



ENGLISH HERITAGE

Caring for Historic Graveyard and Cemetery Monuments



Guidance and best practice for the assessment, planning and implementation of conservation work to monuments as well as legal frameworks and statutory duties.

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Summary

Monuments mark the final resting place of people whatever their origins and status. The materials, design, craftsmanship and inscriptions of these monuments are a rich and irreplaceable repository of information that connects us with previous generations and their history. They continue to be objects of respect but unfortunately, many monuments are also neglected.

Many burial sites are still in use and provide us with landscapes of cultural, historical and natural interest. The monuments within them commemorate the deceased, but also have associated historical, communal and evidential values. The appropriate care of monuments is essential to preserve these values as well as their architectural and aesthetic character.

This advice note is intended for anyone interested in or responsible for the conservation of monuments, memorials and sculptural elements within a churchyard, burial ground or cemetery – this includes those who manage burial sites on behalf of local authorities, churches and other bodies, conservation professionals, statutory bodies and volunteer groups. It should be read in conjunction with both *Paradise Preserved* (published by English Heritage and Natural England in 2007), which introduces the management and conservation of historic cemeteries, and *Managing the Safety of Burial Ground Memorials – Practical Advice for Dealing with Unstable Memorials* (issued by the Ministry of Justice in January 2009).

This note provides guidance and best practice on the assessment, planning and implementation of conservation work to monuments, as well as legal frameworks and statutory duties. Conservation priorities are likely to be directed towards listed monuments but this note relates to all monuments that, due to their condition, are considered to require specialist repair. The guidance is directed primarily towards the conservation of stone as this is the material from which most monuments are made.

DEFINITIONS

Monuments: throughout this document, the word 'monuments' has been used to include outdoor monuments, memorials, sculptures and other symbols of commemoration

Churchyards: a burial ground around a church or other place of worship

Burial grounds: a pre-Victorian place of burial without a place of worship

Cemeteries: a landscaped place of burial



FRONT COVER IMAGES:

Cover Top Left: Headstone which is leaning and suffering from lamination but is still structurally stable © Odgers Conservation Consultants (OCC)

Cover Top Middle: A range of monuments showing a variety of styles, stones and ages © OCC

Cover Top Right: Detail of monument showing lead lettering and loose pointing © OCC

Cover Bottom Left: In Kensal Green Cemetery the competition for space and the grandiosity of the monuments is evident © OCC

Cover Bottom Right: Ivy entwined around the cross of a monument – the eventual result of poor maintenance © OCC

IMAGES:

01: West Norwood cemetery is a typical example of an overgrown cemetery containing a variety of monuments of historic value within a diverse natural landscape © Clara Willett

02: Holbeck Cemetery, Leeds, is a municipal cemetery with a rich diversity of monuments from the 19th and 20th centuries. Many have now been damaged, desecrated or laid down for reasons of 'safety' © OCC

I Approach

Deterioration and the effects of weathering are an inevitable part of the history of a monument. The purpose of conservation is to slow down the rate of decay, remove any causes of structural instability and provide physical security while, at the same time, preserving as much as possible of the historic significance and original material of the monument.

No intervention should ever attempt to alter the intended appearance of the original or seek to achieve a pristine or highly restored condition. Restoration may only be justified in the case of inscriptions of significant historic interest, or where decay has become disfigurement, and repairs are able to overcome losses in a way that is still reversible. These criteria are detailed in English Heritage's *Conservation Principles, Policies and Guidance* (pp 55–7).

Successful conservation and repair requires both careful planning and a clear understanding and knowledge of the proposed approaches, methods and materials. Practical treatment should use materials that are suitable in terms of performance (for example durability and compatibility) and working properties (for example methods of application and health and safety implications). Well-developed practical skills are also essential to carry out the work to the required standard.

Detailed information necessary for step-by-step evaluation of the condition and methods of conservation repair work are covered in Sections 6–8 of this publication, but the main areas of practical treatment for monuments are:

- *Emergency intervention* – Enclosing a monument within a barrier or structure to prevent public access while further inspection, stabilisation and more detailed repair are undertaken. In some instances, application of temporary supports or propping to secure displaced elements (which might otherwise become detached and damaged) may be necessary. However, the routine staking of monuments as a general safety measure should not be considered an appropriate emergency intervention.
- *Repair* – Ranging from repointing open joints, grouting, surface stabilisation and treatment of individual elements to complete dismantling and rebuilding.

- *Cleaning* – Generally to be discouraged as inappropriate techniques can cause damage. The need will depend upon the nature of the original material and dirt layers to be removed. The aim should always be to clean in the safest and least invasive manner without damaging the underlying material.

Many aspects of repair and maintenance of historic monuments, especially those involving complex structures, require professional involvement. Specialist conservators should be engaged to evaluate the condition of the materials of construction, and carry out and supervise treatments. Architects and surveyors need to inspect buildings and larger structures and, in cases of serious structural instability, a structural engineer will be required. Stonemasons and historic building contractors should be used to repair headstones, provide temporary support to displaced elements, repoint defective or failed joints and rebuild collapsed or unstable monuments.

Volunteers can have a role to play in tackling maintenance work such as pruning invasive vegetation. They can also help with research into monuments and the production and updating of the condition reports.

In all cases, the approach must be one of understanding, assessing and carrying out remedial works as the need for them becomes apparent – this will prevent more costly conservation work later and also address any health and safety concerns.



IMAGE:

03: The headstone to Thomas Rosewell in Bunhill Fields, London, although unremarkable, has considerable historical significance. Rosewell was tried for high treason by Judge Jeffries and then pardoned by King Charles II. The headstone was repaired in the 1990s © OCC

2 Historical background

The majority of extant grave markers are found in established burial sites, such as graveyards, churchyards, burial grounds, cemeteries and war cemeteries – all of which are routinely encountered in England. It is important to distinguish between different types of burial sites since each one has its own religious and cultural background. They may also be defined by distinctive legal requirements that can affect monument conservation.

CHURCHYARDS

The practice of burial in churchyards commonly dates from the 8th century AD and assumed a virtual monopoly of such space until the 1850s, when cemetery burial began to replace churchyard burial especially in cities and towns. Churchyards sometimes occupy even earlier ritual sites and thus can have considerable archaeological and historical significance.

Churchyard usage often spans centuries but all too few identifiable early monuments survive. There are few medieval outdoor tombs (for example St Giles, Oxford) and pre-civil war headstones are very rare. Generally it is from the 17th century that legible church monuments survive, and from this period the development of inscriptions began to offer a more personal and

enduring expression of the lives and social relationships of the deceased.

More elaborate outdoor monuments began to appear in the 18th century, as the well-connected ceased to always be buried inside the church. In the same period, commemoration was no longer reserved for the upper classes alone, and the use of local materials and craftsmen led to substantial regional variation in monument styles.

Surviving monuments are often just a fraction of those originally erected – wooden monuments have generally perished, and older stones were regularly removed when damaged or no longer cared for. The lack of space and the fact that only a small proportion of interments were marked with permanent monuments means that surface evidence is not at all representative of the quantity of human burial.

IMAGES:

04: The small churchyard of the Church of Holy Cross, Bab Cary, Somerset, contains monuments of local stone and simple design; many others have been removed or reused for other purposes © OCC

05: To release space for more recent burials, monuments have often been removed – they were usually either discarded, reset (in this case against a wall) or sometimes used as paving © OCC



Overflow burial grounds were sometimes acquired by parish churches to help with the problems of overcrowding. The earliest purpose-built burial ground for the Church of England was St George's Gardens, Bloomsbury. It opened in 1714 as the burial place for two new parish churches which did not have adjoining churchyards.

BURIAL GROUNDS

In England, some Nonconformist communities chose interment in separate burial grounds, of which Bunhill Fields in London, opened in 1656, is one of the oldest examples; Jewish and Quaker burial grounds began to be set up soon after. Such burial grounds mostly tended to avoid the more elaborate forms of churchyard monument, but are of considerable importance as they are some of the earliest surviving sites associated with Nonconformists and minority communities.

In the 19th and 20th centuries, some burial grounds (like Putney Old Burial Ground, London) have been closed and turned into public open space. This may have involved the reinterment of remains and the removal or relocation of monuments. The removal of tombstones has been and still is governed by the *Open Spaces Act 1906*.

CEMETERIES

Cemeteries are a particular type of burial ground that developed in Britain from the 1820s. Dismay at the overcrowding of urban churchyards, combined with a romantic desire to commemorate the dead in an Arcadian garden setting, led to the foundation of a number of cemeteries. These were opened as commercial ventures, as at St James's Cemetery, Liverpool (1825) or All Souls Cemetery, Kensal Green, London (1833). Unlike churchyards, cemeteries were originally located at the periphery rather than the centre of communities and followed the Roman model of being outside the boundaries of the city. The scale of the cemetery is usually much larger than churchyards, with average cemetery size in excess of 10 acres (4 hectares). After the initial opening of private cemeteries in the 1830s and 1840s, a second wave of local authority cemeteries was opened from the 1850s onwards. These were run by 'Burial Boards', and offered cemetery burial for all sectors of society, based on the established garden cemetery model of the private companies.

Monuments varied from the grandiose constructions of the Victorian professional classes to the basic headstones of the poor. The huge majority were

mass-produced by monumental masons in granite and imported marble and, although individually they may have little enduring visual or historic interest, their value as part of a group can often be considerable. The Victorian cemetery required high maintenance and, as funds reduced and families (who are responsible for the upkeep of their monuments) dispersed, neglect became sadly apparent.

In the 20th century burial monuments tended to be less grandiose than those from the Georgian and Victorian eras; there was a move towards more modest, uniform and minimal markers in a natural setting such as the lawn cemetery. More recently, local authorities have come under pressure to reduce expenditure and, following recommendations from the Audit Commission, a programme of removal of headstones and monument clearance has been undertaken.

Although the constant use and introduction of new elements are part of their ongoing historic interest, the majority of old cemeteries have been subject to successive waves of alteration that have sometimes compromised their historical value. Changes might include modifications in the use of the cemetery and the introduction of revised policies, resulting in actions like the removal and laying flat of monuments, the planned reuse of monuments and adaptations for modern burial, such as within natural woodland. Often this has resulted in a mix of landscape types in which features of the original site have been incorporated.

WAR CEMETERIES AND WAR GRAVES

The care of monuments of those killed in the two world wars comes under the remit of the Commonwealth War Graves Commission (CWGC) established in 1915. Some of these monuments are found in parish churchyards, others in municipal or private cemeteries often as dedicated war-grave plots. In addition, there are a few military cemeteries that also contain non-world war service burials.

The diversity of locations, situations and circumstances relating to these sensitive and dignified burial grounds, which are often used for commemorative ceremonies, demands a special approach to their care, conservation and maintenance. This is organised by the CWGC – sometimes through their own staff but mainly through agreements with local authorities, churches, interest groups, individuals and contractors.



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IMAGES:

06: Chapel Grove Jewish Cemetery, Urmston, founded in 1890, is one of several Jewish cemeteries in the Greater Manchester area © English Heritage. NMR

07: In the Quaker burial ground at Almeley, Herefordshire, set behind the Meeting House, the monuments are all of uniform size

and the inscriptions are restricted to the name and dates of the deceased © Kit Byatt, Almeley Wooton Local Quaker Meeting

08: The land for Putney Old Burial Ground was given to the parish in 1763 when the burial grounds around the church had become inadequate. It was closed in 1854 when the Putney Vale Cemetery

opened. It is now designated as a public open space. It contains some 18th-century listed monuments that are in the care of the local authority © OCC

09: Kensal Green Cemetery is still in use as a place of burial, and was one of the first wave of commercial cemeteries opened outside the city. © OCC

10: Dedicated war cemeteries, such as this one at Armley Cemetery, Leeds, are generally well maintained and are the centre of annual commemoration © OCC

3 Monuments

Although the sanctity of many historic burial sites may have diminished, they remain places that reflect the history of former public attitudes to death and commemoration. Surviving monuments reflect social history, craft skills, the development of transport, availability of materials and changing methods of manufacture.

They vary considerably in size, type, construction and design; from gilded, canopied tomb chests using imported marbles to plainly inscribed headstones made from locally sourced sandstone. This diversity, from opulence to more provincial or restrained styles, has included an important legacy of sculpture, often carried out by notable sculptors of the day. Despite the heavy emphasis that is often given to the more elaborate monuments in burial grounds, it should be remembered that the principal 'customer' was usually the mass of urban poor, who were either unable to afford monuments or forbidden to erect them due to regulation or restriction. Any remaining material evidence of pauper graves is therefore of particular value.

The level of expertise needed for the care and maintenance of each monument differs according to its complexity of construction, materials and location. Although individual assessment is therefore essential, the principles, approach and practice required are broadly the same for each case.

TYPES OF MONUMENTS

The following list describes the main categories of monument types that exist within burial sites:

Marker stones may be evident both at the 'head' of the grave and at the 'foot'; they are rarely decorated and may contain only the name and dates of the deceased.

Headstones contain an incised inscription and often a decorative, low-relief motif such as a cross. Varying in size and thickness, they are sometimes accompanied by kerbstones (delineating the boundary of the grave), but these have often been lost or removed during clearance schemes. Traditionally headstones are simply set into the ground, but from the 19th century onwards were often inserted into concrete foundations.

Ledger slabs are inscribed stone slabs, with the deceased interred below. They are used as floor markers within the church and in a graveyard they are set level or just above the ground. A variation is the coped stone or bodystone, whose curved form, sometimes raised on to a low base with chamfered sides, is an imitation of a grave mound.

