

KINGSTON & ARTHUR'S VALE HISTORIC AREA  
NORFOLK ISLAND  
HERITAGE MAINTENANCE MANUAL  
21 NOVEMBER 2019



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# MAINTENANCE MANUAL

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## EXECUTIVE SUMMARY

The Kingston and Arthur's Vale Historic Area (KAVHA) has been actively conserved since the establishment of conservation programs and practices of the early 1960s. The active care and maintenance of the significant built elements of this historic site has sought to retain their integrity, intactness and condition as a means of ensuring their values for future generations.

Best practice conservation principles have developed since the commencement of conservation works in the 1960s and, while the extant significant fabric remains in reasonably sound condition, a revision of practice is considered important to ensure the ongoing condition and integrity together with an authenticity to the presentation of the items within the landscape. In addition to this it is important to ensure the retention of a program of periodic inspections as a means to ensuring that adequate planning, funding and resourcing is provided as part of a Total Asset Management Framework.

Maintenance is fundamental to conservation. A regular program of built and landscape maintenance works has occurred at KAVHA over several decades. The maintenance program, however, has concentrated only on some elements of the main buildings and could be expanded to address other elements such as significant ruins, plantings, and features such as agricultural remains. More complex and costly maintenance works have not progressed, but routine works such as mowing and painting has been ongoing<sup>01</sup>.

Decision making tools are provided within the report to assist in the determination of priorities and programming and to map triggers for capital works programs. Additional tools, including inspection schedules and recording protocols have been developed with KAVHA management to reflect the current needs of the Asset Management approach for the site.

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<sup>01</sup> KAVHA HMP, 2016, p.83



# I INTRODUCTION

## I.1 PURPOSE AND AIMS

This project is intended to establish a Heritage Maintenance Manual for the Kingston and Arthur's Vale Historic Area (KAVHA) on Norfolk Island. The Manual is to account for previous Heritage Manuals dating from 1988 and 2016 together with previous studies into paint finishes and current maintenance practices.

The aims of the Heritage Maintenance Manual are defined as follows:

- 01 To re-establish a program of periodic inspections for the extant built heritage of KAVHA.
- 02 To facilitate the generation of capital works programs as an output of periodic inspections and tools to assist in prioritisation of both maintenance and capital works.
- 03 To inform best practice conservation techniques across a range of typical conservation maintenance practices.
- 04 To support compliance with policies 8.3.1, 8.3.2, 8.3.3 and 8.3.6 and recommendation 18 of the KAVHA HMP.
- 05 To provide an inventory of heritage features subject to periodic inspection.
- 06 To develop an inspection schedule for implementation by the KAVHA Works Crew.
- 07 To provide methodology and specification sheets, with reference to industry codes and standards for traditional materials and techniques.
- 08 To provide guidance on when specialist conservation advice should be sought.

## I.2 SCOPE OF THE MANUAL

The scope of the Heritage Maintenance Manual (the Manual) is to provide a robust framework for the ongoing management and maintenance of the extant significant structures forming KAVHA.

The Manual is to inform the reestablishment of periodic inspections to built heritage items so as to generate an understanding as to their current condition and to establish and forecast planned conservation maintenance and repair. Ideally the program of periodic inspections should form part of a Total Asset Management framework and any future Asset Management System which may be established for KAVHA.



Aerial view of Kingston & Arthur's Vale World Heritage Area. Source: Google Earth, edited by Purcell

# I INTRODUCTION

## I.3 TERMINOLOGY

This document employs the terminology and definitions as outlined within the Australia ICOMOS Burra Charter (2017), and *Managing Heritage Assets*<sup>02</sup> together with definitions assigned to terms within this Manual. The following terms are of particular relevance to this Manual:

Asset	An item of property.
Asset Management System	The method by which Asset Management is delivered.
Built Feature	As with Heritage Asset.
Conservation	Conservation means all the processes of looking after a place so as to retain its cultural significance (Burra Charter 2017).
Cyclic Maintenance	Routine maintenance requiring repetition at regular intervals in order to keep an asset in appropriate condition, supported by regular inspections.
Heritage Asset	A place or asset which is assigned cultural value. For the purpose of this report heritage assets are the structures forming KAVHA.
Item	As with Heritage Asset.
Maintenance	Maintenance means the continuous protective care of a place, and its setting. Maintenance is to be distinguished from repair which involves restoration or reconstruction. (Burra Charter 2017).
Periodic Inspection	A regular condition survey to be undertaken employing the Inspection Schedules outlined within this report.

## I.4 ABBREVIATIONS

CMP	Conservation Management Plan
AMS	Asset Management System
HMP	KAVHA Heritage Management Plan 2016
KAVHA	Kingston and Arthurs Vale Historic Area

## I.5 EXCLUSIONS AND LIMITATIONS

This Heritage Maintenance Manual is focused on the conservation of historic fabric and outlines traditional techniques and specifications of particular relevance to typical conservation maintenance practices. The study acknowledges that there will be specialist conservation works required for historic fabric which would best be executed by conservators and those with heritage skills training. The intent of the Manual is to assist the KAVHA works crew in the implementation of a periodic inspection program, and to enable the execution of recurrent conservation maintenance outside of dedicated capital works programs.

Given the key recommendations of Purcell's Condition and Conservation Report for a return to traditional conservation practices and materials, and the extent of 'catch-up' conservation maintenance the Inspection Schedules do not account for matters of accessibility, building and safety services, health and safety, general presentation or landscaping. Such inspection tasks are considered more appropriate for an Asset Management System which together with this Heritage Maintenance Manual are to be considered as components of an overall Total Asset Management Framework.

The Manual does not account for all recommendations outlined within Purcell's Condition and Conservation Report, 2017, nor does it provide completely for the specification of all conservation works likely to be required on site. The Manual does not account for works to the Cemetery and its monument stones. Input from Structural, Mechanical and Electrical Engineers is beyond the scope of this report.

## I.6 GAPS IN KNOWLEDGE

There are several areas which require further investigation and testing to sufficiently inform the determination of methodologies and specifications. The following areas are recommended for focused studies and trials:

- Sand supply - the suitability of locally sourced sand, where extraction and supply is available, should be determined following sieving and washing. Aside from the determination of an appropriate aggregate mix salt content and organic impurities would need to be determined.
- Norfolk Pine Shingles - the life span of treated Norfolk Pine Shingles should be monitored to inform a total life cycle comparison

<sup>02</sup> *Managing Heritage Assets*, English Heritage, 2009.

# I INTRODUCTION

against

- imported alternatives.
- The performance and efficacy of breathable coatings, such as lime wash and mineral paints, as applied to cementitious coatings should be established through trials.

## I.7 HEALTH AND SAFETY

In undertaking research for this project it was noted that the addition of asbestos in caulking has previously been specified on site. We make recommendation that any work to material of this nature be informed by Hazardous Materials testing.

In addition to the above the conservation specifications and methodologies associated with this Manual call for the use of quicklime. Quicklime is a 'hazardous material'. It is a highly caustic and reactive material and can cause irritation or burns to the eyes and skin during slaking or mixing. PPE, including gloves, goggles and dust masks should be used at all times.

It is to be noted that a full Health and Safety audit has not been undertaken as part of this study and is beyond the focus of this report.

## I.8 REFERENCES

The following reports from the KAVHA archive have been referenced in the preparation of this Manual:

- *Report on Historical Buildings and Other Structures at Norfolk Island with Estimates of Cost of repairs*, Department of Works, August 1959
- *Norfolk Island - Old Colonial Structures*, Commonwealth of Australia, 1962
- *Report on Norfolk Island Plasters*, INSEARCH Ltd, Dr GS Gibbons, 1980
- *Report on Norfolk Island Mortars*, INSEARCH Ltd, undated
- *Norfolk Island Conservation Program Report on Renders and Paints*, Philip Cox & Partners, January 1985
- *Report on Render and Paint Systems used on Norfolk Island*, author and date unknown
- *Maintenance Manual for Norfolk Island Conservation Program*, Philip Cox, Richardson, Taylor & Partners, 1988
- *Norfolk Island Sand Resources Report*, Australian Construction Services, undated
- *Geological Assessment of KAVHA Stonework, Norfolk Island*, Dr Brenda Franklin, 1998
- *KAVHA Gutters*, Eric Martin & Associates, 2003
- *KAVHA Roofing*, Eric Martin & Associates, 2003
- *Report Investigation of Paint Finishes*, Donald Elsmore, 2011
- *KAVHA MAintenance Manual DRAFT*, Eric Martin and Associates, 2016
- Peer review of the 2016 Maintenance Manual, Port Arthur Historic Sites Management Authority, 24 November 2016

## 2 UNDERSTANDING

### 2.1 KINGSTON AND ARTHURS VALE HISTORIC AREA

The Kingston and Arthur's Vale Historic Area (KAVHA) comprises more than 40 buildings, substantial ruins and archaeological remains set within 225 hectares of relatively undisturbed land. All structures were constructed by offenders from stone quarried on Norfolk and Nepean islands or with local timber. KAVHA demonstrates the use of penal transportation to expand Britain's geo-political spheres of influence, punishment of offenders, deter crime in Britain and to rehabilitate. The site is also associated with global developments in the punishments and reformation of offenders during the 19th century offenders.

The layout of the site reflects the strategic spatial placement of buildings that separated both the real and symbolic power of authorities to scrutinise and control the convict population. A complex of military and administrative buildings is elevated on the rise along Quality Row. These include military compounds, offices and cottages for civil and military personnel and a Commissariat Store. There is a clear view from these buildings down to the convict precinct on the foreshore. The pre - 1850s Georgian style buildings (some partly reconstructed) survive in a streetscape setting<sup>03</sup>.

The 1829 Government House is one of the earliest and most intact remaining government house buildings in Australia. The 1835 Commissariat Store (now All Saints Church) is the finest remaining colonial (pre 1850) military commissariat store in Australia<sup>04</sup>. The buildings from the Second (Penal) Settlement 1825-1855 provide one of the finest collections of surviving colonial Georgian structures in the world<sup>05</sup>.

