

LONDON BOROUGH OF CAMDEN	WARDS: ALL
REPORT TITLE Chalcots Replacement Window Design	
REPORT OF Director of Property Management	
FOR SUBMISSION TO Chief Executive	DATE 10 th April 2019
SUMMARY OF REPORT <p>The report provides an overview of the programme of works at the Chalcots estate in relation to the need to replace the windows as part of the curtain wall. It outlines the options for the replacement window type taking into account technical engineering and safety advice as well as resident feedback. The report asks for a decision on the recommended window type.</p> <p>The Chalcots programme is part of our Camden Plan commitment to make homes in Camden safe, well-managed and well-maintained.</p> <p>Local Government Act 1972 – Access to Information The following document(s) has been used in the preparation of this report: No documents were used in the preparation of this report which are required to be listed.</p> <p>Contact Officer: Ruth Craven Head of Camden Safety Programme, 020 7974 1838</p>	
WHAT DECISIONS ARE BEING ASKED FOR? The Chief Executive is asked to approve the recommended option for replacement windows as outlined in Section 5, in consultation with the Cabinet Member for Better Homes.	

Signed: Gavin Haynes



Date: 10th April 2019

1. INTRODUCTION

- 1.1 The report provides an overview of the programme of works at the Chalcots estate in relation to the need to replace the windows as part of the curtain wall. It outlines the options for the replacement window type taking into account technical engineering and safety advice as well as resident feedback. The report asks for a decision on the recommended window type.
- 1.2 Detailed design work on the agreed new cladding system for the Chalcots estate found that the standard of workmanship within the existing curtain wall assembly is variable. The most significant observations relate to structural fixing irregularities, some sill heights that do not meet the regulatory minimum guidance, failed hardware to window systems and the presence of non-regulatory material behind fixing brackets and spandrel panels. There have also been eight instances where window hinges have failed over the last five years, the most recent in March 2019. In some cases this has resulted in total failure of the opening sash with windows falling from height. The most recent incident happened during high winds. The window falling from height was prevented by the addition of safety restraint fitted on all windows across the estate in 2018. However there was still damage and risk of accidents for residents due to broken glass and other materials. In addition there have been other windows that have required remedial repair work to hinges as a result of wind damage.
- 1.3 Aside from the cladding, the prime concern is to rectify recent issues of window failure, and to ensure the safety of residents. The Council's consultant engineers reviewed the health and safety implications in early 2018 and their clear recommendation is that the entire curtain wall system inclusive of windows should be replaced.
- 1.4 In line with the advice received, a decision was made by Cabinet in March 2018 to replace the curtain wall, which includes the windows across the Chalcots estate. Since then, work has progressed with the expert design team to establish options for the window design that meet residents needs and safety standards.

2. WINDOW OPTIONS

- 2.1 Following an initial review of all possible window types, the programme design team presented the Council after the Cabinet decision in March 2018 with the four most viable window options. These are set out below and also in Appendix A:
 - Option 1 – Top Hung Tilt Outwards
 - Option 2 – Bottom Hung Tilt Inwards
 - Option 3 – Bottom and Side Hung Tilt and Turn Inwards
 - Option 4 – Side Hung Turn Outwards
- 2.2 To assess the options in a consistent manner, criteria that outlined the key considerations regarding window design was compiled and used to structure the option appraisal. The criteria include resident safety inside; public safety

outside; ventilation; overheating; ease of operation; solar protection; performance in weather and acoustics as well as cleansing and maintenance.

