon impacts. Further analysis at the next stage of design will help to refine the products use and minimise whole life carbon impacts further.

Bruntwood's Lifecycle Note

Supplementary Report

Pall Mall Windows - Lifecycle Considerations

Date: March 2022

1. **Option 1: Do Nothing**

Current system is already well beyond life expectancy and was installed over 50 years ago (1969). Significant amount of defects relating to weather tightness, corrosion, structural integrity and thermal performance. This includes areas of frame where daylight can be seen through areas.

2. **Option 2: Replace Single Glazed Unit**

Current framing system is already well beyond life expectancy and was installed over 50 years ago (1969). Significant amount of defects relating to weather tightness, corrosion, structural integrity and thermal performance. This includes areas of frame where daylight can be seen through areas.

3. **Replace single glazed unit and add secondary glazing**

While secondary glazing system offers improvements in relation to thermal performance and meets some statutory requirements, the issues with the existing framing system still remain. Lifecycle of secondary glazing system is likely to be 50-60 years but the current framing system is already well beyond life expectancy and was installed over 50 years ago (1969). Significant amount of defects relating to weather tightness, corrosion, structural integrity and thermal performance. This includes areas of frame where daylight can be seen through areas.

4. **Replace single glazed unit and frame and add secondary glazing**

Lifecycle likely to be 50-60 years however issues still relating to thermal performance and comfort. Single glazed system does not meet U value requirements of Approved Doc L and also does not support Bruntwood's Net Zero Carbon targets for 2030 and beyond. Any new system installation is required to meet current day Building Regulation standards; a single glazed system does not meet those standards and would therefore be noncompliant.

5. **Replace single glazed unit and frame and add secondary glazing**

Lifecycle likely to be 50-60 years on the basis that all existing component parts (frame system and glass) are replaced with new.

6. **Replace single glazing with double glazed unit**

Current system is already well beyond life expectancy and was installed over 50 years ago (1969). Significant amount of defects relating to weather tightness, corrosion, structural integrity



and thermal performance. This includes areas of frame where daylight can be seen through openings. Additional weight of double glazed unit into single frame would further accelerate degradation of window frame and not physically possible to install a double glazed unit into the existing frames due to their size and design being for a single glazed system.

7. Replace single glazed unit and frame with standardised double glazed unit and frame system

Lifecycle likely to be 50-60 years.

8. Replace single glazed unit and frame with newly designed double glazed unit and frame system

Lifecycle likely to be 50-60 years.

Supplementary Information

This above lifecycle information has been based on Bruntwood's experience as a commercial property developer as well as having consideration for industry recognised literature, most notably section 2.06 of BCIS (Building Cost Information Service), an extract of which can be seen below:

☒ 02.06 External Windows and Doors			
Component	Median life in years		
	Typical	Min.	Max.
☒ Windows: Acrylic Finished Aluminium: Vertical or horizontal sliding; plugged and screwed	35	25	50

The category selected is the closest to the proposed system for Pall Mall but, as can be seen, this refers to a vertical or horizontal sliding unit whereas the system at Pall Mall is fully sealed. For this reason, and the fact that Bruntwood will ensure proper maintenance of the windows throughout their lifecycle, the stated anticipated lifecycle is c. 50-60yrs.

Bruntwood's Cost Note

Pall Mall Glazing Options

Cost Memo

To be read in conjunction with the Pall Mall Glazing Options Summary (window matrix).

- Option 1. Do nothing. £650,000
 - If the existing windows were to remain then Bruntwood would need to carry out a maintenance package. This would include a mastic/sealant replacement project and the replacement of damaged/cracked single glazed window panes. The majority of the £650k cost is for the sealant replacement works which has been estimated using previous benchmarked projects.
- Option 2. Replacement of existing single glazed glass with new in the existing frames. £900,000
 - This cost is a budget based on similar Bruntwood projects been estimated using previous benchmarked projects with guidance from our preferred glazing supplier.
- Option 3. This option is the same as Option 2 with the addition of secondary glazing. £1,900,000
 - The one million pound uplift from option 2 is a budget for secondary glazing and framing and is based on similar Bruntwood projects.
- Option 4. Replacement of single glazed glass and frames with new. £2,862,828
 - The cost for this option is the same as Option 7. The cost-saving from not installing double glazed units as per option 7 would be countered by the increase in cost to design and manufacture bespoke framing required to match the existing frames like for like
- Option 5. This is the same as Option 4 with the addition of secondary glazing. £3,800,000
 - As per option 4 with circa one million pound uplift for secondary glazing and framing.
- Option 6. Replacement of existing single glazed glass with new double glazed glass in the existing frames. £2,400,000.
 - This option is the same as option 2 with a cost increase for double glazed glass instead of single. There are issues with this option that are not cost-related. Please refer to the Pall Mall Glazing Options Summary (window matrix).

