

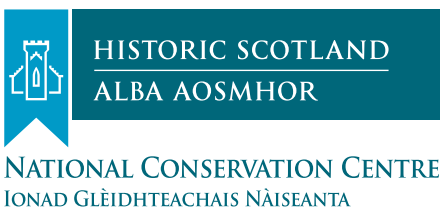
Short Guide

THE REPAIR AND MAINTENANCE OF WAR MEMORIALS



HISTORIC SCOTLAND
ALBA AOSMHOR

NATIONAL CONSERVATION CENTRE
IONAD GLÈIDHTeachais Nàiseanta



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Contents

1. Introduction	02
2. Design and context	04
3. Recording the monument	10
4. Stone elements	11
5. Concrete elements	22
6. Metal elements	23
7. Gilding and other finishes	29
8. Stained and decorative glass	30
9. Graffiti and vandalism	31
10. Bird control	33
11. Summary of common defects and suggested actions	34
12. Statutory consents	35
13. Adding names to war memorials	37
14. Moving memorials	38
15. Summary	39
16. Grants	40
17. Contacts	41
18. References and further reading	42

1. Introduction

Memorials of many types have been erected at various times in the past to commemorate battles and to remember the fallen from conflicts. However, war memorials became much more common following the First World War. The scale of the losses suffered in the War and the many soldiers whose fate remained unknown or uncertain left those at home with a sense of shared grief. There was hardly a parish or community in Britain where a husband, son or father had not been lost and the war memorials erected in their honour are a focal point in towns and villages throughout the country.

Some memorials are dedicated to a specific battle or have epitaphs relating to the regiment or group they commemorate, while others are more generic in nature, relating to all the losses sustained in a particular conflict. War memorials are often free standing in an open, public place (Fig 1), but many smaller memorials are found inside churches, town halls, memorial halls or places of work and recreation. The Scottish National War Memorial at Edinburgh Castle is unique as it consists of an entire building and represents the sacrifice of all Scottish soldiers and the debt owed to them by the nation. Its scale and splendour is representative of its significance as a national memorial (Figs 2 and 3).



Fig 1 Free standing war memorial, Penicuik, Midlothian.

Fig 2 The Scottish National War Memorial, Edinburgh Castle.

There is a natural desire to keep war memorials looking pristine, out of respect for those who died and as a testament to their continued relevance. War memorials were normally paid for by local subscription and many communities wish to honour this legacy by continuing to care for and maintain the memorial. However, there is a delicate balance between maintaining a monument, while still allowing its age and history to be appreciated, and carrying out well-intentioned works such as cleaning or polishing, which may actually cause damage to the material or accelerate decay.

This *Short Guide* summarises the architectural styles and artistic designs of war memorials most often found in Scotland. It considers the types of materials used; the risks to the structures from physical, biological or atmospheric agents; and the appropriate care and maintenance for different types of materials to ensure their long-term conservation. The guidance is focused mainly on monuments, plaques and windows, as these are the most common types.



Fig 3 The Scottish National War Memorial, Edinburgh Castle.

2. Design and context



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Fig 4 Scottish American soldiers' memorial, Edinburgh.

Fig 5 Memorial to staff of the North British Railway Company, Waverley Station, Edinburgh.

War memorials serve many functions and are valued by different groups for various reasons. First and foremost, they are a visual reminder of the loss of life associated with war and play an important role in ensuring that the sacrifice of those who died is not forgotten. War memorials are a focal point for commemoration on Armistice Day and other commemorative events throughout the year and so their physical integrity and appearance is important. War memorials may be linked to a particular regiment, profession or trade, for example postal workers or miners, and may have a special significance for certain groups (Figs 4 and 5). Some war memorials have become visitor attractions or places of pilgrimage and as such may have a value to the community beyond their immediate purpose.

War memorials play an important educational role particularly for schools and local history groups. Visiting such sites can help both children and adults learn about the history of conflicts and the armed forces, the impact past conflicts have had on the nation and how wars have shaped world history. Some war memorials are considered to be of special architectural or historic interest, perhaps being exceptional examples of a particular type or the work of a notable architect or artist, and are statutorily listed. This gives them a greater degree of legal protection.



Fig 6 Celtic cross memorial, Iona.

Fig 7 Cross of Sacrifice, Lyness, Orkney Islands © Royal Commission on the Ancient and Historical Monuments of Scotland; B/76522/cn. Licensor www.scran.ac.uk

Fig 8 Lewis war memorial, Outer Hebrides © Royal Commission on the Ancient and Historical Monuments of Scotland; C/73176/cn. Licensor www.scran.ac.uk

Fig 9 The National Monument, Calton Hill, Edinburgh.

Fig 10 Waterloo Monument, Peniel Heugh, Roxburghshire.

War memorials are sobering reminders of the sacrifices of ordinary people in two world wars and numerous other conflicts, but they also collectively represent a fine example of largely 19th and 20th century art and sculpture. The variety and diversity of their forms and styles is remarkable, ranging from simple plaques or crosses (Figs 6 and 7) to statues, windows, bells, clocks, organs, gardens, memorial gates or entire buildings and sites. For example, the Isle of Lewis war memorial is built in the style of a Scots baronial tower; the names of the fallen are mounted on an array of stones outside the tower which extends the monument into the landscape, so that the whole site becomes a memorial (Fig 8). Other examples are the National Monument on Calton Hill in Edinburgh (Fig 9) and the Waterloo Monument at Peniel Heugh near St Boswells (Fig 10).

The types of war memorials most frequently found in Scotland are monuments built of stone, often with metal elements, particularly bronze, but also copper, cast iron, or lead. For external stone monuments, names of the fallen are typically carved directly onto the masonry, picked out in lead, or incised, cast or embossed on panels fixed to the stone (Figs 11, 12, 13 and 14). War memorials are also often found inside buildings. These are typically stone, timber or metal panels (e.g. bronze or brass) fixed to walls, and may be painted, gilded or have inlaid or incised lettering.

Fig 11 Bronze embossed letters, Penicuik war memorial, Midlothian.

Fig 12 Incised lettering on a bronze panel, Portrush.

Fig 13 Incised lettering on stone, Black Watch memorial, Glenrothes, Fife.

Fig 14 Inlaid lettering, Roslin war memorial, Midlothian.



The tradition of creating war and battle memorials in Scotland dates back to the 19th century, when many memorials to early conflicts were erected. This was partly a result of a resurgence of interest in Scottish history and a popular interest in celtic culture and associations (neo-celticism) fuelled by a Victorian fascination with Highland culture. Most of these war memorials do not list names in a formal roll of honour, but commemorate the event. There are early examples, such as the memorial to 309 Napoleonic Prisoners of War who died at the Valleyfield Paper mill in Penicuik. This was designed in 1830 by Thomas Hamilton in a classical style (Fig 15). Possibly the first civic war memorial to list the names of the fallen was that at Balmaclellan church in Dumfries and Galloway (Fig 16). This records the names of five soldiers who lost their lives in the Crimean war, and bears the inscription:

Erected by the inhabitants of Balmaclellan in memory of the valour and devotedness of five soldiers, natives of the parish, during the war with Russia

It is a simple plinth built of dressed red sandstone, with names cut into the stone and relief carvings of a cannon, rifle, crossed swords and cannon balls.

The design of war memorials, as well as the chosen location and setting, will often have deep meaning and association for those who remember and who are remembered. Monuments in Scotland to the fallen of the First World War were inspired in many cases by ancient celtic monumental heritage, such as the cairn, a simple pile of rubble stones, or the ringed or 'wheeled' celtic cross, often modelled upon the 8th century St Martin's cross in Iona (Fig 17). These monuments are consciously Gaelic in their associations and symbolised the sophistication of old Gaelic culture as well as suggesting a link with early Christian heritage. There are many examples of this type throughout all parts of Scotland (Figs 18 and 19).



Fig 15 Napoleonic Memorial, Valleyfield Paper Mill, Penicuik.



Fig 16 Early civic war memorial, Balmaclellan, Dumfries and Galloway. © Paul Goodwin (2009)



Fig 17 St Martin's Cross, Iona.



Fig 18 Granite 'wheeled' celtic cross war memorial, Edinburgh Castle.



Fig 19 Celtic cross memorial, Roslin.



Fig 20 Sanquhar memorial, Dumfries and Galloway © Paul Goodwin (2012).

Fig 21 Nelson Monument, Taynuilt, Argyll and Bute.

Fig 22 Black Watch memorial, Glenrothes, Fife.

Fig 23 Memorial to Norwegian Soldiers, Edinburgh.

Fig 24 Memorial to the Great War, Blair Atholl, Perth © Mark Duffy.



The cairn represented antiquity in a much more primitive sense, suggesting a strong physical link to the land and the landscape. The rustic, solid form stood as a metaphor for those who, sharing these qualities, fought for their country. The Scottish landscape was rich with pre-historic monuments and some memorials make more direct links to this archaeology (Figs 20, 21, 22, and 23). The First World War memorial at Blair Atholl is simply an upright boulder (later enclosed within a ring of small stones), a clear echo of the archaeological landscape with which the local people would have been familiar (Fig 24). At the Scottish National War Memorial in Edinburgh, the sense of linking the fallen to the land itself was taken a step further, by intentionally exposing the Castle rock inside the apse as a base for the Roll of the Fallen (MacKechnie, 2009).