Tomb chests are four-sided monuments, usually rectangular in plan, with a top slab. Although internal examples often support an effigy, this is rare outside a building. Tomb chests are usually hollow, with the panels (often decorative and incised) fixed at the corners with metal (usually iron) cramps. However, there are also examples where the panels are fixed to brick core walls. Pedestal tombs are of similar construction but square or round in plan. Table chests (or table tombs) are similar to tomb chests, with the main horizontal slab supported by legs or columns.

Allegorical sculpture includes symbolic representations such as crosses, obelisks and broken columns. Figurative angels and mourners are other examples often found in Victorian cemeteries.

Graveboards are wooden panels bearing the inscription and erected along the length of the grave in areas where stone was not readily available. They were supported at either end by upright posts. Very few of these survive.



IMAGE:

II: Headstones, such as this one at Kensal Green Cemetery, constitute the majority of churchyard and cemetery monuments © OCC

IMAGES:

12: An example of a ledger slab at Kensal Green Cemetery. These are easily obscured by vegetation © OCC

13: A tomb chest in Putney Old Burial Ground. Tomb chests were designed in a large variety of architectural styles and with varying degrees of embellishment © OCC

14: An allegorical sculpture in West Norwood Cemetery. More common sculptures (such as inverted torches, half columns) were symbols of death but some of the grander monuments had sculptures that by posture and clothing reflected mourning or the virtues of the commemorated © Mr David March. Source English Heritage. NMR

15: Mixbury, Cherwell, Oxon, contains a rare example of a graveboard, very few of which survive © Mr Alistair Nisbet. Source English Heritage. NMR





Inscriptions not only commemorate the deceased, but are also often a source of social commentary and artistic merit in their own right. They vary greatly in their font type, style and execution and may be incised or proud of the surface, and can be gilded, painted or filled with metal, usually lead.

MATERIALS

Traditionally, gravestones and monuments within historic churchyards and graveyards used local building materials, especially stone. However, the development of cemeteries was reflected in a change to a more diverse range of materials and more flamboyant artistic expression.

Although stone is the predominant material used for monuments, brick, terracotta, artificial stone, cast iron, bronze, lead and wood have also been used, either separately or in various combinations.

Consequently, when planning any conservation work to monuments, it is essential that the materials are correctly identified and their condition accurately assessed. Expertise is required to understand the distinct physical and chemical properties of each material, their reaction to agents of decay and the effect of any remedial treatment on them.

STONE

England has an abundant and varied legacy of stone. Indigenous limestones, sandstones, slates and granites, as well as imported marbles, are all frequently found in burial sites.

Limestone: a sedimentary rock, largely comprising calcareous (calcium carbonate) shells that have been laid down and compressed over millions of years. Found predominantly in the midlands and south of England, the colour and texture of limestone varies considerably from the even, fine texture of pale grey Portland, through to the rich, warm yellow open texture of Ham Hill.

Sandstone: a sedimentary rock, found predominantly in the north and west of England but used for monuments in all areas of the country. Mineral constituents differ though it normally has significant silica content. Sandstone varies considerably in texture, durability and colour – from deep red, to pale cream, through to blue/grey.

Marble: a metamorphic rock, has a close-formed matrix comprised predominantly of calcium carbonate, with mineral inclusions imparting colour. It was only the wealthy who could afford imported marble for the production of grand internal monuments but it became more widely available as the industry expanded. In particular, Italian white Carrara marble, with its purity of colour and fine-grained texture, was ideally suited for detailed carving. There are no true marbles from England, only limestones, such as that from Purbeck that can be polished.

IMAGES:

16: Incised lettering is the most common form of inscription. Setting out and style vary and depend on the qualities of the local stone as well as on the skill of the craftsman © OCC

17: Paints and occasionally other materials (such as pitch) were used to highlight the lettering © OCC

18: Because of its malleable qualities, lead was ideal for beating into the incisions in the stone. In some cases (such as the inscription illustrated here) the letters were left proud. Usually small holes were drilled into the stone to provide a key for the lead © OCC

19: Limestone headstones at St Mary's, Fowlmere © Mrs Charmain Hawkins. Source English Heritage. NMR

20: A sandstone headstone at Howden Minster © OCC

21: A marble monument in Highgate Cemetery © English Heritage. NMR

22: A slate headstone in Kensal Green Cemetery © OCC

23: A granite monument in Kensal Green Cemetery © OCC



Slate: a metamorphic rock, which is naturally found in several regions within England. At one time the midlands contained many slate quarries – these are now redundant, but sources in Cumbria and Cornwall are still active. It is extremely durable and fine in texture, which makes it particularly suitable for incised lettering and detailed carving.

Granite: a coarse-grained igneous rock mainly formed of quartz, feldspar and mica crystals, which provide the attractive flecked colour combinations, varying from pink to grey. It is naturally found mainly in Devon, Cornwall and Scotland. Granite is extremely dense and hard, making it laborious to cut using hand tools, but it is durable and can take a fine polish. Granite monuments tend to be monolithic and are rarely finely carved.

METAL

Iron: a durable, adaptable, and relatively economic material made iron a popular material for the decoration and construction of monuments. From the 18th century onwards, public concern about the theft of corpses from fresh graves (for the purpose of anatomical investigation) led to the erection of protective enclosures comprising railings or posts and chains. The development of industrial production processes in the 19th century made iron more widely available and enabled designs to become more refined. Many of the railings were removed and recycled during the Second World War.

The two main types of iron encountered in monuments are 'wrought' and 'cast'. Wrought iron is forged by heating it and then pounding it into shape on an anvil. It is malleable and can be distinguished from cast iron by techniques of its manufacture – the ends are often tapered and individual units are fused together or secured to each other by using a metal collar or riveting.

From the 18th century cast iron became more popular because of the ease and economy of mass production. It is made by heating the ore until molten, pouring it into a mould and then removing the cast once it has cooled. Cast iron is more brittle than wrought and individual units can only be joined through soldering or brazing.

Bronze: a composite material formed from copper and tin that is used primarily as applied ornament to monuments. Colour will vary due to applied patination and/or weathering; corrosion products such as copper sulphate (verdigris) are common.

Lead: an extremely soft, flexible metal, which is both its appeal and its weakness. From the 18th century lead statuary, reinforced with iron armatures, became popular but it is most commonly found as applied lettering to monuments. The lead is either tamped into

incised letters and then cut flush with the surface or pre-cast. In both cases, the lead is held in place by being tamped into holes pre-drilled into the stone.

OTHER MATERIALS

Terracotta: a clay-based material, which can be cast and modelled into detailed forms. High-temperature firing produces a relatively impervious 'fireskin', which makes this material resistant to weathering. The most notable example is Coade stone, fired clay similar to terracotta, which first became available in 1769. However, due to high cost, mass production of memorial pieces never became established and so the material was not widely used.

Artificial stones: examples of these materials are occasionally found in burial sites. There was great interest and advancement in the manufacture of imitation stone composite mixes during the 18th and 19th centuries and this resulted in a number of patents (for example Pulhamite – the history and conservation of which is described in English Heritage's *Durability Guaranteed*)

Wood: generally used in areas where stone was not easily available. Oak was the most frequently used due to its availability and durability. Even so, there are few historic examples left.

Painted surfaces

Monuments were sometimes painted for embellishment or to provide protection to underlying materials. Inscriptions could be highlighted with paint, and cheaper and more readily available materials were sometimes decorated to imitate more luxurious and expensive ones. Paint types vary and in some cases may contain toxic white lead compounds. It is likely that original paints will have been worn away or over-painted, but some may remain and should be analysed to establish the type(s) and colour(s) of paint present so that any treatment will be appropriate.



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IMAGES:

24: Iron railings were often used to prevent access to the grave. However, in this case in Putney Old Burial Ground, the cast-iron surround seems to be principally decorative © OCC

25: Bronze embellishments on a monument in Kensal Green Cemetery © OCC

26: An example of lead sculpture on a monument © Mr Graham Pierce. Source English Heritage. NMR

27: A terracotta monument at Escomb Cemetery, County Durham © English Heritage. NMR

28: A Coad stone monument in Putney Old Burial Ground © OCC

29: A wooden cross (restored) at St Mary and St John, Cowley, Oxford © Oxfordshire Family History Society

4 Deterioration

All materials decay, especially when exposed to the harsh effects of prolonged weathering. However, the rate of deterioration of a monument will vary according to the material, the method of construction, the degree of exposure and the prevailing environment. For any monument, assessment of these factors and identification of the mechanisms of decay are essential to its preservation. Incorrect diagnoses can lead to costly and ineffective interventions which may cause lasting damage.

Common factors affecting the construction, deterioration and maintenance of monuments are:

- material properties and decay characteristics
- structure
- inappropriate treatments

MATERIAL PROPERTIES AND DECAY CHARACTERISTICS

STONE

Stone monuments are subject to a variety of decay mechanisms, which can be categorised as chemical, physical and biological. As they are exposed and susceptible to ground conditions, moisture plays a significant part in any deterioration.

Chemical

- *Disruption through soluble salts* – Ground water in burial-site soils is rich in dissolved salts derived from the natural degradation of plant materials and the decomposition of human remains. Since many stones are buried in the ground, they act as wicks for the ground water; as this evaporates (usually in an 'evaporation zone' that occurs up to 1 metre above ground) salts will appear as crystals, often white in colour – this is generally referred to as efflorescence. When salts crystallise beneath the surface within the pore structure of the stone, internal stresses are created leading to the weakening and loss of stone. Repeated wetting and drying exacerbate this process by causing salts to go in and out of solution.
- *Attack from pollution* – Some atmospheric gases, such as sulphur dioxide, nitrogen oxides and ozone, can cause decay of stone surfaces. The effects are associated with the formation of gypsum (calcium sulphate), a mineral that is more water-soluble than the carbonate minerals from which it is formed. Marbles and limestones are particularly sensitive to chemical attack from acids formed by the combination of pollutant gases and water. This is most evident in the way that the marble surface loses its polish. On older marble and limestone monuments, this leads to erosion of details, the loosening of grains ('sugaring'), and the formation of black weathering



IMAGES:

30: This monument shows the loss of detail and powdering of the surface caused by salt crystallisation © OCC

31: Marble in particular is affected by repeated wetting and drying, which weakens the bond between the grains of stone and leads to sugaring of the surface © OCC

32: Limestone is susceptible to the formation of a black crust of calcium sulphate, particularly in a polluted environment © OCC

crusts. For sandstones, a brittle and less-permeable surface crust is formed – this eventually exfoliates and is often referred to as ‘contour scaling’.

Physical

- *Degeneration of natural rock formation* – Sedimentary rocks, such as limestone and sandstone, are formed by the deposition of particles, which build up in layers termed ‘beds’. For any construction, the direction of these masonry beds is extremely important since weathering takes advantage of the natural weaknesses between them and can lead to delamination of the stone. In most cases, stone should be placed so that its natural bedding plane is perpendicular to applied forces or weathering. Headstones, however, because of the height required, are normally edge-bedded with their bedding planes parallel with the face. This makes them susceptible to lamination, which in turn leads to loss of inscriptions and surface details.

Slate is extremely durable and may remain sound even in the most inhospitable situations, but, as a material, it is still susceptible to lamination. Granites, too, are very resilient and polished surfaces have been observed to last more than a century. Even so, these can deteriorate through the breakdown of their silicate minerals.

- *Freeze/thaw activity* – Most processes of stone deterioration are associated in some way with the transport and action of water. Monuments in burial sites are constantly exposed to moisture through capillary suction from damp soil (‘rising damp’) and through precipitation. Thus, it is possible for the stone to be saturated and when this water freezes, it can create a bursting pressure within the pores. This freeze/thaw cycle can be repeated many times each winter, leading to crumbling of the surface and the gradual disappearance of details such as inscriptions. Changing climatic conditions may mean that freeze/thaw will tend to occur less regularly.

Biological

- *Trees and shrubs* – These are a very common cause of decay and damage to monuments. On a large scale, plants and climbers can engulf a monument, prevent the evaporation of moisture and attach themselves to vulnerable surfaces. Woody species, such as *Buddleia*, cause physical damage by establishing root systems within joints and then pushing elements of monuments apart. Creeping plants, such as ivy or Virginia creeper, are tenacious and can both cause physical damage as well as trap moisture and cause staining on the surfaces. However, many non-woody herbaceous plants cause no problems and indeed often add to the character of the burial ground.
- *Lower plants* – The discolouration and patina caused by the presence of microbiological growth such as bacteria, moulds, algae and lichens often add to the mellow and aged appearance of burial sites. Excessive colonisation can obscure inscriptions and some growths secrete acidic deposits, which, in the long term, may lead to slight deterioration of the stone surface.

Some individual species are protected by law and many burial grounds are also valued wildlife habitats and may be designated. Further information on wildlife interests is available in English Heritage’s *Paradise Preserved*.

METAL

Iron

If regularly maintained, iron is extremely robust. However, lack of routine painting (with suitable paints such as those based on micaceous iron oxide) will expose the metal to moisture, which causes corrosion, in the form of rust. This is observed initially on the surface of the metal, but after prolonged exposure it can lead to disintegration. Corrosion of wrought-iron cramps



IMAGES:

33: Lamination is commonly observed with sandstone when the natural bed runs vertically, as can be seen in this example © OCC

34: Monuments make perfect supports and seed beds for higher plants © OCC

35: Monuments are host to a vast array of lichens, mosses and algae, which are considered an integral part of their appearance © Mark Seaward

causes exfoliation and expansion of the forged strata of the metal and this can lead to fracturing and disruption of the adjacent stone (or other brittle elements).