- Option 7. Replace existing windows and frames with standard double glazed glass and frames. £2,862,828.
 - This cost is a quote from our glazing supplier. There are multiple issues with this option that are not cost-related. Please refer to the Pall Mall Glazing Options Summary (window matrix).
- Option 8. Replacement of existing single glazed windows and frames with newly designed bespoke double glazed windows and frames to match existing aesthetics as close as possible. £4,100,000.
 - This cost is a quote from our glazing supplier.

BRUNTWOOD

Union,

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Savill's Market Requirement for Sustainability

Pall Mall Court

Sustainability and the changing face of occupier demand.

Contents

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1. Introduction

- 1.1. This report has been prepared by James Evans, MRICS. I have worked as an advisor to office developers for over 20 years, focussed predominantly on Manchester City Centre. During this time I have worked on several large regeneration projects including St Peters Square, First Street and Circle Square. In addition to this I act for various office occupiers and advise them on their workplace / occupational strategies. These businesses include PWC, Pinsent Masons, Bank of New York Mellon and Insight.
- 1.2. The purpose of this report is to examine the impacts on office demand of the changing attitude of businesses towards the environment and their own Sustainability targets. In considering this topic I examine the current statutory environment and how occupier's demands are beginning to change. I also consider office building's sustainability credentials and in turn how developers are responding to this ever changing landscape.

2. The Current Landscape

- 2.1. For a number of years Sustainability and the wider ESG (Environmental, Social, Governance) agenda has become more important to businesses of all sizes. Arguably momentum has shifted dramatically over the last 5 years as world leaders and internationally recognised "influencers" continue to place the very highest level of importance to this pressing issue. As a consequence business stakeholders are increasingly demanding in their requirements and are seeking to take action now in response to this issue.
- 2.2. Within the UK Real Estate sector the response to this has been driven both by occupiers seeking to conduct themselves in a more environmentally conscious manner as well as policy makers who are attempting to change behaviour through legislation.
- 2.3. From a Real Estate perspective the main legislative changes have focussed on Energy performance and particularly EPCs. This has seen the requirement for buildings available to let having to upgrade their EPC to C by no later than 2027 and B by no later than 2030. Currently the landlords of Listed buildings are able to apply for an exemption to the EPC requirements if they can illustrate it will negatively impact on the heritage value of the building. At this stage the 2030 changes are not yet confirmed, and therefore there is no clarity as to how Listed Buildings will be dealt with however it is likely the current regime will remain.

3. The Office Occupier Response

- 3.1. Given the desire to act in a more sustainable way, many occupiers are now assessing their real estate portfolio and considering how this fits within a wider “ESG” strategy. A large proportion of businesses are setting ambitious targets to achieve Net Zero Carbon status and recognise the key part that their buildings plays in this.
- 3.2. A large number of varying building accreditations have emerged over the last 20 years. These differ in their methodology and what they are measuring and consequently have led to a mixed response in uptake. There remains significant confusion as to which accreditations measure what and which will emerge as the market recognised “label”. I have summarised those accreditations that are generally the more widely recognised at Appendix 1.
- 3.3. As a consequence of this myriad of ratings and accreditations it is fair to say there is significant confusion within the industry and no consistency around those accreditations that are widely recognised as being the most important to occupiers and therefore being widely adopted by landlords and developers.
- 3.4. From the conversations Savills are having with occupiers throughout the UK and specifically in Manchester, I would advise the following trends are beginning to emerge:-
- More generally occupiers are increasingly asking questions of landlords around how the office they are considering locating to, or are already within, can operate in a more sustainable fashion.
 - Although this is increasingly common from larger scale occupiers, with an in house property team, smaller businesses are also asking similar questions of landlords.
 - Whereas 2 years ago businesses seeking to acquire sub 5,000 sq ft would rarely interrogate the environmental credentials of an office, approximately 45% of all enquiries received to the Savills Manchester office agency team ask about this topic.
 - Many occupiers do not have a clear view of what they actually want in terms of their sustainability criteria and therefore no one Industry Credential eg BREEAM, EPC etc is asked for more than another. This is particularly the case for smaller occupiers who require evidence the building they are moving to is deemed to be sustainable without actually knowing what to ask for or how to prove this.
 - Energy use is however increasingly the area of discussion, particularly around the sourcing of this energy and its measurement within a specific demise (not simply building common parts). Removal of gas, electrification of buildings and sourcing of all energy from renewables is now common place. The ability to integrate renewable on sites through the likes of PV's or heat pumps is also a trend we are seeing.