In some cases the rusticity of the cairn was echoed in the base of crosses or obelisks, or in the texturing of the sculpture, by using rock-faced or rubble stone rather than polished masonry (Figs 25 and 26). However, the cairn form itself also became stylised, in some cases taking on an architectural or highly contrived quality, translating the ancient reference into a modern context (Figs 27 and 28).

Fig 25 War memorial at St Munn's parish church, Argyll.

Fig 26 Battle of Bothwell Bridge memorial, South Lanarkshire.

Fig 27 Battle of Prestonpans memorial cairn, East Lothian.

Fig 28 Battle of Nechtansmer memorial cairn, Angus.



Other common memorial types in Scotland are the mercat cross (Fig 29) and the obelisk (Fig 30), as well as a wide range of stone and bronze statuary. In addition to the consciously Scots monuments, the fashion for particular designs or designers also influenced the range of monuments seen in Scotland. Renaissance, classical, and Arts and Crafts designs reflected the changing tastes of designers and commissioners during the main period of memorial building in the 20th century (Figs 31 and 32).



Local communities often commissioned notable artists, architects or sculptors to design war memorials. Sir Robert Lorimer, Alexander Carrick, Charles Pilkington Jackson, Thomas Clapperton and William Birnie Rhind are names associated with war memorials in Scotland, but there are many others. Sometimes the artist is named on the monument and can be readily identified (Figs 33 and 34); those with more obscure origins may require additional research. Individual commissions resulted in some unusual designs and materials alongside the traditional celtic, classical and imperial patterns. The war memorial in Peebles by B.N.H. Orphoot is built of white limestone with a polished copper dome and combines Renaissance architecture with Moorish decorations in mosaic and marble (Fig 35).



Fig 29 Mercat cross style memorial, Kilrenny, Fife.

Fig 30 Obelisk memorial at Battle of Prestonpans site, East Lothian.

Fig 31 Classical fluted pillar, Grantown-on-Spey, Highland.

Fig 32 Stylised celtic design, Liberton, Edinburgh.

Fig 33 & 34 Architects and sculptors names are sometimes clearly displayed on memorials.

Fig 35 Peebles war memorial by B.N.H Orphoot.



Bronze and stone sculpture is a common component of war memorials. Earlier war memorials tend to show positive imagery of the military, often in a triumphalist or confident pose. However by the time of the Boer War and the conflicts that followed, a change in the imagery is evident; soldiers are frequently shown looking bowed, injured or struggling, often being helped by their compatriots. Many First and Second World War memorials of this type are almost morbid in their style, sometimes even showing dead or dying soldiers or mourners in a much more negative reflection of the devastation of war and the human cost (Figs 38 and 39). This reflects changes in artistic taste towards more realistic imagery and a change in attitudes to conflict, as the old imperial iconography was replaced by a more emotional and visceral reminder of the losses suffered.

Collectively the war memorials in Scotland, which number several thousand, represent a fine collection of art and sculpture, from the very earliest beginnings of Scottish culture to modern reflections on the role of remembrance, from a simple cairn or cross to an elaborate and richly decorative shrine. These monuments are important primarily for the function they serve as a physical record of those who died for their country and the importance of that sacrifice, but their value as monuments and as art is also important. Understanding how to care for these monuments is essential for their long term survival.

New memorials are still being commissioned and constructed today and whilst many follow a traditional design, newer materials and architectural or artistic styles may be incorporated (Fig 40). Maintaining and repairing more modern structures can present a different set of challenges. When planning works to a war memorial it is important to have a clear understanding of the materials the memorial is made from, and to understand the specific conservation requirements relevant to them.



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Fig 36 The Commando memorial, Spean Bridge, Highland.

Fig 37 Granttown-on-Spey war memorial, Highland.



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Fig 38 Scottish National War Memorial, Edinburgh.

Fig 39 King's Own Scottish Borderers memorial, Edinburgh.

Fig 40 Memorial to British volunteers who fought in the Spanish civil war, incorporating fibreglass statue of 'La Passionara', Glasgow.

3. Recording the monument

The record of names on a war memorial is an important source of information. As time passes names can become obscured, defaced or illegible through wear, and as relatives pass away there is a danger that the record could be permanently lost (Fig 41). Keeping a written and photographic record of inscriptions on war memorials is an essential element of caring for the monument, but maintaining the physical inscriptions is also important.

As a priority, whoever is responsible for the care and maintenance of a war memorial should establish its historic or architectural significance, particularly if it is listed. Researching the history of the memorial can uncover important information such as who paid for it, its materials and designer, and how the names included on the memorial were selected; all of which can help inform future management. War Memorials Trust has guidance on *Researching the history of a war memorial*. Making an accurate written and photographic record of all features including condition, location, construction details, decorative features and inscriptions will help inform conservation or restoration decisions. This will also provide a permanent record of the memorial and its features in case of damage or theft. War Memorials Trust has a template condition survey to help assess the condition of war memorials. Many local authorities have a War Memorials Officer who can also offer information and advice; details of War Memorials Officers are on War Memorials Trust’s website.

Once a record has been compiled, it should be placed in the appropriate Historic Environment Record (HER), locally or nationally. It is helpful to keep old photographs, original newspaper cuttings and documents relating to previous maintenance and repair work. You should also ensure that there is a record of the memorial on the War Memorials Online website and the Scottish War Memorials Project database. Further information may be available in the local HER or the register of war memorials curated by the Imperial War Museum’s War Memorials Archive (see Section 16 *Contacts* for further details).

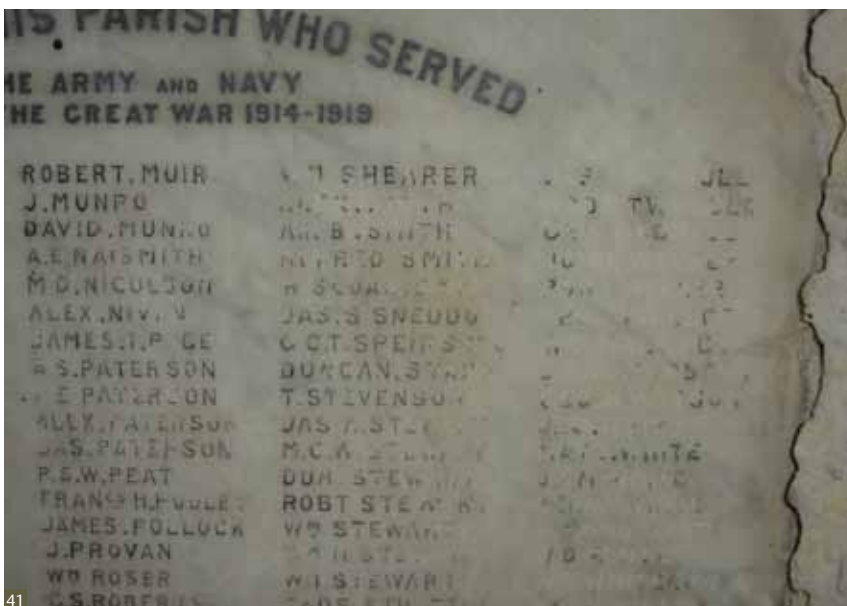


Fig 41 Names can become obscured, defaced or illegible through wear.

4. Stone elements

Sandstone and granite are the most widespread stone types used for war memorials in Scotland. It is much less common to find memorials constructed of limestone, however there may be local examples. Imported marble was sometimes used for sculptures on war memorials and may be found in conjunction with other types of stone. Slate is sometimes found as inlaid panels with inscriptions.

Sandstones can vary widely in quality, appearance and durability. Where repairs are required it may be necessary to identify the source of the stone, either from records or by using a stone-matching service. Sandstone is typically softer and more porous than granite and whinstone and is therefore more vulnerable to damage from inappropriate cleaning, poor detailing and weathering. Some sandstone can be prone to delamination, where layers of stone detach from the surface, this normally occurs when the stone has been bedded incorrectly.

Granite was frequently used for war memorials even where it is not the local stone. This may be because its durability and aesthetic qualities were considered particularly appropriate for war memorials. Granite has a crystalline structure which can take a high polish and this characteristic has sometimes been exploited, particularly for interior memorials, while external monuments may use a combination of finishes and were often left deliberately rustic (Figs 42 and 43). If appropriately treated, granite memorials can have a long lifespan with relatively little maintenance required. But, despite their durability, granite monuments can still be harmed by aggressive cleaning methods or the use of inappropriate repair materials (Figs 44 and 45).

Conservation and repairs to stonework on war memorials should follow the principles of minimum intervention and retention of original fabric. Cleaning, re-pointing, indent repairs or re-facing should only be considered where the condition or structural integrity of the monument is compromised, or where the defects are detracting from the significance and status of the monument. It is not uncommon for historic structures to have a lean and usually this is not a problem or sign of structural instability. Unless it is apparent that the memorial is at risk of collapse monitoring should be undertaken to establish if movement is active or not. The advice of a conservation accredited architect or structural engineer should be sought where there is a cause of concern.