- 2.3 A number of additional window options were considered and disregarded as they were not appropriate for use in a high rise blocks or did not perform adequately against the required criteria. These windows included sliding, parallel opening, pivot and vertically sliding sash.
- 2.4 None of the final four options outlined in 2.1 fully satisfy every criteria. A matrix was established to understand how each option performs against the criteria to help officers consider the technical specification and balance of safety and usage. Through this process option 2 failed to meet the requirements for ventilation and overheating, as has the smallest opening. Option 4 does not meet resident and public safety requirements as requires residents to over-reach outwards to operate
- 2.5 Using this detailed assessment the Council, in consultation with the residents of the blocks, concluded that two of the options would best meet the criteria. These are option 1 similar to the current window configuration that opens outwards and is hinged at the top and option 3, a “tilt and turn” window, which is opened inwards as a casement with the hinge at the side or as a ‘hopper’ that is hinged at the bottom. Appendix B outlines the detailed matrix for the final two options to consider.
- 2.6 The below table is an overview of the two options performance against the criteria:

Table 1 – performance of window options against key criteria

Criteria	Option 1 top hung tilt outwards	Option 3 Tilt and turn inwards
Resident Safety Inside	This window would need to be restricted to an opening of 30cm, and the sill would need to be dropped in the bedrooms and lounge. Without this mitigation the window could not be opened beyond 10cm. (See Appendix B 5.1).	This window could be opened to three positions, 10cm, 30cm and fully opened with the use of a specialist tool. This option also requires a dropped sill in the bedrooms and lounge.
Public Safety Outside	As windows open outwards, given the history at the Chalcots, restraints would be required to prevent window failure externally. A risk would remain that windows would twist on their hinges in adverse weather. Should hinges fail, the restraints would stop the fall	No risk posed.

Criteria	Option 1 top hung tilt outwards	Option 3 Tilt and turn inwards
	of the window however the effectiveness of the restraints over a 30 year life cycle with the potential for interference or deterioration needs to be considered.	
Ventilation	This window would need to be opened beyond 30cm to allow for purge ventilation. Even with the dropped sill the design proposal limits the opening of this window to 30cm. It will not therefore provide adequate ventilation. It is not recommended by our safety experts. (See Appendix B 5.1).	Meets requirements when in fully open purge position, this does require the window to be fully opened in the “turn” position which will be managed by the use of the specialist tool.
Overheating	Unless fully openable, which the safety experts cannot recommend (i.e. beyond 30cm), overheating is a risk to approximately 25% of rooms (7 out of 27 rooms on each floor). See appendix B 3.1.	Meets requirements for all rooms when fully open in the “turn” position.
Ease of Operation	Easy to use.	Easy to use.
Solar Protection	Improved glazing will be used to reduce solar gain. Blinds would not interfere with opening.	Improved glazing will be used to reduce solar gain. Blinds could interfere with opening.
Performance Weather and acoustics	Good performance.	Good performance.
Cleaning and Maintenance	Not able to clean the outside opening face of glass. Risk of hinge failure in adverse conditions if opened beyond restrictors.	Able to clean the outside opening face of glass. The tilt and turn window is more complex in that it has two functions rather than one. However, maintenance will be easier and safer to carry out within the building.

2.7 The Building Regulations guiding the matrix are from new build standards. The Council has no legal obligation to adhere to the requirements outlined in table 1 if they are an improvement on the existing window installation. However expert advice is that it is considered best practice when technically possible. Construction Design & Management Regulations 2015 also state that designers must:

- Eliminate foreseeable health and safety risks to anyone affected by the project (if possible) take steps to reduce or control any risks that cannot be eliminated.
- 2.8 The design team have raised a number of concerns regarding the performance of the current windows and while replacing the windows the Council aims to improve the performance with the new window model. Evidence has confirmed that residents with windows facing south have a higher risk of overheating. Therefore ventilation, overheating and solar protection are key criteria. This has also been raised in the summer months by residents and Councillors during the heatwave in 2018.
- 2.9 After the incidents of window failure, and the commitment by the Leader of the Council to ensure safety is the priority, both resident and public safety performance need to be demonstrable. The Council has committed to make a recommendation based on the needs of the most vulnerable residents and families, as well as those homes most affected by heat gain due to their position in the block.
- 2.10 In order to satisfy safety concerns and resident priorities in the final design stage the expert design team and the intended contractor have proposed an additional mitigation to deal with the risk of accidents which could include falling. This is to lower the window sill height to provide a clear gap of 1100mm between window ledge and openable sash for both options. This is proposed for the lounge, bedroom windows and kitchen windows that are not over cabinets. This will lower the height of the sill ledge to approximately 200mm above floor level thereby reducing risk of falls by having a physical barrier to 1100mm above any accessible ledge. This is outlined in Appendix B section 5.1. This mitigation provides an appropriate design to tackle the main concerns raised by the Council and residents in respect of resident safety for both options. The design proposal also ensures compliance with Building Regulations and deals with overheating and ventilation. Design issues related to both internal and external finishes to the area, created by a lower level sill, are being finalised. This will include solutions in bathrooms where, for example, the bath is adjacent the window or kitchen when a cabinet is underneath the window. It will also address the potential need to relocate radiators.
- 2.11 In order to meet the requirements of all of the criteria and ensure the safest window option is installed a number of mitigations have been proposed by the expert design team for the two remaining options:

Option 1:

Ventilation – Windows will be openable to allow for ventilation. The windows will have restrictors with two settings on each window at 10 and 30cm. This is in response to (a) safety and (b) ensuring we do not make the installation worse than it is at present. To achieve purge ventilation the windows would need to be openable beyond 30cm, however this introduces a risk when residents lean out to close the window. Purge ventilation is required to meet full ‘new-build’ ventilation requirements. (See outline in 2.7).

Overheating – The energy transmission through glass is measured by 'g' value. The use of a higher g-value glazing would help reduce overheating when compared with the current windows. Glazing with g-values of 0.4 and 0.3 are being considered by the design team.

Resident Safety – To ensure the safety of residents internally a restrictor would have to be placed on each window. These restrictors would be more robust than in the current windows and more difficult to override. To exceed the 30cm setting a key would be required but through the detailed design risk assessment this option has been rejected because it would require a resident to overreach out of the window. The lowered height of the sill does help mitigate this risk however there is still a risk of residents leaning out to close windows opened beyond 30cm.

Public Safety – Due to the risk of window hinges failing during adverse weather conditions on an outward facing window, two metal restraints could be installed onto each window. This will make sure that if the hinges fail the window will not endanger the public. This does rely however on the restraints remaining in place during the lifecycle of the window. The restraints would also be a post-manufactured fitting, thereby relying on consistent quality of fitting. Maintenance of these windows would require operatives working at height which would generally require a full scaffold to carry out a repair or replacement.

Option 3:

Ventilation The windows will have two opening mechanisms that allow for more flexibility dependant on the need for ventilation. The tilt option will open to 10cm. A key can be used to extend the window opening to a second restrictor set at 30cm. An additional purge could be available with the use of a bespoke tool to release the metal restrictor.

Over heating – Currently the only option to meet criteria for all glazing options when fully opened. The use of a higher g-value glazing would help reduce overheating when compared with the current windows. Glazing with g-values of 0.4 and 0.3 are being considered by the design team.

Resident Safety – To ensure the safety of residents internally a restrictor will be placed on each window. These restrictors would be more robust than in the current windows and more difficult to override. Fully opening a window in the 'turn position' requires a 2 step approach that includes a key and a bespoke tool to override the restrictor, requiring a more conscious effort than with the current windows. Further consideration is required regarding how to support and guide residents to safely use the bespoke tool. The lowered height of the sill does in addition help mitigate this risk. Further work will be carried out to support residents to use this tool safely and manage risk.

Public Safety - As this is an inward opening window there is no risk to external public safety. It is easier to maintain and all maintenance and repair work can be carried out from within the property

- 2.12 In terms of frame and sash integrity both options have similar lifespans. There are however some differences in the hinge/opening mechanisms that produce variations in life cycle between the two options:

- Option1 may be more prone to hinge failure, e.g. in adverse weather conditions, and the proposed restraints for fall arrest may need to be maintained over time.
- Option 3 may incur higher costs in repair if failure occurs to the tilt and turn mechanism.