To illustrate the direction of travel I outline below some specific examples of what organisations are telling us and what is influencing their decisions. In some instances we are bound by confidentiality and therefore we are not able to disclose the identity of the occupier.

3.5. Case Study 1 – World Leading Professional Services Business

Savills act on behalf of this International business. In recent discussions with their head of UK Property, she disclosed that Sustainability is at the very top of their agenda and “dominates their real estate strategy”. As they focus on their Net Zero Carbon targets they are insisting on the “best carbon credentials” for any new building they will consider.

3.6. This organisation is currently undertaking a review of all M&E systems in the buildings they occupy and will work with their landlords to undertake a life cycle review in an attempt to meet their NZC targets. Buildings which still have non renewable gas are viewed unfavourably.

3.7. With regards to credentials, given this organisation's scale they have certain internal performance specifications they will require a building to meet should they wish to relocate to it. They are less driven by industry recognised credentials however do place some degree of weighting behind NABERS. They like this measure as it relates to energy efficiency as well as being an in use performance measure.

3.8. Case Study 2 – Cundall

Cundall are an international engineering business for whom Savills recently acted for within Manchester. We were instructed to search the market for a new office for Cundall of approximately 5,000 sq ft.

3.9. From our initial meeting it was apparent the environmental credentials of any office building they would relocate to was very important. Having undertaken a search for this office, a short list of two was drawn up and the respective landlords were asked to present the environmental credentials of the buildings.

3.10. Upon negotiation it was clear the key issue for Cundalls was energy usage and the sourcing of renewable energy. The latter point became a particular issue and was resolved by insertion of a very specific clause within the lease which insisted on all energy procured to be from renewable sources. This example illustrates how it is not just large acquisitions that are increasingly influenced by the Sustainability agenda.

3.11. Case Study 3 – Advanced Engineering Business

Savills act within the UK for this leading Advanced Engineering business. We have acquired various offices for them within the UK and their main driver is the ability to achieve Net Zero Carbon status. With their next acquisition they are particularly focussed on the landlord illustrating that the building is Net Zero Carbon in operation. This requirement is not yet live but is anticipated will be within 2022. Those buildings that can not illustrate a pathway to being NZC in operation will not be considered.

4. The Landlord / Developer Response

- 4.1. Landlords and Developers are increasingly aware of the changing environmental requirements of occupiers. Much of the leasing evidence and market demand points to the increasing importance of Sustainability in its broadest sense and particularly energy efficiency. This latter point will only gather more momentum as recent increases in energy costs will further motivate occupiers to select more energy efficient building stock.
- 4.2. Most occupiers are seeking to improve their office environment more generally and part of this “flight to quality” is categorised by increased sustainability demands. This in itself is evidenced by a direct correlation between highest rents achieved and Environmental performance. Research conducted by Savills shows that of the Top 50 leasing transactions (by rent paid) over 80% of these buildings were BREEAM “Very Good” and above.
- 4.3. If we consider the next cycle of development occurring in Manchester it is evident high levels of Energy Performance and Sustainability are featuring very highly:-

Pall Mall Court

Market Requirement for Sustainability



	Building	Size	Environmental Credentials
	EDEN	115,000 sq ft	- Targeting BREEAM Outstanding - NABERS 5.5 Star - EPC A - Photovoltaics generating on site electricity - Air source heat pumps
	4 Angel Square	200,000 sq ft	- Targeting Net Zero Carbon in Operation - EPC A - BREEAM Outstanding - Air source heat pumps
	Havelock	100,000 sq ft	- EPC A - Targeting BREEAM Outstanding