Bronze

Bronze is extremely resilient and corrosion is usually superficial and caused by chemical reactions between the constituent metals, moisture and pollution. The run-off from bronze causes deep-seated staining to porous stone surfaces beneath. Structurally, disruption of bronze elements is usually caused by corrosion of internal iron fixings.

Lead

Lead statuary is prone to splitting as a result of the corrosion of iron armatures. Lead is also susceptible to deformation, or 'creep', whereby it slumps under its own weight. Lead lettering can become detached and it has also been known to be attractive to some birds; removal and pecking marks are not uncommon.

OTHER MATERIALS

Ceramics

Fired materials such as brick and terracotta have a 'fireskin' that affords virtually impervious resistance to weathering. However, if this barrier is breached, moisture will penetrate easily and can cause decay.

Wood

Exposed to rainfall and ground moisture, wooden monuments constantly contain some level of moisture, but if this is above 20 per cent then there is enough free water for micro-organisms, in particular fungi, to grow and cause decay. The most common of these are dry rot (*Serpula Lacrymans*) and wet rot (*Coniophora puteana*), which break down the lignin and cellulose fibres of wood, resulting in the formation of various sugars. These provide food for the larvae of different insects. The structure of wood can also be destroyed by infestation by wood-boring insects such as death-watch beetle (*Xestobium rufovillosum*) and woodworm or furniture beetle (*Anobium punctatum*).

STRUCTURE

Inappropriate design or detailing of monuments can mean that water does not run off and can be responsible for structural problems as well as staining and erosion of the surface. As water is the main cause of the corrosion of iron fixings, ingress into the monument can lead to displacement, cracking and even loss of stone panels.

Ground subsidence can cause a monument to lean, subside or collapse. The movement may be due to insubstantial foundations or no foundations at all, disturbance from tree roots, excavation by burrowing animals or collapse of coffins and vaults. Depending on the construction of the monument, deformation of the structure can lead to point loading and cause spalling and fracturing of the stone. Another side effect is the opening of joints, which will allow plants and vegetation to take root.

Impact damage, vandalism or theft of part of the monument can also cause structural problems.

INAPPROPRIATE TREATMENTS

Stone and brick are generally relatively soft and porous materials. If they are repaired or their joints pointed with hard, impervious mortars (such as those based on a cement binder), then moisture is unable to evaporate and this will lead to decay of the stone or brick. Similarly, the application of impervious protective coatings (such as 'sealers') can, after exposure to weathering, cause flaking of the surface.

Removal of biological growth such as lichens, using even gentle means, may be well intentioned but is often damaging and should generally be avoided. Aggressive cleaning methods should always be avoided as they can cause the etching, roughening and discolouration of stone and metal surfaces, which will in turn lead to accelerated decay.



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IMAGES:

36: Iron cramps corrode and can expand by as much as up to seven times their original volume. This causes stresses that can only be relieved by disruption or breaking of the stone elements © OCC

The early signs of corrosion are breaks in the corners of the stone panels and lifting of the top © OCC

37: Chest monuments are held together by iron cramps and are particularly susceptible to damage from the corrosion of the iron.

38: Atmospheric corrosion of bronze results in the formation of copper carbonate that will migrate into and stain adjacent stone and marble © OCC

39: Lead lettering is usually secured using small holes drilled into the stone as a key. In this example the letters have either been removed or stolen but the evidence for their presence remains © OCC

set into the ground to insufficient depth. Despite this, it still remains stable © OCC

40: This monument at the Church of St Mary, East Lydford, is leaning either because of changes in ground condition or because it was

41: This severely disturbed memorial in Kensal Green Cemetery still retains support at each corner but the panels have fallen inwards. It gives a good idea of the typical construction of a chest monument © OCC



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IMAGES:

42: At Nunhead cemetery the total collapse of one monument is only prevented by the size and stability of the adjacent monument. In such cases, the collapse of burial vaults or coffins can be the cause of the subsidence © Clara Willett

is entirely inappropriate. As well as being a poor colour match, the cement will lead to decay of the more porous stone. Cracks between it and the stone will also allow moisture ingress © OCC

43: The use of rigid cement pointing on this monument at the Church of the Holy Cross, Babcary,

44: Cement has been used to adhere fractured elements of this column in Putney Old Burial Ground, and the cementitious

pointing to the adjacent joint has cracked, allowing vegetation to become established © OCC

45: As can be seen on this example from Kensal Green Cemetery, coatings applied to monuments are rarely successful as the presence and movement of moisture will tend to cause disruption of the surface © OCC

46: It is perhaps an understandable desire for descendants to want to clean monuments (and particularly the inscriptions) to their relations. However such interventions should be avoided as they can lead to more lasting damage to the monument © Monument Conservation Collaborative

5 Legislation

HEALTH AND SAFETY

RESPONSIBILITIES FOR THOSE WHO OWN AND MANAGE BURIAL SITES

Responsibility for safety within a burial site lies with the owner and management. This would usually be a local authority, congregation (through for instance the Parochial Church Council) or faith group responsible for the site or, in a small number of cases, a private owner. If the site is no longer used, then this responsibility is often divested to the local authority.

As a result of well-publicised accidents and fatalities in the past 5 years, there is an increased awareness about public safety and the potential dangers especially of large headstones and monuments. This has been debated in the House of Commons and is the subject of recent advice from the Ministry of Justice developed by the Burials and Cemeteries Advisory Group (*Managing the Safety of Burial Ground Memorials – Practical Advice for Dealing with Unstable Memorials*). This recommends that monuments considered to be potentially hazardous are the subject of periodic and appropriate inspections and risk assessments.

The overall risk is likely to be low and the frequency of assessment and any inspection needed to support it will be determined by the findings of existing assessments and consideration of local factors. Details of carrying out risk assessments are outlined on p 25.

OWNERSHIP AND RESPONSIBILITY FOR INDIVIDUAL MONUMENTS

Ownership of the monument lies with the descendants of the person(s) to whom the monument is dedicated. If work needs to be carried out, then every effort should be made to contact the owner to inform them of the nature and cost of the necessary works.

It is essential that notification of works is widely publicised so as to inform as many people as possible and to allow any owners or interested parties to come forward. Once notified, it is the responsibility of the monument owner to maintain the monument in good condition. However, if owners or descendants cannot be traced (which is quite likely in the case of historic monuments) then those who have responsibility for the burial site must take the necessary action.

PRACTITIONERS' RESPONSIBILITIES

Practitioners are legally liable for the work that they carry out and it is recommended that their work complies with current standards and other best-practice philosophies and guidelines, such as those outlined in Section 8.

Under the *Health and Safety at Work Act 1974*, it is also the responsibility of the practitioner (including the self-employed and burial authority employees) to ensure the safety of those who could be affected by their acts or omissions.

The *Management of Health and Safety at Work Regulations 1999* require the contracted practitioner to assess and control the significant risks arising from their work activities.

STATUTORY DESIGNATIONS

Various statutory designations can be applied to burial sites and to their associated buildings and monuments in recognition of their historic or architectural interest, their importance as historic landscape designs or wildlife habitats, or their amenity value. Designations highlight special importance and provide safeguards for conservation management. Protection through statutory designation is outlined in English Heritage's *Paradise Preserved* (pp 2–18).

If work is planned to any monument, those responsible for the churchyard or burial ground need to consult the local planning authority to find out if the monument is listed or scheduled. If so, then Listed Building Consent or Scheduled Monument Consent will be required before any work can start.

In addition, consecrated Church of England sites are governed by ecclesiastical law, which requires a faculty to be granted by the diocesan chancellor in order to carry out works within an Anglican church or its churchyard. Roman Catholic, United Reform Church, Methodist and Baptist congregations should consult with their own authorities to see whether an equivalent permission is required in addition to other statutory consents (see www.helm.org.uk).

6 Management

The management of historic monuments should be seen as an integral part of the overall management of the burial sites, which often have diverse historic, cultural, aesthetic, wildlife and amenity values. These interests need to be balanced with the function of the site as an operating burial ground. A Conservation Management Plan provides a structured approach to the assessment and management of an historic burial site and is a useful tool for assessing what matters and why, and then deciding what needs doing and how to go about it. It is a formal way of doing what common sense dictates and should be commensurate with the size of the burial site, the number of monuments and the resources available. Details about Conservation Management Plans are outlined in English Heritage's *Paradise Preserved* (pp 19–27).

The guidelines issued by the Ministry of Justice (*Managing the Safety of Burial Ground Memorials – Practical Advice for Dealing with Unstable Memorials*) provide a suggested approach to managing monuments, carrying out risk assessments, evaluating the risk and deciding on precautions. It reinforces the need for recording and implementing decisions and for communication of the process to all interested parties.

PRIORITISATION OF WORK

The Conservation Management Plan should include priorities for attending to monuments in the short, medium and long term.

Short term

- drawing up inventories to establish the number and type
- carrying out a condition survey and risk assessment
- undertaking emergency work to monuments whose condition is hazardous
- ensuring that routine maintenance is carried out (see p 27)

Medium term

- undertaking specified repairs, with priority given to listed monuments and structures because of their special interest
- monitoring the condition of monuments in order to identify those that are actively deteriorating

Long term

- monitoring their condition
- undertaking further repairs as they become necessary

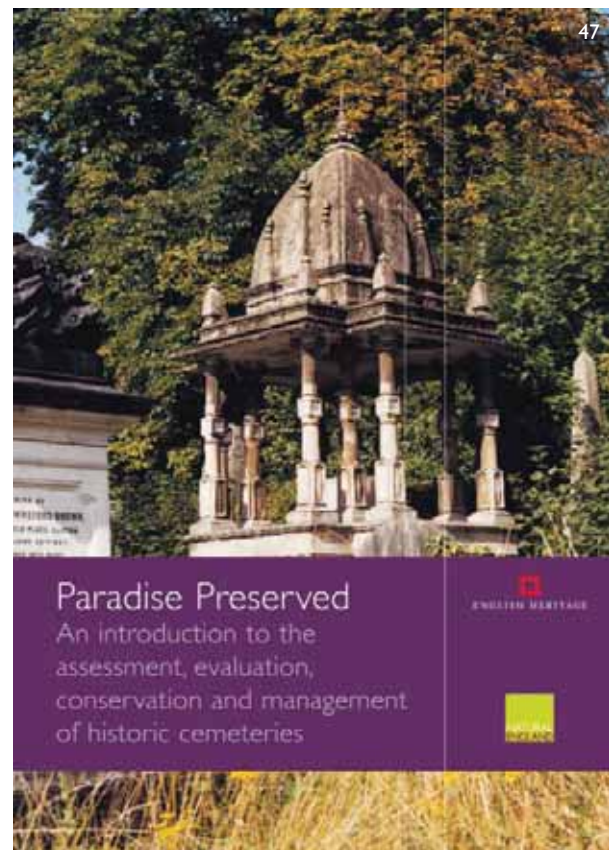


IMAGE:

47: The publication *Paradise Preserved* (2002, 2007) provides advice on the management of historic cemeteries, emanating from a Parliamentary Select Committee Inquiry into this issue (2001) © English Heritage

7 Inspection and assessment

INSPECTION SURVEY PROCESS

The inspection survey is a critical part of the Conservation Management Plan that determines the need for any practical interventions. Ideally all historical monuments should be inspected but realistically, it may be that only those that are identified as being significant or that are clearly deteriorating need be surveyed.

An initial 'sweep survey' is a swift inspection that can quickly identify the principal monuments or groups of monuments that fall into these categories and can assess any essential and urgent work that needs to be carried out. A fuller survey can then provide baseline data for periodic re-inspection of these monuments and for monitoring the effects of conservation treatments. Within Church of England sites, monuments are inspected by the architect or surveyor (appointed by the Parochial Church Council or Diocese) as part of the quinquennial survey.

Regular re-inspection is the best means of determining if change over time is affecting the stability of the monuments. Necessary repairs can then be planned before instability occurs, preventing unnecessary damage or loss and minimising additional expenditure.

DOCUMENTATION

The compilation, storage and retrieval of information are essential to the care of historic monuments and should be part of the Conservation Management Plan. The collation of information may, depending on the number of monuments involved, require assistance from a number of people.

SITE PLANS

Site plans, photographs and other archival information may already exist in the archives of the burial authority or local authority. All Church of England churches should have and should maintain an accurate churchyard plan. Any existing records should be checked for accuracy and amended as required. Original plans often do not show monuments, but rather delineate family plots and other areas of ownership or jurisdiction. However, they can form a template upon which supplementary information can be built.

If such records cannot be found or do not exist, then a preliminary survey is needed to provide a plan of the burial site showing the position of existing monuments and other relevant features. It is possible to create a plan using a number of methods from simple sketch to detailed plotting using GPS equipment.

INVENTORY

Any inventory of the monuments should include, as a minimum, details of their location, dimensions, description and the materials of construction. Inscriptions should also be recorded since they are particularly susceptible to loss through surface erosion and damage. Any designations or statutory protection should also be noted.

A fuller inventory of the monuments should include outline condition reports, drawings and supporting photographs as well as art-historical details such as the designer, the builder or, in the case of statuary, the sculptor. For larger cemeteries and burial sites, it may be impractical to undertake a survey for all monuments, only those of historical significance need be recorded.

