
CMR 169 07-08-01

Durham Light Infantry Museum & Gallery - A review of suitability for use for permanent storage and display of archive and object collections

Executive Summary

- i. This report is the outcome of an assessment of information and site visits to two DLI collections-holding facilities and to the, now closed, DLI museum building at Aykley Heads, Durham, a former location of the DLI object collections. The purpose is to help inform a review of the decision in 2015 to close the museum and to consider whether and how the building might be used in the future for any DLI-related display and activities.
- ii. Currently DLI-related collections are held in three locations: the Durham County Record Office, where the DLI archives are stored and used; the DLI Research and Study Centre at Sevenhills, Spennymoor, where most of the object collections are stored, as well as other Durham County heritage collections, and Durham University, where the DLI medals collection is stored currently (not seen). A new Durham History Centre is under development, to store and display collections, including the combined DLI collections together at one site along with other heritage and archival collections.
- iii. The needs of the types of heritage materials that form the DLI collections are described. Most of the materials are vulnerable to extremes of humidity and temperature and wide and rapid fluctuations. They are historically important and valuable and require a high level of security and of protection from fire, flood and other hazards. The nature of the necessary protection and of buildings that provide it are set out in two British Standards and these were used in this study to define both what is needed in a suitable repository and how current locations and the Aykley Heads museum building compare.
- iv. The old DLI museum site at Aykley Heads is described in some detail (see section 3.). It was always inadequate in some respects, even against earlier standards, and these weaknesses are set out. The building was not constructed such that it could meet the required standards currently and would need very considerable investment just to bring it up to a quality such that it could be used as a general cultural venue, c. £2 - 3 million. To upgrade it further to allow for heritage collections permanently to be displayed and stored at the site would cost more, probably another £2.5 million.
- v. The proposed new History Centre represents a massive improvement in the protection of the DCRO and the DLI collections, as well as meeting the needs of The National Archives and others that have statutory and quasi-statutory authority to assess and evaluate the levels of protection provided by local authority archives and museums. In this context, it would be important to consider not only the capital cost of upgrading Aykley Heads but also the duplication of revenue expenditure required. The site, however, could be refurbished at a much lower cost sufficient to provide a cultural events and performance location and possibly as a memorial and place of reflection, however it should be noted that there already exists a formal DLI memorial garden at Durham Cathedral which is recognised by the Regiment.

I. Introduction and context

I.1 This report is the outcome of an assessment of information and site visits to DLI collections-holding facilities and to the, now closed, DLI museum building at Aykley Heads, Durham, a former location of the DLI object collections. The purpose is to help inform a review of the decision in 2015 to close the museum and to consider whether and how the building might be used in the future for any DLI-related display and activities.

I.2 Currently DLI-related collections are held in three locations: the Durham County Record Office, where the DLI archives are stored and used; the DLI Research and Study Centre at Sevenhills, Spennymoor, where most of the object collections are stored, as well as other Durham County heritage collections, and Durham University, where the DLI medals collection is stored currently. A new Durham History Centre is under development, to store and display collections, including the combined DLI collections together at one site along with other heritage and archival collections.

I.3 An assessment of the qualities of the respective sites must be carried out objectively and for this review they are evaluated against the British Standards for managing such collections and for the buildings that hold collections, BS 4971:2017 and BS EN 16893:2018 respectively.¹ These standards' committees and their work on drafting and developing them is led by BSI and by the NCS consultant employed for this review, who is chairman of both of the committees. These standards are defined by the needs of the different types of collections that suitable buildings will hold.

I.4 These standards also underpin the respective Accreditation schemes for Archives (directed by The National Archives - TNA) and for Museums (directed by the Arts Council England - ACE).² The DLI archives do not constitute 'Public Records' under the meaning of the Public Records Act 1958. Those pre-1920 records relating to DLI that are Public Records were sent to the then Public Records Office (now TNA) by the relevant ministry at the time of the Act, 1958, and the post-1920 records are held by the Ministry of Defence in Glasgow. While in the care of DCRO, the DLI collections benefit from the same level of statutory protection that must be provided for other, Public and Local Authority Records and which requires Archives Accreditation by TNA. The firearms and related weaponry content of the museum holdings are the subject of statutory controls in the form of firearms licensing law for museums, which in addition to mandatory procedures, requires that a museum is Accredited in order to be granted a license.³

2. The DLI collections & their needs

2.1 The heritage collections of the DLI can broadly be categorised as being archives, objects and art works. The collections were in part the residue of heritage items that the regiment accrued over the many decades from the precursor, the 68th Durham Regiment of Foot (Light Infantry) formed in 1758 and from the time of its amalgamation with the 106th Regiment of Foot (Bombay Light Infantry) in 1881. The collections predominantly date up to the time of the DLI's eventual merger with other Light Infantry regiments into The Light Infantry in 1968, later The Rifles.