### 2.2 STATEMENT OF SIGNIFICANCE

The Kingston and Arthur's Vale Historic Area is of outstanding significance to the nation as a convict settlement spanning the era of transportation to eastern Australia between 1788-1855. It is also significant as the only site in Australia to display evidence of early Polynesian settlement, and the place where the Pitcairn Island descendants of the Bounty mutineers were re-settled in 1856<sup>06</sup>. Adaption, demolition, reuse and conservation of these buildings by the Pitcairn Island descendants has created a rich tapestry overlaid on this history. Some extant buildings have been in continual use since this time.

A full statement of significance, and assessment against the prescribed World, National, Commonwealth and Norfolk Island heritage values is available within Section 4 of the KAVHA Heritage Management Plan (HMP), 2016.

### 2.3 VISION STATEMENT

The Kingston and Arthur's Vale Historic Area is a place of outstanding heritage value to the people of Norfolk Island, the Australian community and internationally.

The rich and interwoven natural and cultural landscape of the KAVHA site will be conserved, managed, protected and presented with authenticity as a vibrant place through effective governance, good management, improved support, best practice techniques/tools and enduring community partnerships<sup>07</sup>.

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<sup>03</sup> Australian Convict Sites World Heritage Nomination, Commonwealth of Australia, January 2008, p.18

<sup>04</sup> KAVHA Heritage Management Plan, JRA, Context and GML, 2016, p. 52

<sup>05</sup> Ibid, p.63

<sup>06</sup> <https://environment.gov.au/heritage/places/national/kavha>

<sup>07</sup> KAVHA Heritage Management Plan, JRA, Context and GML, 2016, p. 16



## 2 UNDERSTANDING

### 2.4 KAVHA HERITAGE MANAGEMENT PLAN 2016

The following policies from the KAVHA HMP (pages 107-110) have relevance to this project:

#### 8.3.1 *Fabric Conservation*

- All works to significant buildings, structures or ruins within the KAVHA site will be consistent with the principles and practices of the Burra Charter;
- Fabric conservation will respect the historic layering of individual buildings, structures and ruins;
- Remaining unaltered original finishes and materials will be preserved and not changed;
- Intrusive and incompatible fabric will be removed as and when appropriate;

#### 8.3.2 *Maintenance*

- Modern materials will be avoided where they may be likely to impact upon or cause damage to significant original fabric.

#### 8.3.3 *Buildings*

- Traditional building materials and techniques will be used where possible to retain the handmade individual characteristics of each building.

#### 8.3.6 *Other Structures*

- Original fabric will be retained, repaired and stabilised, in preference to the introduction of replacement fabric.

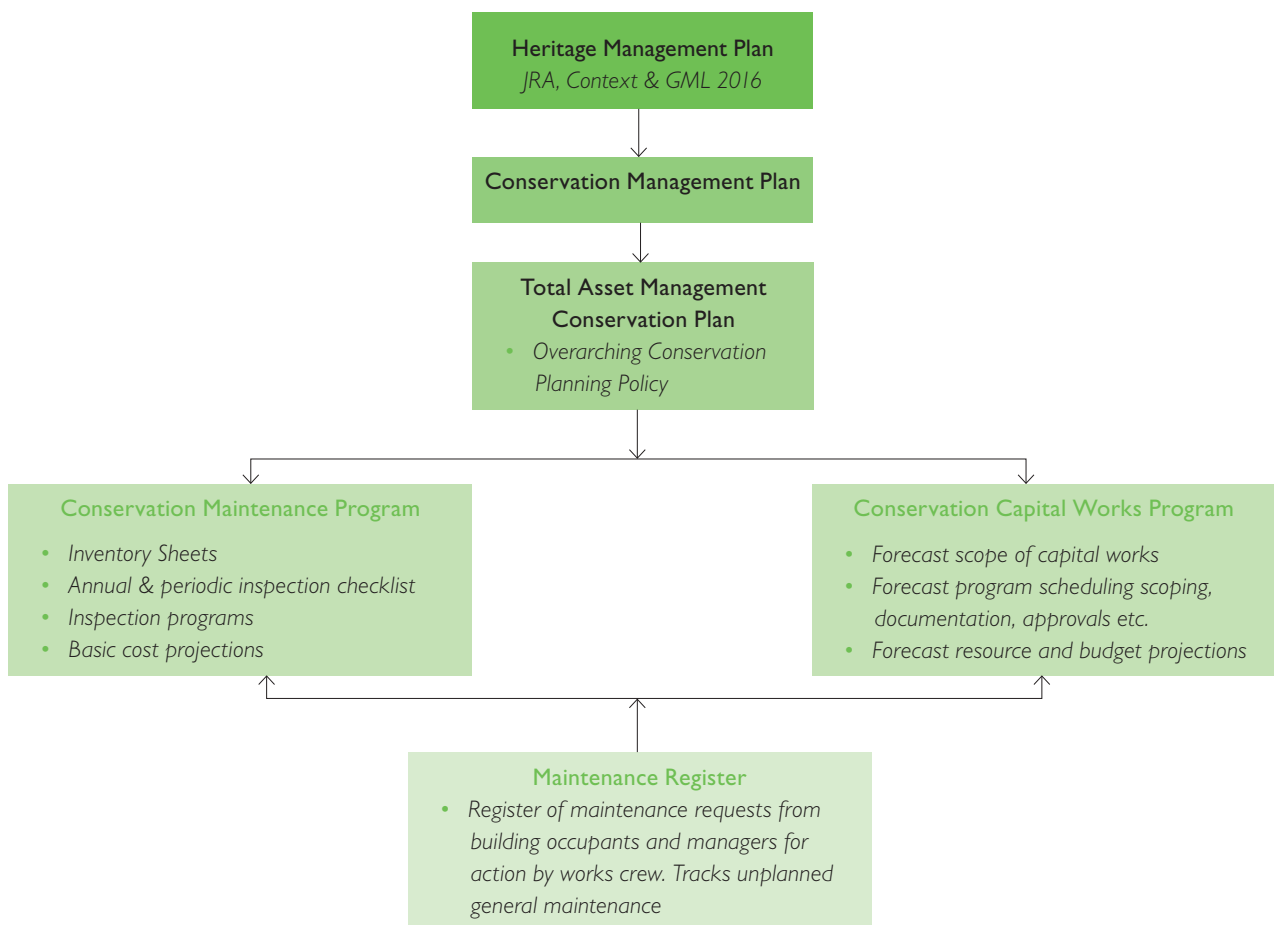
## 2.5 CONSERVATION MAINTENANCE FRAMEWORK

Maintenance or Conservation Plans for KAVHA should be developed in consideration of the existing governance framework if they are to best respond to the legislative, operational and budgetary requirements of the site, and be effective in the delivery of sound conservation and economical outcomes in a best practice manner.

Conservation refers to all the processes of looking after a place so as to retain its cultural significance. It includes maintenance and may, according to circumstances, include preservation, restoration, reconstruction and adaptation and will be commonly a combination of more than one of these<sup>08</sup>.

The purpose of this framework is to establish a general philosophical approach that, together with a clear understanding of significance, can guide decision making and help identify the appropriate conservation and maintenance response in the ongoing management of the place. This Manual makes recommendation of contemporary practice based upon a review of the 1960s and subsequent 1980s conservation program. The methodology outlined within the 1980s program presented a sound cyclic maintenance program which could be readily maintained and amended to the needs of the place, by those directly responsible for its day to day care and management. The framework of the contemporary Heritage Maintenance Manual takes the framework of the 1980s Manual and contextualises the inspection schedules for implementation within the context of the site in 2019. The major departure from the 1980s Manual is in the specification and methodologies outlined for conservation works, with a return to traditional materials in response to the condition and presentation of the historic fabric.

The following framework has been developed for this Heritage Maintenance Manual.



<sup>08</sup> Australia ICOMOS Burra Charter, 2017

## 3 OVERVIEW OF CONSTRUCTION MATERIALS, METHODS AND CONTEXT

### 3.1 OVERVIEW OF CONSTRUCTION MATERIALS AND METHODS

#### 3.1.1 Introduction

Conservation works at KAVHA have been well documented and a wealth of information exists to inform both the original construction materials and methodologies together with subsequent conservation practices. The following overview provides a summary of key observations drawn from archival sources and is intended to provide context for future conservation maintenance decisions.

#### 3.1.2 Stone

The majority of the Colonial buildings are constructed from locally quarried calcarenite limestone. This stone is comprised of fossils, shells and general calcareous (limestone-based) detritus, 'cemented' together within a calcite and/or clay matrix. Calcarenite stone is recognised as a strong and durable stone which withstands physical weathering processes.<sup>09</sup> In her 1998 Geological Assessment Dr Brenda Franklin summarises the stone as follows:

The climate in Norfolk Island is coastal and semi-tropical with an absence of frost and of polluting acid gases in the salty atmosphere. The good state of the preservation of the calccrete buildings on Norfolk Island is most likely due to the combination of a favourable internal structure of the stone, which does not allow large amounts of soluble sea-salt crystallisation and build up in an absence of other polluting compounds and agents.

The 2008 CMP provides a valuable overview of the geological presentation of Norfolk, Nepean and Phillip Islands, the coastlines of which are mostly bounded by precipitous cliffs of basalt and tuff 60-90m in height, the result of marine erosion<sup>10</sup>.

The only coastal lowland is at Kingston, which is 1km long and up to 0.8km wide with a fringing coral reef. Between 120,000 and 20,000 year B.P sea level dropped and fluctuated between 40-90m below the present level. Coral reefs were formed on this shallow marine platform, and with a further drop in sea level to 140m below present level these reefs were exposed and eroded. Blown by the prevailing southerly winds into the vicinity of Point Hunter and Nepean Island, the sand sized fragments cemented together to form the sedimentary rock calcarenite. This cross bedded sedimentary carbonate rock outcrops along the shore of the Kingston lowland. Nepean Island is pure calcarenite up to 35m thick. Calcarenite was the material from which the Second Settlement structures of Kingston were largely built<sup>11</sup>.

The geological presentation of Norfolk, Nepean and Phillip Islands provides two building stones - 'Rubble' and 'Massive' calcarenite. 'Rubble' calcarenite has been used for general wall construction, with the 'massive' calcarenite, which presents as a denser material with tighter pore structure, being employed on those elements with a greater structural role, or requiring a higher level of dressed and carved finish<sup>12</sup>. Stone was quarried in a number of locations, at Chimney Hill, to the rear of Government House, adjacent to the lime kilns and from the reefs of Slaughter and Cemetery Bays<sup>13</sup>.