Fig 42 Rusticated base on war memorial.



Fig 43 Rock-faced stone base.

Fig 44 Abrasive cleaning can cause loss of definition to sculptural elements.

Fig 45 Loss of definition to granite lettering following cleaning.

4.1 Stone decay

Stone is one of the most stable building materials when properly maintained and correctly detailed. However, over time all types of stone will erode and weather. The rate of decay depends on the type of stone and the level of exposure. The deterioration of stone can also be affected by the way the stone has been dressed and bedded or by natural variations within individual pieces of masonry.

Common causes of damage to stone war memorials:

- Atmospheric pollutants
- Biological growths, exacerbated by cleaning or persistent damp conditions
- Physical damage from abrasions, collisions, vandalism or theft (Fig 46)
- Chemical cleaning
- The use of hard, dense cement mortars for re-pointing and repair works
- Abrasive cleaning techniques (Fig 47)
- Cracking from frost action or expansion of ironwork
- Salt damage
- Graffiti
- Natural weathering and faults in the stone
- Poor architectural design or detailing



Fig 46 Impact damage to corner of ashlar masonry.



Fig 47 Abrasive cleaning can roughen the surface of polished or dressed masonry.

4.2 Surface soiling

Since the Clean Air Acts of 1956 and 1968 atmospheric pollutants such as soot and industrial chemicals have been significantly reduced, but increasing vehicular emissions continue to be a common source of stone soiling and decay in urban areas. Stone monuments may also be subject to soiling and discolouration from biological or chemical agents, both natural and man-made.

It is perfectly natural for a stone to gradually change colour from its pristine new state, as exposure to the elements creates a natural patina on the surface. The patina begins to form when the fresh stone is cut from the quarry and a thin crust is formed by soluble minerals within the stone being deposited at the surface as the stone dries out. The wetting and drying cycles caused by exposure to the weather continue the mineralogical changes near the stone surface which, combined with particulate matter in the atmosphere, develop into a stable surface zone, usually only a few millimetres thick. This patina acts as a protective layer and its removal by inappropriate cleaning methods can expose the softer stone underneath to deterioration and decay. It also gives the stonework much of its character and can be appreciated as an indication of the monument's permanence and endurance.

The appearance of old stonework can be beautiful in itself and stone should never be cleaned simply to 'renew' the appearance of the stonework. Soiling should generally only be considered as a defect if it is causing damage to the fabric of the monument, if it has a significant detrimental visual effect or if it makes it impossible to assess the condition of the memorial.

Algae, lichen and mosses can be common on external stonework, especially in rural areas. The presence of such growths on stone is not necessarily harmful and may even contribute to the appearance of the monument. However, biological growths may encourage soiling by providing a suitable surface for pollutants to adhere to, so if they are damaging the stone or obscuring inscriptions or decorative detail on a war memorial it will be desirable to remove them. Removal of biological growths may also be necessary in order to undertake a condition assessment of the surface. Some species are protected by law. More information on protected species is available from Scottish Natural Heritage (www.snh.gov.uk).

4.3 Plant growth

Where sites are neglected or where fractures in stonework or pointing allow a build up of vegetation, small plants and tree saplings can readily take a hold. Buddleia and ivy are common and can cause serious damage if not removed or controlled. Plants can bury roots within the joints or under the base of war memorials, causing fractures, jacking or destabilisation of the monument.

In severe cases the monument may have to be dismantled and rebuilt, but in most cases plants can be carefully weeded out and the roots removed. Where the plants are well established, the use of a biocide may be necessary once the visible growth has been cut back, to kill off the root network and allow the remainder of the plant to be removed.

4. Stone elements

4.4 Moss

Moss will only grow where there are persistent damp and sheltered conditions, so it may form on the shaded sides of war memorials, where structures are overshadowed by buildings or trees, or where heavy rainfall combines with poor water run-off. Small amounts of moss are not harmful but in greater quantities it can cause deterioration of stonework or pointing, largely because moss retains moisture, making the stone vulnerable to frost damage. Where moss is mainly established along joint lines it normally means the joints are open and trapping water, so this should be investigated.

Moss is not aggressive and can be easily removed by gently scraping away with a wooden spatula as part of a regular maintenance regime by volunteers. There is normally no need to use biocides.

4.5 Algae

The growth of algae on a stone surface indicates the presence of water. Algal growths are usually green and slimy when fresh and become black when the surface dries out. Algae may colonise where the monument is situated in a very wet area, or where it is overshadowed by trees or buildings and remains damp for extended periods (Figs 48 and 49).

Algae can be inhibited simply through the control of surface moisture by repairing architectural details to control run-off or encouraging quicker drying by removing sheltering vegetation. When dry, it can often be removed simply by brushing with a stiff bristle brush or scraping with a wooden spatula. Sometimes additional cleaning with a non-ionic detergent may be required to remove any residue.



Fig 48 Plant growth shading can encourage damp conditions.

Fig 49 Bio-colonisation on war memorial.

4.6 Lichen

Lichen are a combined growth of fungi and algae. They are extremely slow growing and are often a sign of a clean atmosphere. The subtle colours and mellowing effect of lichen on stonework can be very beautiful and some rare species are protected (Fig 50). Most lichen are harmless but there are some species which can be damaging to the surface of vulnerable stone types, causing blistering or pitting.

As the removal of lichen can damage the stone, it is recommended that removal is considered only in cases where the stone is being adversely affected by the lichen or where inscriptions are obscured. If this is the case, removing the lichen with a stiff bristle brush will usually be sufficient. Where the stone is generally in good condition this can be undertaken by a volunteer. Where the stone is very old or in poor condition a specialist should be consulted. For particularly hard lichen, a water saturated scrim cloth should be applied for a minimum of an hour before attempting to brush or scrape it off. Steam cleaning can also be an effective method of removal and has the added benefit of having a sterilising effect which delays re-growth. Steam cleaning should only be undertaken by a professional.



Fig 50 Lichen on old stonework.

4.7 Use of biocides

The application of a biocide is frequently specified for removal of biological growths and following stone cleaning. However, biocides are generally only effective for a short period of time unless the underlying reason for the growth has been addressed. In addition, dead growth following the application of a biocide can provide a nutrient layer on which new growth will re-establish itself at an accelerated rate.

Biological growths are most effectively dealt with as part of an annual maintenance cycle. The use of biocides with a neutral pH are preferable on stone monuments as natural stone can be affected by acid or alkali based products. It is increasingly recognised that cleaning stone structures may actually promote the development of biological growths, particularly algae (Fig 51). This may be due to the phosphates in some chemical cleaning agents, or the creation of a rougher surface on cleaned stone to which plant growth can more easily attach itself.

Should the decision be taken to apply a biocide, perhaps where extensive or persistent plant growth is present, the treatment used must be effective at destroying the problem organism without harming other flora and fauna in the vicinity or entering water sources. It should not leave deposits on the stone, alter the natural colour of the stone or affect the stone in any permanent way which could lead to further deterioration. Proprietary household bleaches, patio cleaners and weedkillers should not be used on war memorials as they often contain harsh chemicals and can deposit salts, causing further decay. Professional advice should always be sought. War Memorials Trust has specific guidance on biocides and detergents.

4.8 Stone cleaning

Where soiling is deemed to be having a significant detrimental effect on stonework, either physically or aesthetically, it may be considered appropriate to carry out stone cleaning. Opinions vary on the appropriate appearance of war memorials, i.e. a weathered or pristine appearance, however, an aged surface should not be confused with soiling and any cleaning undertaken should conserve the existing patina. Decorative elements and inscriptions in bronze or other materials should be carefully protected during all cleaning processes as they may become damaged.

Where the need for stone cleaning has been established, the least aggressive method should always be the starting point in order to minimise risk of damage to the monument. The success of all methods depends on the skill of the operative and correct specification.

Trial panels

Before carrying out stone cleaning on any monument a small trial panel in a discreet area should be prepared to determine the effect of the cleaning method on the stonework. On memorials where there are different stone types or where there is a variety of soiling, several test panels may be necessary. Once the procedure and level of cleaning has been agreed the trial panel should remain until the majority of the work has been completed so that it can be used as a 'control'. This can also help to avoid disputes.



Fig 51 Bio-colonisation after cleaning.

Dry brushing

Manually brushing the stone with a stiff natural bristle or nylon brush to remove organic growth and loosely bound surface dirt is a gentle and effective method of cleaning. It can be effective on rubble and rock faced ashlar structures where soiling is loosely bound. If the stone is in good condition this work can be undertaken by volunteers. However, where the stone is friable even manual brushing can cause loss of surface detail and so care should always be taken to ensure the stonework can withstand the abrasion and, if in doubt, a specialist should be consulted. Wire brushing is not suitable for war memorials.

