PURCELL

WOKING PALACE

CONSERVATION MANAGEMENT PLAN

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APPENDIX E

REPAIR GUIDELINES (WORKS TO STANDING BUILDINGS AND PALACE REMAINS)

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1 INTRODUCTION

This document has been prepared for Woking Borough Council. The guidelines detailed should inform all works for the repair, preservation or conservation of the above-ground palace remains within the site. This should be read in conjunction with the condition survey undertaken by Purcell in 2012 (Appendix C of the Conservation Management Plan).

Woking Palace is a scheduled monument. All works undertaken within the monument will be subject to consultation and permission from Woking Borough Council and English Heritage. Consultation, normally in the form of a method statement, should be undertaken prior to any work being undertaken within the site.

The guidelines below provide a general guide to repair and maintenance of the standing fabric. In determining a method statement for individual repairs additional information may be needed, requiring specialist assessment or analysis. It may also be necessary to undertake a scheme of building recording in cases where substantial amounts of fabric are being altered in a scheme of repair. This will be advised through consultation with English Heritage. A digital photographic laser survey of the remains inside and outside would provide a good record of the present remains and provide a base record to record planned and executed works.

All works to the standing fabric within the palace should be undertaken by a specialist in historic buildings and masonry repairs, in conjunction with a specialist conservation contractor.

This document provides outline guidance. However each scheme of repair will require its own individual strategy. This is particularly important for lime based work. For example original or earlier mortars may have inherent defects which one does not wish to replicate. Repair mortars may also require a bespoke mix in order to meet performance requirements.

Every scheme of maintenance and repair should be informed by an understanding of the fabric. Repairs or re-pointing also represent the opportunity to remove or replace previous repairs which have failed, or have resulted in deterioration of the surrounding masonry or which are visually poor. As such every scheme will present its own solutions.

Further information and detailed guidance is outlined in English Heritage publication *Practical Building Conservation: Mortars, Renders and Plasters* (2011).

2 BRICK POINTING

2.1 PREPARATION

Prior to repointing, all joints require adequate cleaning. All mortar should be raked out to an adequate depth, normally to a depth twice that of the joint width and back to sound mortar and cleaned using (PH Neutral) water. Tools wider than the joint width, angle grinders or other similar mechanical equipment **should not** be used as it will have a significant physical and adverse impact upon the historic fabric by damaging the edge of the stone or brick.

Clearing out and preparation of joints should always be undertaken from the top down in contrast to the pointing which should be undertaken bottom up, this will take account of the effects of gravity. Sound mortar and especially original/historic mortar should be retained where possible. A scheme of repointing can be used as an opportunity to remove failing or inappropriate mortars, which are usually the result of earlier unsympathetic repairs.

Following raking out of joints and prior to pointing work being undertaken the wall should be brushed down, the joints brushed out and the wall dampened to prevent suction drawing the moisture out of the fresh mortar resulting in rapid drying which causes shrinkage cracking in the mortar.

Finishing the pointing is a significant essential part of the pointing process and is essential in determining the final appearance. After a period of approximately one day when the initial set in the mortar has taken place the mortar should be lightly tamped with a bristle brush to expose the aggregates a process which will reveal the aggregates and particulates that give the mortar its character.

2.2 POINTING OF LOW STANDING REMAINS, BRICK ELEVATIONS AND VAULTED BUILDING

Repointing to vertical walls should be undertaken using NHL 3.5 lime mortar. A moderately hydraulic lime should provide a strength and density of mortar that is relatively porous and not too strong so as to cause any further erosion to the stonework or brick.

The mix ratio would tend to be 1 lime to 2 ½ -3 sand (mixture of grit sand and fine sand). As the colour of the chosen sands will largely determine the finished colour and appearance of the finished pointing mortar it should be selected to suite the individual sections of wall based on a detailed understanding of the fabric. Trial control samples of mortar should always be prepared, finished and allowed to dry out for several days prior to finally agreeing the mortar mix, sands used and mix ratios to carry out larger areas of re-pointing. Additional particulate inclusions to the mortar mix which add to the character and technical qualities of the finished mortar and may include brick or stone dust and un-slaked lime lumps to make it aesthetically in-keeping with the earlier extant mortar. The addition of particulate inclusions should be based upon evidence found in the extant mortars so that the technical and aesthetic qualities of the original mortar are matched as closely as possible.

A specialist should take representative mortar samples from deep within the stone walls and brick walls and have the mixes analysed to inform future lime mortar mixes.

It is essential that careful records are kept of the exact ingredients used, type and manufacturer of hydraulic lime, sands and their quarry source or supplier, inclusions and their source and mix proportions. In this way following areas of proposed pointing can be accurately matched. Photographs of recently pointed areas are also of benefit in recording which areas were pointed and when. All such information should be kept in a maintenance log kept by the building owner. Contractors should be carefully chosen from those with previous experience and a track record of working with historic building. Good working practice should be adopted by the specialist when re-pointing the wall. Correct pointing tools should be used. Mortar

should be firmly pressed into the joint and the mortar should be adequately protected from the sun by hessian to avoid the risk of rapid drying and shrinking and to allow a slow rate of setting and curing. Pointing work in the winter months should be avoided as mortar exposed to temperature lower than 3 degree Celsius is liable to freeze, expand and fail. It is normal to flush the pointing to the surface of the stone where it is not eroded however where the edges of stonework have become rounded and the joints have become enlarged the pointing should be recessed into the joint so that original joint width is maintained.