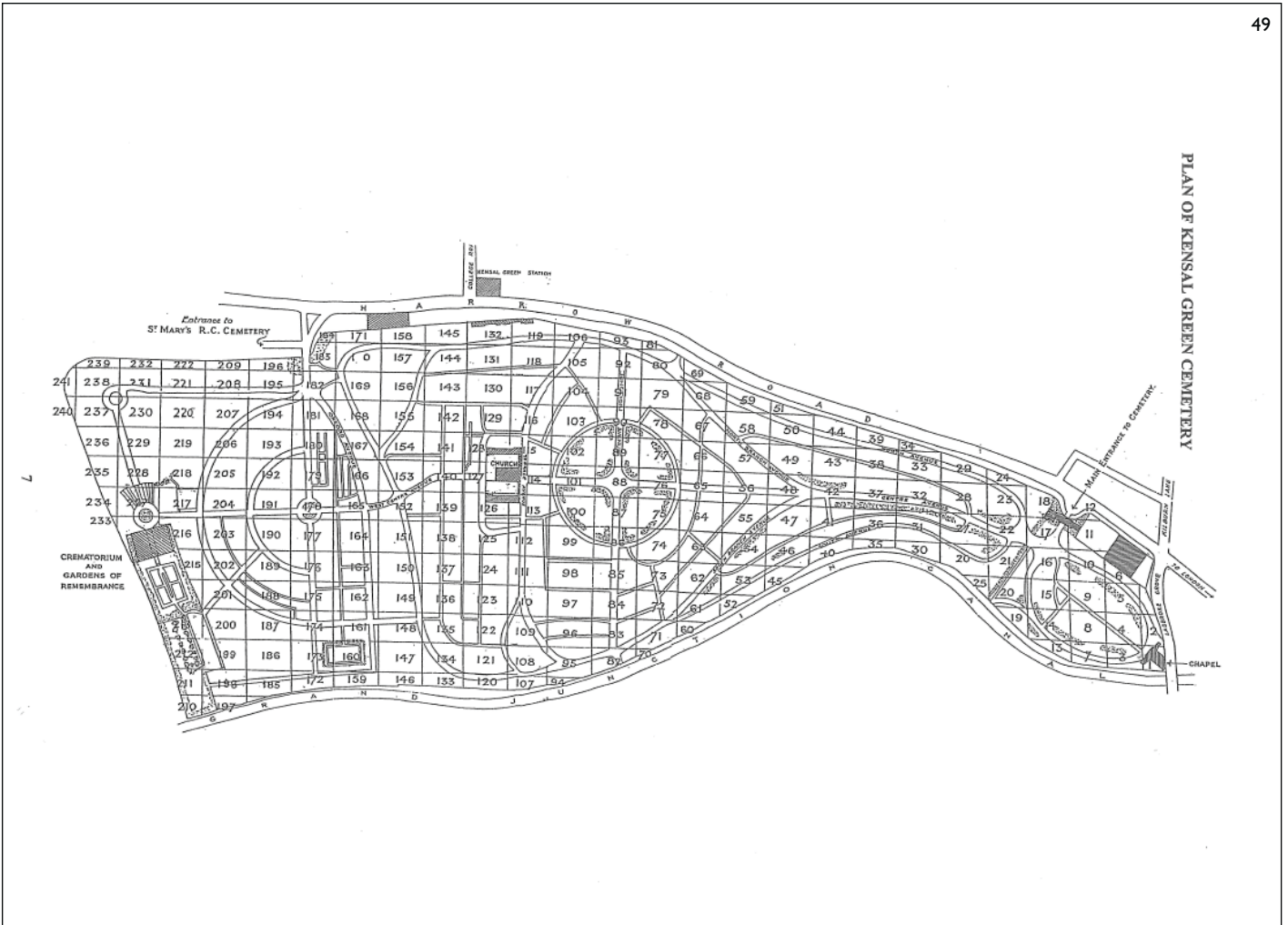
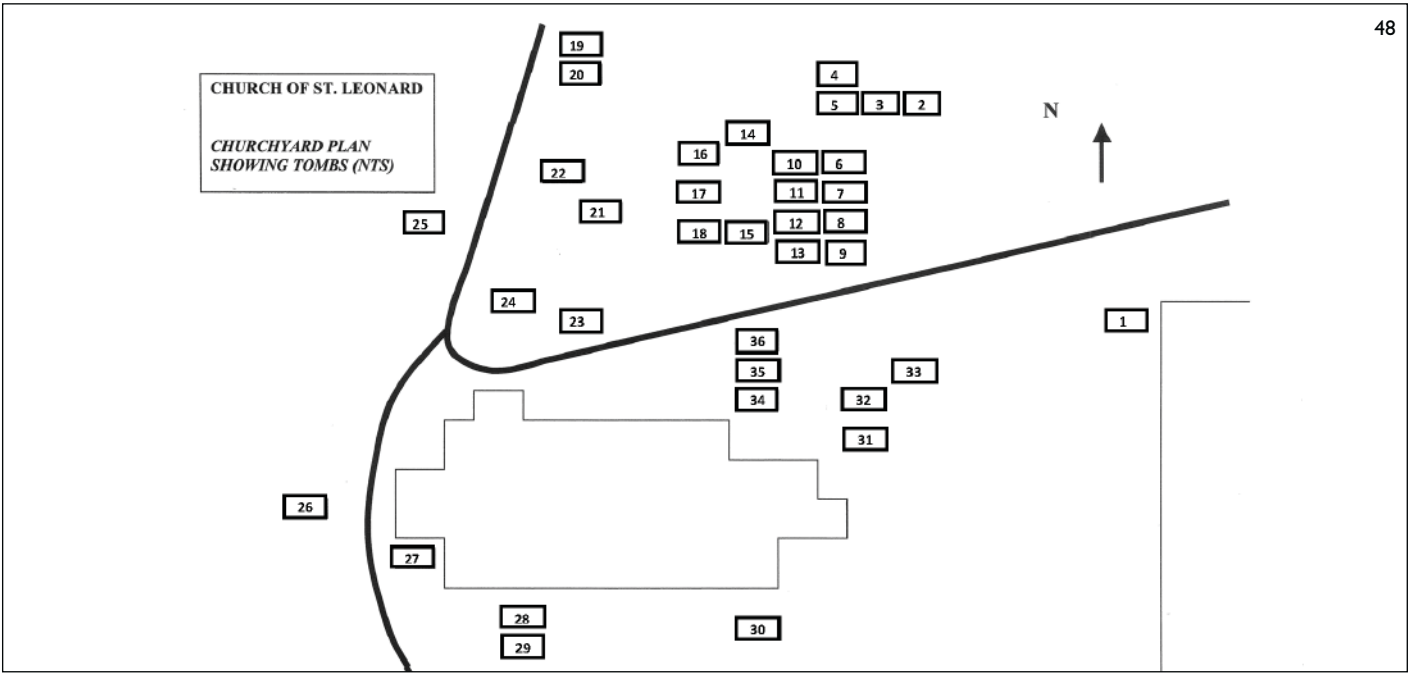
It is useful to have a standard format for recording the details of each monument, which will make recording swifter and ensure continuity of information collected. An example of such a format, with explanatory notes, is shown on pp 23-4 (available as a download at www.english-heritage.org.uk/publications).

PHOTOGRAPHIC RECORDS

Photographs should show the monument as a whole and also focus on any particular problems so that the records can be looked at a later stage to assess any further deterioration.

ARCHIVING RECORDS

Collected information (such as reports, plans and photographs) needs to be safely stored, ideally with the site owner or authority, so that it can be easily accessed for reference and to inform future specification and work. If it is saved in a digital format, it is imperative that the disks are appropriately stored and regularly backed-up. A growing number of companies offer services to digitise graphics and records, resulting in comprehensive information storage and retrieval systems.



IMAGES:

48: A site plan can be hand-drawn and need not be to scale as long as it allows individual monuments to be identified © OCC

49: Larger more crowded cemeteries will require more formal site plans, often divided into a grid system. This will need to be read in conjunction with the inventory of monuments © Kensal Green Cemetery

Proforma Condition Report



ENGLISH HERITAGE

NAME OF BURIAL SITE

ADDRESS

IDENTIFICATION	Name (of earliest burial)		Others commemorated	
	Location ^a	Dimensions (in mm) ^b Height: Width: Depth:		Type
	Date of earliest death	Designer/sculptor/mason ^c		Any existing reference
	Designation ^d	Orientation of monument and inscribed faces		
DESCRIPTION	Technique of inscription ^e		Principal materials Limestone Granite Marble Brick Slate Sandstone Bronze Other:	
	Previous interventions ^f			
STRUCTURAL CONDITION	Overall structural condition <i>Sound</i> <i>Tilted (include angle)</i> <i>Disruption/separation</i> <i>Fallen</i> <i>Collapsed</i> <i>Laid flat</i>		Ground condition <i>Good/level</i> <i>Subsidence</i> <i>Collapsed vault</i> <i>Soft soil</i> <i>Other:</i>	
	Condition of foundation (if visible)		Type and effect of plant growth	
MATERIAL CONDITION	Types of deterioration <i>Loose elements</i> <i>Missing elements</i> <i>Cracking</i> <i>Damage from cramps</i> <i>Disruption</i> <i>Open joint/cracked pointing</i> <i>Other:</i>		Surface condition <i>Surface dirt</i> <i>Accretions/deposits</i> <i>Graffiti</i> <i>Delamination</i> <i>Powdering/spalling</i> <i>Eroded</i> <i>Organic growth</i> <i>Other:</i>	
	Condition of inscription ^g			
SUMMARY	Photographs ^h		Priority for repair ⁱ 1 2 3 4	
	Maintenance issues ^j			
	Date of inspection	Inspection carried out by		Date for re-inspection ^l

This form is designed to provide sufficient information on a monument to allow for the prioritisation of any repairs. It should be suitable for all monuments in burial sites. In some cases, particularly for more complex monuments, when this survey identifies problems of deterioration, a further more detailed survey may be required.

Superscript letters refer to the notes below. Boxes that contain italicised alternatives should have one or more of the choices highlighted and, if necessary, additional brief information added.

NOTES

- a The location of monuments should be marked up on an overall plan of the burial site. In many cases, it is best to divide the site into sections so that the location can be a map site reference. In the absence of a plan of the burial site, an accurate description of the location should be included here, for example '20 metres north-west of south gate'.
- b Dimensions should be of the main monument not including kerb sets or other demarcated areas.
- c The name of the designer, sculptor or mason is often written discreetly on the side of a monument at low level.
- d Designations should indicate the grade of any listing.
- e The technique of inscription can include one or more means such as incised, painted, filled, surface-mounted letters, lead lettering.
- f Previous interventions, which may be apparent from an examination of the monument, include descriptions such as cleaned, partially cleaned, repointed, new stone indents, rebuilt, surface repairs and surface coatings. Further information may be available from an archive, architects' records or local knowledge.
- g The inscription itself is not recorded on the condition survey form. Where the inscription is obscured or faint, spraying the surface with water and/or examining it in raking light can sometimes help to ascertain its nature and condition.
- h Monuments should be photographed to show all elevations. For all monuments, this will require a minimum of two photographs (for example front and back for headstones). Specific problems should be photographed separately so that a visual record is available for monitoring that particular condition.
- i The priority of repair and time for re-inspection should be identified using the table below as a guide:

Category	Condition & risk status	Action required	Re-inspection required in
1 (very bad)	Hazardous/unstable	Intervention as soon as possible	Once repaired, after 5 years
2 (poor)	On-going deterioration	Intervention within 2–5 years	Prior to intervention and then after 5 years
3 (fair)	Some decay but generally stable	Intervention may be required in 5 years	After 5 years
4 (good)	Stable	No intervention required	After 5 years

- j Any maintenance that will prevent possible future deterioration of the monument should be identified – for example removal of adjacent vegetation, drainage, nearby subsidence.

CONDITION SURVEY AND RISK ASSESSMENT

The condition survey and risk assessment are critical activities that determine the need for any practical intervention. A visual inspection followed by physical examination should aim to establish factors affecting the condition and stability of the monument. The risks need to be objectively evaluated (for example by using the simple Five Step approach suggested by the Health and Safety Executive – see www.hse.gov.uk) and an order of priority established for any emergency measures or practical intervention.

Provided with a standard checklist for recording the condition of a monument and some basic guidance and training, volunteers can carry out much of the initial survey work. Checks may be required to ensure that there is a consistent level of observation.

Useful guides for recording can be found either in Mytum's *Recording and Analysing Graveyards* (www.britarch.ac.uk) or from *An Introduction to Graveyard Recording* (www.scottishgraveyards.org.uk/recording.shtml)

Following initial observations, further detailed assessment or scientific investigation might be identified – this would require the involvement of the appropriate specialist (for example a conservator or structural engineer).

CONDITION SURVEY

The condition survey should aim to record the following information for each monument and any surrounding kerbs:

- location (including section and grave number if appropriate)
- designation
- dimensions
- monument type and description
- orientation of monument and inscribed faces
- technique of inscription (for example lead filled, incised, painted)
- names, dates of death, dedication
- designer/sculptor etc
- materials of construction
- the condition of the monument, including

the structural condition:

- the position of the monument (for example sound, tilted, falling apart, fallen, collapsed)
- any open joints or cracks.
- any signs of current movement
- the ground conditions (visible subsidence, soft soil)
- the condition of the foundation
- type and extent of deterioration (for example loose elements, open joints, delamination, cracks – including dimensions)
- types of plant growth and their effect

the surface condition:

- soiling
- effect of organic growth
- type and extent of deterioration (for example loose/damaged/eroded areas, missing details)
- condition of the inscription (for example crisp, clear but weathered, partly legible, illegible)

- previous interventions, especially those that have failed
- the person who carried out the inspection
- the date when the inspection was carried out

RISK ASSESSMENT

A monument that is structurally unsound may pose an immediate hazard to burial site employees or visitors, its own survival or the condition of other monuments near by.