There is one documented instance of the use of Bondi Sandstone, as the left hand side column (northern) of the Royal Engineers building c.1980s. There are potentially additional stone supply sources across KAVHA. Generally it is recommended that any replacement stone be sourced from the reclaimed stockpile, however there may be instances where stone is required from alternate sources. In these instances supply should be informed by careful specification specific to the individual application and structural requirements.

#### 3.1.3 Lime

Records indicate that building lime for use at KAVHA was manufactured by burning the 'rubble' calcarenite stone from Chimney Hill from c.1792<sup>14</sup>. 'The Norfolk Island lime, burnt from locally quarried calcarenite, on hardening, assumes the same characteristics as the stone itself. The survival of vestiges of the First Penal Settlement is largely due to this characteristic of the lime. When the buildings were fired at the end of the first Settlement the lime became very hard, protecting the structures from weathering.'<sup>15</sup>

Laboratory testing and reporting associated with the 1985 Report on Renders and Plasters, in Section 2.4, provides a testing methodology which will enable the identification of early plaster and will prove beneficial in any future programs of conservation works for the retention of extant significant fabric<sup>16</sup>.

<sup>09</sup> *Geological Assessment of KAVHA Stonework, Norfolk Island, Dr B Franklin 1998*

<sup>10</sup> *Kingston and Arthur's Vale Historic Area Draft CMP, Otto Cserhalmi & Partners, 2008, p.47*

<sup>11</sup> *Ibid, p.47*

<sup>12</sup> *Ibid, p.299*

<sup>13</sup> *Ibid, p.239*

<sup>14</sup> *Ibid, p.189*

<sup>15</sup> *Ibid, p.189*

<sup>16</sup> *Norfolk Island Conservation Program Report on Renders and Paints, Phillip Cox & Partners, January 1985, p.59*

## 3 OVERVIEW OF CONSTRUCTION MATERIALS, METHODS AND CONTEXT

### 3.1.4 Sand

Anecdotal, oral and documentary evidence (see Cox 1985) indicates that sand used in the construction of the historic structures of KAVHA was locally quarried beach sand from Emily and Cemetery Bay's. While noting that the sand is sourced from marine environments the matrix and grain distribution of the sand is good, it is sharp and well graded. Given the marine origin of the sand it is likely that it is salt laden. It could therefore safely be presumed that with no known documentary evidence of hot mixing practices in the preparation of lime mortars, and recorded advice of the KAVHA conservation crews that *'The washing of sand to remove salt has never been practice on Norfolk Island and the techniques to achieve this by simple means are not known'*<sup>17</sup> and that mortars, renders and plasters would have a high residual salt content.

It is however interesting to note the results of laboratory testing undertaken in association with the 1985 report on renders and paints, which indicated relatively low residual salt levels in traditional mixes, as opposed to later mixes with cement components. This warrants further investigation and testing should sand be locally sourced for future conservation programs.

The updated report by Australian Construction Services highlights the challenges of sand extraction from Emily and Cemetery Bay's noting '...its immense value as a heritage site, both for European and pre-historic settlement...'<sup>18</sup> It goes on to note that a technique for extraction without impact to archaeological potential would be required. In summary it notes that extraction should not be carried out in an ad-hoc manner to supply materials for works, with the exception of conservation works<sup>19</sup>. Careful consideration should be given to the appropriateness of Emily and Cemetery Bay's for sand supply. Consultation with the Conservation Advisory Committee and a consulting Archaeologist should be undertaken. If supported trials for the application of this aggregate for hot lime mixes should be established and monitored for efficacy prior to considerable extraction.

### 3.1.5 Renders, Mortars and Plaster

Physical evidence indicates that the original applied coating to the Calcarenite 'rubble' walling was similar to that of harling or roughcast, '... the rough open-textured surface of the harling dissipated the impact of driving rain and increased evaporation of moisture once rain eased. Roughcast was quick and easy to apply, with a wet slurry mixture (washed course aggregate mixed with hot lime) thrown onto the render or floating coat that has been scratched.'<sup>20</sup> Typically the harling is then finished in limewash. It is however noted, with reference to archival photographs<sup>21</sup> that not all structures and walls were finished.

The practice of 'bagging' the 'rubble' calcarenite walls commenced, widely, following the 1962 specification and has remained the practice for the finishing of exposed rubble calcarenite since this time, with variation to the cement content of the mix.

The cementitious renders and plasters, which are now in some instances 50 years old are starting to fail. In those instances, for example compound walls, where the render has been bagged directly to the surface of the 'rubble' calcarenite, the stone appears reasonably sound, but presents now as exposed to the environmental factors which early lime mortars and renders were protective of. It is assumed that at upper and lower levels of such walls there is likely to be a greater penetration and extent of cementitious products.

There are no practical ways through which to remove these contemporary coatings without significant impact to the extant original fabric. As such these areas should be left to take their course of deterioration. Purcell's Condition and Conservation Report of 2017 makes recommendation that future works should be undertaken in lime based materials, and this recommendation is reflected in the specification and methodology outlined within this Heritage Maintenance Manual.

### 3.1.6 Coatings and Finishes

The 1988 Maintenance Manual saw the introduction of 100% acrylic paints as a replacement to the traditional practice of lime-washing, white-washing and distempers evident in both archival and physical documentation.

It was also around the time of the 1988 Maintenance Report that the original tonal colours, evident in photographic archives and in extant physical evidence<sup>22</sup>, changed.

<sup>17</sup> Report on Historical Buildings and Other Structures at Norfolk Island with Estimates of Cost of repairs, Department of Works, August 1959, p.15

<sup>18</sup> Norfolk Island Sand Resources Report Australian Construction Services, undated

<sup>19</sup> Ibid, p.19

<sup>20</sup> English Heritage Practical Building Conservation: Mortars, Renders & Plasters, p.89

<sup>21</sup> Reverend Bice's Panorama

<sup>22</sup> See No. 10 Quality Row outbuildings.

### 3 OVERVIEW OF CONSTRUCTION MATERIALS, METHODS AND CONTEXT



Norfolk Island Pine sourced for timber roofing shingles. Source: Department of Environment, 2007.



An example of the Calcarenite as found in Slaughter Bay. Note sound condition given the exposed location. Source: Purcell.



Extant renders and harling to the outbuildings of No. 10 Quality Row. Source: Purcell.



Sand was traditionally sourced from the adjacent Emily and Slaughter Bays. Source: Purcell.

The change in surface texture arising from the mortar and paint specification, together with the departure from the original colour scheme has impacted the setting and presentation of the historic buildings within the landscape.

'The monochrome appearance of a wall, which can be gained with modern paints, was not the character of the place in the nineteenth century.'

<sup>23</sup>

It is further noted that some elements which appear to have been unpainted historically, have since been included within the painting program. Elements such as the replacement column to the Royal Engineers Building, carved of Bondi Stone in more recent years, are displaying evidence of accelerated deterioration due largely to acrylic coatings.

Comparatively, the cellar to Government House, the only such space inspected to retain lime wash finishes is in sound condition requiring no more maintenance than reapplication of this same material.

The specification of acrylic paint is impacting on the integrity, condition and presentation of the significant fabric and structures of KAVHA. Reverting to lime based finishes will not only be more appropriate for the long term integrity and condition of the fabric but improve the authenticity and presentation of the buildings.

A 2011 Report Investigation of Paint Finishes by Donald Elsmore provides a valuable analysis of the history of coatings and finishes, including an analysis of historic photographs and historic and physical evidence and references and should be considered in the change of conservation

<sup>23</sup> KAVHA, Draft CMP, JRA, 2007, p.257



## 3 OVERVIEW OF CONSTRUCTION MATERIALS, METHODS AND CONTEXT

practice, inclusive of the recommendation that alternate colour schemes be considered for external joinery. This may assist in the mitigation of the biological growth to painted timber elements both with regard to presentation and maintenance practice.

### 3.1.7 Timber

There is an abundant supply of Norfolk Island Pines, employed for building purposes across KAVHA. There is evidence of boarer activity and documented history of treating pine with salt water and lime<sup>24</sup> and with creosote.

An investigation of paint finishes, prepared by Donald Ellsmore in 2011, suggests consideration of Stockholm Tar. Treatments such as Pine Tars have potential visual implications which should be further considered in the establishment and implementation of any alternate colour schemes.

### 3.1.8 Hazardous Materials

A review of historic specifications (c.1980s) has identified potential hazardous materials use within some materials, such as caulking compounds<sup>25</sup>. There are several examples nationally which demonstrate the use of asbestos in materials such as pointing mixes and caution should be employed when undertaking remedial and conservation works at KAVHA beyond the typically assumed applications of hazardous materials. Future Hazardous Materials Surveys should take account of this finding.

### 3.1.9 Roofing

Roofing materials are limited to fibrocement shingles and timber roofing shingles. Timber shingles have been sourced from both locally available tannalised Norfolk Island Pine and Casuarina sourced from New South Wales. The 1980s Maintenance Manual nominated lead soaker flashings to the underside of timber ridge boards there has been a departure to butynol rubber which provides greater workability.

It is noted, with reference to archival photographs that woven hip and ridge laying patterns were traditionally employed.

While the 2003 KAVHA Roofing Report notes a 70 year life cycle for the Casuarina supply the durability of currently available supplies should be investigated. Further the life cycle of tannalised Norfolk Island Pine appears sufficient to consider nomination of this local supply. The establishment of a dedicated forestry practice for long term supply, together with the retention of local skills and experience for the billeting and splitting of shingles, is a sustainable practice in both environmental and conservation terms.

### 3.1.10 Rainwater Goods

PVC gutters are used across the site for those roofs furnished with rainwater goods. The wholesale specification of this material stems from the brief comparison of the 2003 KAVHA Gutters Report. Archival images indicate that rainwater goods were not originally employed.

It is recognised that the introduction of rainwater goods, while presenting impact to the authentic presentation of the site, are valuable for reducing an excess of rainwater at the base of masonry walls subject to rising damp and salt attack, this being a sound maintenance principle. It is also acknowledged that PVC rainwater goods are a departure from typical specifications generated for historic precincts. That said the extreme coastal environment, freight considerations and durability of the material far exceeds the anticipated lifecycle of alternate materials.