3 REPLACEMENT OF BRICK

The mortar within the brick elevations should be specified to be sacrificial as the original lime mortar mixes would have performed in order to preserve the significant and primary fabric of the brick. There will be occasions when bricks require replacement however this should only be where brick is substantially eroded or degrading and causing structural distress or where there is lack of support to the brickwork above. The decision to cut out and replace brick should not be made on aesthetic grounds alone. The original or early brick work is of architectural heritage merit and where possible should be retained in all cases.

Replacement conservation brick work should be identifiable as a clear new addition to the walls whilst being in-keeping with the adjacent masonry. This will allow a clear understanding of the walls, phasing and repair over time. Insertion of new bricks should, where possible, match the size, density and general colour of the surrounding masonry and respect the existing masonry coursing and bonding.

Records of masonry repair should be kept in all cases. A newly created archive should be deposited at the Lightbox where access can be made available for future inspection.

4 MORTAR CAPPING TO CONSOLIDATED WALL-HEADS

High and low level rough racked wall heads are highly susceptible to freeze thaw frost action in winter months as the water tends to collect on the wall head and penetrate the porous lime mortar literally shattering it. An NHL 5 eminently hydraulic lime mortar should be used to point the joints of the wall head which will provide a less porous and stronger mortar that will be more resistant to frost attack. Periodic re-inspection will be required after the winter months to check for any frost damage and it may be necessary to carry out remedial work to areas that may have suffered from frost action. The philosophy should be that the mortar is sacrificial to the original stonework and although cement mortar mixes would be resistant to frost action the stonework or brickwork will be liable to suffer from erosion due to the moisture that would be concentrated in the stone or brick.

5 SOFT CAPPING

A future recommendation is to consider adding 'soft cappings' to the free standing brick wall heads. The technique of soft capping entails using turfs containing indigenous grasses and plants used to over cap and protect the hard capped wall head and consolidated wall face. The benefit that soft capping has over the present hard capping are:

a. Hard capped walls tend to collect water and concentrate rain water run off onto the face of the top courses of the wall where salts are concentrated and freeze thaw action tends to degrade the masonry at a faster rate than the main body of the wall. Soft capping of turf to wall heads have a projection which tends to shelter the wall head. The soft capping acts like a sponge that absorbs water, holds it rather than sheds it and allows it to evaporate naturally.

b. Soft capping can enhance the appearance of ruined monuments reinforcing the notion of a 'romantic ruin'

c. Soft capping can enhance the biodiversity of the site

Issues to consider

SOURCING THE TURF

- The site is a Scheduled Monument and as such it will probably not be permitted to cut tuft from the immediate site. The best turf to use is turf from the site itself but if this is not possible then source from as close to the site as possible.

ECOLOGY

- It may be necessary to carry out pre-emptive ecological surveys to establish whether there are any restrictions imposed by the presence of protected plants, bats, great crested newts or other protected species.

ESTABLISHING TURFS

The two main threats to the successful establishment of turfs on consolidated wall heads are drying out and wind uplift.

DRYING OUT

Turf requires a reservoir of moist soil to allow the grass roots to penetrate and become established. To this end a trough of compacted soil and sub-layers of inverted commercial turf acts as a bedding for the site dug turf.

The commercial turf is used as a sacrificial bedding layer and is laid inverted (grass down) so that by the time the roots of the capping turf penetrate the commercial turf, the grass has died off and a good sized well matted soil reservoir has been created to absorb rainwater and feed the indigenous grass. When bedding the commercial and capping turfs it is important that they are well butted and beaten down to eliminate any air pockets that would dry out the turf. It is important that there are no exposed soil edges that would rapidly dry out.

WIND UPLIFT

The site dug capping turf would be susceptible to wind uplift if it were laid directly onto the wall head. Therefore in order to anchor the capping turf sub-layers of inverted commercial turf (garden centre) is laid on the wall head to allow the capping turf to be pegged down with bamboo or hazel pegs at various angles. Commercial turf is used as it has an even thickness, square edges and the grass roots are tightly matted providing good anchorage for the pegs.

SELF SEEDED TREES

Self-seeded trees that root themselves into wall heads and wall faces are extremely detrimental to the wall structure. Soft capping will provide a perfect seed bed for such invasive self-seeded woody plants.

Whereas moorland locations where the harsh climate precludes the propagation of trees may be ideally suited to soft capping, high inaccessible walls in woody glades may not be suitable.

TIMING OF SOFT CAPPING WORKS

- The ideal time to carry out soft capping work is in the damper seasons and not in the height of summer or winter so that drying out and ice penetration does not become an issue.