¹ BS 4971:2017 *Conservation and care of archival and library collections*, BSI, London 2017; BS EN 16893:2018 *Conservation of Cultural Heritage: Specifications for location, construction and modification of buildings or rooms intended for the storage or use of heritage collections*, BSI, London 2018

² See: Archive Service Accreditation <https://www.nationalarchives.gov.uk/archives-sector/archive-service-accreditation/> and UK Museum Accreditation Scheme <https://www.artscouncil.org.uk/supporting-arts-museums-and-libraries/uk-museum-accreditation-scheme/>

³ See: <https://www.gov.uk/guidance/apply-for-or-manage-a-section-5-shooting-club-or-museum-licence#museum-licence>

2.2 A fuller description of the collections can be found in other documentation but in summary the museum and art collections comprise approximately 15,000 items, while the archive collection currently has over 75,000 individual items, with around 53,000 catalogue entries. The objects and art comprise the entire museological holdings of the DLI (with some archival materials within it). The DLI archives represent 1.4% of the total County Record Office holdings. All of the archive holdings are hygroscopic (able to absorb moisture) in nature (paper, photographs, parchment, leather and cloth), requiring suitable packaging and an environment in storage that avoids risks of high humidity (above 60% relative humidity - RH) and, particularly in use, the risks of very low humidity (less than 35% RH). These materials need to be held in a moderate to low temperature (annual average of less than 18 °C) and protected from temperature levels above 24 °C. A major proportion of the museum holdings are similarly sensitive to RH and heat, including as they do textiles, leather and wood in many examples (for example handheld firearms) where these materials are combined with non-hygroscopic metals, which presents the need for a measure of stability in RH.

2.3 The DLI archives are predominantly from the 20th century but also contain much material from the 19th and 18th, including unique and highly significant early photographs. The papers used for documentation and correspondence, particularly those produced in the second half of the 19th century and the first half of the 20th, are very vulnerable to acidification of their fibres and consequent discolouration and embrittlement. While in some cases the severity of these inherent weaknesses can only be partly ameliorated by remedial treatments, a key protection is to ensure they are not continuously exposed to relatively high temperatures, above 24 °C and not continuously above c.20 °C. Such temperature, all year round, accelerates their decomposition, further exacerbated by periods of elevated RH. The most effective passive protection of these materials is good packaging (using stable materials that do not themselves contaminate the documents) and control over the ambient temperature in storage in such a way that any warmer seasonal periods are offset by much cooler periods. This does not require constant mechanical control unless the building housing the collections is inadequate (poor insulation, extensive internal heating, warm lights etc.).

2.4 Similarly, episodes of very high RH present an extreme risk to these and similar hygroscopic materials and the most effective protection is packaged storage in air-tight, water-tight and heavily insulated store locations where there are no extraneous water supply and drainage routes and where the construction prevents external flooding and leaks. The impact of very high RH, consistently above 65%, caused by air infiltration through the porous fabric of unsuitable building construction, by ventilations systems and by leaks etc. is the promotion of mould germination on what are very nutritious materials for fungi and bacteria. Existing fungal infections in buildings enhance the likelihood of re-growth and contamination of collections even at relatively moderate RH peaks reaching 65% for fairly short periods. Mould infections of archival and other hygroscopic materials are extremely damaging, both in the short and the longer term and high spore levels in buildings present a health risk to staff and users.⁴

2.5 All of the archival collection and much of the museum collection need to be protected from insect pests and rodents. The textiles in particular are at constant risk of moth and other insects that use silk (e.g. flags) and wool (e.g. uniforms) for their eggs and the subsequent larvae consume them. These materials need to be protected when on display from the damaging effects of light exposure over time and will decay rapidly when exposed to Ultra Violet radiation from sunlight (including North light)

⁴ See for example: World Health Organisation *Guidelines for indoor air quality: dampness and mould*
<https://www.who.int/publications/i/item/9789289041683>

and some older lamps such as fluorescent strips and halogen spotlights. Cumulative exposure on display, even without UV radiation, causes inks, colours and silver halide photographic emulsions to fade.