- 2.13 During the design team's investigations it was established that an additional change would be required at Blashford if option 3 is chosen. This is because the block has a different design for the corner windows. This additional change relates to the large rectangular windows that are currently heavy and can be difficult to use. The proposal would not change the overall area of glass in the viewing panels but will break the opening window into smaller frame sizes. This proposed design will be easier for frailer residents to open and close safely
- 2.14 The technical evaluation criteria outlined in appendix B was established by the external expert design team in consultation with Camden to identify the most suitable window type for the Chalcots estate. Based on the detailed technical analysis the expert design team consider Option 3 with the lowered sill height best satisfies the criteria which covers safety, resident priorities and engineering requirements.
- 2.15 The Planning team have provided comments on the detailed design of the windows. They have advised that they would have no objection to either of the options presented above, this is on the basis that irrespective of the opening mechanism selected the external appearance of the window when closed would be broadly similar. Planning also commented on the acceptability of different opening mechanisms being used on each block. They advised, ideally, it would be preferable to maintain consistency across the blocks, but if that were not possible at least to maintain consistency in window style on each block. It would not be desirable from a planning perspective to have a mix of window types across a block, unless they were arranged in a logical and clear pattern.

3. RESIDENT FEEDBACK

- 3.1 The Council committed to engage with residents on the window design options. Three resident engagement events were held in June 2018. Information was shared that explained the criteria and four window options. Window samples were created so that residents could have an opportunity to trial using a sample window at each event. Nearly 200 residents attended the events. All of the information was also shared via post so that residents unable to attend the events were also informed. The aim of this engagement was to gain feedback from residents on what was important to them about their windows and ask which of the options they prefer.

Resident Survey

- 3.2 A survey was designed to understand how residents use their windows. The survey asked what residents think about their existing windows and what are their highest four priorities for their new windows based on the criteria.

- 3.3 Residents were asked what they think of their existing windows. Based on the criteria over 65% of the responses agree that the existing windows keep people on the inside safe, are easy to use, work well with curtains and blinds and keep out rain.
- 3.4 The survey results also showed evidence that not all residents think that their windows perform well against some of the criteria.
- 51% disagreed (or did not know) that their current windows had performed well and therefore did not require any repair for faults or breakages.
 - 48% disagreed (or did not know) that their current windows gave them enough fresh air when open.
 - 45% disagreed (or did not know) that their current windows kept a comfortable temperature in their flat.
 - 44% disagreed (or did not know) that their current windows posed no risk for people outside.
 - 42% disagreed (or did not know) that their current window kept out enough outside noise when open.
- 3.5 Residents were asked what were the most important four criteria performance measures for their new windows. The table below outlines the criteria rated in order of resident priority.

Priority Score	Criteria
1	Letting in fresh air
2	Keeping out noise
3	Keeping people inside safe
4	Comfortable Temp
5	Keeping out rain
6	Easy to use
7	Easy to clean
8	Working with curtains and blinds
9	Keeping people outside safe
10	Easy to maintain

Table 3 – Priority criteria for windows

Resident Feedback Form

- 3.5 Following the events all residents were asked to give feedback on the information shared and the window options available. A total of 142 feedback forms were received by the Council.
- 3.6 The table below sets out the window option preferences as captured by the event feedback forms sent directly to the Council:

Option 1	41%
Option 2	3%
Option 3	47%
Option 4	5%
No option	4%

Table 4 – Results from the consultation event feedback forms

- 3.7 In terms of block specific results, the data for Taplow and Burnham showed option 1 – *Top Hung Tilt Outwards* as the preference and the data for Bray, Dorney and Blashford showed option 3 – *Bottom and Side Hung Tilt and Turn Inwards* as the preference.
- 3.8 Two of the TRAs chose to ask residents directly what their preferred window options were via a door knocking exercise. A total of 167 resident-led feedback forms were received from Burnham and Taplow residents only. The results are outlined below:

Burnham and Taplow TRA	Option 1	85%
	Option 2	2%
	Option 3	10%
	Option 4	3%
	No option	0%

Table 5 - Results from the resident-led feedback forms

- 3.9 Residents were asked to tell us how helpful they found the information shared via post and at the events to ensure they were part of the engagement process.
- 84% of respondents said that they agreed or strongly agreed that the information at the engagement events has helped them understand what is happening to their new windows.
 - 68% of respondents said that they agreed or strongly agreed that they feel involved in the process of replacing the windows on their estate.