A risk assessment should:

- identify the hazard
- identify who might be harmed and how
- evaluate the risk and decide on the precautions needed to reduce this risk
- record the findings and take steps to implement the precautions needed
- review the assessment periodically

Such an assessment is clearly appropriate for those monuments that are in a poor state of repair but for others, a reasonably practical approach will involve

assessment of monuments periodically or when anything changes. It is for the operators to decide on the frequency of this assessment.

It is vitally important that the risk assessment and any associated testing are balanced with the desire to retain historic fabric so that the monument can continue to serve its original purpose in its intended environment.

English Heritage does not endorse the practice of physical testing using 'topple test' devices. In the case of listed or scheduled monuments, no physical testing should take place without consulting the appropriate statutory body.

In general, it is difficult to apply a uniform testing procedure to historic monuments, as they are composed of aged materials, assembled in a variety of ways. The best means of assessing safety in these situations is a combination of detailed inspection, investigation and judgement by experienced professionals.

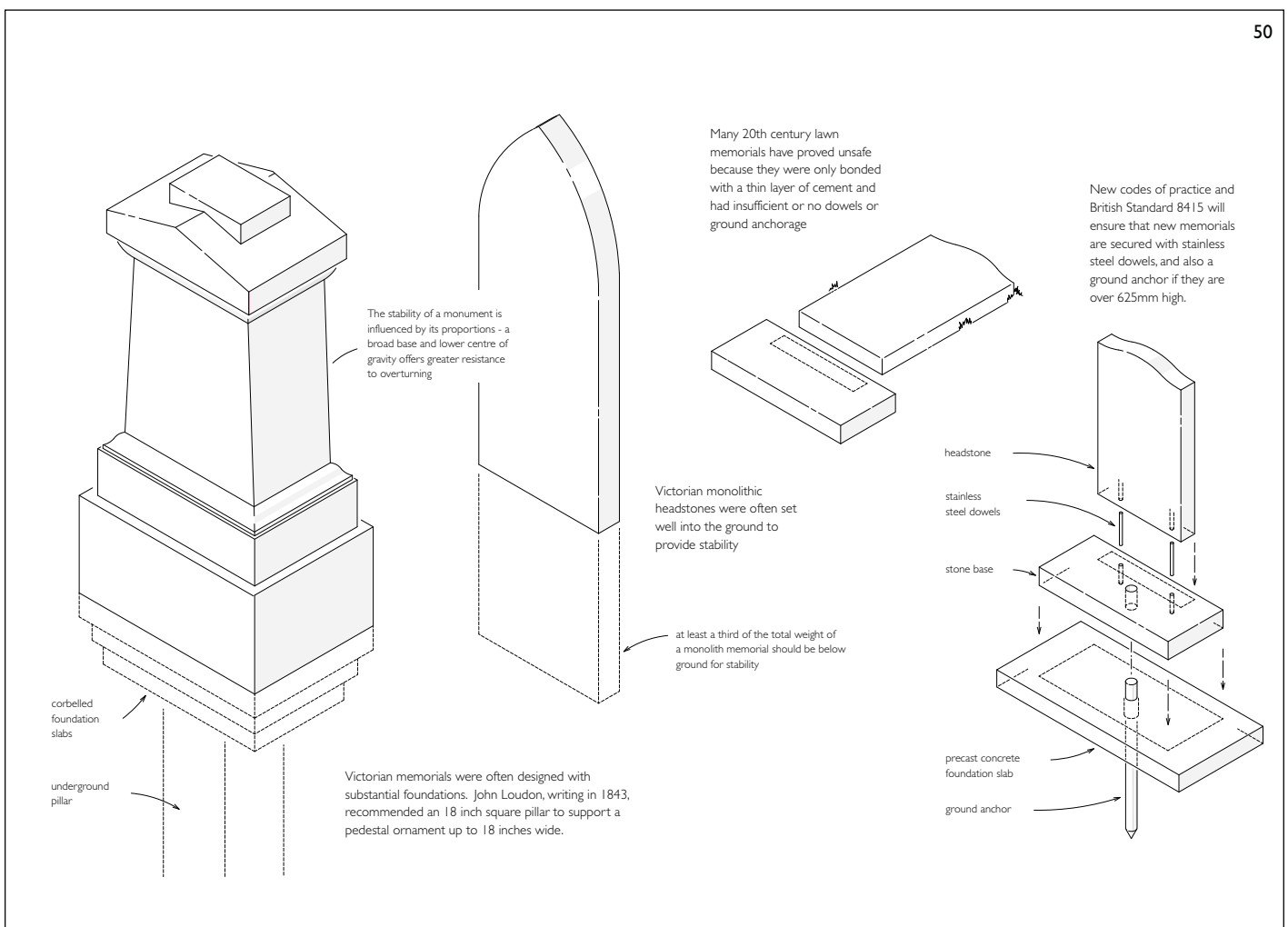
Monuments in historic cemeteries may not be perfectly upright. This can be due to a number of reasons – inadequate foundations, ground movement as a result of subsidence or tree roots, corrosion of internal iron fixings, or separation of individual components.

For headstones, stability can be tested during the initial inspection by applying gentle pressure to the top, working from the side to avoid any chance of injury in the event that the monument is unstable. Observable movement does not necessarily mean that the monument is unsafe and hazardous; it is only an indication that further investigation is necessary. A range of movement might be tolerated depending on the type of structure and ground anchors used, and this will inform the assessment.

Further advice on achieving a balanced approach can be found in the Ministry of Justice guidance: *Managing the Safety of Burial Ground Memorials – Practical Advice for Dealing with Unstable Memorials*.

ILLUSTRATION:

50: Stability of graveyard and cemetery monuments



8 Practical Treatment

ESTABLISHING PRIORITIES

A suitable way of categorising monuments based on their condition is given in Table 1. This uses categories established for the English Heritage 'Heritage at Risk' register.

Category 1 will normally require structural measures to eliminate any associated hazards. Identifying the correct category for any monument is inevitably subjective and the criteria will need to be kept under review. However, these categories can be useful for deciding on an action plan and can be included in both the sweep survey and the condition record.

COMMISSIONING CONSERVATION WORK

DEVELOPING A POLICY ON THE TREATMENT OF MONUMENTS

Once the need for practical treatment to a monument, or group of monuments, has been established and funding is available (see p 39), work can be commissioned. Before this starts, it is essential to obtain the relevant consent for any works, from both the owner of the monument (if they can be traced) and any statutory authorities.

If statutory consent is required (for example if the monument is listed or within the curtilage of a listed place of worship), then the application should include a description of the monument, an analysis of the cause of deterioration and a full method statement of the work to be carried out, with details of the methods and materials to be used. This will have to be drawn up by a conservator, mason or other experienced conservation professional and they should also provide

a budget estimate that will assist in assessing funding requirements. (Guidelines on the production of conservation reports are available at www.churchcare.co.uk).

It is essential that all work is carried out by those experienced in the field of monument conservation. It is highly recommended that burial authorities either maintain a register of persons or companies, who have the expertise and experience for such work or consult existing registers (for example www.conservationregister.com).

ROUTINE CARE AND MAINTENANCE

The best means of long-term preservation is routine care and maintenance, appropriate to the needs of the monuments and carried out by suitably competent personnel.

Good maintenance includes:

- At its most basic level, looking on a regular basis and reporting anything that does not look right.
- Regular updating of the condition survey and reviewing of the risk assessment (see pp 25–6 for details).
- Grass cutting. The maintenance of grass levels in most burial sites relies upon power mowers but these machines can easily damage stone monuments – collisions can cause lateral shifting and/or fractures. Hand-held trimmers, even with replaceable plastic cord, can also damage the surface of softer stones. The use of shears and secateurs to trim grass and plants close to monuments is preferable. Cuttings should always be removed from surfaces of monuments to discourage further plant growth.

Category	Condition	Action required	Re-inspection required
1 (very bad)	Unstable	Intervention as soon as possible	Once repaired, after 5 years
2 (poor)	On-going deterioration	Intervention within 2–5 years	Prior to intervention and then after 5 years
3 (fair)	Some decay but generally stable	Intervention may be required in 5 years	After 5 years
4 (good)	Stable	No intervention required	After 5 years

Table 1: Categorising monuments based on their condition



51

- Management of large and invasive plants. Monuments that have become overgrown, while having some romantic appeal, can encourage vandalism through a public perception of indifference or lack of care. Even burial grounds managed as wildlife areas still need to be maintained and invasive plants checked to sustain and enhance biodiversity interests as well as allowing for periodic re-inspection of monuments. More substantial plants should be cut with secateurs and roots removed without disrupting the monument. Diseased trees and dead tree branches can fall, and are thus a hazard to nearby monuments and visitors. Dealing with these and any problems due to the proximity of larger tree roots will require a qualified tree surgeon. Tree work and scrub clearance should not be carried out during the nesting season.
- Management of soil levels. Subsidence and drainage problems are characteristic of nearly all burial sites. It may be necessary to consult landscape architects or civil engineers to evaluate changes in soil level and the likely effects any works may have.

PRACTICAL INTERVENTION

The main options for practical intervention are as follows:

- emergency measures
- repair
- cleaning
- consolidation and surface treatment
- replacement of decayed or missing elements

EMERGENCY MEASURES

If a monument, or any part of it, has been identified as being unstable or unsafe, the first priority is to cordon it off with suitable, easily visible signage. In certain cases, after consultation with a structural engineer or other suitable qualified professional, specifically designed temporary supports may need to be installed. This, however, does not include routine staking of monuments, which should not be considered an appropriate emergency measure.

Barriers provide only a short-term solution and require periodic inspection to ensure that they have not been breached. Maintenance of plants and grass behind the barriers may not be carried out so vegetation can rapidly overgrow the monument, leading to further problems. It is unacceptable to use barriers around an historic monument for a prolonged period of time; they are not a substitute for considered conservation action.

Because of sometimes over-zealous misinterpretation of guidelines, it has become common practice to lay apparently unstable monuments flat on the ground.



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IMAGES:

51: This monument in Kensal Green Cemetery is an extreme example of how lack of maintenance over many years has allowed the extensive colonisation by higher plants © OCC

52: Over the years, a combination of soil build-up and subsidence can change the appearance and setting

of a monument. This case shows the monolithic Brunel monument in Kensal Green Cemetery with its surrounding kerb, but the same applies for much simpler monuments such as headstones, where the lower levels of inscription can become hidden beneath the ground © OCC

Treatment of vandalism and graffiti

The need to prevent theft and vandalism is an important preventive aspect of care. Surfaces may be defaced by graffiti or sections may be broken off and discarded. Metal roofing materials are attractive to thieves and entire monuments may be stolen for re-sale as 'architectural salvage'. It is important that security measures to prevent theft or vandalism are considered.

Graffiti needs to be removed as soon as possible, not only because it will be easier if tackled quickly but it will also discourage further attacks. This requires experienced operatives in order that 'ghosting' can be minimised and an imbalance between the cleaned and non-cleaned surfaces avoided. Where it is necessary to retain lichens or other surface details, the advice and experience of a conservator may be required.

While temporary dismantling may be a reasonable response to urgent safety concerns, this is not an acceptable permanent solution for any monument and especially not for those that are architecturally or historically important. For a listed monument, such action will require listed building consent, and this is likely to be rejected in favour of a long-term solution involving well-thought-out conservation repair techniques. In a Church of England churchyard a faculty may also be required.

If a monument is dismantled or laid down, then plans should be put in place as soon as possible to reinstate it; the longer it is left the more overgrown and damaged it will become and as a result it will pose an ever-increasing safety hazard to cemetery users.

REPAIR

The care of historic material often requires more than simply routine maintenance. Repairs to the materials and structure may be required to stabilise the condition that has arisen as a result of natural weathering or inflicted damage. Conservation repair should be thought of as the minimal intervention required to ensure the continuing survival of the monument. It involves considered and skilled practical methods, using materials compatible with the original. It should only be carried out by suitably qualified and experienced conservators and masons.

Repairs should be carried out as soon as necessary to prevent further damage and may include:

- resetting fallen monuments
- dismantling and rebuilding larger monuments (generally only a last resort)
- removing decayed or defective previous repairs and fixings
- rejoining fractured elements
- repointing open joints
- mortar repair
- filling voids or areas of loss

Resetting fallen monuments

Simple, tall headstones are typically long panels of stone that are set directly in the ground. With this type of fixing, those that are tilted may be susceptible to collapse and physical damage although many are

perfectly stable – each situation needs to be considered individually. For stones found lying on the ground and that are to be reset, the first step is to determine their correct original location and orientation. Stones that have become overgrown should be cleared of vegetation and allowed to air dry before their condition is assessed. Any work of resetting requires an assessment of the manual handling and should only be carried out with appropriate hoisting equipment.

Resetting in ground

When a gravestone is reset, it should have a minimum of a third of its length in the ground. If this means that some of the inscription is close to or even below the ground then resetting it on a base should be considered. Disturbed ground should be backfilled with a mixture of sand, gravel and crushed stone, wetted and compacted to provide support. The area should be graded with topsoil, which is then seeded.

Resetting on/in a base

By the early 19th century, many headstones were set on to bases, which were designed either with a setting slot or pins to hold the headstone.