Low pressure water washing

This is one of the least aggressive methods of cleaning stone. It is commonly used to clean stone where dirt is bound to relatively soluble chemical compounds and is particularly effective on limestone and granite. More stubborn soiling can be softened with water and then manually removed with natural bristle brushes or a wooden scraper. Water washing can also be effective on marble, combined with a neutral pH soap for more difficult or greasy deposits.

Water washing should use the minimum amount of water sufficient to wash the deposits away, or loosen them enough so they can be removed manually otherwise it can cause over-saturation or staining of the stone. Cleaning should always begin at the top of the monument to avoid washing dirt onto previously cleaned surfaces. Water washing should not be undertaken in very cold weather as it will leave the stone vulnerable to frost attack. Basic water cleaning to relatively sound stone can be done by volunteers but more sophisticated methods should be undertaken by specialist contractors.

Steam cleaning

Steam cleaning is often used in conjunction with other methods such as bristle brushing or low pressure abrasive cleaning. The steam loosens surface-bound dirt, causing it to swell and become detached. It is not suitable for the removal of carbon based pollution deposits as these are generally not water soluble and tend to penetrate the matrix of more porous stone. When used in conjunction with mild detergents, steam cleaning can be effective at removing grease and oil deposits. Newer proprietary 'steam cleaning' processes use pressurised, super-heated water directed onto the surface which softens surface deposits allowing easy removal. This process is effective at removing organic growth, paint and some types of graffiti and is particularly effective on limestone and granite. Steam cleaning should be undertaken by specialist contractors (Fig 52).

Low pressure abrasive cleaning

Proprietary low pressure cleaning systems employ a specialized nozzle, which delivers water mixed with a very fine abrasive powder. The process tends to be less aggressive than other forms of pressure washing as the particles used are very fine and applied in a vortex rather than directly onto the surface. This method can also be used without water to deliver a low pressure abrasive clean and can be effective at removing pollution crusts, particularly from sandstone. The skill of the operative is essential in ensuring no damage is done to the monument. Used incorrectly, such methods can cause loss of definition to tooled finishes and roughening of the stone.



Fig 52 Steam cleaning a war memorial © West Lavington Parish Council (2010).

Abrasive cleaning

There are a number of other methods that are sometimes used for cleaning stone but which are not suitable for war memorials or historic stone monuments in general. These include dry or wet grit blasting, disc cleaning and high pressure water washing. Such methods carry a high risk of damaging the surface of the masonry and joints, and causing further deterioration.

Chemical cleaning

A wide range of acid and alkaline chemical cleaning agents are available which vary in strength and effectiveness. Detergents and biocides are sometimes added. Chemical cleaning is particularly damaging for porous stones, but even very hard impermeable stones such as granite can be affected. Chemicals can permeate into the stone resulting in efflorescence and associated decay over subsequent years. Often chemical cleaning is combined with pressure washing to remove residues, which can cause further damage (Figs 53 and 54).

Because of the risks attached, chemical cleaning is not normally recommended for stone war memorials. In exceptional circumstances the use of chemical cleaners may be appropriate, for example for some types of graffiti and severe staining on sandstone where deposits are not soluble in water. In such cases it is essential to do patch tests with the different strengths and concentrations to choose the best option specific for the type of stone. Acidic products should never be used on limestone and marble. Chemical cleaning should be undertaken by specialist conservators.

Poultices

Some types of staining can penetrate into the stone, for example staining caused by metal run off, such as iron oxide (rust) or copper compounds from bronze and brass. Cleaning techniques which act on the surface of the stone will not be effective in these cases, and a poultice is the best option.

Poultices are typically applications of fibrous or clayey materials containing water and/or other solvents. They work by drawing the stain out of the stonework. Poultices containing sequestering agents are available for the removal of metallic stains (Fig 55). Sequestering agents chemically isolate specific staining components, forming soluble compounds which can then be removed from the surface. Run-off staining from metal is normally a result of a lack of maintenance of the protective coating (wax, paint or patination oils). If this coating is not maintained after cleaning the staining will re-appear.



Fig 53 Uneven or aggressive cleaning can cause discolouration.

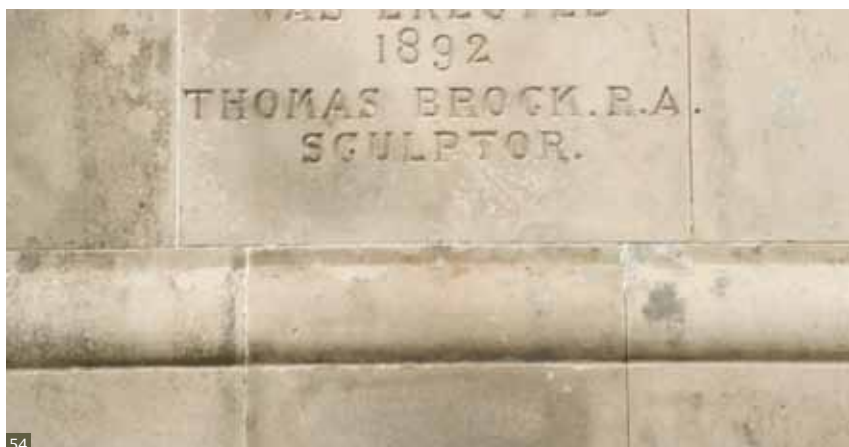


Fig 54 Patchy appearance of masonry following cleaning.

Fig 55 Staining caused by run off from bronze panel.



4.9 Re-pointing masonry

It is important to ensure that pointing remains sound as defective joints can lead to water ingress and result in damage to stonework from freeze/thaw cycles (Fig. 56). Defective pointing which allows moisture retention can also encourage biological growth, often leading to further damage to the structure. Re-pointing will be necessary when the bedding or jointing mortar becomes washed out or detached from the masonry, leaving gaps where water can penetrate. Where pointing is very badly deteriorated stones may become loose and require re-bedding. War memorials are important monuments and were often built from high quality ashlar masonry with fine joints, or from coursed, squared and dressed stone. Re-pointing dressed stone requires a high level of skill as conventional methods and tools can easily damage the arrises of the stone. Contractors with suitable skill and experience should be sought (Fig. 57).

Before starting any re-pointing work, a detailed evaluation should be carried out to determine the full extent of the required work and the specification of the mortar mix. Re-pointing should normally only be carried out where the existing pointing has become defective and there is evidence of, or a risk of, damage to the stonework. Slightly or partially eroded pointing is often still performing effectively and over-zealous re-pointing may do more harm than good, both aesthetically and functionally. It is important to take photographs of the monument before beginning any stone repair work, to use as a reference for the repair and to avoid disputes over workmanship.

Decayed and loose mortar should be removed carefully using a thin steel hook or knife. Fine joints can also be cut out using an oscillating disc (not an angle grinder or vibrating cutter). The joints should normally be raked out to a minimum depth of 25mm, or twice the width of the joint, whichever is greater. To ensure all the loose and decayed mortar is removed, the joints should be carefully flushed out with water, taking care that the debris is not collected elsewhere on the monument.



Fig 56 Defective pointing increases the risk of frost damage
© Paul Goodwin (2012).

Fig 57 Fine joints re-pointed in lime mortar. Lossiemouth, Moray
© George Wilson (2011).



4.10 Specifying mortar for repairs

Natural stone should not be re-pointed using cement based mortars as these are normally too inflexible and impervious to allow thermal movement and vapour transfer. As granite is hard and dense, it does not tend to suffer from sacrificial weathering in the way that softer stones will when a strong mortar is used, however the hardness of the stone is not the only aspect to consider when specifying a mortar. When cement-based or other inflexible mortars are used with a hard stone, the structure cannot easily accommodate thermal movement. The stone resists cracking and therefore as the body of the structure expands and contracts with natural changes in temperature and humidity, the mortar joints will absorb the strain and may crack. Cracks in the mortar joints allow water to get into the structure. This can become trapped, potentially leading to damage from frost and vegetation growth.

Lime mortars are more flexible and can accommodate movement more readily so there is less likelihood of cracking. Lime mortars also allow moisture to evaporate and a degree of permeability in the mortar joints is important even with very hard stones, as the only way moisture can move through the structure is via the joints. For granite and whinstone a stronger lime mortar can often be used without risking damage to the stone, but a high compressive strength or cement-based mortar is not necessary and may cause problems in the long term.

Lime mortar work is best avoided during very cold weather or on very warm, dry days. The fresh pointing should be protected from drying out too quickly by placing sheets of damp hessian against the stone face until the mortar is cured. In warm weather conditions, the hessian should be regularly sprayed with a fine water mist. If the pointing is allowed to dry too rapidly it is likely to fail. Failed pointing is crumbly and may have a white 'bloom' of free lime on the surface. Where this occurs the pointing will have to be removed and re-done.

4.11 Stone repairs

Where an individual stone has decayed or been damaged to the point that it is causing a problem to the memorial, for example by allowing water to penetrate into the structure, or is having a significant detrimental impact on the appearance of the memorial, replacement may be considered. Stone should not be renewed simply because it is weathered. Over time all natural stone will weather and take on an established appearance; this is not a sign of decay and can contribute to the character of the war memorial, signifying its age and sense of timelessness. Where war memorials are vulnerable to impact damage, for example if they are on a busy street, the placement of discreet bollards can provide some protection (Fig 58).