Opportunities to revert to original roof presentation should be considered in instances where rising damp, salt attack and biological growth are not considerations.

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<sup>24</sup> *Ibid*, p.5

<sup>25</sup> AIA-001 *Specification for works at Government House, Clause C7, p.13*

## 4 INVENTORY OF HERITAGE ASSETS

### 4.1 INTRODUCTION

This Inventory is intended to identify those historic built features that are subject to this Heritage Maintenance Manual. The intention is to draw on the base-line information generated by the 1998 Maintenance Manual with population of recorded actions since this time. The generation and maintenance of this record will assist in a clear understanding as to the history of works, in turn informing conservations decision and assisting in the generation of budget forecasts. A sample inventory sheet is provided at Appendix A.

### 4.2 INVENTORY OF HERITAGE BUILDINGS

The following Inventory of heritage assets employs the asset numbering system as set out in the 2008 CMP. Heritage assets subject to this Heritage Maintenance Manual are identified as follows with reference to the items scheduled in the 1980s Maintenance Manual::

- D1 - No. 1 Quality Row
- D2 / D3 - No. 2/3 Quality Row
- D4 - No. 4 Quality Row
- D5 - No. 5 Quality Row
- D6 - No. 6 Quality Row
- D7 - No. 7 Quality Row
- D8 - No. 8 Quality Row
- D9 - No. 9 Quality Row
- D10 - No. 10 Quality Row
- D11 - No. 11 Quality Row
- D12A - Old Military Barracks – Main Building
- D12D - Old Military Barracks – Building No. 1
- D12E - Old Military Barracks – Building No. 2
- D12F - Old Military Barracks – Building No. 3
- D12G - Old Military Barracks – Building No. 4
- D12J / D12T / D12Q - Old Military Barracks – Toilets, Magazine and Guard House
- D16A - New Military Barracks – Main Building
- D16B - New Military Barracks – Officers' Mess
- D16C - New Military Barracks – Officers' Outbuilding
- D16F - New Military Barracks – Magazine
- D16D - New Military Barracks – Guard House
- A1A - Government House
- A1B - Government House - Carriage House
- A1F - Government House - Stables
- A1G - Government House - Garden Lodge
- H30 - Royal Engineers Office
- H30+ - Royal Engineers Office Stables
- H23 - Pier Store
- H28 - Crankmill
- H24 - Settlement Guard House
- H35 - Flaghouse•H32 - Double Boatshed
- H34 - Single Boatshed
- H1A - Surgeons Quarters
- H1B - Surgeons Kitchen
- G5F - Protestant Chapel

## 5 INSPECTION AND REPORTING SCHEDULES

### 5.1 INTRODUCTION

The following inspection and reporting schedules are to be employed to generate conservation and maintenance needs in the establishment of a cyclic maintenance plan, and associated capital maintenance program.

### 5.2 DETERMINING A FREQUENCY OF INSPECTION

The frequency of inspection will generally depend on a combination of factors: an asset's general condition, significance, vulnerability and occupancy. The inspection report should include any recommendations for a longer or shorter inspection cycle. In re-establishing cyclic maintenance program it is considered important to commence with annual and 3 yearly periodic inspections. It is further recommended that these be supported by 5 yearly inspections to those items assessed as being of high priority and poor condition. These inspections should be undertaken by the KAVHA team in collaboration with appropriately experienced consultants of built heritage disciplines relevant to the identified or potential needs of the item.

### 5.3 GUIDANCE NOTES ON APPLICATION

#### Determining Condition

Condition rankings are defined below for inspections at KAVHA.

Condition	Building, structures
Good	Structurally sound, weather-tight, and with no significant repairs needed.
Fair	Structurally sound, but in need of minor or localised repair; or showing signs of a lack of general maintenance.
Poor	Deteriorating structure, breached weather-tightness or general deterioration of most elements of the fabric; or where there has been a disaster event affecting part of the asset.
Very Bad	Structural failure or clear signs of structural instability, or serious loss of weather-tightness leading to major deterioration of the interior; or where there has been a disaster event affecting most of the asset.

## 5 INSPECTION AND REPORTING SCHEDULES

### Assessing Maintenance Requirements

A table of indicative ratings for programming maintenance works are defined below for assessment of heritage fabric at KAVHA.

Rating	Definition	Notes
1 Unavoidable/Immediate	Required immediately for safety reasons, or to ensure compliance with the HMP and condition of the National and Commonwealth Heritage values. Required to prevent imminent damage or rapid deterioration	Must be put in hand immediately
2 Essential/Urgent	Required urgently to avoid increased cost or dilapidation	Should be put in hand as soon as possible, certainly within the year
3 Necessary in current cycle	Necessary within the current maintenance cycle to preserve the value or utility of the asset. Will include some cyclical maintenance	Should be planned over the next 1-4 years (see prioritisation matrix)
4 Desirable	To improve function or performance, or enhance or reinstate features	Plan as appropriate, alongside other higher priority works, or defer to later years
5 Long term	Repeat cyclical maintenance or longer term planned repairs over the span of the AMP	Timescales will need to be identified

## 5 INSPECTION AND REPORTING SCHEDULES

### Determining the inspection and forward works programs

While the above matrix assists in the prioritisation of maintenance tasks for individual items the matrix below is intended to assist in establishing the inspection program, prioritising the conservation maintenance backlog and forecasting priorities for future conservation capital works projects. In addition, this tool may assist in prioritisation where budget constraints present, where forward budget allocations are to be determined, or to assist in the development of business cases with regard to cost benefit and heritage value analysis.

The following matrix has been developed for KAVHA with reference to *Managing Heritage Assets*, prepared by English Heritage 2009.

Multiplying condition by impact ratings gives a degree of urgency where 1 is highest priority and 25 is non-urgent priority		Impact of not carrying out the works (loss of heritage or operational value, impact to visitor experience and operations)				
		1	2	3	4	5
		Major Impact			Minimal Impact	
Condition of element	1 Very Bad	1	2	3	4	5
	2 Poor	2	4	6	8	10
	3 Fair	3	6	9	12	15
	4 Good	4	8	12	16	20
	5 Excellent	5	10	15	20	25

### 5.4 ROLES AND RESPONSIBILITIES

The following personnel are responsible for the implementation and delivery of the Cyclic Maintenance Program:

- Director, Heritage and Economic Development (*Canberra*)
- KAVHA Works Crew Manager; Responsibility for agreed annual maintenance program delivery and inspection under SDA (*Norfolk Island Regional Council*)
- Contracts and Building Works Supervisor – Responsibility for coordination of minor capital site works
- Commonwealth Heritage Manager; Management / development of cultural heritage at KAVHA



## 5 INSPECTION

BUILDING NAME	
BUILDING CODE	
DATE OF INSPECTION	
REPAIRS CARRIED OUT SINCE THE LAST INSPECTION	
OUTSTANDING WORKS	
REPAIRS AND URGENECY	
CONDITION RATING	
PRIORITY RATING	
PHOTOGRAPH REFERENCES	

## 5.1 EXTERIOR - ANNUAL

ELEMENT	FREQUENCY	Life Expectancy	INSPECT		
			No	Yes	Action if yes
<b>EXTERIOR ROOF</b>					
Timber shingle	Annual	Missing, split or slipped shingles			Replace fixing to secure shingle, or replace shingle as necessary
	Annual	Raised, loose or rusting fixings			Replace fixing to secure shingle
	Annual	Inspect for areas of potential water ingress			Notify if identified
	Annual	Inspect for vegetation and biological growth			Remove vegetation or treat biological growth as necessary. Refer to specification Section 6.7
	Annual	Failing pointing or render coat			Repoint or patch in lime mortar prepared in accordance with Specification Sections 6.3 or 6.4
	Annual	Peeling or flaking paint and limewash			Reapply limewash prepared in accordance with Specification Section 6.6
Chimneys	Annual	Flashings and fixing in poor condition			Refix or replace as necessary
	Annual	Chimney flue requires cleaning			Sweep
	Annual				
Cement Tile Roofs					
<b>FLASHINGS AND CAPPINGS</b>					
Metal	Annual	Flashings damaged or absent			Renew
	Annual	Raised, loose or rusting fixings			Refix and replace where necessary
	Annual	Raised laps			Dress down
	Annual	Rust and staining to suggest dissimilar metals			Install isolating barrier or replace with compatible metal components
	Annual	Flashings to roof penetrations loose or damaged			Repair and refix
Timber	Annual	Timber ridge covers damaged or absent. Potential for water ingress?			Renew. Confirm presence of soaker flashing.
	Annual	Raised, loose or rusting fixings			Refix and replace where necessary
<b>ROOF DRAINAGE</b>					
PVC	Annual	cracked or broken			Replace
	Annual	Defective joints			Reseal
	Annual	UV damage or deterioration suggesting need for replacement			Replace rainwater goods. Select material with reference to an established roofing policy and strategy
	Annual	Gutter or downpipe brackets loose or missing			Refix or replace. Where relating to masonry walls retain fixings to mortar joints
	Annual	Gutters holding water			Check for sufficient gutter falls, adequate gutter brackets and clear any blockage to downpipe
	Annual	Gutters, hoppers and downpipes blocked			Clean gutters, hoppers and downpipes
<b>EAVES &amp; VERANDAH CEILINGS</b>					
	Annual	Potential points of access for birds nests or rodents			Block entry
	Annual	Evidence of damp staining which might suggest failing roof or rainwater goods			Clear downpipes. Monitor any biological growth and treat if persistent in accordance with Specification Section 6.7
	Annual	Blocked ventilation			Unblock
	Annual	Birds nests			Remove
	Annual	Peeling or flaking paint and limewash			Repaint in accordance with Specification Section 6.6
Annual	Biological growth			Treat in accordance with Specification Section 6.7	
<b>WALLS</b>					
<b>North</b>					
Weatherboard	Annual	Peeling or flaking paint			Repaint in accordance with Specification Section 6.6
	Annual	Loose weatherboards			Refix
	Annual	Rusted, loose or missing nails			Replace
	Annual	Damage to corner stops and mouldings			Repair or replace
	Annual	Biological growth			Treat in accordance with Specification Section 6.7
Masonry	Annual	Large extent of defective mortar joints			Repoint in lime mortar in accordance with Specification Section 6.3
	Annual	Evidence of rising damp			Identify potential source of damp and rectify. If source is unidentified notify.
	Annual	Evidence of falling damp			Identify potential source of damp and rectify. If source is unidentified notify.
	Annual	New cracks to structural stones such as lintels or cornices			Notify. Monitor if minor and not presenting immediate public safety risk. If major initiate remedial works.
	Annual	Check any crack meters or movement recording protocol (and previous reading) noted for the asset. Evidence of increased movement			Notify
	Annual	Drummy, delaminating or dislodged masonry			Notify. Monitor if minor and not presenting immediate public safety risk. If major initiate remedial works.
	Annual	Drummy historic renders or plaster			Notify. Monitor if minor. If major initiate remedial works.
	Annual	Drummy cementitious renders and plaster			Remove and notify
	Annual	Bubbling paint			Notify and consider paint removal and remediation in accordance with Specification Section 6.6
	Annual	Vegetation growth			Remove vegetation
Annual	Damp and biological growth to area around downpipes suggesting blockage and/or leak			Clear downpipes. Monitor biological growth and treat if persistent in accordance with Specification Section 6.7	
<b>South</b>					
Weatherboard	Annual	Peeling or flaking paint			Repaint in accordance with Specification Section 6.6
	Annual	Loose weatherboards			Refix
	Annual	Rusted, loose or missing nails			Replace
	Annual	Damage to corner stops and mouldings			Repair or replace
	Annual	Biological growth			Treat in accordance with Specification Section 6.7
Masonry	Annual	Large extent of defective mortar joints			Repoint in lime mortar in accordance with Specification Section 6.3
	Annual	Evidence of rising damp			Identify potential source of damp and rectify. If source is unidentified notify.
	Annual	Evidence of falling damp			Identify potential source of damp and rectify. If source is unidentified notify.