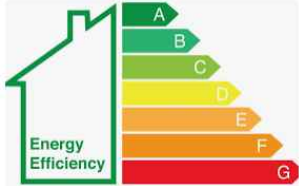
5. Implications for Pall Mall Court

- 5.1. Any occupier considering a relocation to a Manchester City Centre office building, to include Pall Mall Court, will wish to ensure the development / refurbishment has been done in a manner that responds to their own Sustainability targets. Such occupiers will be seeking evidence of how the building has been refurbished in an environmentally responsible fashion and how it will operate into the future.
- 5.2. The requirements to achieve market and legislative energy targets are heavily reliant upon the performance of the fabric and M&E infrastructure of a building. Most tenants looking at buildings of this level of rent are well represented and both the fabric and M&E infrastructure will be heavily scrutinized by specialist surveyors. Particular challenges will come with the U value of the window systems and weathertightness, with many questions around how Bruntwood as landlord and developer are going to address the issues this will cause around heat gains/losses. Operational running costs of tenants spaces go hand in hand with meeting key sustainability criteria, therefore the performance of any infrastructure and fabric needs to facilitate low and more efficient energy usage, even more so in a volatile world of high energy costs. Any evidence of leakage and energy loss or the need to upsize mechanical systems to compensate will not be well received in the market.
- 5.3. We are also entering a world of changing lease agreements with the "green" lease becoming more of a prominent discussion point. No doubt future lease agreements will place an emphasis on how both landlord and tenant spaces operate sustainably.

6. Conclusions

- 6.1. Customers of office space throughout the UK are increasingly aware of their responsibilities to the environment. Legislative change, stakeholder pressure and a desire to alter behaviour is all driving this. However, the level of knowledge and understanding of how real estate fits into a Net Zero Carbon strategy remains unsophisticated.
- 6.2. Momentum is certainly gathering and occupiers are increasingly challenging developers and landlords to provide office space that helps businesses in their NZC strategies. Although occupiers may not know the precise questions to ask, the larger businesses are employing experts to help them. Smaller businesses on the other hand, though potentially less sophisticated in their knowledge, are also increasingly demanding action from landlords.
- 6.3. Those office buildings that are unable to adapt to this changing market will become unlettable. Furthermore, those landlords which fail to invest in their buildings to ensure they respond to this market dynamic will struggle to attract capital (whether that be through shareholder equity or debt) and consequently will experience a spiral downwards. In such instances their portfolios will become increasingly obsolete and values will diminish.

APPENDIX: 1

	Accreditation	Benefits
	BREEAM	Leading industry assessment tool. Aim to target Excellent. Semi -tailored criteria which aligns well with UK.
	BREEAM In-Use	The BREEAM name is well known within the industry. This measure considers a building when actually occupied and in use as opposed to a developers "base build".
	ISO 14001	Leading environmental standard designed to enable organisations to target, achieve and demonstrate continuous improvement in environmental performance as one integrated management process.
	EPC Rating (Mandatory)	This is a mandatory item
	Whole Life Carbon Assessment	This is expected to become far more relevant as the 2030 key date moves closer. Good interest/understanding from the industry as a whole
	NABERS UK	This certification is industry wide in Australia and very well thought of. The scheme is becoming available in the UK during 2021. Main focus is a building's energy efficiency.
	SKA	This is well respected within the UK and fairly well known in the industry. This accreditation focusses on actual fit out.
	LEED	Considers minimum performance levels for Buildings at design stage. Links into the Green Building Council.

The above represent predominantly environmental measures. However, various other schemes focus on the wider Social and “Wellness” agenda. These include:

	Accreditation	Benefits
	WELL CORE (base build)	Seen as the 'gold standard' in H&W certification. Has global recognition. Established and credible. This is very heavily used in the American market as well as the UK.
	WELL Health & Safety Rating	Good opportunity for operational integration. Good coverage of health, safety & wellbeing operational best practice, esp post-Covid
	Fitwel	No minimum requirements. Good opportunity for operational integration. Recognised as the H&W certification suitable for existing assets where the opportunity for major design-led project is minimal and yet H&W outcomes are sought. No mandatory requirements so a project can pick and choose from a scorecard until the targeted certification points are achieved.
	The IMMUNE Building Standard	This certification aims to be fairly all encompassing with regard to ESG.
	Cycling Store	Provides comparison point against other projects and an interesting sales note
	Air Rated	Can provide incoming tenants with tangible data on air quality within the building
	RESET Air	Can provide building owner and also tenants robust continuous real-time indoor air quality monitoring which is very much in demand as part of a tangible approach to H&W. Sensor technology has responded to demand, dashboards make the data digestible. RESET recognised by BREEAM and WELL