Loose headstones with existing bases should always be reset, but the base often requires re-levelling and realigning, particularly when it is made from more than one stone. Beds between stones should be of mortar using lime putty (gauged with pozzolanic additives to provide additional strength) or natural hydraulic lime. For larger stones, lead shims can be used to establish a reasonable joint dimension, and for minor adjustments to the level. Corroded pins should be removed and replaced with threaded stainless steel whose diameter is no more than a third of the depth of the headstone. These should be set in a natural hydraulic lime mortar or in a suitable moisture-insensitive structural adhesive, such as epoxy resin. There have, however been situations where, in damp conditions, resin-anchored dowels have not adhered to the stone, which, as a result, has become loose.

Stones that require insertion into existing slotted bases can be set using a pourable natural hydraulic lime mortar. Stones are set plumb and level, and should be braced for a minimum of five days to limit movement during curing of the mortar.



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53b



53c



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IMAGES:

53: The accessibility of most monuments means that they are a ready target for graffiti. Here at St George in the East, Wapping, the monument was continually being defaced so, once the graffiti had been cleaned off, railings were installed to match the earlier ones that had been removed © Nimbus Conservation Ltd

54: The erection of simple exclusion fencing and warning signs are the first step when potentially hazardous monuments have been identified, but must not be used as a means of deferring repairs © Clara Willett

55: These potentially hazardous monuments at the Church of St Mary, East Lydford, have been secured using a ratchet strap and fenced off in preparation for more detailed inspection and subsequent repair © OCC

56: Carefully conceived and well-executed repairs can save even the most damaged monuments, as can be seen here at the Church of the Holy Cross, Babcarry © OCC

57: This monument at the Church of St Mary, East Lydford, has either fallen over or been laid flat; its horizontal position now seems to have been accepted as intentional and the grass threatens to cover it over © OCC



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IMAGES:

58: An example of a pin used to secure a headstone – this one has corroded and will need to be replaced with stainless steel © Clara Willett

59: This broken headstone at Bunhill Fields was first secured with a cramp, which then corroded, and is now supported by a newer stone inserted next to it © OCC

60: Using lifting gear to dismantle a monument must be carried out by those with experience and knowledge of how monuments are constructed, as the release of weight from supports and panels can sometimes cause sudden changes in load path, which may have unexpected consequences © Nimbus Conservation Ltd

61: Reconstruction of monuments often uses a core for additional support and to enable loads to be more evenly distributed, as can be seen here at St George in the East, Wapping © Nimbus Conservation Ltd

62: Broken sections of headstone can be joined together; the joint will sometimes need to be reinforced with stainless-steel pins drilled to a minimum depth of 50mm either side of the joint © Monument Conservation Collaborative

Fractures at (or just below) ground level are relatively common for thinner headstones, but the success of structural adhesion in these situations is limited. Options that should be considered include raising the level of the base and setting the upper section into the slot or reinforcing the break by providing a backing stone.

In some cases, the base may need to be renewed; this can be fabricated on site by casting concrete in the ground, using a foam insert to create a setting slot.

Dismantling and rebuilding larger monuments

This is not generally desirable and should only be carried out when an assessment of the condition has demonstrated a structural necessity and all other options have been considered. Larger and more complicated monuments will require a thorough investigation of their construction. The most commonly encountered monuments requiring such intervention are tomb chests.

Before dismantling, the monument needs to be recorded and each part identified so that the structure can be accurately rebuilt.

Movement (whether during dismantling or rebuilding) of larger parts of the monument will require specialist lifting techniques and equipment and the input of experienced professionals.

Rebuilding of monuments may require the installation of new foundations. Depending on the ground conditions, these can be either compacted hardcore or reinforced concrete, in the form of a solid raft or a series of beams, set just below ground level.

In order to prevent rising groundwater, a damp proof membrane (DPM) is sometimes placed between the foundations and the monument. There are numerous materials available for this purpose, including lead sheet, polyethylene sheet and heavy-duty plastic; the selection will depend on an assessment of suitability. Lead sheet is most frequently used since it combines strength and flexibility suitable for use in an external environment. In most cases, however, rain falling and then splashing above the level at which it has been inserted will make a membrane largely redundant.

For rebuilding, the monument may require additional support and this can be provided by a breeze-block or brick core, which is built either as a solid or honeycomb structure. An air gap (with a minimum width of 50mm) must be left between the core and the monument. Rebuilding will normally include the installation of new stainless-steel cramps and fixings to secure elements of the monument to each other and to this internal, invisible core. Cramps can be secured with resin or lime mortar/grout – the latter is preferable as it is reversible.

Mortars based on lime putty (with pozzolanic additive) or natural hydraulic lime should be used for bedding all stones and filling joints between them.

Removing decayed or defective previous repairs and fixings

Repairs and fixings have failed if they no longer function or have caused damage to the stone. They may also be unsightly. Removal of failed mortar, cement and degraded resins may cause damage and so this must be weighed up against leaving them in place. If their removal is necessary to allow for other conservation work, it is generally done mechanically with small hand tools.

Cutting of metal pins and cramps may require power tools such as a reciprocating hacksaw; these should be used with care to ensure that the adjacent material is not damaged. Ferrous metal pins, which are often locked in place because they have expanded through corrosion, should be removed by drilling them out with a non-percussive drill.

Repair of fractures/rejoining fractured elements

Surfaces to be bonded together should be carefully cleaned and the pieces fitted together dry to identify contact areas. Any surface fragility of the stone may compromise the effectiveness of the adhesive so it may require consolidation beforehand (see p 36). If there are missing pieces, it is worthwhile searching the surrounding area in case they are lost in the vegetation.

For larger pieces of stone, a thixotropic, moisture-insensitive two-part epoxy resin is applied along both surfaces of the break, keeping the adhesive slightly back from the edge. Most of these adhesives require a minimum air and surface temperature of 10°C to cure. The pieces are pushed together, accurately aligned and held firmly in position with sash clamps, ratchet straps or other suitable means. The assembly is braced while the resin sets – typically a minimum of 24 hours. Any excess adhesive should be allowed to partially cure, then carefully cut away with sharp hand tools. Minor gaps can be filled with a mortar repair. A recent fracture of sound material generally requires less adhesive than a weathered surface with poorer 'fit'.

Smaller sections of stone (typically less than 50mm in all three dimensions) can be joined by using more sympathetic adhesives such as finely ground lime mortar or glue made from lime and casein.

Reinforcement

In many cases, repair of fractured stone will require the use of pins as reinforcement. The number and type of pins will depend on the cross-section of stone, the nature and soundness of the material, and the location and shape of the fracture.

Where pinning is required, holes should be drilled (perpendicular to the break) at slow speed, using an appropriately sized masonry bit. The diameter of the drill hole should be less than one third of the thickness of the stone. Threaded stainless steel rods are recommended for pinning and these should be set in a moisture-insensitive adhesive.

Repointing open joints

Mortar joints provide structural cohesion and prevent water ingress. Where they have failed – by erosion, cracking, separation or complete disintegration – they must be replaced with new mortar that is well adhered, compatible with the stone and historically correct in its appearance.

The cutting-out of joints should be done with small hand tools, to a depth of at least twice that of the joint width.

For most monuments, pointing mortars can be based on lime putty (un-gauged or gauged with additives to aid curing or provide additional strength) or natural hydraulic lime (NHL 2 or 3.5) binders – typically in the ratio by volume of 1:3 binder to aggregate. Matching the colour and texture relies upon using aggregates compatible with those in the original mortar and obtaining the right surface finish.

Pointing work should not be undertaken when there is a risk that temperatures will fall below 5°C. The mortar must be allowed to set in a controlled way and prevented from drying out too quickly; depending on the binder and local conditions, this may involve keeping it damp for several days.

Mortar repair

Mortar repairs can be used to fill voids and provide protection for decayed areas of stone. Mortar colour and texture should be matched to that of the unsoiled stone. As with pointing mortars, lime putty or natural hydraulic limes can be used and are typically 1:2.5 binder to aggregate.

The surface of the original stone needs to be clean and requires a key to allow the repair to adhere. Shallow repairs (less than 10mm) may require the removal of a small amount of original stone in order to provide sufficient depth and strength for the mortar. As with pointing, application and curing of mortar needs to be carefully controlled.

Filling voids or areas of loss

For monuments, grouting is most often used to fill voids and to re-establish cohesion between delaminated layers, and thus prevent the penetration of water. To be effective, this requires the careful removal of loose debris from the voids using hand

tools and flushing with water either on its own or mixed with solvents such as isopropanol or Industrial Methylated Spirits (IMS). The grout needs to be of low strength with fine aggregates (typically 1:1 binder to aggregate); proprietary grouts can be used if they are suitable for use with historic stonework. Grout should be introduced in stages to prevent the build-up of hydraulic pressure, which could exacerbate loss of stone. When the grout has set, the edges of the filled spaces should be capped with mortar repairs.

CLEANING

Cleaning is a complex issue involving both aesthetic and technical considerations and should be considered as a major intervention; as such it is important to involve a qualified conservator or other conservation professionals to provide advice.

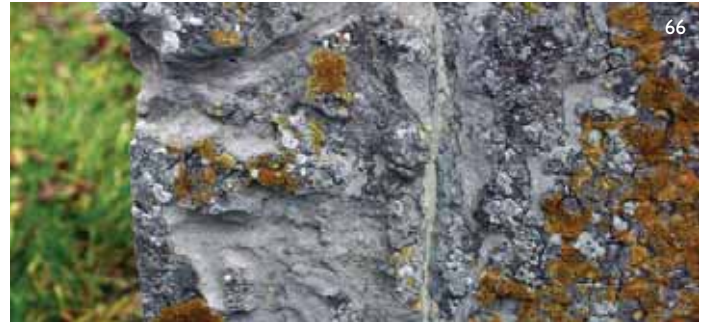
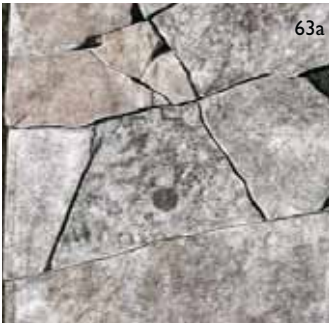
Historic objects should not be cleaned just because they look unsightly. As a general rule monuments should be cleaned only for technical reasons – for example removing soiling which is causing damage to the historic material or to allow further treatment to be carried out. The aim of cleaning is not to return the monument to a 'like new' appearance, but to safely remove particulate deposits, staining and biological growths that are harmful to the materials or unnecessarily obscure detail. Cleaning can be acceptable to allow inscriptions to be read but this is normally only applicable to war memorials or those of significant historic or cultural interest. Obscured inscriptions in graveyards can often be read by wetting the surface and viewing them under raking light (for example shining a torch from one side).

An appropriate cleaning strategy is one that uses the mildest and least damaging practical methods to remove the soiling and achieve the desired cleaning effect, while minimising any alteration of the underlying stone. The method should be controllable (both in practical and health and safety terms) and must not deposit by-products into the stone that cannot be completely removed as part of the cleaning method.

Most soiling in churchyards and cemeteries is due to biological growth, or the deposition of airborne particulates; the latter is more characteristic of sites in urban or industrial areas. Some apparent soiling may actually be colour alteration that is intrinsic to the stone on ageing. In other instances, discolouration may be associated with the degradation of older repair materials, such as adhesives, iron fixings or unstable surface treatments.

Appropriate cleaning requires correct evaluation of:

- the nature of the material, for example the mineralogy of the stone



IMAGES:

63: Oviatt Monument was broken into many pieces and was carefully glued and pinned together. Joints and missing small sections were filled with mortar to match the stone in colour and texture © Monument Conservation Collaborative

64: Where joints are very fine, mortars will need to be accurately placed. In some cases, as here at St George in the East, Wapping, tape can be used to prevent any blooming of adjacent stones © Nimbus Conservation Ltd

65: Mortars must be individually formulated with the binder and additives dependent on their location; they must also match the adjacent stone in colour and texture as far as possible. In this case at the Church of the Holy Cross, Babcary, the joint has been filled with a pointing mortar and the two distinct different types of stone repaired with appropriate NHL 3.5 hydraulic lime mortars © OCC

66: On this example from the Church of the Holy Cross, Babcary, mortars using finely ground aggregates have been used to fill small voids and to support and protect laminations, which will help to prevent water ingress © OCC

67: Hand scrubbing with a soft bristle brush and water may be appropriate to remove surface dirt. The removal of lichens and algae will only be effective in the short term as these will tend to recolonise the stone © Monument Conservation Collaborative

68: If the need has been established, cleaning can be successfully carried out on a stable stone by an experienced conservator or conservation mason. This example is using low-pressure water (300psi; 20 bar) and a wide fan tip (40°). The residue at the base of the marker is foam from the rinse water, which contains an antibacterial agent © Monument Conservation Collaborative

Cleaning method		Material type										
		Stone					Metal			Wood	Other	
		Limestone	Sandstone	Marble	Slate	Granite	Iron	Bronze	Lead		Terracotta	Reconstituted stone
Water washing	Mist spraying	•		•	•	•				•	•	•
	Pressure washing	•		•	•	•	•	•			•	•
	Steam	•		•	•	•		•			•	•
Mechanical	Hand-held	•	•	•	•	•	•	•	•	•	•	•
	Dry air-abrasive	•	•	•	•	•	•				•	•
	Wet air-abrasive	•	•	•	•	•	•	•			•	•
Chemical	Acid		•		•						•	
	Alkali	•	•		•	•						•
	Organic solvents	•	•	•								
	Biocide	•	•	•	•	•				•	•	•
Poultices		•		•	•	•		•				•
Special	Laser	•	•	•	•	•	•	•			•	•

Table 2: Methods for cleaning stone

- the condition of the material
- the nature and extent of soiling
- the biodiversity and importance of biological growth including lichens, mosses and algae

Table 2 provides guidance of the range of materials to be found on burial monuments and a selection of possible cleaning methods. Initial cleaning trials, carried out in a discrete location, are essential to demonstrate the effectiveness of any of the options. In practice, more than one method may be appropriate for different types of soiling and substrate.