If a decision is made to replace individual stones, or sections of stonework, it is important to ensure that a correct match is specified both in terms of geological properties and physical appearance. Indenting with incompatible stone may cause further problems in the future due to differential weathering, performance and appearance. Where possible, a stone sample should be analysed to identify the quarry it came from. Records may also show where the stone was sourced from. Where an exact match is not available the most similar geological match should be specified. In some cases, partial stone indents may be specified rather than replacement of a whole piece of stone, in order that as much original fabric as possible can be retained.

When removing the damaged or decayed stone, care must be taken to ensure the arrisses of surrounding stones are not chipped or damaged. Power tools should not normally be used as they significantly increase the risk of damage to surrounding stonework. The exception to this is the careful use of an oscillating disc cutter for cutting out stone or joints. A sufficient depth of the decayed stonework should be removed in order to ensure that the replacement stone can be securely fitted in to the space. This would normally be a minimum of 100mm. The new stone should be dressed to match the tooling on the original stone, but should not be artificially weathered or distressed to blend in with the surrounding stones (Fig 59). Over time new stones will weather down and blend in, if they have been well matched and dressed.

4.12 Eroding inscriptions

Where names have become or are becoming illegible through erosion or damage, it may be necessary to sharpen or re-cut the letters. However, if this is likely to cause more damage to the monument, or if the substrate is too delicate, then re-cutting the names on to a different part of the monument or on a new panel may be more appropriate. If the inscription is the work of a notable artist it may be desirable to retain the original work and allow it to erode naturally, and provide an alternative method of reinstating the list of names. A balance needs to be struck between conserving the monument itself and ensuring that the roll of honour is preserved.

Plaques of different stone should not be added as they will affect the appearance of the memorial and may cause damage to the original stonework from differential weathering.

Fig 58 The risk of impact damage can be reduced by discreet placement of bollards.

Fig 59 Stone indents on a war memorial, Edinburgh.



5. Concrete elements



Fig 60 Bannockburn battlefield memorial, Stirlingshire.

Fig 61 Concrete elements can be vulnerable to cracking, Craigie, Ayrshire
© Craigie Community Council (2012).



It is not unusual to find concrete as part of a war memorial, often forming steps, bollards or other boundary elements. Sometimes the entire memorial may be concrete. Whilst not strictly a war memorial, the battlefield monument at Bannockburn is one example, formed of two semi-circular walls of cast concrete representing the opposing sides (Fig 60).

Concrete structures can be vulnerable to cracking, caused by corrosion of ferrous fixings, freeze/thaw expansion or structural damage (Fig 61). Concrete structures can also be disfigured by staining caused by salt efflorescence or biological agents. Where concrete has developed cracks, it is important to identify the cause, and if possible remedy this before attempting to repair the damage. This may involve cutting out ferrous fixings and replacing with stainless steel equivalents, improving weathering details or repairing damaged or missing elements that are causing structural damage.

Cast concrete can be difficult to repair, and repairs will often be visible. Obtaining a close match to the original mix in terms of strength, colour and texture will help minimise the visual impact. Unless the original specification is known from records, or can be ascertained (for example if the monument is of relatively recent date and the contractor or craftsman can be consulted) analysis of the concrete will probably be necessary in order to determine the most appropriate repair specification. Analysis can be carried out by specialist materials consultants or conservators. Samples of the proposed mix should be produced to ensure a suitable match and to avoid disputes. Small cracks can sometimes be effectively repaired using a grout based on Ordinary Portland Cement (OPC) and fine mastic sand, various types of proprietary resins or lime mortar.

6. Metal elements

The most frequently used metal in war memorials is bronze, but copper, brass, iron and lead elements are also found. In some cases gilding may be present. Where historic or artistic metalwork is concerned, repair methods should always be chosen to minimise risk of damage to the material, and to retain as much of the original as possible. The advice of a specialist should always be sought.

6.1 Bronze

Bronze is a very common feature of war memorials either in whole, as cast statues, or as a constituent part, such as a plaque or decorative panel. Bronze is an alloy of copper and tin.

The surface of bronze statues was often treated to create a certain aesthetic effect. This is called patination. The patina can vary across the metal surface to accentuate certain features or to create optical highlights. Dark brown is the most common patination finish for war memorials and plaques but sometimes sculptures were treated with chemicals which hasten or simulate the corrosion process to create a variegated finish which was then stabilised using oils or wax. This could produce an antique appearance. Raised letters on memorials were often polished to a sheen to highlight them.

After patination, a protective microcrystalline wax is applied to the bronze and this needs to be regularly re-applied to maintain the protective coating. 'Bronzing liquid' is not an appropriate finish for traditional bronze as it is the wrong colour, it obscures detailing, particularly of the raised letters, and it does not offer adequate protection to the metal.

Surface deterioration

When bronze corrodes it leaves deposits of the corrosion products on the surface. The deposits are normally copper compounds (carbonates and sulphates) which create the familiar green surface finish sometimes known as verdigris (Fig 62). Although the green colour is a result of corrosion it can be maintained as long as it is stabilised using an appropriate protective wax.

Where bronze has not been regularly re-waxed, the natural processes of weathering can accelerate corrosion and loss of the applied patina. This will lead to a change in appearance and over time the bronze may become vulnerable to damage and decay. Vehicular emissions and environmental pollution can accelerate the deterioration of bronze. Bronze exposed to a salty, marine environment is particularly vulnerable, while bird droppings can also be highly corrosive. Active corrosion, which appears as pitting, powdering and pustules, should be treated urgently by a metals conservator.

Wrought iron armatures may be found within bronze statues, left over from the casting process or as structural support. Wrought iron expands considerably as it corrodes in damp or wet conditions, which can cause 'oxide jacking' of the surrounding material and consequent structural damage to the bronze elements. If water has reached internal armatures the surface of the bronze needs to be checked for physical damage or corrosion and repaired to prevent further water ingress.



Fig 62 Bronze memorial with verdigris.

Sometimes bronze is painted over with gloss or 'bronze' paint in an attempt to minimise maintenance or arrest deterioration. This will significantly change the appearance of the monument and store up future problems (Fig 63). Where paint has been applied in the past, it should be removed and a suitable patination finish and wax applied by a conservator.

Cleaning bronze

Most cleaning methods followed by re-patination and waxing will result in a slightly patchy appearance. This is normally aesthetically acceptable and will present the monument in its conserved state. In order to achieve a restored or 'as new' appearance, the bronze will have to be stripped back to the bare metal using abrasive cleaning, re-patinated and waxed. This will result in the loss of any remaining traces of the original surface finish and should only be undertaken in exceptional circumstances.

Basic cleaning using low pressure water, non-ionic, neutral detergents and natural bristle brushes can be carried out on site and is normally all that is required for a maintenance regime. Any works more advanced than basic maintenance need to be undertaken by a metals conservator. More extensive bronze conservation is normally done off site in work-shop conditions (Fig 64). If this is not possible, extra care must be taken to protect against damage. Patination requires heat to be applied which could cause the bronze to expand and crack surrounding masonry.

Steam cleaning

Steam cleaning can be an effective technique for removing corrosion products and surface deposits when used at low to medium pressures. It may not remove all traces of corrosion products so the surface should be carefully checked over after cleaning. Steam cleaning should always be undertaken by specialists.

Low pressure abrasive cleaning

Proprietary low pressure cleaning systems employ a specialized nozzle, which delivers water mixed with a very fine abrasive powder. The process tends to be less aggressive than other forms of pressure washing as the particles used are very fine and applied in a vortex rather than directly onto the surface. This method can also be used without water to deliver a low pressure abrasive clean. These processes should only be used to remove active corrosion deposits and severe soiling from bronze sculptures as they can also remove original patination layers. The skill of the operative is essential in ensuring no damage is done to the monument. Used incorrectly, such methods can damage the original surface finish.

Chemical cleaning

The use of chemical cleaning agents, normally acid or alkali based products, is not normally suitable for cleaning bronze on war memorials. These products are likely to cause damage to the patination and may affect rainwater run-off which can damage or discolour stone plinths. Where bronze elements have graffiti damage, the use of chemical cleaning materials may be required. Such specialist cleaning should always be entrusted to a conservator.



Fig 63 Detail on a bronze memorial obscured by a thick coating of paint © Paul Goodwin.

Fig 64 Conservator cleaning bronze.

Other methods

Other types of cleaning such as blasting with particulate matter or high pressure water washing are not recommended as they can be excessively abrasive and may cause damage to the bronze or surrounding masonry. War memorials should never be cleaned with household brass or metal cleaning products, acid or alkali based cleaners, or using abrasive processes such as sanding or wire-brushing. These methods are likely to damage the metal. Phosphor bronze brushes are sometimes specified, but these can also damage the surface patination and are not recommended.