## 5.1 EXTERIOR - ANNUAL

	Annual	New cracks to structural stones such as lintels or cornices	Notify. Monitor if minor and not presenting immediate public safety risk. If major initiate remedial works.
	Annual	Check any crack meters or movement recording protocol (and previous reading) noted for the asset. Evidence of increased movement	Notify
	Annual	Drummy, delaminating or dislodged masonry	Notify. Monitor if minor and not presenting immediate public safety risk. If major initiate remedial works.
	Annual	Drummy historic renders or plaster	Notify. Monitor if minor. If major initiate remedial works.
	Annual	Drummy cementitious renders and plaster	Remove and notify
	Annual	Bubbling paint	Notify and consider paint removal and remediation in accordance with Specification Section 6.6
	Annual	Vegetation growth	Remove vegetation
	Annual	Damp and biological growth to area around downpipes suggesting blockage and/or leak	Clear downpipes. Monitor biological growth and treat if persistent in accordance with Specification Section 6.7
<b>East</b>			
<b>Weatherboard</b>			
	Annual	Peeling or flaking paint	Repaint in accordance with Specification Section 6.6
	Annual	Loose weatherboards	Refix
	Annual	Rusted, loose or missing nails	Replace
	Annual	Damage to corner stops and mouldings	Repair or replace
	Annual	Biological growth	Treat in accordance with Specification Section 6.7
<b>Masonry</b>			
	Annual	Large extent of defective mortar joints	Repoint in lime mortar in accordance with Specification Section 6.3
	Annual	Evidence of rising damp	Identify potential source of damp and rectify. If source is unidentified notify.
	Annual	Evidence of falling damp	Identify potential source of damp and rectify. If source is unidentified notify.
	Annual	New cracks to structural stones such as lintels or cornices	Notify. Monitor if minor and not presenting immediate public safety risk. If major initiate remedial works.
	Annual	Check any crack meters or movement recording protocol (and previous reading) noted for the asset. Evidence of increased movement	Notify
	Annual	Drummy, delaminating or dislodged masonry	Notify. Monitor if minor and not presenting immediate public safety risk. If major initiate remedial works.
	Annual	Drummy historic renders or plaster	Notify. Monitor if minor. If major initiate remedial works.
	Annual	Drummy cementitious renders and plaster	Remove and notify
	Annual	Bubbling paint	Notify and consider paint removal and remediation in accordance with Specification Section 6.6
	Annual	Vegetation growth	Remove vegetation
	Annual	Damp and biological growth to area around downpipes suggesting blockage and/or leak	Clear downpipes. Monitor biological growth and treat if persistent in accordance with Specification Section 6.7
<b>West</b>			
<b>Weatherboard</b>			
	Annual	Peeling or flaking paint	Repaint in accordance with Specification Section 6.6
	Annual	Loose weatherboards	Refix
	Annual	Rusted, loose or missing nails	Replace
	Annual	Damage to corner stops and mouldings	Repair or replace
	Annual	Biological growth	Treat in accordance with Specification Section 6.7
<b>Masonry</b>			
	Annual	Large extent of defective mortar joints	Repoint in lime mortar in accordance with Specification Section 6.3
	Annual	Evidence of rising damp	Identify potential source of damp and rectify. If source is unidentified notify.
	Annual	Evidence of falling damp	Identify potential source of damp and rectify. If source is unidentified notify.
	Annual	New cracks to structural stones such as lintels or cornices	Notify. Monitor if minor and not presenting immediate public safety risk. If major initiate remedial works.
	Annual	Check any crack meters or movement recording protocol (and previous reading) noted for the asset. Evidence of increased movement	Notify
	Annual	Drummy, delaminating or dislodged masonry	Notify. Monitor if minor and not presenting immediate public safety risk. If major initiate remedial works.
	Annual	Drummy historic renders or plaster	Notify. Monitor if minor. If major initiate remedial works.
	Annual	Drummy cementitious renders and plaster	Remove and notify
	Annual	Bubbling paint	Notify and consider paint removal and remediation in accordance with Specification Section 6.6
	Annual	Vegetation growth	Remove vegetation
	Annual	Damp and biological growth to area around downpipes suggesting blockage and/or leak	Clear downpipes. Monitor biological growth and treat if persistent in accordance with Specification Section 6.7
<b>FOOTINGS</b>			
		<b>No</b>	<b>Yes</b>
	Annual	New evidence of cracks or settlement	Monitor. If movement is active notify.
	Annual	Check any crack meters or movement recording protocol (and previous reading) noted for the asset. Evidence of increased movement	Notify
	Annual	Blockage to sub-floor vents	clear blockage.
	Annual	Is the external ground level higher than any known damp proof course and/or internal floor level	Identify potential source of damp. Notify. Agree rectification such as clearing of any leaf litter and debris or removal of soil overburden under archaeological instruction.
	Annual	Evidence of rising damp	Identify potential source of damp. Notify. Agree rectification such as clearing of any leaf litter and debris or removal of soil overburden under archaeological instruction. Refer to Specification for further instruction as to any remedial treatment.
<b>JOINERY</b>			
		<b>No</b>	<b>Yes</b>
<b>Action if yes</b>			
Window and door assemblies			

## 5.1 EXTERIOR - ANNUAL

	Annual	Overall structural integrity of timber element (door, window etc) in poor condition			Repair with reference to Specification Section 6.5
	Annual	Cracks to glazing or missing panes			Replace
	Annual	Failing or missing glazing putty			Replace
	Annual	Bubbling paint			Remove and repaint in accordance with Specification Section 6.6
	Annual	Peeling or flaking paint			Repaint in accordance with Specification Section 6.6
	Annual	Loose or deteriorating glazing beads and stops			Refix or replace
	Annual	Hinges and hardware inoperable or requiring maintenance			Repair and maintain
	Annual	Biological growth			Treat in accordance with Specification Section 6.7
<b>VERANDAH FLOOR</b>			<b>No</b>	<b>Yes</b>	<b>Action if yes</b>
Flagged floor	Annual	Evidence of structural settlement, flagstone failure or uneven surfaces			Notify
	Annual	Biological growth			Treat in accordance with Specification Section 6.7
<b>ARCHITECTURAL FEATURES</b>			<b>No</b>	<b>Yes</b>	<b>Action if yes</b>
Significant features	Annual	Does the structure have significant architectural features (e.g. significant door elements, turned verandah posts, metal components)			Identify and schedule for annual and periodic inspections
Metals	Annual	Inspect for corrosion of metal element and integrity of embedment			Notify. Treatment to be determined by metals conservator
	Annual	Check for corrosion impact to adjacent materials			Notify. Repair adjacent material in accordance with relevant specification