In all cases, operatives must have considerable experience of using the methods, equipment or chemicals on weathered, historic surfaces, since inappropriate cleaning can cause irreversible damage. All proprietary methods and materials must be used according to manufacturers or suppliers instructions. Some methods may require subsequent rinsing or neutralising.

Atmospheric soiling

Some soiling can be removed from stones with smooth surfaces (for example polished granite or marble) with natural bristle brushes and clean water. Large-scale general cleaning can be accomplished with the cautious use of small water lances, designed for the DIY market, and equipped with wide fan spray nozzles. Many of these machines run at a pump pressures of 80–100 bar (1120–1400 psi), so the tip must be kept as far away from the stone surface as is practical to avoid over-cleaning and damage to the surface.

The removal of gypsum (calcium sulphate) crusts from limestones can be achieved through the application of

ammonium carbonate and other poultice formulations. These work by chemically reacting with the calcium sulphate to form more soluble compounds that can then be removed with water. These processes do not work with the higher silica contents of sandstones and the cleaning of this material is more problematic. Acid and alkali cleaning methods have been used in the past to clean sandstone, but they require careful control and can cause irrevocable damage to the substrate and harm plants and animals. They are not recommended for general use on monuments.

Salts, stains and graffiti

Poultices and gel packs permit relatively long application times for specialised chemical cleaning, and thus can be very useful for removing or reducing stains and graffiti. Poultices are prepared using a medium (such as clay or cellulose paste) and a liquid that dissolves the soiling. Water, for example, is the appropriate solvent for soluble salts. For the removal of metallic stains, good results have been achieved with aqueous solutions of ammonium citrate (for rust), and ammonium carbonate (for copper stains).

Graffiti removal involves the dissolution of a wide range of media, including spray paints, marking pens, wax crayons and lipstick. Cleaning is generally done with solvent-based paint strippers, sometimes followed by poultice application of organic solvents to eliminate deeper residues. At all stages, thorough rinsing to remove all traces of chemicals is essential. Removal should be carried out as soon as possible after the graffiti has been applied, since air and sunlight cause some types of graffiti to become considerably more difficult to dissolve.

Biological growths

There should always be a presumption against the removal of biological growths. If it does happen, the simplest approach involves physical removal of thicker growths with secateurs or surface growth with wooden spatulas, followed by cleaning with water and brushes.

Most commercial pesticides are aqueous formulations of organo-halogen compounds quaternary ammonium compounds, metallic salts or oxidising agents, combined with surfactants. Growing concern for the environment has long made the former practice of automatic use of pesticides in any situation obsolete and untenable. Before even considering pesticide use it is important to define what the actual problem is and what options there are for dealing with it – pesticides should be the last solution considered.

Only products approved by the Pesticides Safety Directorate (part of the Health and Safety Directorate) may be sold, supplied, stored, advertised or used. The regulations also cover disposal. Only 'professional' products should be used in public/commercial situations and users of such pesticides must comply with the Conditions of Approval relating to their use. There are also additional restrictions placed on the use of pesticides in, or near, watercourses. Only certain approved products may be used and the Environment Agency has to approve such use in each case.

If treatment with pesticide is considered the only option, it should be prepared according to the manufacturer's instructions and then carefully applied to the stone surface by trained operatives. It is left in contact with the stone for the recommended dwell time and the treated area is covered with polythene. After this, much of the dead biological growth can be removed through dry brushing with a stiff bristled brush. The process can be repeated and a final application left on the surface to prevent regrowth. Cleaning may appear incomplete at first, but subsequent improvement occurs as the most tenaciously attached plants, lichens or algae are gradually removed from the stone surface by weathering.

Reformation of biological growths varies depending on the weather, stone type, pore structure and surface roughness. Some regrowth can be expected after 2–3 years but if there is significant amount within 6 months, then it is likely that the product was unsuitable for the task.

CONSOLIDATION AND SURFACE TREATMENTS

The application of either a consolidant or surface treatment should not be carried out before a thorough understanding of the rate and mechanisms of decay have been fully investigated and understood. Such treatments should be considered as a last resort and should only be applied by an experienced conservator.

Consolidation materials should not adversely affect the structure or behaviour of the stone, nor deposit by-products that may harm or affect its appearance, in terms of colour, texture or surface reflectance. However, there has been little success in achieving all, if any, of these criteria for external monuments so their use has been limited.

Once applied, they are almost impossible to remove from the substrate and can potentially cause more damage, particularly where the stone is in direct contact with groundwater as is the case in burial sites.

Consolidation

A consolidant aims to restore cohesion and physical strength to degenerating material. Consolidants are available in a variety of materials (see Table 3), several of which pose significant health and safety risks. Consolidants are normally prepared by diluting the solid material in a solvent, to produce a low-viscosity liquid that is then applied in a series of applications in order to achieve sufficient penetration. When the solvent evaporates, the consolidant is left within the stone, ideally leaving the pore spaces open but with the matrix of the stone reinforced. Consolidation should only be carried out by an experienced conservator.

Small friable areas can be consolidated using acrylic solutions or inorganic compounds that will provide temporary support to allow protective mortars to be applied. Traditional stone preservatives, such as limewater, are still sometimes used although their effectiveness has been questioned.

Surface treatments

Surface treatments, such as water-repellents, sheltercoats and graffiti barriers provide a protective layer to vulnerable material.

Modern water-repellents (for example silanes, siloxanes and fluoropolymers) have been effective in controlled environments but are not generally suitable for an external environment. The properties of water repellency have frequently led to greater damage in the long term, trapping moisture within the stone matrix.

Masonry protectants, such as limewash (lime putty coloured with lime-fast pigments, diluted with water) and sheltercoats (lime putty and finely ground aggregates, diluted with water) provide a sympathetic and sacrificial layer. By the nature of their composition, they can alter the appearance of the stone surface, though by judicious colour selection and sensitive application these effects can be minimised. Over time, these surface applications weather down to a harmonious appearance, similar to the underlying stone. In most cases they will need to be reapplied periodically and this must be incorporated into any maintenance regime.

Organic		Inorganic	
Acrylics	Silanes	Alkaline earth hydroxides	Siliceous compounds
Acrylic resins	Alkoxysilanes	Limewater	Silicon oxide dispersions
Acrylic dispersions	Silicone esters	Barium hydroxide	Sodium /potassium silicate

Table 3: Types of consolidants

A number of coating systems are marketed as graffiti barriers. In general, these are not recommended as they change the behaviour and appearance of the stone. However, some success has been noted with the application of coatings based on polysaccharides or glycol waxes. These are readily removed with hot water – it is important that they are reapplied after each cleaning operation to remain effective.

REPLACEMENT OF DECAYED OR MISSING ELEMENTS

Replacement of decayed existing, or missing stonework with new is the final option when all other repair options, such as mortar repairs, are not feasible or will not provide an appropriate long-term solution. Replacement can vary from minor indents to significant elements and should always be carried out by an experienced craftsman.

Missing or badly damaged parts of a monument should only be replaced for structural, safety or functional, and not aesthetic, reasons. If replacement can be justified, it should only be carried out if there is sufficient physical or archival evidence available to ensure accurate replication of the detail.

Materials used for replacements should be selected on a like-for-like basis, matched not only visually but also in terms of physical and, for stone, mineralogical characteristics. This means that the replacement should be compatible with the original and is therefore more likely to weather in a similar way.

Replacement elements and indents should be cut and finished to match the original, and not the weathered, profile. Installing the new piece may require some of the existing stone to be cut away to provide a sound base for fixing the new stone – this should always be carried out in such a way as to ensure that removal of original material is kept to a minimum.

Retooling and relettering

Retooling is not an acceptable method for treating surface deterioration on historic fabric because it can alter the overall dimensions, form and surface finish of the monument.

Inscriptions may on occasions need to be recut so that they can be read, but in many cases careful and selected cleaning may be all that is required.

If recutting is necessary, it should be carried out by an experienced letter-cutter. Since historic inscriptions will have been cut by hand, this is the most appropriate method for any restoration. Pneumatic and abrasive power tools are unlikely to achieve an acceptable result.

Inscriptions may have been painted and, where this paint has failed, the letters can be reinstated using paint of a suitable medium, such as acrylic (reversible) or oil. It is not always necessary or desirable to paint the inscription in its entirety, and just touching in decayed areas can often be sufficient to make it legible. Whichever medium is chosen, painting must be carried out with due regard for the surface, the style of lettering and the original paint. Inappropriate paint or inexperienced hands can lead to 'bleeding' of the paint and spoiled inscriptions.



69



70a



70b



71a



71b



72



73

IMAGES:

69: A sheltercoat has been applied to a monument at Kensal Green Cemetery to provide protection for the stone surface. A further benefit may be the harmonisation of newly indented stone with the old. However, in exposed environments, sheltercoat will need to be reapplied regularly (every 5 to 10 years) © OCC

70: In this example from Putney Old Burial Ground, the column was extensively decayed and had been repaired on more than one occasion. Given its vulnerability to future damage, a decision was taken to replace it using a template taken from a more complete column from one of the other corners. The stone was chosen to match the original © OCC

71: Indenting of stone in a chest monument is usually necessary

adjacent to joints and is brought about by damage caused by the corrosion of an iron cramp. These images show two examples at St Nicholas, Bathampton – one done recently and the other done some time ago so that it has now blended in with the adjoining stone © OCC

72: The tooling-off of decayed surfaces is not acceptable as it can lead to the destruction of the shape and form of the monument, Hunslet Cemetery, Leeds © OCC

73: Repainting of lettering. This must always be carried out with great sensitivity but it can be justified if the inscription is of significance and is in danger of being lost. In many cases, just recording the inscription will be sufficient © OCC

Human remains

The discovery of human remains and associated artefacts should always be treated with dignity and respect. Repair and conservation work would not normally involve the disturbance of burials although this may occur inadvertently.

English Heritage and the Cathedral and Church Buildings Division of the Church of England have jointly produced guidelines on the legal, ethical and practical treatment of archaeological human remains and associated artefacts, with emphasis on human remains within Church of England land (see pp 42).

9 Further information

FUNDING

Some local planning authorities run grant schemes to repair historic buildings and preserve conservation areas. The English Heritage website provides guidance on their sources of funding.

It may also be possible to use Section 106 agreements for new developments close to burial grounds to secure funding for conservation work for these sites. Conservation management plans and specifications for conservation work can help identify potential Section 106 projects when funding is offered.

ARCHITECTURAL HERITAGE FUND

The Architectural Heritage Fund helps to repair and regenerate historic buildings by helping voluntary and community groups with grants, low-interest loans, and advice.

www.ahfund.org.uk

BIG LOTTERY FUND

The Big Lottery Fund is a Lottery Distributor created to award grants to education, health and environment projects throughout the UK.

www.biglotteryfund.org.uk

ENGLISH HERITAGE

There is a high demand for English Heritage grants. Applications for funding are assessed against English Heritage's grant priorities as well as the scheme criteria. Priority will be given to listed buildings and monuments, scheduled monuments and registered parks and gardens that have been identified as being at risk and included on the Heritage at Risk register. For further information contact the relevant local office (see back cover).

www.english-heritage.org.uk/grants

GEOLOGISTS' ASSOCIATION CURRY FUND

The Curry Fund supports a variety of causes including geological conservation, for example the purchase, clearance and recording of sites.

www.geologistsassociation.org.uk/Curry.html

HERITAGE LOTTERY FUND

The Heritage Lottery Fund distributes money raised by the National Lottery to support all aspects of heritage

in the UK, from historic buildings and museums to archives, nature conservation and oral history.

www.hlf.org.uk

LANDFILL COMMUNITIES FUND (LCF)

The LCF enables landfill operators to support a wide range of environmental projects by giving them a 90 per cent tax credit against their contributions to Environmental Bodies. Please see website for more details.

www.entrust.org.uk

PRINCIPAL SOURCES OF ADVICE

ASSOCIATION OF BURIAL AUTHORITIES (ABA)

ABA represents organisations engaged in the management and operation of burial sites. It has taken on some of the functions of the Memorial Advisory Bureau and is a useful source of advice on conservation and maintenance issues in churchyards and cemeteries. The Association runs the Phoenix Awards to create a renaissance of funerary art and cemetery design.

www.burials.org.uk

CARING FOR GOD'S ACRE

The conservation charity for churchyards and burial grounds.

www.caringforgodsacre.org.uk

CHURCHCARE

This is the co-ordinating body for Diocesan Advisory Committees. It publishes advice on all aspects of caring for churches. (Formerly the Council for the Care of Churches.)

www.churchcare.co.uk

THE CHURCH MONUMENTS SOCIETY

The Society offers a focus for all who have an interest in church monuments of all types and periods. It was conceived to encourage the appreciation, study and conservation of church monuments both in the UK and abroad.

www.churchmonumentsociety.org

ENGLISH HERITAGE

The English Heritage website provides further details on designation, how to get buildings or monuments considered for designation, and how to apply for consent to carry out work on a protected building or monument.
www.english-heritage.org.uk/caring/listing

HEALTH AND SAFETY EXECUTIVE (HSE)

HSE's mission is to protect people's health and safety by ensuring that risks in the changing workplace are properly controlled.

www.hse.gov.uk

HSE publications: <http://books.hse.gov.uk>

HELM (HISTORIC ENVIRONMENT LOCAL MANAGEMENT)

English Heritage's online resource for owners, planners and everyone else involved with caring for the historic environment at a local level.

www.helm.org.uk

IMAGES OF ENGLAND

This online photographic library contains over 300,000 photographs of England's listed buildings, including almost all listed gravestones and monuments.

www.imagesofengland.org.uk

INSTITUTE OF CEMETERY AND CREMATORIUM MANAGEMENT (ICCM)

The ICCM sets ethical, professional and social standards for the management of burial, cremation and related services. It has published national guidance on the management of memorials that includes advice on setting policies for training burial site staff; carrying out safety surveys every five years; testing and recording monuments; risk assessment; remedial actions and safety signage.

www.iccm-uk.com

LOCAL AUTHORITIES

Local authorities should be the initial point of contact regarding any proposed repair or relocation of listed memorials. To find a local authority go to:

www.direct.gov.uk

THE MAUSOLEA AND MONUMENTS TRUST

This is a charitable trust, founded in 1997, for the protection and preservation for the public of Mausolea and Sepulchral Monuments situated within the United Kingdom and Northern Ireland.

www.mausolea-monuments.org.uk

MEMORIAL AWARENESS BOARD (MAB)

The MAB is a campaigning organisation raising and promoting awareness of memorialisation issues.

www.memorialawarenessboard.com

MINISTRY OF JUSTICE

The Ministry of Justice is responsible for burial law and practice for the public and for burial professionals. The Ministry decides applications for exhumation licences, regulates the removal of human remains from disused burial grounds and considers applications for the closure of churchyards.