Implications of Bay Removal and Bay Removal Investigation Report

Implications of Bay Removal Study

Date: 18 May 2022 V.1

The technical design team have reviewed the outcomes of the bay removal study, as set out in Quest's report, "Bay Removal Report – V2a". From this review the following responses have been provided:

- Structures – DW Consulting Engineers LLP:
 - None of the options will have impact to structures. As such, they do not envisage any changes to our reports.
- Energy and Sustainability - Ramboll:
 - It appears that all options will still be insulated. If the cold bridging can be limited with all options, it should have minimal impact on the energy consumption. As such, they do not envisage any changes to their reports or the matrix
- Heritage – Stephen Levrant Heritage Architecture:
 - Option A – would be of no/minimal impact as it is the least intrusive option and have minimal visual impact
 - Option B – would not change their conclusions regarding impact and it could be seen holistically as part of the new window system. If this results in a notable horizontal line, then this would have an adverse impact.
 - Option C – as there will be more intrusive intervention and damage to tiles so there will be a level of impact. This would be mitigated on the basis that the tiles are a like-for-like match.
- Architecture – Sheppard Robson:
 - Option A
 - Limited risk, assumption visible mastic would be required to stop water ingress
 - The flashing would require paint removal and application of the new finish, albeit hand applied
 - Option B
 - Concern this introduces an additional horizontal (an element we have been removing from the extrusions) with the flashing overlapping the frame
 - Suggested the flashing is cut back just shy of the edge (if possible) and then the new flashing is returned to the frame to omit the horizontal.
 - The overall dimension for this option will increase the frame by the thickness of the flashing, but as this will be only in mm, this should not visibly alter the appearance.
 - Option C
 - A risk of tile damage, therefore a risk to the cost plan and programme to achieve detail. However, it would ultimately provide a like-for-like finish.
- Warranties – Quest:
 - All new elements of flashing or insulation would be covered by a warranty. However, any element of existing material left in place would not be covered by warranty.

The preferred option is Option C whereby the flashing is carefully removed and replaced like-for-like. This may also include like-for-like repairs of the mosaics along the perimeter of the frames. It is proposed to carry out further investigations of the flashing and to continue to work through the option in more detail during the determination of the application. If for any reasons this

Option is not achievable then we propose to continue working proactively with MCC to come to a positive solution.

The options matrix has not been updated to reflect the report. This is because the three options are in the process of design development and therefore it would be premature to do so. That said, any updates would be very minor given the overall scale of the intervention.



Pall Mall, King Street, Manchester



Bay Removal Report – V3a

This report provides information on our findings following the removal of a ground floor bay on the 25th & 26th April 2022.

The methodology for the removal of the bay had previously been agreed with Manchester City Council.

Initial Assumptions

Based on our initial involvement in the scheme in June 2019 when a visual inspection of the main façade was undertaken we based our proposals on a replacement window system fixed back to the building structure on a floor by floor basis. At the initial inspection some head fixings and floor fixings were visible but no stripping out of finishes was carried out.

Some lower ground floor areas and entrances are installed in an aluminium shopfront system and there are some other areas of vertical strip windows, predominantly to the stair cores. These will be dealt with separately and are not covered by the bay removal.

Our initial inspection showed a single glazed aluminium window system with an aluminium flashing at the head of the window.

Results of Investigation

One bay, consisting of front and two return panels, was removed from its installed position and stored on site for re installation if necessary.

The removal did not reveal anything of concern to effect either the proposed window design or installation process.

The work did reveal that the aluminium flashing at the head of the windows returns back to the building structure at a slope and then returns up behind the mosaic tiles. To avoid disturbing the tiles, which are of heritage significance, the pressing has been left in place.

It was not possible to determine if the pressing can be removed completely and replaced with new as the corners appear to be welded together and we did not want to disturb the tiles.

The results therefore suggest that the interface with the window and the flashing / existing building will need to be explored further.

The following photo's show the existing pressing at the head of the window which has had to be cut to facilitate the removal of the window.



Cut in existing pressing at head of window.



Pressing above window as existing



Head pressing cut and left in situ, existing window removed

Solutions

There are three potential solutions relating to the head pressing.

Firstly, if it is acceptable to yourselves we can look to remove the pressing further but it may dislodge some of the tiles. Please advise if you wish further investigation to be done in this area.