## 5.2 INTERIOR - ANNUAL

ELEMENT	FREQUENCY	Life Expectancy	INSPECT			
			No	Yes	Action if yes	
<b>INTERIOR</b>						
<b>CEILINGS &amp; CORNICES</b>						
Timber ceiling linings	Annual	Is the general integrity of linings sound. Is there evidence of sagging, rot or borer damage.			Notify	
	Annual	Is there evidence of damp			Check for water ingress and rectify. Allow damp to dry, prepare and paint in accordance with Specification Section 6.6	
	Annual	Is there evidence of biological growth			Check for water ingress and rectify. Allow surface to stabilise, prepare and paint in accordance with Specification Section 6.7	
	Annual	Is there peeling or flaking paint			Repaint in accordance with Specification Section 6.6	
	Lath and plaster	Annual	Is there evidence of damp			Check for water ingress and rectify. Allow damp to dry, prepare and paint in accordance with Specification Section 6.6
		Annual	Is there evidence of biological growth			Check for water ingress and rectify. Allow surface to stabilise, prepare and paint in accordance with Specification Section 6.6
		Annual Annual	Is there peeling or flaking paint Is there evidence of sagging			Repaint in accordance with Specification Section 6.6 Notify and consider best practice remedial works for stabilisation in preference to large scale replacement.
	Plasterboard	Annual	Is there evidence of damp			Check for water ingress and rectify. Allow damp to dry, prepare and paint in accordance with Specification Section 6.6
		Annual	Is there evidence of biological growth			Check for water ingress and rectify. Allow surface to stabilise, prepare and paint in accordance with Specification Section 6.6
		Annual	Is there peeling or flaking paint			Repaint in accordance with Specification Section 6.6
Annual		Is there evidence of sagging			Notify	
<b>WALLS</b>						
Timber	Annual	Peeling or flaking paint			Repaint in accordance with Specification Section 6.6	
	Annual	Loose boards			Refix	
	Annual	Rusted, loose or missing nails			Replace and refix	
	Annual	Evidence of borer activity or rot			Notify	
	Exposed Masonry	Annual	Large extent of defective mortar joints			Repoint in accordance with Specification Clause Section 6.3
		Annual	Evidence of rising damp and/or efflorescence			Notify. Seek to establish and retard source of ingress and establish a conservation program informed by Specification XX and XX
		Annual	Evidence of falling damp and/or efflorescence			Notify. Seek to establish and retard source of ingress and establish a conservation program informed by Specification Section 6.1
		Annual	New cracks to structural stones such as lintels or cornices			Notify. Monitor if minor and not presenting immediate public safety risk. If major initiate remedial works.
		Annual	Check any crack meters (and previous reading) noted for the asset. Evidence of increased movement?			Notify
		Annual	Drummy, delaminating or dislodged masonry			Notify. Monitor if minor and not presenting immediate public safety risk. If major initiate remedial works.
Plastered or rendered masonry walls	Annual	Bubbling paint to suggest unbreathable paint type			Notify and consider program for removal in accordance with Specification Section 6.6	
	Annual	Evidence of rising damp and/or efflorescence			Notify and seek to establish and retard source of ingress and establish a conservation program informed by Specification Section 6.1	
	Annual	Evidence of falling damp and/or efflorescence			Notify and seek to establish and retard source of ingress and establish a conservation program informed by Specification Section 6.1	
	Annual	New cracks to structural stones such as lintels or cornices			Notify. Monitor if minor and not presenting immediate public safety risk. If major initiate remedial works.	
	Annual	Check any crack meters (and previous reading) noted for the asset. Evidence of increased movement?			Notify	
	Annual	Drummy render coats			Notify and monitor	
	Annual	Bubbling paint to suggest unbreathable paint type			Notify and consider program for removal in accordance with Specification Section 6.6	
Plasterboard	Annual	Evidence of damage from moisture and biological growth			Identify source of damp. Notify for replacement	
	Annual	Failing paint			Notify for remediation	
<b>FLOOR</b>						
Timber	Annual	Evidence of structural failure			Notify for investigation and remedial works	
	Annual	Loose boards			Refix	
	Annual	Evidence of rot or borer activity			Notify for investigation and remedial works	
	Annual	Failure of surface coatings			Rectify	
	Flagged floor	Annual	Evidence of damp and efflorescence			Notify for investigation and remedial works
Annual		Evidence of structural settlement, flagstone failure or uneven surfaces			Notify	
Floor Coverings						
<b>JOINERY</b>						
Window and door assemblies, architraves and skirtings	Annual	Overall structural integrity of timber element (door, window etc) in poor condition			Repair with reference to Specification Section 6.5	
	Annual	Cracks to glazing or missing panes			Replace	
	Annual	Failing or missing glazing putty			Replace	
	Annual	Bubbling paint			Remove and repaint in accordance with Specification Clause Section 6.6	
	Annual	Peeling or flaking paint			Repaint in accordance with Specification Section 6.6	
	Annual	Loose or deteriorating glazing beads and stops			Refix or replace	
	Annual	Check for damage to operation of joinery hardware (e.g. hinges, locks, sash cords and rollers)			Repair and maintain	
	Annual	Biological growth			Treat in accordance with Specification Section 6.7	
<b>ARCHITECTURAL FEATURES</b>						



## 5.3 EXTERIOR - PERIODIC

ELEMENT	FREQUENCY	Life Expectancy	INSPECT			
			No	Yes	Action if yes	
<b>EXTERIOR</b>						
<b>ROOF</b>						
Timber shingle	Annual	Missing, split or slipped shingles			Replace fixing to secure shingle, or replace shingle as necessary	
	Annual	Raised, loose or rusting fixings			Replace fixing to secure shingle	
	Annual	Inspect for areas of potential water ingress			Notify if identified	
	Annual	Inspect for vegetation and biological growth			Remove vegetation or treat biological growth as necessary. Refer to specification Section 6.7	
	Chimneys	Annual	Failing pointing or render coat			Repoint or patch in lime mortar prepared in accordance with Specification Section 6.2 or 6.3
		Annual	Peeling or flaking paint and limewash			Reapply limewash prepared in accordance with Specification Section 6.6
		Annual	Flashings and fixing in poor condition			Refix or replace as necessary
		Periodic	Caps / hats missing, in poor condition or loose			Repair or replace in stone or concrete cap typical to Norfolk island as available
		Annual	Flue obstructed by nesting and debris			Clear flue
		Annual	Chimney flue requires cleaning			Sweep
Annual	Inspect for potential movement or destabilisation of the chimney			Monitor, notify and consider structural inspection		
<b>FLASHINGS AND CAPPINGS</b>						
<b>Metal</b>						
Metal	Annual	Flashings damaged or absent			Renew	
	Annual	Raised, loose or rusting fixings			Refix and replace where necessary	
	Annual	Raised laps			Dress down	
	Periodic	Insufficient lap lengths or clips			Refix and relay in accordance with Lead Sheet Association Rolled Lead Sheet Manual standard industry detail	
	Periodic	Cracks in flashing			Renew	
	Annual	Rust and staining to suggest dissimilar metals			Install isolating barrier or replace with compatible metal components	
Timber	Annual	Flashings to roof penetrations loose or damaged			Repair and refix	
		Timber ridge covers damaged or absent. Potential for water ingress?			Renew. Confirm presence of soaker flashing.	
	Annual	Raised, loose or rusting fixings			Refix and replace where necessary	
	Periodic	Check integrity of soaker flashings (below timber ridge capping) for signs of deterioration			Replace if failed and re-install in roof renewal program	
<b>ROOF DRAINAGE</b>						
<b>PVC</b>						
PVC	Annual	cracked or broken			Replace	
	Annual	Defective joints			Reseal	
	Annual	UV damage or deterioration suggesting need for replacement			Replace rainwater goods. Select material with reference to an established roofing policy and strategy	
	Annual	Gutter or downpipe brackets loose or missing			Refix or replace. Where relating to masonry walls retain fixings to mortar joints	
	Annual	Gutters holding water			Check for sufficient gutter falls, adequate gutter brackets and clear any blockage to downpipe	
	Periodic	Downpipes discharging at footings			Redirect away from footings and into ground drainage system where present. Where ground drainage system is absent consider need for introduction.	
Annual	Gutters, hoppers and downpipes blocked			Clean gutters, hoppers and downpipes		
<b>EAVES &amp; VERANDAH CEILINGS</b>						
Eaves & Verandah Ceilings	Annual	Potential points of access for birds nests or rodents			Block entry	
	Annual	Evidence of damp staining which might suggest failing roof or rainwater goods			Clear downpipes. Monitor any biological growth and treat if persistent in accordance with Specification Section 6.7	
	Annual	Blocked ventilation			Unblock	
	Annual	Birds nests			Remove	
	Annual	Peeling or flaking paint and limewash			Repaint in accordance with Specification Section 6.6	
	Annual	Biological growth			Treat in accordance with Specification Section 6.7	
<b>WALLS</b>						
<b>North</b>						
Weatherboard	Annual	Peeling or flaking paint			Repaint in accordance with Specification Section 6.6	
	Annual	Loose weatherboards			Refix	
	Annual	Rusted, loose or missing nails			Replace	
	Annual	Damage to corner stops and mouldings			Repair or replace	
	Periodic	Contact with the ground line			Clear ground under supervision or instruction from an archaeologist	
	Annual	Biological growth			Treat in accordance with Specification Section 6.7	
	Masonry	Annual	Large extent of defective mortar joints			Repoint in lime mortar in accordance with Specification Clause Section 6.3
		Annual	Evidence of rising damp			Identify potential source of damp and rectify. If source is unidentified notify.
		Annual	Evidence of falling damp			Identify potential source of damp and rectify. If source is unidentified notify.
		Annual	New cracks to structural stones such as lintels or cornices			Notify. Monitor if minor and not presenting immediate public safety risk. If major initiate remedial works.
		Annual	Check any crack meters or movement recording protocol (and previous reading) noted for the asset. Evidence of increased movement			Notify
		Annual	Drummy, delaminating or dislodged masonry			Notify. Monitor if minor and not presenting immediate public safety risk. If major initiate remedial works.
Annual		Drummy historic renders or plaster			Notify. Monitor if minor. If major initiate remedial works.	
Annual		Drummy cementitious renders and plaster			Remove and notify	
Annual	Bubbling paint			Notify and consider paint removal and remediation in accordance with Specification Section 6.6		
Annual	Vegetation growth			Remove vegetation		