Re-patination and re-waxing

Re-patination of bronze monuments is a specialist process which should be undertaken by a conservator. It involves cleaning back corrosion products and reapplying patination over the existing finish, or in extreme cases cleaning back to bare metal and re-patinating (Figs 65 and 66). Re-patination can be a controversial area of conservation so professional advice should be sought on what is appropriate for a specific memorial. Both Historic Scotland and War Memorials Trust generally take a flexible attitude towards re-patination of bronze war memorials, in light of their particular artistic and commemorative functions. Where re-patination is agreed it is generally advised that, unless there is severe corrosion, a moderate approach is taken which preserves any original surviving patination layers.

After cleaning and re-patination works, the bronze should be protected with a microcrystalline wax. Re-waxing should be carried out at least every five years as part of a maintenance regime. This will avoid the need for expensive repair and conservation work in the future. The old wax will need to be removed before new wax is applied.

6.2 Brass

It is quite common to find brass memorial panels, often within a church building or town or village hall (Fig. 67). Brass panels may have embossed or inlaid lettering and sometimes hammered relief decoration. Brass is an alloy of copper and zinc and can be polished to a high shine. However, it can be vulnerable to corrosion or tarnishing if unprotected, particularly in a damp atmosphere. Brass is often lacquered to inhibit tarnishing and to retain a shiny appearance. Overzealous cleaning can damage the lacquer causing or exacerbating deterioration. Lacquer is prone to crazing as it ages. In such cases the lacquer will need to be removed and replaced.

Un-lacquered brass can be gently buffed with a soft cloth, but frequent polishing, particularly with the use of abrasive polishes, will erode the surface and may damage inscriptions and other detail over time. Household brass cleaners should not be used as they can leave a salt residue. The application of a micro-crystalline wax can help inhibit corrosion and retain a shiny appearance. Brass can be prone to dents or scratches, so careful handling is required if the memorial is moved for cleaning or repair, or if it is in a vulnerable location.

A simple maintenance strategy for brass would involve an annual inspection, light dusting and cleaning with distilled water and mild detergent, if necessary, taking care to ensure no residue is left and the surface is dried afterwards. Dirt can be removed from crevices and inscriptions using a soft bristle brush. This can be undertaken by volunteers. Where severe soiling or deterioration has occurred then specialist conservation work may be required to remove old lacquer and re-finish.

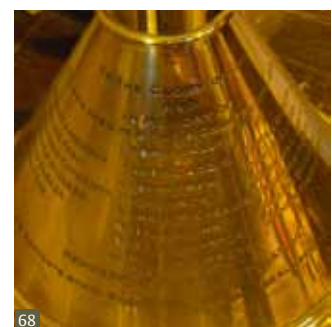


Fig 65 Argyll and Sutherland Highlanders' monument before cleaning.

Fig 66 Argyll and Sutherland Highlanders' monument after cleaning.

Fig 67 Brass war memorial panel, Eddleston church, Scottish Borders.

Fig 68 Brass memorial lectern, St John's Mission Church © Paul Goodwin (2010).

6.3 Copper

Copper may be found as a roofing material on some war memorials, for example at Peebles (Fig 69), although it is fairly unusual. It is more likely to be found as inlaid or embossed panels in an internal environment (Fig 70). Like bronze, copper may be pre-patinated for artistic effect, or polished and lacquered to prevent corrosion and retain the shiny metallic appearance. Copper left untreated will gradually form a green patina or verdigris over time. Internal copper components should be lightly dusted or washed, much like brass.



Fig 69 Copper roof on war memorial, Peebles.

Fig 70 Hammered copper panel, Black Watch memorial, Perth
© Mark Duffy.

6.4 Ironwork

War memorials sometimes have iron components, particularly railings or gates (Figs 71 and 72). These are often surrounding a stone monument but occasionally may form the memorial itself, for example the iron memorial gates at Kirkintilloch (Fig 73). Both cast and wrought iron can be very durable if well protected but are vulnerable to corrosion if not maintained. Iron elements can also be subject to impact damage, vandalism and theft. Repairs to ironwork should be undertaken using traditional materials and methods.



Fig 71 Iron railings enclosing memorial.

Fig 72 Metal rails to support wreaths, Lossiemouth, Moray
© George Wilson (2011).

Fig 73 Kirkintilloch memorial gates © David McNay (2006).

Cleaning ironwork

The paint on iron is protective and needs to be maintained to protect the iron from water which causes corrosion. Metalwork will often need to be cleaned in order to prepare the surface for re-coating. For war memorials and other historic metalwork, any loose or ingrained surface dirt or rust should be removed but original layers of paint and decorative schemes should not be removed unless it is necessary for more extensive conservation or repair work.

Chemical cleaning using acid cleaners or chemical dips are sometimes suitable for removing heavy rust staining and for stripping back to bare metal ready for re-coating, however in most situations it is not recommended as there is a risk of damaging the metalwork from over-cleaning and deposition of salts. Chemical dipping is carried out off site and requires the metalwork to be dismantled. This should only be specified on the advice of a conservator. Metalwork should be thoroughly steam cleaned following chemical cleaning to ensure that all of the chemicals have been removed.

Water washing using bristle brushes can be effective at removing soluble salts and loosely bound dirt or loose paint. Ironwork should be carefully dried before applying new coatings. High pressure water washing, using a proprietary 'vortex' or spinning jet system, can be useful in removing rust and paint; however it risks forcing water into crevices or voids which can increase the risk of future corrosion, particularly in situ.

Abrasive cleaning and surface preparation using wire brushes and scraping is effective and unlikely to cause damage, but is only really suitable for small areas. Mechanical abrasive cleaning using power tools should only be considered in cases of severe corrosion and should be carried out by a specialist ironwork conservator. Wet and dry abrasive blast cleaning and dry ice blasting are all effective at removing rust and paint in preparation for recoating but should only be carried out by a skilled operative to avoid damaging the metal surface. These types of abrasive cleaning can be difficult to control and there is a risk of damaging surrounding stonework through abrasion or water run-off. Such methods should only be carried out on the advice of a conservator and are not normally necessary or appropriate for routine maintenance work.

6.5 Lead

Lead may be found as a component of war memorials as a roofing or flashing material, in the form of cast lead statues or as lettering. New lead work is normally pre-patinated with oil in order to prevent the formation of lead oxide which can cause white staining and run-off. Lead is a very durable material and requires minimal maintenance. However, by far the biggest threat to lead elements on war memorials is theft. Missing or damaged lead details, such as flashings, should be replaced as a priority as they are often performing a weathering role.

6.6 Protecting against theft of metals

Metal components of war memorials are increasingly being targeted by thieves. Metals that are particularly at risk are lead, copper and bronze (Fig 74). There are various ways in which war memorials can be protected against metal theft. Some include physical fixings or barriers alarms or other deterrents. Forensic marking is increasingly being applied to metal elements of war memorials to try and deter thieves. This works most effectively when used in conjunction with other security measures and where its use is clearly advertised with warning signs (Fig 75).

Where theft does occur, ideally the stolen item should be replaced like-for-like with anti-theft measures put in place, such as additional fixings. In cases where there is persistent theft, replacement with an alternative material may be appropriate, so long as it is physically and aesthetically compatible with the original monument. Synthetic replicas such as resin plaques are not normally considered suitable for replacement on historic memorials. For further information see the Historic Scotland Short Guide *Lead Theft* and the War Memorials Trust publication *War memorial theft: Prevention and solutions*.



Fig 74 Theft of bronze panels from war memorial, Wednesfield, West Midlands © Wolverhampton City Council (2011).

Fig 75 Signage can act as a deterrent.

7. Gilding and other finishes

Gilding is the application of thin layers of gold leaf on architectural details, and is sometimes found on war memorials, both internal and external (Fig 76). Although gold leaf is a very delicate material, it is surprisingly robust, as gold is inert and will not tarnish. Externally, the main threat to gilding is the weather, while internally, the main causes are abrasion or damage from cleaning, as the thin layer of gold leaf is easily rubbed away. Gilding should only be cleaned by gentle dusting using very soft gilding 'mop' brushes (Fig 77). Gilding must never be rubbed or washed.

The use of 'gold' paints are never recommended for repair or conservation works as they will tarnish too quickly and do not have the same lustre of genuine gold leaf. The Historic Scotland Inform Guide *Gilding: Techniques, Care and Maintenance* provides further information on the care of gilded surfaces.

Carved or painted wooden memorials are quite common in churches and civic buildings, sometimes with gilding or inlaid panels of brass or bronze. Internal war memorials can be at risk from over-cleaning, often by well meaning volunteers or staff. Cleaning should be limited to gentle dusting for painted or varnished wood. Untreated wood can be protected with a natural beeswax polish, applied very sparingly once or twice a year. The use of household cleaners, polishes and water can damage timber elements and should be avoided (Fig 78). Mosaics and other decorative details are sometimes found, although these are not common. Where present and in need of repair, the advice of a specialist conservator should be sought.



Fig 76 Gilding on the Scottish National War Memorial, Edinburgh Castle.



Fig 77 Cleaning gilded elements.

Fig 78 Timber war memorial panel, damaged by water from floor cleaning and use of brass cleaner © Paul Goodwin.