2.6 It should go without saying that most archive and museum objects are of value, in market terms as well as for historical and emotional reasons. This makes them at risk of being stolen, particularly from displays and reading rooms and even from stores. In addition, a collection that contains weaponry and armaments represents a very high risk of theft and may be a potential for terrorist attention as a source. In addition to the law surrounding weaponry, there are security standards for the protection of heritage collections, most specifically those in the building standard BS EN 16893:2018 chapter 7. These emphasise a high level of attack resistance for a museum and archive building, as well as a complex and sophisticated system of invigilation, detection and response.

2.7 The needs of the DLI collections are only partly met by their two key current locations: DCRO and Sevenhills. The DCRO archive stores are very well managed by staff but within a far from ideal setting, on the lower ground floor of County Hall and in numerous locations across the site. Old vault rooms and more recently offices and print works rooms have been racked out and fitted with fire and security infrastructure as far as possible. These spaces do not have the structural fire resistance required by BS EN 16893 and their environments are unstable. Air conditioning systems are installed in the older stores but these are antiquated and, because the structure is not sufficiently air tight or thermally stable, they struggle to maintain suitable conditions, while generating a considerable annual revenue cost in energy, repairs and maintenance. There remains the ever present risk of a fire starting in the offices above and around the record office and spreading into or even collapsing into the archives (as happened for example at Norwich Central Library in 1994), of flooding caused by fire fighting in that eventuality or simply because of drainage or supply problems further up the building, and resulting contamination from asbestos throughout the building. Only a modern purpose-built, standards-compliant store will meet the needs of the DCRO collections and do so without continuous recourse to air conditioning systems and the revenue expenditure and carbon impact that this causes for the County. TNA has only offered Accreditation for the DCRO service because of the plans to relocate to a purpose-built history centre, precisely because the current accommodation is so inadequate.

2.8 The second principal store location for DLI collections is at Sevenhills, Spennymoor. Here, there is a research room and office, for people wishing to learn more about DLI history, and two principal storage areas for the DLI object collections. Staff have been doing a superb job in packaging and managing the collections but the stores are far from being suitable to current standards. The main store has only a suspended ceiling below the roof, and walls and doors do not meet the necessary security standard. The environment is very unstable, with very high RH in summer and very low RH in winter. There is a form of air conditioning system in place but it appears to provide only ventilation and monitoring data shows clearly it cannot provide stability.

2.9 The other DLI store is simply a caged area at the end of the very large library resources warehouse structure at the site. RH conditions are wildly erratic and temperature largely uncontrolled. There is a considerable risk of pest infestation in this location especially as there is no means of containing the space.

2.10 There are other heritage collections stored in the warehouse at Spennymoor. The County's archaeology archive and finds, including human remains, are stored there in new purpose building mobile racks. Staff have been systematically working through the collections to package them, with some more vulnerable objects inside microclimate boxes, protected from extremes of RH. However, the vast majority of the collections are only in standard card boxes and as such are at risk of environmentally induced deterioration, particularly mould germination, as there is no way consistently to manage the RH

for most of the collection. There is a small art store at one end of the office section of the building. The art works are well packaged and this does probably provide some buffering and protection from any extremes of RH, but the temperature cannot be controlled. The door to the store is not sufficiently secure and would not provide the necessary resistance were a burglar to enter the site out of hours.

2.11 A very concerning aspect about the DLI collections being held at Sevenhills is the fire risk: the DLI centre sits atop a packaging business warehouse. In addition to the lack of control of fire safety measures below, the fire load of stored cardboard packaging is immense and if a fire were to start it would spread up to reach the DLI collections above it (the principle objects store) and quite probably cause the collapse of the floor structure, tipping the collections into the fire. There is a sprinkler system in the building but it is not clear if it extends to the packaging business premises below nor whether the necessary fire maintenance measures are fully complied with. It is a fundamental requirement of the standards that a heritage store location is not within a shared management structure such as this, where the separation between the two appears so vulnerable. The same may be said for other heritage collections at the Spennymoor site.