- As the consolidation of masonry wall heads and caps using hydraulic lime mortars needs to be carried out before soft capping works, and it will be necessary for the lime hardener so that the masonry is not dislodged when beating down the turfs, it will be necessary to plan say a 1 – 2 month gaps in the programme for the lime to harden.

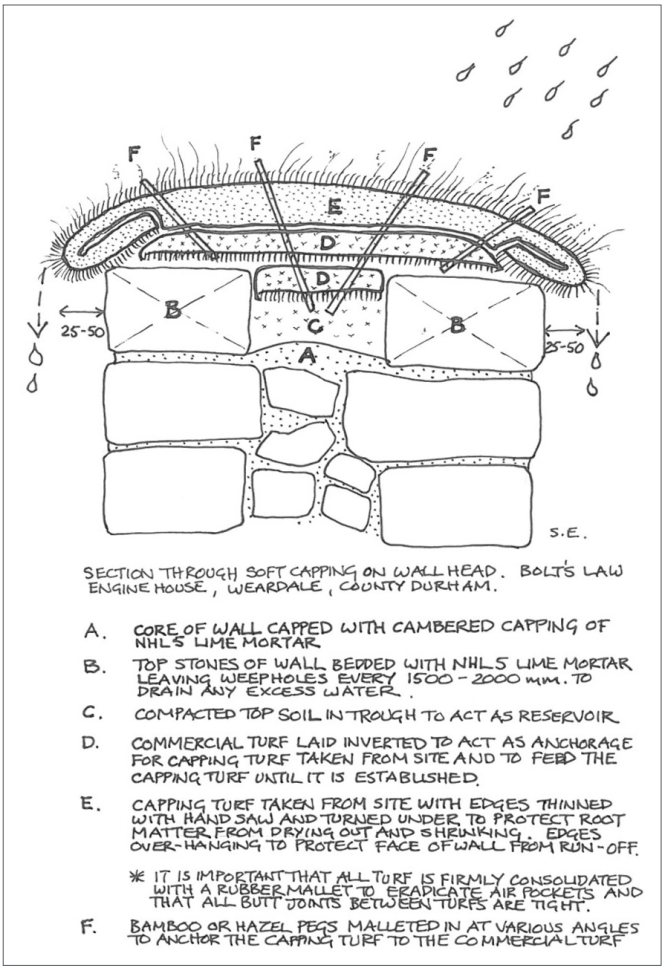
MAINTENANCE

- Planned maintenance of the soft capping is an essential part of the decision to soft cap. Low and medium level wall heads that are easily accessed for monitoring and maintenance are the ideal however if soft capping is carried out in inaccessible high level wall heads, planned inspections and maintenance by mobile platform or rope access specialists every few years should be budgeted.

- Contractors responsibilities to irrigate the turf during the defects liability period needs to be considered. For high level soft capping this may mean rigging up a hose pipe to allow watering from ground level.

CHOICE OF CONTRACTOR

It is always preferable to appoint a contractor who has carried out soft capping works previously to minimise the possibility of failure. The diagram opposite shows a section through an example of soft-capping at Bolt's Law Engine House in Weardale, County Durham.



Soft capping

6 MONITORING SCHEDULE

Ground maintenance and mowing of grass is currently undertaken three times per year. It is recommended that the remit of this maintenance is extended to include:

- Removal of vegetation growth upon standing remains. Light plant growth can be physically removed however plants whose roots have established themselves within masonry joints should be removed by the application of systemic weed killer.
- Removal of vegetation growth to low level wall capping
- Removal of harmful self-seeded woody vegetation and sapling growth to soft capping (if applied)
- Watering of soft-capping if necessary whilst it is establishing

Pointing and building fabric

Quadrennial inspection by historic building/conservation specialist. This can be undertaken in conjunction with a general condition survey.

Mortar capping

An inspection of the integrity of the mortar capping should be undertaken at least once a year. This is best undertaken in spring so the frost impact from the winter can be inspected.

Soft capping (if applied)

The integrity of this should be inspected as part of a quadrennial inspection.

7 POLICIES

General maintenance work and repair should adhere to the following general policies:

- All repair works are subject to consultation with English Heritage and Woking Borough Council
- All repair work should be undertaken by a suitably qualified professional
- All repair work should be undertaken with a sound understanding of the existing and historic building fabric
- The retention of original or early fabric of historic significance is paramount to any scheme of maintenance and repair
- All schemes of repair require a record which is to be added to a 'repair and maintenance archive' located at The Lightbox. Names and contact details of contractors carrying out the work should also be recorded as re-engagement of successful contractors should hopefully lead to consistency.
- There should be a record of maintenance and monitoring, as outlined above. The record of this monitoring should be archives with the 'repair and maintenance archive' at The Lightbox and within Woking Borough Council Asset Management / Property Department.

8 ACTION PLAN FOR REPAIRS

- Undertake site maintenance schedule.
- Create a site maintenance archive to be held at The Lightbox.
- Commission laser survey of all buildings inside and outside prior to any further works to record fabric and to monitor future changes in condition.
- Take mortar samples from walls to analyse original mortar mix and inform mix and source of line and sand for consistency of future mortar and pointing.