## 5.3 EXTERIOR - PERIODIC

	Annual	Damp and biological growth to area around downpipes suggesting blockage and/or leak	Clear downpipes. Monitor biological growth and treat if persistent in accordance with Specification Section 6.7
<b>South</b>			
Weatherboard	Annual	Peeling or flaking paint	Repaint in accordance with Specification Section 6.6
	Annual	Loose weatherboards	Refix
	Annual	Rusted, loose or missing nails	Replace
	Annual	Damage to corner stops and mouldings	Repair or replace
	Periodic	Contact with the ground line	Clear ground under supervision or instruction from an archaeologist
Masonry	Annual	Biological growth	Treat in accordance with Specification Section 6.7
	Annual	Large extent of defective mortar joints	Repoint in lime mortar in accordance with Specification Clause Section 6.3
	Annual	Evidence of rising damp	Identify potential source of damp and rectify. If source is unidentified notify.
	Annual	Evidence of falling damp	Identify potential source of damp and rectify. If source is unidentified notify.
	Annual	New cracks to structural stones such as lintels or cornices	Notify. Monitor if minor and not presenting immediate public safety risk. If major initiate remedial works.
	Annual	Check any crack meters or movement recording protocol (and previous reading) noted for the asset. Evidence of increased movement	Notify
	Annual	Drummy, delaminating or dislodged masonry	Notify. Monitor if minor and not presenting immediate public safety risk. If major initiate remedial works.
	Annual	Drummy historic renders or plaster	Notify. Monitor if minor. If major initiate remedial works.
	Annual	Drummy cementitious renders and plaster	Remove and notify
	Annual	Bubbling paint	Notify and consider paint removal and remediation in accordance with Specification Section 6.6
	Annual	Vegetation growth	Remove vegetation
Annual	Damp and biological growth to area around downpipes suggesting blockage and/or leak	Clear downpipes. Monitor biological growth and treat if persistent in accordance with Specification Section 6.7	
<b>East</b>			
Weatherboard	Annual	Peeling or flaking paint	Repaint in accordance with Specification Section 6.6
	Annual	Loose weatherboards	Refix
	Annual	Rusted, loose or missing nails	Replace
	Annual	Damage to corner stops and mouldings	Repair or replace
	Periodic	Contact with the ground line	Clear ground under supervision or instruction from an archaeologist
Masonry	Annual	Biological growth	Treat in accordance with Specification Section 6.7
	Annual	Large extent of defective mortar joints	Repoint in lime mortar in accordance with Specification Clause Section 6.3
	Annual	Evidence of rising damp	Identify potential source of damp and rectify. If source is unidentified notify.
	Annual	Evidence of falling damp	Identify potential source of damp and rectify. If source is unidentified notify.
	Annual	New cracks to structural stones such as lintels or cornices	Notify. Monitor if minor and not presenting immediate public safety risk. If major initiate remedial works.
	Annual	Check any crack meters or movement recording protocol (and previous reading) noted for the asset. Evidence of increased movement	Notify
	Annual	Drummy, delaminating or dislodged masonry	Notify. Monitor if minor and not presenting immediate public safety risk. If major initiate remedial works.
	Annual	Drummy historic renders or plaster	Notify. Monitor if minor. If major initiate remedial works.
	Annual	Drummy cementitious renders and plaster	Remove and notify
	Annual	Bubbling paint	Notify and consider paint removal and remediation in accordance with Specification Section 6.6
	Annual	Vegetation growth	Remove vegetation
Annual	Damp and biological growth to area around downpipes suggesting blockage and/or leak	Clear downpipes. Monitor biological growth and treat if persistent in accordance with Specification Section 6.7	
<b>West</b>			
Weatherboard	Annual	Peeling or flaking paint	Repaint in accordance with Specification Section 6.6
	Annual	Loose weatherboards	Refix
	Annual	Rusted, loose or missing nails	Replace
	Annual	Damage to corner stops and mouldings	Repair or replace
	Periodic	Contact with the ground line	Clear ground under supervision or instruction from an archaeologist
Masonry	Annual	Biological growth	Treat in accordance with Specification Section 6.7
	Annual	Large extent of defective mortar joints	Repoint in lime mortar in accordance with Specification Clause Section 6.3
	Annual	Evidence of rising damp	Identify potential source of damp and rectify. If source is unidentified notify.
	Annual	Evidence of falling damp	Identify potential source of damp and rectify. If source is unidentified notify.
	Annual	New cracks to structural stones such as lintels or cornices	Notify. Monitor if minor and not presenting immediate public safety risk. If major initiate remedial works.
	Annual	Check any crack meters or movement recording protocol (and previous reading) noted for the asset. Evidence of increased movement	Notify
	Annual	Drummy, delaminating or dislodged masonry	Notify. Monitor if minor and not presenting immediate public safety risk. If major initiate remedial works.
	Annual	Drummy historic renders or plaster	Notify. Monitor if minor. If major initiate remedial works.
	Annual	Drummy cementitious renders and plaster	Remove and notify

## 5.3 EXTERIOR - PERIODIC

	Annual	Bubbling paint			Notify and consider paint removal and remediation in accordance with Specification Section 6.6
	Annual	Vegetation growth			Remove vegetation
	Annual	Damp and biological growth to area around downpipes suggesting blockage and/or leak			Clear downpipes. Monitor biological growth and treat if persistent in accordance with Specification Section 6.7
<b>FOOTINGS</b>			<b>No</b>	<b>Yes</b>	<b>Action if yes</b>
	Annual	New evidence of cracks or settlement			Monitor. If movement is active notify.
	Annual	Check any crack meters or movement recording protocol (and previous reading) noted for the asset. Evidence of increased movement			Notify
	Annual	Blockage to sub-floor vents			clear blockage.
	Annual	Is the external ground level higher than any known damp proof course and/or internal floor level			Identify potential source of damp. Notify. Agree rectification such as clearing of any leaf litter and debris or removal of soil overburden under archaeological instruction.
	Annual	Evidence of rising damp			Identify potential source of damp. Notify. Agree rectification such as clearing of any leaf litter and debris or removal of soil overburden under archaeological instruction. Refer to Specification Section 6.1 for further instruction as to any remedial treatment.
<b>JOINERY</b>			<b>No</b>	<b>Yes</b>	<b>Automated Action if yes</b>
Window and door assemblies	Annual	Overall structural integrity of timber element (door, window etc) in poor condition			Repair with reference to Specification Section 6.5
	Annual	Cracks to glazing or missing panes			Replace
	Annual	Falling or missing glazing putty			Replace
	Annual	Bubbling paint			Remove and repaint in accordance with Specification Section 6.6
	Annual	Peeling or flaking paint			Repaint in accordance with Specification Section 6.6
	Annual	Loose or deteriorating glazing beads and stops			Refix or replace
	Annual	Hinges and hardware inoperable or requiring maintenance			Repair and maintain
	Annual	Biological growth			Treat in accordance with Specification Section 6.7
<b>VERANDAH FLOOR</b>			<b>No</b>	<b>Yes</b>	<b>Action if yes</b>
Flagged floor	Annual	Evidence of structural settlement, flagstone failure or uneven surfaces			Notify
	Annual	Biological growth			Treat in accordance with Specification Section 6.7
<b>ARCHITECTURAL FEATURES</b>			<b>No</b>	<b>Yes</b>	<b>Action if yes</b>
Significant features	Annual	Does the structure have significant architectural features (e.g. significant door elements, turned verandah posts, metal components)			Identify and schedule for annual and periodic inspections
Metals	Annual	Inspect for corrosion of metal element and integrity of embedment			Notify. Treatment to be determined by metals conservator
	Annual	Check for corrosion impact to adjacent materials			Notify. Repair adjacent material in accordance with relevant specification

## 6.1 DEALING WITH SALT AND DAMP DAMAGE

### OBJECTIVE AND OVERVIEW

Desalination is the process of removing salts. The principal approach for the treatment of salt attack and damp at KAVHA is for the removal of impervious coatings of cementitious renders and plasters together with the removal of acrylic paints. This mitigating measure, and the reinstatement of breathable lime-based applied finishes will greatly reduce the presence of salt attack. There may however be instances in which the removal of salts is necessary following this remedial work.

Following the removal of cementitious renders and/or acrylic paints the masonry substrate and any applied lime based coatings, salt crystallisation and damp may still be evident to evaporative surfaces. This will likely result from increased permeability and continue as the masonry substrate dries. As such it will be important to treat the first lime based renders and plasters as being potentially sacrificial and to ensure that cyclic maintenance programs allow for regular removal of crystallised salts (through brushing or dry vacuuming) and periodic renewal of sacrificial renders failing in the presence of concentrated salt deposits.

While there are a range of commonly employed desalination techniques captive head washing is a fast and effective way of removing salts. It is also noted that poultice applications are potentially incompatible with the void ratio presented by much of the rubble calcarenite on site, it being potentially difficult to remove from the deep pore structure.

Captive head washing is a system which delivers a low-pressure water, while concurrently vacuuming water and dissolved or loose surface deposits in an enclosed head attachment to a wet vacuum which recovers water. Dry vacuuming with this system may also present as a useful long-term maintenance response for any visible salt crystallisation or friable ground deposits at the end of the conservation program and in the transition to a cyclic maintenance program.

Sacrificial lime renders may be appropriate applications to internal surfaces where damp and salt attack remains prevalent following the removal of cementitious renders and acrylic paints.

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### SPECIFICATION, METHODOLOGY AND WORKMANSHIP

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#### CAPTIVE HEAD WASHING

##### GENERALLY

- All works are to be undertaken by personnel with experience in the captive head washing system.
  - Ensure that salt and disaggregated masonry deposits are removed from the work area prior to the commencement of work.
  - The building fabric and work area shall be maintained free of all residual water as a result of the desalination process.
  - Pre-wet the surface with potable water a day prior to wash cycles to mobilise salt ions.
  - Slowly draw the captive head across the surface at a rate which will dissolve any surface lying salts. Determine the rate through trials. It is important to note that a slower cycle may extract more salt.
  - Clean up on completion of the work.
  - Ensure all waste water is captured by the vacuum.
  - Allow to repeat this for two cycles, or more for those areas with evidence of greater salt activity.
-

## 6.1 DESALINATION

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### SACRIFICIAL RENDERS

#### MATERIALS

- Knock up Coarse Stuff before and during use to achieve and maintain a workable consistency in a forced action mixer (or similar). Do not add water.

#### PREPARATION

- Clean down generally before application of sacrificial render.
- Protect all adjacent fabric prior to the commencement of works.
- Pre-wet wall prior to application of render.
- Render is to extend at least 50mm beyond the site of the salt attack.

#### APPLICATION GENERALLY

- Apply each coating firmly to achieve good adhesion and in one continuous operation between angles and joints.
- All coatings to be firmly bonded, of even and consistent appearance.
- Render is to extend at least 50mm beyond the site of the salt attack
- Cure render following application to prevent excessively rapid or localised drying out. See Curing

#### COATS AND FINISH

- Total application thickness to be approximately 6mm or to match the thickness of any adjacent retained renders or plasters.
- Finish surface ensuring consistency of colour, texture, profile, and overall appearance. The surface is not to be given a smooth trowel finish as this decreases the permeability of the evaporative surface.

#### CURING

- Keep mortars and renders wet for 1 week. Mist spray with water several times a day. Follow with 1 week drying under protective coatings (such as damp hessian) and follow with an additional week of mist spray.
-

## 6.2 LIME MORTARS

### OBJECTIVE AND OVERVIEW

A return to lime based mortars, renders and plasters has been recommended so as to improve breathability of masonry walls.

The preparation of hot-mixed lime mortar has been nominated for trial so as to explore the use of locally sourced sands. The process of hot-mixing assists in the removal of impurities of from the sand and as such has a lesser material specification.

Hot mixed mortars are suitable for bedding, pointing and harling. Mortars prepared from Lime Putty.