2.12 The development of the proposed History Centre is intended to remedy the storage needs of the DCRO and DLI collections. They will provide the necessary separation of management, the fire resistance, security resistance and flood protection required by BS EN 16893. They will reduce the annual revenue costs of managing environment, reduce the services' carbon impact and ensure that they are preserved. (It will not receive the other object collections that DCC is currently looking after at Spennymoor, so they will continue to be exposed to the risks referred to.) In addition to massively improving the qualities of protection afforded to DCRO and DLI collections it will also offer a modern and safe environment for researchers and those wishing to explore displayed collections. It will also ensure that DCC's archives and the DLI museum collections achieve Accreditation, opening doors to programme and conservation funding that are otherwise closed (not least the National Heritage Memorial fund's £2 million contribution to programme for these collections).

3. Building qualities - Aykley Heads DLI Museum & Gallery

3.1 The DLI museum at Aykley Heads was constructed in the late 1960s initially as the County Museum, then it became an arts venue and subsequently it was decided that it would also be the focus for the DLI collections. It is largely of steel frame and concrete construction and has been modified a number of times since. It is on a split level of ground, cut into a hillside, with originally a glazed 'curtain wall' under a rendered concrete façade, the glazing along the lower ground floor front and glazing at the entrance on ground level at the side, as viewed from the parkland steeply sloping before it (see figures 1., 2. and 3. below, the glazing no longer present). In the early 1970s the glazed wall was attacked and a Bren machine-gun was stolen, and in the 1980s another, similar attack culminated in the theft of silverware. These thefts resulted in substantial changes to its external appearance, for improved security. The glazed areas were blocked in and a new entrance lobby built onto the side at the lower ground level. These attacks were reported widely and may be said to have heightened an understanding in the museums world for greater structural security standards.

3.2 In 1999-2000, the building and the Regimental displays underwent a comprehensive HLF-funded refurbishment. The lower ground level comprises an added lobby and a display area for DLI collection materials. Upstairs on 'floor 2' or the higher ground level, were further display areas, including one for the medal collections, and access to a workshop area and two stores leading from the workshop. There was also access from that level to a landing with a lift and stairs to the top floor, which comprises large temporary exhibition and events spaces and staff offices.



Figures 1., 2. & 3. Views of Aykley Heads including loading entrance, formerly glazed public entrance.

3.3 The display facilities on the lower ground level are now empty and partly dismantled (see figures 4. and 5. below). The cases have no internal climate buffering facilities ('gel trays') that would otherwise permit stabilisation of RH inside them, something that is standard nowadays. The larger of the cases present risks to staff in requiring very large sheets of glass to be removed in order to access the vitrine (the space inside a display case). The cases are lit internally with fluorescent strip lights. It was reported that access to alter the lighting was challenging, being from the top of the wall panel/case structure. Spotlights in the ceiling complement the case lights and the bulbs appear to be LEDs. The whole display area is run down and partly dismantled. The absence of seals and of the capacity to buffer cases means that they could no longer be used to display heritage safely. It is likely that an air conditioning system, with vents visible in the ceiling, was relied upon to try to control temperature and RH of the whole room, rather than fitting modern standard display cases. Interviews with staff including those working in the years before closure in 2016, revealed testimony such as:

"The 2000 refurbishment, though costing a million plus, was underfunded, with the resulting displays, though superficially well done, plagued with problems (poor lighting, unsealed cases, inadequate labelling, etc). Also, the 'new' displays of 2000 had an expected shelf-life of just ten years, but there was no planning or...investment for a renewal [after that time]... the displays were unchanged when the building closed in April 2016."