Overall Resident Feedback

- 3.10 The resident feedback regarding the preferred window option corresponds with the Council's initial view that either Option 1 or Option 3 were the most appropriate for further consideration. The consultation event feedback forms showed that 88% of residents preferred either option 1 or 3, with a slightly higher percentage preferring option 3. By contrast, the resident-led feedback forms for Taplow and Burnham expressed a preference for option 1.
- 3.11 As a result of the above, officers considered whether different blocks could have different options installed. In terms of installation, the supply chain timelines could be different for the two options which would mean different programme timeframes for the blocks. With regards Planning, the advice is that each option looks the same when closed and therefore the permission would not be impacted.
- 3.12 Residents were asked to state why they had chosen their preferred option so that the Council could understand the rationale for the decision. Comments received outlined the following:

Option 1 – Top Hung Tilt Outwards:

- The most referenced reason was because this option is the same as the existing windows.
- Considered a safe option and some noted the need for the flexible metal cord as an additional safety measure.
- Good ventilation.

- Concerns about how much noise this option allows into properties.
- Concerns that an open out option gets dirtier due to substances being thrown from higher floors

Option 3 – Bottom and Side Hung Tilt and Turn Inwards:

- The most referenced reasons were both good ventilation and the potential for easier cleaning.
- The multiuse function of this option allowed more ways of adapting and using specifically noted by some families.
- An open inwards option would prevent stains on windows due to substances being thrown from higher floors.
- Safety concerns wanting more clarity on the use of restrictors to make it safe.
- Concerns that it could be complicated to use.

- 3.13 Overall, the feedback suggests that residents indicate that good ventilation and comfortable room temperature is the most important factor for day-to-day use. Residents also want to make sure a safe option is chosen with effective restrictors installed. This is in line with the key criteria flagged by the design team and need to ensure robust mitigations.
- 3.14 Given that the feedback forms are evenly weighted between options 1 and 3, and that resident-led feedback is not uniform across the estate, it is recommended that the decision should be based on safety first including technical requirements and where possible residents requirements is made according to the criteria of safety, followed by the assessed as being important to residents and the corresponding technical advice from the design team.

4. RISK ASSESSMENT

- 4.1 The Head of Safer Homes was asked to offer a recommendation based on safety advice. A risk assessment has been completed that outlines the below. See Appendix C. The following is based on the content of the technical report as well as the assessment of residents' preferences.
- 4.2 Hazard removal is the first consideration in the hierarchy of safety controls followed by implementing control measures if the risk is retained. The council and its contractor have a legal duty to design out foreseeable risks.
- 4.3 As per Section 1.2 there have been 8 incidents where windows have fallen out due to the failure of the outward opening hinge mechanism. The most recent incident happened 7 March 2019 where a window at Taplow House was caught by a strong wind causing hinges on both sides of the window to break. The window fortunately was left suspended on fall arrest lanyards installed on the estate. These incidents will be incorporated into the revised risk assessment for the outward opening option.
- 4.3 As part of the risk assessment process working with consultants and the principal designer we have designed in further risk mitigation by reducing the

height of the window sills which will be incorporated into the revised risk assessments.