The Ministry's Burial and Cemeteries Advisory Group was established in December 2001 following the report on cemeteries by the Environment, Transport and Regional Affairs Committee (Eighth Report, 21 March 2001 HC 91-1). The group was established to use the collective expertise of the industry, and to provide advice and information for burial authorities, the public, and government, including in connection with the review of burial law.

www.justice.gov.uk/guidance

NATIONAL ASSOCIATION OF MEMORIAL MASONS (NAMM)

The aim of the association is to further the memorial masonry industry and safeguard the interests of the bereaved through the promotion of high standards, wide choice and increased understanding in all matters relating to natural stone memorials.

www.namm.org.uk

NATIONAL FEDERATION OF CEMETERY FRIENDS

The Federation represents groups of volunteers interested in conserving cemeteries. The website has links to other Cemetery Friends Groups' websites.

www.cemeteryfriends.org.uk

NATIONAL MONUMENTS RECORD (NMR)

The NMR is the public archive of English Heritage. It holds more than 10 million photos, plans, drawings, reports and publications as well as the national databases of England's designated buildings and sites.

www.english-heritage.org.uk

PUBLIC MONUMENTS AND SCULPTURE ASSOCIATION (PMSA)

The PMSA aims to heighten public appreciation of Britain's public sculpture, and to contribute to its preservation, protection and promotion.

www.pmsa.org.uk

WAR MEMORIALS TRUST

The War Memorials Trust provide advice and information for the repair and conservation of war memorials.

www.warmemorials.org

OTHER SOURCES OF ADVICE

ARBORICULTURAL ASSOCIATION

www.trees.org.uk

BRITISH LICHEN SOCIETY

www.thebls.org.uk

BRITISH TRUST FOR CONSERVATION VOLUNTEERS (BTCV)

www.btcv.org.uk

BUILDING CONSERVATION DIRECTORY

www.buildingconservation.com

COMMONWEALTH WAR GRAVES COMMISSION (CWGC)

www.cwgc.org

THE CONSERVATION REGISTER

www.conservationregister.com

THE INSTITUTE OF CONSERVATION (ICON)

www.icon.org.uk

INSTITUTION OF STRUCTURAL ENGINEERS

www.istructe.org

NATIONAL HERITAGE TRAINING GROUP

www.nhtg.org.uk

ROYAL INSTITUTE OF BRITISH ARCHITECTS

www.architecture.com

ROYAL INSTITUTION OF CHARTERED SURVEYORS

www.rics.org/uk

ROYAL INSTITUTION OF CHARTERED SURVEYORS BUILDING CONSERVATION FORUM

www.rics.org/forums

STONE FEDERATION GREAT BRITAIN

www.stone-federationgb.org.uk

BIBLIOGRAPHY

CONSERVATION

Materials

English Heritage 2006 *Identifying and Sourcing Stone for Historic Building Repair*. London: English Heritage (www.english-heritage.org.uk/publications)

English Heritage 2008 *Durability Guaranteed: Pulhamite Rockwork – Its Conservation and Repair*. London: English Heritage (www.english-heritage.org.uk/publications)

Schaffer, R J 1932 *The Weathering of Natural Building Stones*. Building Research Special Report 18. London: HMSO (facsim edn 1972)

Practical treatments

Andrew, C *et al* 1994 *Stone Cleaning: A Guide for Practitioners*. Edinburgh: The Robert Gordon University and Historic Scotland

Anson-Cartwright, T (ed) 1997 *Landscape of Memories: A Guide for Conserving Cemeteries*. Toronto: Ministry of Citizenship, Culture and Recreation

Ashurst, J and Ashurst, N 1988 *Practical Building Conservation*. English Heritage Technical Handbook Series, vol 1: *Stone Masonry*; vol 2: *Brick, Terracotta and Earth*; vol 3: *Plasters, Mortars and Renders*; vol 4: *Metals*. Aldershot: Gower Technical Press

Ashurst, J and Dimes, F (eds) 1990 *Conservation of Building and Decorative Stone*. London: Butterworth-Heinemann

Ashurst, N 1994 *Cleaning of Historic Buildings*, 2 vols. London: Donhead

British Standards Institution 2000 *BS 8221/2 Code of Practice for Cleaning and Surface Repair of Buildings – Surface Repair of Natural Stones, Brick and Terracotta*. London: British Standards Institution

British Standards Institution 2005 *BS 8415. Monuments Within Burial Grounds and Memorial Sites – Specification*. London: British Standards Institution (updated 2009 *BS 8415:2005+A1:2009*)

British Standards Institution 2011 *BS EN 459/1 Building lime – Definitions, Specifications and Conformity Criteria*. London: British Standards Institution

Caring for God's Acre and Stonework and Walls in Churchyards. *Factsheet 9* (www.caringforgodsacre.org.uk)

Doehne, E and Price, C A 2010 *Stone Conservation: An Overview of Current Research*, 2 edn. Los Angeles: The Getty Conservation Institute (www.getty.edu/conservation/publications)

English Heritage 1999 *Graffiti on Historic Buildings and Monuments – Methods of Removal and Prevention*. London: English Heritage (www.english-heritage.org.uk/publications)

English Heritage 2008 *Theft of Metal Roof Coverings from Churches and Other Historic Buildings*. London: English Heritage (www.english-heritage.org.uk/publications)

Historic Scotland 1991 *Conservation of Historic Churchyards: Guide for Practitioners*. Edinburgh: Historic Scotland

Historic Scotland 1999 *Technical Advice Note 18: The Treatment of Graffiti on Historic Surfaces*. Edinburgh: Historic Scotland

Historic Scotland Graveyards and Gravestones electronic leaflets 2003:

1 *Working in a Scheduled or Listed Graveyard or Burial Ground*

2 *Good Practice in Maintaining a Historic Graveyard*

3 *Looking after Gravestones*

6 *Emergency Measures for Historic Memorials. A Short Guide for Cemetery Managers*

7 *Historic Scotland Grants in Relation to Graveyards or Burial Grounds*

8 *Abandoned Structures within Graveyards*

(www.historic-scotland.gov.uk)

Historic Scotland 2002 *Conference Proceedings: Conservation of Historic Graveyards Conference 2001*. Edinburgh: Historic Scotland

Maxwell I, Nanda, R and Urquhart, D 2001 *Guide for Practitioners 2: Conservation of Historic Graveyards*. Edinburgh: Historic Scotland

National Association of Memorial Masons 2010 *NAMM Code of Working Practice. NAMM Supported the Memorial Mason in complying with the British Standard 8415*. Rugby: NAMM (www.namm.org.uk)

Teutonico, J-M and Fidler, J (ed) 2001 *Monuments and the Millennium*. London: James and James

Torraca, G 2009 *Lectures on Materials Science for Architectural Conservation*. Los Angeles: The Getty Conservation Institute (www.getty.edu/conservation/publications)

Principles and management

Clark, K 2001 *Informed Conservation: Understanding Historic Buildings and their Landscapes for Conservation*. London: English Heritage

English Heritage 2008 *Conservation Principles, Policies and Guidance for the Sustainable Management of the Historic Environment*. London: English Heritage (www.english-heritage.org.uk/publications)

English Heritage 2007 *Paradise Preserved: An Introduction to the Assessment, Evaluation, Conservation and Management of Historic Sites*. London: English Heritage (www.english-heritage.org.uk/publications)

English Heritage and the Church of England 2005 *Guidance for Best Practice for Treatment of Human Remains Excavated from Christian Burial Grounds in England*. London: English Heritage (www.english-heritage.org.uk/publications)

Wildlife

Caring for God's Acre *Various Factsheets* (www.caringforgodsacre.org.uk)

Chester, T 2011 *Churchyard Lichens Fact Sheet*. British Lichen Society. (available under Churchyards at www.thebls.org.uk)

Cooper, N 2001 *Wildlife in Church and Churchyard – Plants, Animals and their Management*, 2 edn. London: Church House Publishing

English Heritage 2007 *Paradise Preserved: An Introduction to the Assessment, Evaluation, Conservation and Management of Historic Sites*. London: English Heritage (www.english-heritage.org.uk/publications)

Gilbert, O 1992 *Rooted in Stone: The Natural Flora of Urban Walls*. Peterborough: English Nature

HISTORY

Burial grounds

Brooks, C et al 1989 *Mortal Remains: The History and Present State of the Victorian and Edwardian Cemetery*. Exeter: Wheaton in association with the Victorian Society

Council for Scottish Archaeology Carved Stones Adviser Project 2006 *An Introduction to Graveyard Recording* (www.scottishgraveyards.org.uk/recording.shtml)

Cox, M (ed) 1998 *Grave Concerns: Death and Burial in England 1700 to 1850*. CBA Research Report 113. York: Council for British Archaeology

Curl, J S 1972 *The Victorian Celebration of Death*. Newton Abbot: David and Charles

Memorials

Burgess, F 1979 *English Churchyard Memorials*. London: SPCK

Colvin, H 1991 *Architecture and the After Life*. New Haven and London: Yale University Press

Crossley, H 1991 *Lettering in Stone*. Self Publishing Association

Darke, J 2000 *User's Guide to Public Sculpture*. Swindon: English Heritage

Esdale, K 1927 *English Church Monuments 1510–1840*. London: Batsford

Institute of Cemetery and Crematorium Management 2007 *Management of Memorials* (www.iccm-uk.com/iccm)

Lees, H 2000 *English Churchyard Memorials*. Stroud: Tempus Publishing

Mytum, H 2000 *Recording and Analysing Graveyards*. York: Council for British Archaeology in association with English Heritage

Rutherford, S 2008 *The Victorian Cemetery*. Oxford: Shire Publications

Worpole, K 2003 *Last Landscapes*. London: Reaktion

LEGISLATION

Church of England 1993 *Care of Churches and Ecclesiastical Jurisdiction Measure: Code of Practice*. London: Church House Publishing

English Heritage 2007 *Commemorative Structures Selection Guide*. London: English Heritage (www.english-heritage.org.uk/publications)

HMSO 1977 *Local Authorities Cemeteries Order 1977*

HMSO 1991 *Ecclesiastical Law, England: The Faculty Jurisdiction Rules 2000*. Statutory instruments 2000; 2047. London: The Stationery Office

UK Legislation *Open Spaces Act 1906* (www.legislation.gov.uk)

Health and Safety

Biocidal Products Directive/Regulations (BPD/R) 2009/107/EC (www.hse.gov.uk/biocides/bpd)

Caring for God's Acre and Health and Safety in Churchyards. Factsheet 20 (www.caringforgodsacre.org.uk)

Health & Safety at Work Act 1974 and 1984 (www.hse.gov.uk)

Historic Scotland Graveyards and Gravestones electronic leaflets 2003:

4 *Health and Safety for Historic Graveyards: Guidance for Visitors and Owners*

5 *Health and Safety in Historic Graveyards: Guidance for Works Teams and Volunteer Workers, including Volunteer Surveyors*

(www.historic-scotland.gov.uk)

Management of Health and Safety at Work Regulations 1999 (the Management Regulations) (www.hse.gov.uk)

Ministry of Justice 2009 *Managing the Safety of Burial Ground Memorials – Practical Advice for Dealing with Unstable Memorials* (www.justice.gov.uk/guidance)

National Association of Memorial Masons 2010 *NAMM Code of Working Practice. NAMM Supported the Memorial Mason in complying with the British Standard 8415*. Rugby: NAMM (www.namm.org.uk)

Management

Council for the Care of Churches 2001 *The Churchyards Handbook*, 4 edn. London: Church House Publishing (www.chbookshop.co.uk)

Department for Constitutional Affairs 2005 *Guide for Burial Ground Managers* (www.justice.gov.uk/guidance)

National Federation of Cemetery Friends 2009 *Saving Cemeteries. A Handbook for Cemetery Friends*. South Croydon: NCF (www.cemeteryfriends.org.uk)

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