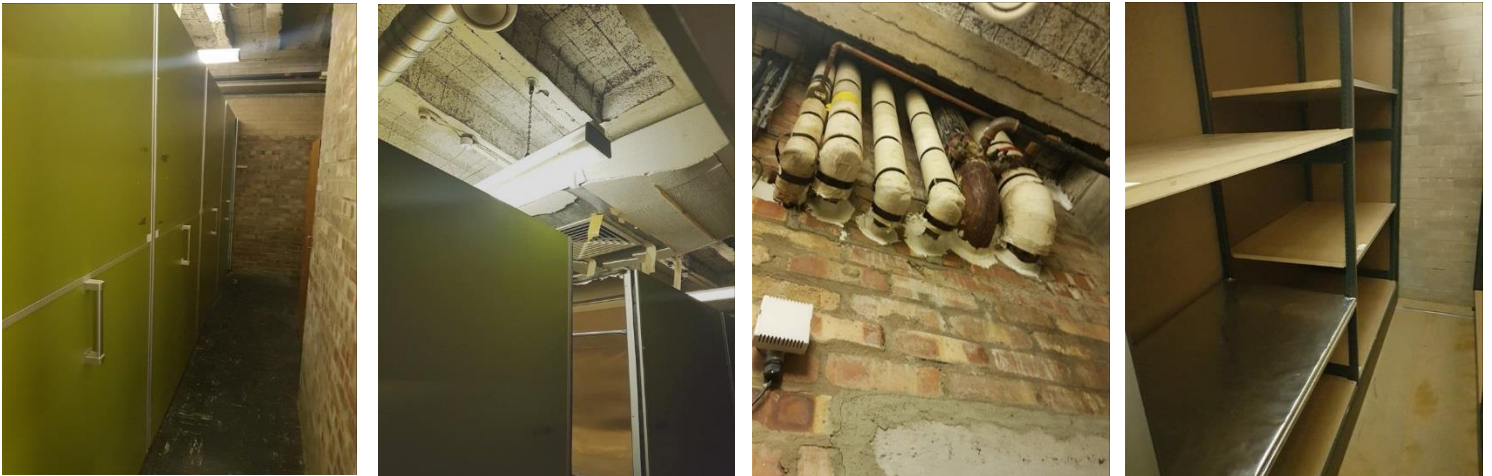
3.4 The air conditioning system is understood to have had to be repaired regularly and was always "inadequate". This is the most common experience of museum and archive managers across the UK so it is unsurprising that Aykley Heads was no exception. (This very fact has led to a change in strategy in the sector, embodied in BS EN 16893, aiming to reduce reliance on mechanical ventilation for climate control and to reduce their high levels of annual maintenance and energy costs and their carbon impact.) The DLI museum was further disadvantaged by being primarily constructed in the 1960s, with lower levels of insulation and large single glazed windows.



Figures 4. & 5. Old display areas at Aykley Heads, including dismantled medal cases.

3.5 The store areas were also inspected for this report. One of them, formerly used for objects, textiles and some framed items, leading off from the workshop space, is in a dilapidated state. The large format mobile racks are constructed from chipboard and hardboard on a light steel frame. No aspect of the equipment meets the current standard for heritage shelf equipment (ref. BS 4971:2017 section 5.6). Heating pipework that runs through the workshop was routed through the store wall into the store in order to then be directed upward, to avoid a steel joist near the wall on the workshop side (instead of routing it up before the joist) and so would have constantly affected the internal climate. The environment was supposed to be managed using the ventilation systems and the ductwork for this, with degrading joints and insulation, is clearly visible. The walls appear to be single skin brickwork and the door does not fully seal and provides low attack resistance and minimal fire resistance, well below that required by the current building standard (ref. BS EN 16893 chapters 6 and 7). The store room now could not be used as a store without a new, fire, security, air-tight membrane and waterproof construction built inside it. Being on the first floor it would not be the optimum for a low energy store, benefiting from an uninsulated floor slab. No aspect of this room currently meets BS EN 16893 standards and storage of firearms in this room may be prohibited without greater security protection.

3.6 The capacity of this store is insufficient for the object collections, although if more were on display on a rotation elsewhere in the building this issue might be ameliorated. A second store, in better general condition but with no racking, also leads off the workshop. It is small, c. 3m x 5m maximum, and would provide only limited further capacity if fitted with racking. A pier towards one corner reduces workable space for racking. It is constructed in the same way as the first store and similarly would need an internal construction to provide the standards required but this would reduce its capacity as a store even more. There has been a suggestion that it might house the DLI archives but at the moment it is not only too small but is so far away from meeting the standards that without substantial investment it could never achieve Accreditation. The archives were specifically moved out of this building in 1998 for this reason. They have doubled in quantity since. If the DLI museum site were to be used to store collections, the only practical approach would be to construct a new store elsewhere within the envelope of the building.