- 4.4 Using these principles of prevention it would seem clear that Camden has the opportunity to remove certain hazards by choosing window option 3. These are as follows:
1. Hazard of accidentally falling through the window opening. This is not likely as the lower fixed pane of glass will remain at a safe height. (See Appendix B section 5.1 Blashford and 5.2 Taplow, Burnham, Bray and Dorney for proposed measurements). Residents' operational guidance would need to ensure that objects were not stored or placed near the window to prevent any risk of them falling through the window opening.
 2. Windows falling out. This is not likely for option 3 as all moving parts open inwards.
 3. Safety of maintenance operatives. Option 3 window maintenance can be achieved from the inside of each property and would therefore reduce the need for external working at height.
- 4.5 Therefore, the risk of windows falling out and working at height can be designed out by choosing option 3.
- 4.6 The well-being of residents is also a serious consideration and option 3 will provide improved ventilation opportunities, which has been raised by residents as a significant issue causing heat stress and discomfort during hot weather conditions.
- 4.7 Concerns have been raised about items being deliberately thrown from the windows. As part of the risk assessment process we need to consider reasonable behaviour taking action to mitigate any associated risk. Unreasonable/criminal actions of individuals is not something that Camden can mitigate against. If the windows are used in the correct manner, then the risk level which has been assigned through the risk assessment will remain the same. We will engage with residents in the use and operation of the selected window.
- 4.8 Officers have discussed the resident engagement results, technical evaluation criteria and risk assessments with the Chalcots Working Group that meets regularly to discuss the programme of works. Members include TRA representatives from each blocks, the Ward Councillors and Cabinet Member as well as relevant officers.
- 4.9 The Working Group asked that a number of questions be addressed regarding the window options before a final decision was made. A report was presented to the group in November 2018 which was compiled taking advice from the technical design team, manufacturing companies, safety advisors and property specialists. This has been updated to take into account the final design stage proposals of dropping the sill height to mitigate further safety risk based on design team and contractor advice. See Appendix D for the FAQ report.

5. RECOMMENDATION

- 5.1 Officers have considered the technical and safety advice and mitigations available, as well resident feedback. Taking into account the needs of the most vulnerable residents and families, as well as those properties most affected by heat gain, the recommendation is for option 3 the tilt and turn window to be procured across all 5 blocks.
- 5.2 Option 3 the tilt and turn window would best meet the key priorities as well as providing a more enhanced performance compared to the current windows and option 1, summarised below:
- More flexible opening mechanism would allow for a safer smaller opening when high level of ventilation is not required.
 - Wider opening is available to allow for purge ventilation when required which best meets best practice industry requirements and meets residents' needs to reduce overheating. .
 - There is no risk to external window failure and public safety.
 - To fully open the window in the turn position for purge ventilation requires a 2-step approach that includes a key and a bespoke tool to override the restrictor, requiring a more conscious effort than with the current windows. Further consideration is required regarding how to support and guide residents to safely use the bespoke tool. The lowered height of the sill does help mitigate this risk.
 - An improved glazing option would help mitigate overheating.
 - Inward opening allows for cleaning of the outside of the window.
- 5.3 The Council has a duty to design out known risks. Therefore the risk of windows falling out and working at height can be designed out by choosing option 3.
- 5.4 It should be noted that some residents, including some TRA representatives, are opposed to an inward opening window and further engagement will be required to reassure all residents of the safety and additional ventilation benefits of this option. Some TRA representatives also voiced significant concerns regarding the proposed lowering of the window sill and asked officers to explore all design options in relation to this.
- 5.5 Whilst both window options require the lowering of the sill there is no recommended decision at this point about what this might look like in residents' homes. Following the initial discussion with TRA representatives, the contractor is looking for design solutions to these changes. All residents will be visited in their homes to discuss the options that are available.

6. LEGAL IMPLICATIONS (comments from the Borough Solicitor)

- 6.1 Legal comments are incorporated in the body of the report.

7. RESOURCE IMPLICATIONS (comments from the Director of Finance)

- 7.1 This report sets out the various window options for the Chalcots estate, taking into account advice from the expert design team, feedback from residents and

risk assessments. The recommended window option is option 3 for reasons set out in the report above.

- 7.2 The capital budget for Chalcots as submitted to Cabinet for First Capital Review in July 2018 was £74.4m relating to all professional fees, removal of cladding, new fire doors and £56m for Phase 3 main works (for new cladding and curtain wall system) in line with estimates from March 2018 Cabinet paper.
- 7.3 Since budget setting in 2018, the Council has awarded the contract and the costs from the tender are currently being worked into capital review 2019. The design process is underway - it is noted that the option 3 windows will carry a higher materials cost than the option 1 windows due to the two modes of operation.
- 7.4 The Council continues to review options for recovery of its losses, and has received confirmation that £80.6m of removal and replacement cladding costs can be claimed from the Government's cladding fund, but in the short-term, any capital expenditure not covered by the fund must be met from one or a combination of borrowing, capital receipts or re-prioritising expenditure within the current capital programme.

REPORT ENDS