Potential solutions are:-

- A) Provide a small pressing to the head of the replacement windows to support the leading edge of the existing pressing.
- B) Provide a new pressing to overlaid the existing pressing. New flashing finished to match the new window frames.
- C) Remove completely the existing flashing and replace with a new flashing finished to match the new window frames.

Option A will not alter the visual appearance of the façade as the added pressing will not be visible.

Option B will be visible but will match the finish of the new windows. Further investigation is required for this option to ensure we do not affect any drainage routes, assuming the existing pressing is installed as such to provide drainage from the rear of the mosaic tiles.

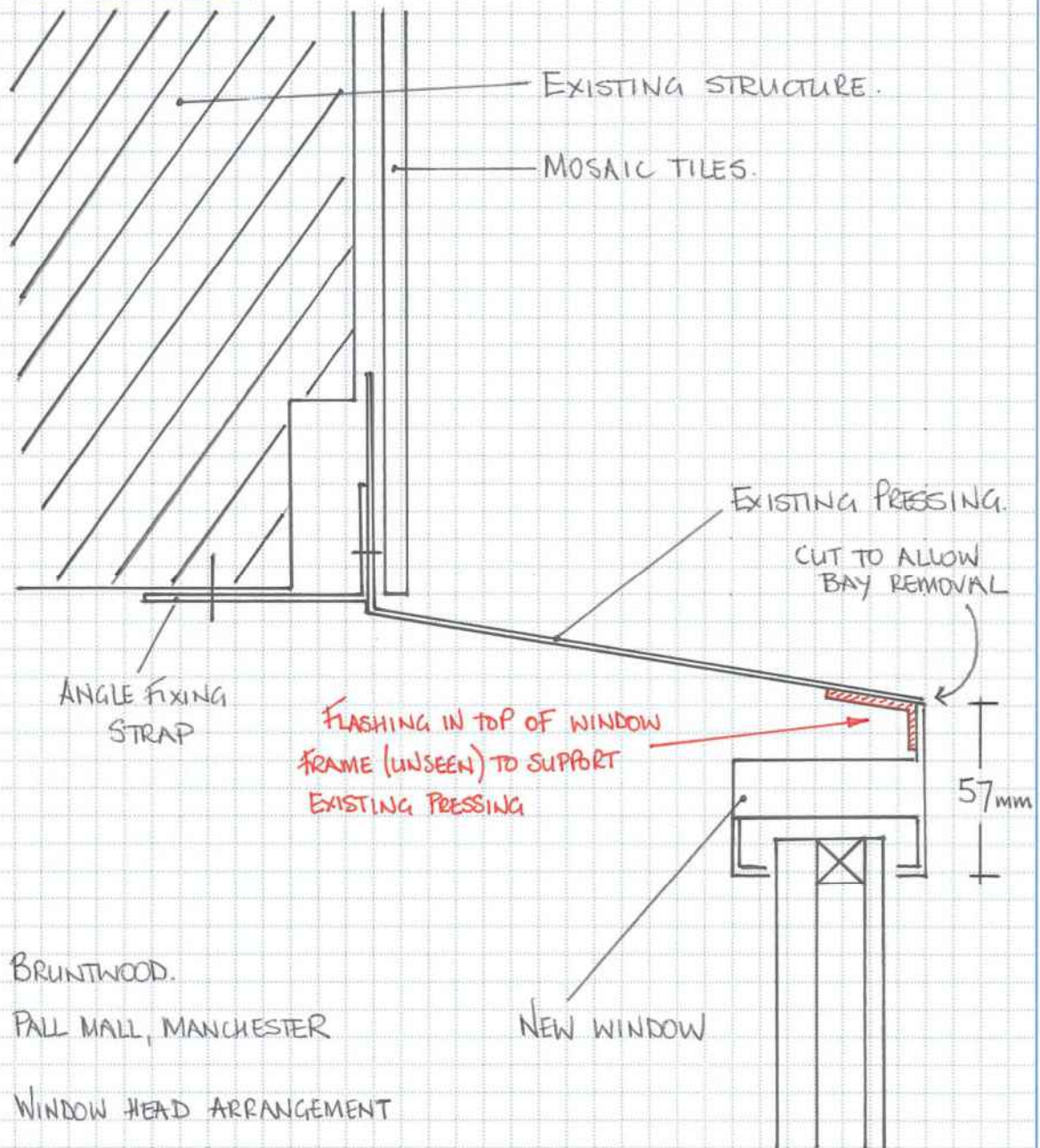
Option C will be visible but will match the finish of the new windows. This option will however cause some tiles to be dislodged which would need to be refixed after the new flashing is installed.