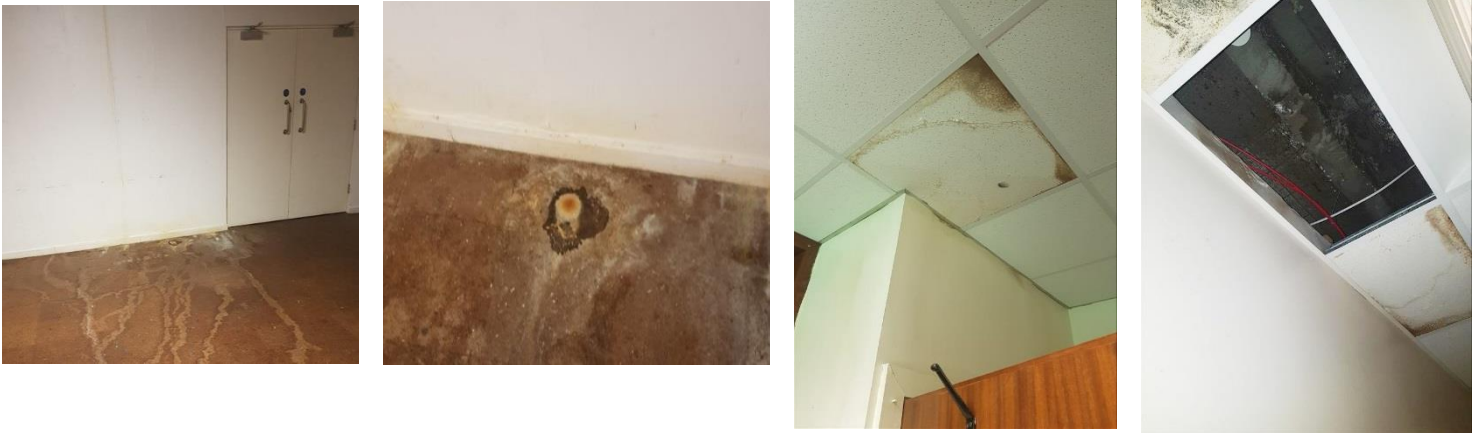


Figures 6., 7., 8. & 9. Views of the objects store, racking, ductwork, wall and pipework.

3.7 Facilities for exhibition and events are substantial, with large exhibition rooms and, although rudimentary, a loading bay. The lift attending the loading bay is seriously inadequate and would now be deemed unacceptably small and narrow for human use by Building Regulations. A reconfiguration of use of space within the building might make it viable for events, performances and short-term exhibitions that do not require support from the Government Indemnity Scheme (which would require standards-compliant security improvements to the structure and the infrastructure and approval of these by the ACE National Security Adviser). The display area and fittings, described above, are degraded and no longer fit for purpose. The medal cases in the gallery on floor 2. were largely dismantled and are no longer useable. But the scale of the spaces suggests they may lend themselves to being repurposed. The main weaknesses of the building are the roof and the position, cut in the hill-side with possibly inadequate water-proofing.



Figures 10., 11., 12. & 13. Examples of biological activity and evidence of the vulnerable position of the building, cut into the hill-side, enhancing the potential for damp penetration at ground level.



Figures 14., 15., 16. & 17. Examples of persistent historic water penetration problems (see 3.6 above).

3.8 The building was apparently plagued by roof leaks from the time it was built; it was re-roofed twice between its construction and closure. In addition, one leak overnight caused by failure of the air conditioning equipment ran through the ventilation ductwork and was so extreme that water poured out of the building when staff opened up the building in the morning. Some leaks were so persistent that they have resulted in deterioration of the internal fittings and even the build-up of calcite deposits (the beginnings of a stalagmite, see image above). The signs of leaks are visible everywhere throughout the building, with stains on the floors, down the walls and in suspended ceiling tiles. These are not recent stains, since closure: they present evidence of the structural weakness of the roof and possibly also of the concrete and steel frame itself. This in turn has led to high moisture content through parts of the building and fungal infections on woodwork for example. The large single glazed windows would have contributed to this in winter when the heating was fully operational, with condensation running down the window panes, rotting the sills and resulting in a build-up of fungal and other biological activity such as moss and lichen *inside* the building (see images above).