8. Stained and decorative glass

It is not uncommon to find memorials in the form of coloured or stained glass windows, often in churches, but sometimes in other public buildings. Some were commissioned by individual families in honour of a lost son or father, but there are examples of larger windows commissioned as collective war memorials (Figs 79 and 80).

Decorative glass can be coloured, etched or engraved with decoration and lettering. Individual panes are mounted in a framework of lead comes which are in turn supported by horizontal supports called saddle bars, typically of iron or bronze. Glass is fragile and can be damaged by impact, vibration or vandalism. Thermal movement of the metal elements can also cause decorative glass windows to deteriorate and become loose or warped over time. They should be periodically inspected for signs of distress. Distortion can be mitigated by adding additional saddle bars, and fixing the lead comes in position with copper wire.

Stained glass windows are sometimes given a protective covering on the outside, to improve energy efficiency or protect the window from damage, or both. If not suitably designed and ventilated these forms of secondary glazing can lead to problems from condensation build up, leading to accelerated decay of the timber or metal elements of the glazing.

Memorial windows should be routinely inspected for signs of damage or decay, so that conservation work can be planned at an early stage. Cleaning stained glass can risk scratching the surface or affecting any applied decoration and should be limited to dusting with a soft brush or duster, or occasional gentle washing with a soft, damp cloth. Glass cleaning products should not be used on stained or painted glass. The advice of a specialist conservator should be sought for more extensive cleaning, repairs, or replacement of individual panes or comes.



79



80

Fig 79 Merchant Navy memorial window in Trinity House, Port of Leith.

Fig 80 Stained glass First World War memorial window, Dunblane Cathedral, Perthshire.

9. Graffiti and vandalism

Sadly, even war memorials are not immune to graffiti and other vandalism. Graffiti typically appears in the form of spray paint (aerosols), marker-pen, carvings or scratches (Figs 81 and 82). It is usually a priority to remove graffiti as quickly as possible as it has a very negative impact on the appearance of monuments, particularly war memorials. Prompt removal will help discourage copy-cat attacks and it is also sensible from a technical perspective as paints, glues and inks become increasingly difficult to remove as they dry out

If a war memorial has been vandalised, it is important to record the incident, photographically and with a written description. Notify the police and obtain a crime reference number, which will be needed for any insurance claim. Professional advice may be needed to decide on the most appropriate action i.e. cleaning, stone repairs etc. Check with the local authority whether the monument is listed and obtain advice and necessary consents for remedial work. A suitably skilled contractor will be required and cleaning trials may be necessary before any work is undertaken.

9.1 Removing graffiti

While most types of paint and other media can be removed from a stone surface, problems can arise when pigments are carried into the pores by solvents in the paint. The application of additional solvents to try and remove the paint can sometimes result in the pigments being driven further into the pores. Use of oil based products, bleach or detergents can also cause staining or discolouration and should only be used as advised by a specialist conservator (Fig 83).

Measures must also be taken to ensure run-off, aerial mists, drips and splashes do not harm the rest of the structure or the wider environment. Operatives should follow product guidelines in term of application and removal and wear the appropriate protective equipment. The Historic Scotland Inform Guide *Graffiti and its safe removal* gives further information on appropriate products and procedures.

It is impossible to remove graffiti where physical damage has been caused, such as names being carved into the stone. In such cases a judgement has to be made as to whether it is desirable to repair or re-face the affected stone.



Fig 81 Graffiti on base of monument.



Fig 82 Paint and scratched graffiti on bronze memorial panel.

Fig 83 Using a poultice to remove graffiti.

9.2 Preventive measures

If graffiti is a persistent problem in a particular location it may be prudent to consider applying a sacrificial barrier-coating system as a preventive measure. It will not stop graffiti being applied but will make the removal process more straightforward.

Sacrificial coatings are normally made from polysaccharides and can be removed with low-medium pressure water washing or steam cleaning. The coating will need to be reapplied to the monument after each graffiti removal. Any type of coating can change the appearance of the monument, sometimes leaving a glossy finish, and may affect the permeability of the stone; however a balance must be struck between the visual and physical impact of the coating, and the risk of damage from future graffiti attacks and consequential cleaning. Permanent, acrylic based or other irreversible coatings are not suitable for war memorials.

Other preventive measures to reduce the risk of vandalism include neighbourhood watch schemes, improved lighting, CCTV and physical barriers such as gates, fences and landscaping (both hard and soft). The crime prevention officer of your local police force may be able to advise you on measures to reduce the risk of future vandalism. See War Memorial Trust's guidance *War memorial theft: Prevention and solutions* for further suggestions.

10. Bird control

Birds can affect war memorials by soiling and forming nest sites. Pigeons, seagulls and starlings are the species most frequently encountered. Bird droppings (guano) can leave stains on stone and metalwork (Fig 84). This has a negative impact on the appearance and may also promote decay processes. The droppings are normally acidic and run off can cause corrosion or bleaching.

Spikes can be fixed to ledges or flat surfaces to prevent birds landing, however these are visually intrusive and rarely appropriate for war memorials unless the memorial is housed within a larger structure. In some cases, fine netting strung across openings and over roosting sites can physically prevent birds from landing. In most cases this would be unfeasible for war memorials. Bird repellent gels can damage the surface of metals and stone and are not recommended. In some cases, decoys of birds of prey placed nearby may be effective at preventing roosting. For many memorials in urban areas, the only solution may be regular maintenance and surface cleaning to prevent a build up of bird droppings.



Fig 84 Bird soiling on bronze can be corrosive.

11. Summary of common defects and suggested actions

Problem	Cause	Solution
<i>Soiling of stone</i>	<i>Elevated moisture levels and/or atmospheric pollution</i>	<i>Possible gentle cleaning depending on stone type/condition</i>
<i>Vegetation and biological growth</i>	<i>Lack of maintenance, excessive ground or surface moisture</i>	<i>Removal of vegetation, ensure adequate drainage and air movement</i>
<i>Open joints in stonework</i>	<i>Deterioration of pointing, invasion of vegetation causing jacking, aggressive cleaning, structural movement</i>	<i>Remove vegetation, rake out and re-point with lime mortar. Check for underlying movement</i>
<i>Loss of surface detail of stone</i>	<i>Aggressive cleaning, natural erosion, poor quality stone</i>	<i>Reduce or avoid cleaning, re-face stone only where necessary</i>
<i>Eroding stonework or inscriptions</i>	<i>Weathering of soft stone, aggressive cleaning methods, incorrectly bedded stone</i>	<i>Re-cut inscriptions, consider indenting new stones if severely decayed</i>
<i>Discolouration of bronze</i>	<i>Corrosion, lack of maintenance</i>	<i>Stabilisation with wax, or cleaning, re-patination and re-waxing</i>
<i>Rusting ironwork</i>	<i>Lack of maintenance, paint deterioration</i>	<i>Clean back, treat with primer and micaceous iron oxide and paint</i>
<i>Graffiti</i>	<i>May be more likely where memorial is neglected</i>	<i>Clean using appropriate solvent. Consider sacrificial anti-graffiti coating</i>
<i>Bird mess soiling</i>	<i>Birds, overhanging trees or cables</i>	<i>Netting or decoys, regular cleaning and maintenance</i>

12. Statutory consents

The only legislation specific to war memorials is the War Memorials (Local Authorities Powers) Act 1923 and subsequent amendments. This empowers local authorities to use funds to maintain, repair and protect war memorials; however, it imposes no obligation on the local authority to do so.

Some war memorials are listed and a few are scheduled monuments. In such cases, consent will be required for alterations, cleaning or reinstating architectural details or for the addition of fixed security measures such as CCTV or lighting. It is wise to speak to the local authority at an early stage to discuss whether statutory consents may be required and to come to a broad agreement about what would be most suitable. Many local authorities have a War Memorials Officer, who is the first point of contact on all matters to do with war memorials.

Listed Building Consent

Listed Building Consent (LBC) must be obtained where proposals will alter the character of a listed war memorial. This applies regardless of the category of listing (A, B or C). It can include repair and conservation works where the extent is such that it materially affects the character of the monument. This may be the case for example where stone replacement works are required, and for cleaning.

If the memorial is listed you should always check with the local planning authority whether LBC is required before undertaking any work. You can find out if a memorial is listed by contacting the local planning authority or Historic Scotland. Please note that if a memorial is not listed in its own right but is fixed to a listed building or within its curtilage, it may be considered part of the listed building and therefore still require LBC.

The planning authority (in most cases the local authority) will advise whether work requires consent. All applications for consent are made through the local authority and are decided by them. When a local authority is itself the owner or applicant, it will advertise the application but it will be determined by Historic Scotland.

Scheduled Monument Consent

If a monument is scheduled, the prior written consent of Scottish Ministers is required for most works, including repairs and alterations. This is called Scheduled Monument Consent (SMC). The presumption is that work will be the minimum necessary consistent with the preservation of the monument. If your war memorial is scheduled then you should speak to Historic Scotland at an early stage to discuss proposals for cleaning, repair or alterations.

Planning Permission

Planning Permission may sometimes be required for alterations or additions to a war memorial, for example erecting new boundary railings. Additional restrictions may be in place in Conservation Areas. The planning authority will advise whether permission is required for works and what is likely to be granted consent.