From a visual point of view there would be no change other than newly finished materials in options B and C.

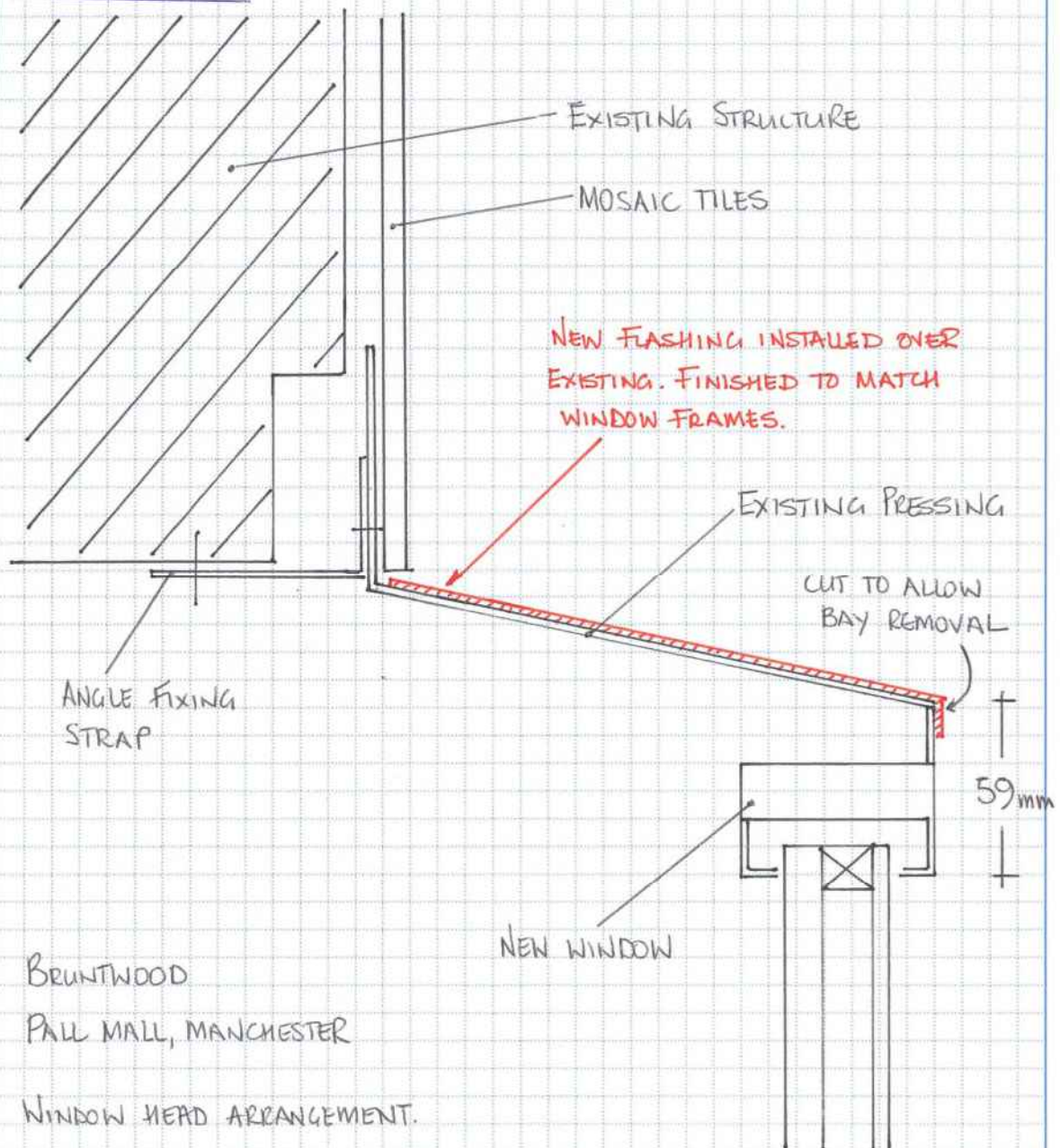
The existing pressing is un-insulated so to improve the performance of this area there will be a need to provide some insulation to the rear of the pressing in all of the above cases. The amount of insulation will be determined by the location of the internal finishes in relation to the head of the window.

Please see sketches below indicating the potential solutions.

OPTION A



OPTION B



OPTION C