3.9 These problems are not insurmountable. With substantial investment the building might be re-usable for cultural events and short term temporary exhibitions, both of art and of historical material, including relating to the history of the DLI. The problems of the leakiness of the concrete envelope need to be investigated and resolved (if indeed they can be resolved) and the internal contamination cleaned up. There are asbestos floor tiles in several areas of the building which may need to be removed. The old displays need to be stripped out and the windows and frames will need to be removed and replaced with modern, double-glazed and secure units. It is possible that the heating pipework will need to be removed, the air conditioning system and infrastructure needs to be stripped out and the old oil-fired boiler is no longer suitable for a low carbon trajectory. All of these things can be done to make it a publicly accessible site, but only at a considerable price. Those 'envelope' works would be essential before beginning to plan for internal structural additions to permit long-term storage and use of priceless heritage collections. The cost of making it an accessible and economic cultural venue, without stored collections, may be in the region of £2-3million depending on the findings of a structural building survey and the level of quality of finishes and facilities. Currently much needs to be stripped out and it may be more cost effective to hollow out the building where it can be, address any structural issues and construct new internal spaces. As long as galleries can be made secure with an internal security partition at ground level, it may even be possible to re-instate the more attractive glazed walls at entrance level.

3.10 To upgrade it further to be a place of deposit for archives and for military history objects may require a further £2.5million or more. It will require a stand-alone store constructed inside the envelope of the building, with a four-hour fire resistant structure, heavily insulated and rendered air tight inside as well as water tight. The store will need to have a security resistance of RC4 minimum to meet BS EN 16893 for general heritage collections, but a level of RC6 is advisable because its location is fairly remote and it may be that this level is needed anyway for firearms storage licensing.⁵ Infrastructure and management need upgrading so that detection and response provision prevents or detects attackers *before* they reach the store. If built on what is probably an uninsulated floor at lower ground or ground level, the store structure will benefit from the thermal shielding of the outer structure and the natural cooling effect of a ground-contact slab, avoiding the need for unsustainable cooling or air conditioning systems and thereby helping the council meet its negative carbon emission targets and being compliant with BS EN 16893:2018 (see clause 5.3 and all sub-clauses). The fire detection and response systems for the store would need to be improved over the existing basic point smoke detectors.

3.11 In scale, as an estimate the store might need to be able to hold 100% of the collections even if less than that proportion is in store at any one time, as this allows also for growth as well as flexibility for programme in the galleries (the archive has been growing at approximately 5 linear metres per annum since being moved to DCRO). The store structure and the racking necessary for the collections will cost in the region of £1.5million.

3.12 The display areas that might house original DLI material would need to be more secure and better managed environmentally and structurally than would cultural events spaces. They could be suitable for some forms of art exhibitions, but not of high value work and those where items are loaned under the Government Indemnity Scheme, since these would require the higher level of security, fire protection and environmental qualities needed by a collection like the DLI. Display cases that meet the necessary standards for high value items cost many thousands each, so careful planning would need to be given as to how much original material and how many medals and firearms are on display at any one time, if the costs of suitable quality displays can be met. Improvements over and above the basic cultural events location, allowing for secure display, would be likely to cost a further £1million.

3.13 These construction, storage and display qualities are the same features that have been designed into the new History Centre, so there is also a need to consider the value of duplication. With the County's archives alone running to 5 miles of racking without the DLI archive, and with the existing, largely empty County Hall site deemed only temporarily acceptable by The National Archives, there is no practical or economic basis for an 'either or' scenario involving the old DLI museum and gallery building, so use of the DLI building, whether or not for DLI collections storage, is only viable as an 'extra'. This perhaps reinforces any suggestion that conversion of the DLI museum building to a venue alone, one that does not store collections permanently but has the capacity to provide educational and memorial events and displays periodically and as a place of reflection, is a more viable option and would avoid spending more money on re-construction beyond that minimum, using the History Centre as the collection depository.

⁵ For RC classes see BS EN 1627:2011 *Pedestrian doorsets, windows, curtain walling, grilles and shutters - Burglar resistance - Requirements and classification*, BSI London 2011