Ecclesiastical Exemption

Many war memorials are located within church buildings, attached to the church building or free standing within their grounds. If a church is listed and the war memorial is physically attached to it or sited within its curtilage, then the war memorial will probably be covered by the listing. However, buildings that are in use as places of worship for certain denominations do not, by law, require listed building consent for alterations (except for total demolition). This is called Ecclesiastical Exemption.

Historically, churches in ecclesiastical use have been fully exempt from the requirement for permission to undertake alterations to their interior and exterior. Since 1 January 2006 a voluntary agreement has been in place between Historic Scotland and a number of denominations whereby listed building controls now apply to works affecting the exterior of a place of worship where the works are deemed by the planning authority to affect its character.

Anyone intending to carry out works to the exterior of a place of worship should therefore approach the local planning authority to find out if an application for listed building consent and/or planning permission is required. Planning permission is not covered by Ecclesiastical Exemption and may be required for the erection of a new memorial in the grounds of a listed church. The interior of a listed building used for worship remains fully exempt from the requirement for listed building consent but church denominations will normally have internal guidance that requires them to approach their own decision-making body. A list of the denominations included in the scheme can be found at www.historic-scotland.gov.uk/listed-building-control-churches.pdf

13. Adding names to war memorials

Sometimes there is a need or desire to add further names or inscriptions to existing war memorials. It may be necessary to obtain Listed Building Consent or Scheduled Monument Consent for this work. However, as long as there is sufficient space and the same style/method of lettering is used there is unlikely to be any objection. War Memorials Trust helpsheet *Addition of names to war memorials* provides further advice and information.

The addition of other plaques or inscriptions, such as to commemorate restoration works or anniversaries, is not generally supported by War Memorials Trust. Such additions can detract from the original purpose of the war memorial and create a cluttered appearance.

14. Moving memorials

War memorials were often carefully located in places chosen by the local community and they should not normally be moved or relocated unless there is a very good reason to do so. Damage can be caused during dismantling or if they are moved to an inappropriate location, for example from an internal to an external environment. War Memorials Trust recommends that a memorial should only be moved if it is at risk due to its location or is inaccessible. In most cases there are other options to moving the memorial, for example improving access to the memorial with appropriate landscaping or visiting arrangements.

If the memorial is listed then Listed Building Consent would be required for moving it. Free standing war memorials have sometimes been moved, with consent, such as the Heart of Midlothian war memorial at Haymarket, Edinburgh, which was relocated to accommodate a tramline (Fig 85).

War memorials are often attached to buildings that were important to communities, such as a church, village hall or factory and these memorials can be vulnerable if the building becomes disused. Proposals to remove memorials sometimes come up when a community relocates, or a building closes or is sold. In such circumstances it may be necessary to relocate the war memorial if it would otherwise become inaccessible. Unless a memorial is listed in its own right, it would cease to be listed upon removal from the listed building, so arrangements as to its future location, care and maintenance would need to be agreed before it is removed. See War Memorials Trust's helpsheet *Relocation of war memorials* for further guidance.



Fig 85 Heart of Midlothian war memorial, Haymarket, Edinburgh.

85

15. Summary

War memorials are a valued part of local and national heritage and are a familiar sight in urban and rural areas throughout the country. There is a natural desire to care for war memorials, although there is sometimes uncertainty about the best way of doing this. With any maintenance or conservation approach a balance needs to be struck between conserving the fabric of the monument and maintaining its function as a war memorial and place of remembrance. It is important to gain a full understanding of a monument and make an accurate record so that appropriate maintenance and repair can be planned. Recognising the symptoms of decay which may affect particular materials in the structure, such as stone decay or metal corrosion, is an important skill for anyone who is responsible for a war memorial.

This *Short Guide* has set out the main ways in which war memorials can be damaged and how they should be conserved, but it is always wise to seek professional advice for any works which go beyond basic maintenance. With regular and appropriate maintenance and repair, war memorials can continue to be relevant, both as monuments of remembrance, and in many cases as fine examples of artistic skill and local craftsmanship.

16. Grants

War Memorials Trust and Historic Scotland Small Grants Scheme in Scotland:

Historic Scotland provides funding through the Trust to support the conservation and repair of free standing war memorials in Scotland.

War Memorials Trust Small Grants Scheme: This aims to support the repair and the conservation of all types of war memorials throughout the UK and is open to everyone to apply.

Please visit the grants section of War Memorials Trust's website for further information on these schemes, how to apply, other sources of funding and advice for applicants.

www.warmemorials.org/grants

Please note War Memorials Trust cannot fund retrospectively under any circumstances.

Memorials Grant Scheme: This current scheme is run by the Department for Culture, Media and Sport and can return, as a grant, the VAT incurred in memorial projects, including creating new memorials. Please see the website for details on eligibility and how to apply.

www.memorialgrant.org.uk

17. Contacts

Historic Scotland

Longmore House
Salisbury Place
Edinburgh
EH9 1SH
0131 668 8600
www.historic-scotland.gov.uk

Historic Scotland Technical Research Unit

(Technical enquiries)
0131 668 8668
hs.conservationgroup@scotland.gsi.gov.uk

Historic Scotland Heritage Management Team

(Planning / listed building matters)
0131 668 8600
hs.listingsandconsents@scotland.gsi.gov.uk

Historic Environment Grants Team

(Funding options)
0131 668 8801
hs.grants@scotland.gsi.gov.uk

War Memorials Trust

42a Buckingham Palace Road
London
SW1W 0RE
www.warmemorials.org
www.warmemorials.org/links-scotland

Conservation advice/grants: 020 7233 7356

conservation@warmemorials.org

Charity: 020 7834 0200 / 0300 123 0764

info@warmemorials.org

In Memoriam 2014

Provides free SmartWater forensic marking to war memorial custodians to protect metal elements
www.inmemoriam2014.org

War Memorials Online

www.warmemorialsonline.org.uk
info@warmemorialsonline.org.uk

The Scottish War Memorials Project

www.warmemscot.s4.bizhat.com

Imperial War Museums' War Memorials Archive

Imperial War Museum
Lambeth Road
London
SE1 6HZ
020 7207 9863 / 9851
www.ukniwm.org.uk
memorials@iwm.org.uk

Church Buildings Maintenance in Scotland

www.maintainyourchurch.org.uk

The Society for the Protection of Ancient Buildings (SPAB) in Scotland

www.spab.org.uk/spab-in-scotland

Faith in Maintenance

www.spabfim.org.uk

The Building Conservation Directory

Resource for finding conservation products and services
www.buildingconservation.com

The Conservation Register

Resource for finding conservation contractors
www.conservationregister.com

Institute of Conservation (ICON)

Resource for conservation advice and register of conservators
www.icon.org.uk

HESPR (Historic Environment Service Providers Recognition)

Resource for finding conservation contractors and specialists
www.ihbc.org.uk/hespr

18. References and further reading

MacKechnie, Aonghus (2009) 'Carn air a' Mhonadh: 'Gaeldom's Monuments, Cairns, Crosses and Celticism', *Journal for the Scottish Society for Art History*, Vol 13 (2008-2009) pp. 22-32.

War Memorials Trust

War Memorials Trust publishes a range of advice on the care and maintenance of war memorials including specific materials, legislation and general war memorial issues which have been mentioned throughout this guidance.

Advice on maintenance of war memorials,
War Memorials Trust and English Heritage (2006)

War memorial theft – Prevention and solutions,
War Memorials Trust and English Heritage (2009)

Conservation and management of war memorial landscapes,
War Memorials Trust and English Heritage (2012)

War Memorials Trust helpsheets are available to download at
www.warmemorials.org/a-z

Historic Scotland

Scottish Historic Environment Policy (December 2010)
www.historic-scotland.gov.uk/shep

Managing Change in the Historic Environment (October 2010)
www.historic-scotland.gov.uk/index/heritage/policy/managingchange.htm

Short Guides:

Lead Theft: guidance on protecting traditional buildings (2012)

Technical Advice Notes:

TAN 10: Biological Growths on Sandstone Buildings (1997)

TAN 18: The Treatment of Graffiti on Historic Surfaces (1999)

Guides for Practitioners

Guide for Practitioners - Stone Cleaning in Scotland (1994)

Guide for Practitioners 2 - Conservation of Historic Graveyards (2001)

INFORM Guides:

Biological growth on masonry - identification and understanding

Bird control on buildings

Boundary ironwork: a guide to reinstatement

Bronze: the care and repair of monumental bronze

Cleaning sandstone – risks and consequences

Gilding: techniques, care and maintenance

Growing old gracefully – appreciating the appearance of historic buildings

Graffiti and its safe removal

Indent repairs to sandstone ashlar masonry

Masonry decay: dealing with the erosion of sandstone

Re-pointing ashlar masonry

Structural cracks

Terracotta and faience

The maintenance of iron gates and railings

The use of lime and cement in traditional buildings

All Historic Scotland publications, including Short Guides, Technical Advice Notes (TANs), Guide for Practitioners and INFORM guides can be found on our website www.historic-scotland.gov.uk/conservation



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