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### DEFINITIONS

<b>Hot Mixing</b>	Mortars prepared by adding quicklime to aggregate and water. Quicklime reacts with the water generating heat and binding with the aggregate (sand) to produce mortar
<b>Hydrated lime</b>	Hydrated lime (bagged or builders lime) is produced by slaking quicklime in water to produce a dry powder
<b>Lime Putty</b>	Lime putty (or fat lime) is made by slaking quicklime with excess water, in the absence of aggregate.
<b>Quicklime</b>	Quicklime (lump or rock lime) is the raw material produced when limestone (calcium carbonate) is fired. Carbon dioxide is burnt off, leaving calcium oxide, or quicklime

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### SPECIFICATION, METHODOLOGY AND WORKMANSHIP

#### MATERIALS

There are limited sanctioned sources of available sand for use in construction on island. Sand for conservation at KAVHA has traditionally been taken from the site. However, this traditional source of sand is under review with a phasing out of the source a likely outcome due to environmental and heritage considerations. It is understood that alternative sources are being secured.

#### DETERMINING VOID RATIO:

Well graded sand generally has a 30 per cent void ratio by volume. Therefore a 30 per cent binder by volume is a general rule of thumb.

The following test can be used to determine the void ratio of local sands:

- 01 In two separate measuring cylinders or other graduated beaker or flask have equal volumes of water and oven dried sand.
- 02 Pour the sand into the cylinder of water and tap the base gently to level.
- 03 Note the amount of water that lies above the sand – void ratio is calculated by deducting this value from the original volume of water and expressing as a percentage.

## 6.2 LIME MORTARS

### SAND FOR LIME PUTTY:SAND MASONRY MORTARS

- Hard, dry and well graded, washed with a low clay content (not exceeding 1%) and free from effervescing salts.
- Sieve to screen up to 98% pass at 2.36mm
- Colour and source to be determined through samples and with reference to testing data.

### SAND FOR HOT MIXED MASONRY MORTARS

- Hard, dry and well graded, washed with a low clay content and free from effervescing salts.
- Sieve to screen up to 98% pass at 2.36mm
- Colour and source to be determined through samples and with reference to testing data.

### LIME

- Quicklime (lump) fired in excess of 850.c

### WATER

- Potable, clean, free from deleterious chemicals, acids alkalis and unusual proportions of salt.

### ADDITIVES

- Do not use additives without consultation with a Conservation Architect.
- Do not use cement.

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## PREPARATION

### HEALTH AND SAFETY

- Quicklime is a 'hazardous material'. It is a highly caustic and reactive material and can cause irritation or burns to the eyes and skin during slaking or mixing.
- PPE, including gloves, goggles and dust masks should be used at all times. Sugar-water eyewash should be available at all times.

### PREPARING LIME PUTTY

- Type: Slaked directly from CL 90 (high calcium) quicklime to AS 4489 (BS 890), using an excess of water.
- Proportioning to AS CA27(1959).
- Density of matured lime putty: 1.3-1.4 kg/litre.
- Prepare lime for incorporation into the mortar mix to AS CA.27-1959, Clause 5a. Allow to mature undisturbed for a minimum of two 90 days.

### MAKING LIME:SAND MORTARS

- Batching: By volume. Use clean and accurate gauge boxes or buckets.
- To be: 3 parts sand, 1 part lime putty.
- Mixing: Mix materials thoroughly to uniform consistency, free from lumps.
- Contamination: Prevent intermixing with other materials, including cement.
- Equipment: Roller pan mixer or forced action mixer.
- Alternatives: Coarse Stuff prepared by Westlegare Pty Ltd or equivalent. NOTE: This product contains trass or kaolin pozzuolan which may not be compatible with some applications.

### MAKING HOT MIXED LIME MORTAR

- Batching: By volume. Use clean and accurate gauge boxes or buckets.
- Add dry sand wet sand and then add lime
- To be: 3 parts sand, 1 part lime, sufficient water so as to prevent overheating while ensuring that the mix is not dried.
- Mixing: Add dry sand to mixer and dampen. Add lime in specified proportions and thoroughly mix.
- Equipment: Roller pan mixer or forced action mixer



## 6.2 LIME MORTARS

### KNOCKING UP LIME MORTARS

- Remix matured lime putty and hot mixed mortars in roller pan mixer prior to use.
- Do not add water.

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### STORAGE AND TRANSPORTATION

#### QUICKLIME

- As a highly reactive material quicklime should be stored and transported in dry, airtight containers to prevent premature slaking.

#### LIME PUTTY & HOT MIXED MORTAR

- Stored in sealable containers covered by a layer of limewater to prevent drying out and carbonation. If stored correctly lime putty can be kept indefinitely.
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## 6.3 REPOINTING

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### SPECIFICATION, METHODOLOGY AND WORKMANSHIP

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#### MATERIALS

##### LIME MORTAR

- Preparation of lime mortar as before specified

##### KNOCKING UP LIME:SAND MORTARS

- Knocking up before and during use: Achieve and maintain a workable consistency by compressing, beating and chopping. Do not add water.
- Equipment: Roller pan mixer or forced action mixer.

##### ADDITIVES

- Do not use additives without consultation with the CHM and where appropriate a Conservation Architect.
- Do not use cement.

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#### PREPARATION

##### PREPARING BEDS/BACKINGS GENERALLY

- Remove defective pointing to a depth equal to three times the width of the joint up to a maximum of 25mm. Do not widen joints.
- Thoroughly clear out void using hand tools and brushes.

##### POINTING AND REPOINTING

- Clean down the work area prior to commencement.
- All joints are to be dampened prior to mortar application to reduce suction. Control water so as not to saturate walls.
- The repointing mortar shall be applied in a putty-like consistency and be firmly pushed back to completely fill the empty joint. Cut the mortar back before it sets, and finish with a tamping brush to ensure compaction and porosity of surface finish.
- Finish joint to match adjacent pointing.

In order to match the existing texture:

- i. Carry out such surface treatments such as water spraying and bristle brush stippling after the mortar has achieved an appropriate surface set (this may vary according to season from 12 to 30 hours). An appropriate surface set is when it is just still possible to push a fingernail into the mortar.
  - ii. Bristle brush stippling should be carried out by tapping the brush into the mortar.
  - iii. Spray with a fine water spray as soon as tamping is complete.
  - iiiii. Joints are to be kept damp for a minimum of 7 days. Prevent drying out by covering with polythene sheet or similar and/or spraying with water. Select as is appropriate to exposure.
-

## 6.4 PLASTERING AND RENDERING

### OBJECTIVE AND OVERVIEW

Several studies have found that the cementitious renders, selected for the durability in the harsh environmental conditions is impacting the integrity, condition and presentation of the significant fabric and structures of KAVHA.

The recommendations outlined within this technical specification and methodology are principally aimed at a departure from cementitious renders. The objective being to return to traditional lime-based coatings so as to improve breathability and authentic presentation. This specification and methodology makes recommendation of a lime base plasters and renders, inclusive of harled coatings traditionally employed at KAVHA.

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### DEFINITIONS

- Harling**
- A thrown, or cast on, finish of lime and aggregate. Also known as roughcast or peddledash
- Rendering**
- External plaster systems

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### SPECIFICATION, METHODOLOGY AND WORKMANSHIP

#### PREPARATION

##### LIME AND HAIR PLASTER

- PREPARATION: remove existing defective plaster, ensure background is stable and suitable for plastering; see clause 545
- RENDERCOAT: lime putty : sand mix (coarse stuff) lime putty:sand 1:3.
- 5-10kg of good fiber reinforcement well beaten with 1 cubic metre of the coarse stuff
- Thickness (excluding dubbing out): Not more than 12mm excluding dubbing out.
- FLOATING COAT: lime putty:sand mix (coarse stuff) lime putty:sand 1:3
- 5-10kg of good good fiber reinforcement well beaten with 1 cubic meter of the coarse stuff.
- Thickness 6-8 mm
- FINISHING COAT: lime putty:silver sand (3:2) or neat lime putty to match texture of existing finish.
- Thickness 3mm
- FINISH: Internal work: Smooth to match existing, finish with a Wood float, leave ready for painting. See also clause 781

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### MATERIALS

#### FIBRE REINFORCEMENT

- Proportions (approximate): 5 kg hair to 1 m<sup>3</sup> of coarse stuff.
- Clean, free from grease and other impurities. Well teased before adding to the mix.
- Well distributed throughout with no balling into lumps.

#### ADMIXTURES

- Do not use admixtures.
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## 6.4 PLASTERING AND RENDERING

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### PREPARING BACKGROUNDS

#### REPAIRING EXISTING RENDER/STUCCO

- Cut out all loose, hollow, soft, friable, badly cracked or otherwise damaged areas to form rectangular patches with straight horizontal and vertical square or slightly undercut edges.
- Cut back to initiation joint lines where they occur.
- Cut out cracks other than hairline cracks to a width of not less than 75 mm, undercutting all edges but the bottom.
- Wash and brush exposed backgrounds and edges to remove dust and loose material.

#### REPAIRING AREAS OF EXISTING DEFECTIVE PLASTER

- Remove plaster which is loose, soft, friable, badly cracked or affected by efflorescence in the area nominated for repair. Remove stained or affected plaster to 300mm beyond last point of visible staining.
- Cut back to straight horizontal and vertical edges.
- Advise if any built-in timbers, structural deficiencies or sources of damp are revealed.
- Thoroughly dry brush the background and edges to remove dust, loose material and efflorescence before applying plaster.

#### RAKING OUT FOR KEY

- Rake out joints in existing masonry to a depth of not less than 13mm. Wash dust from joints.

#### SECURING DETACHED PLASTER

- Where described in the schedule of works fix sound but detached plaster with 60mm long stainless steel screws plugged to the masonry with 25mm stainless steel washers and 38mm diameter. Brass mesh washers recessed into the depth of the plaster. Fill the surface of the plaster over the washer with lime putty.

#### CRACKS IN LIME PLASTER

- Fill cracks less than 3mm wide with Lime putty.

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### PLASTERING

#### APPLICATION GENERALLY

- Apply each coating firmly to achieve good adhesion and in one continuous operation between angles and joints.
- All coatings to be not less than the thickness of removed or adjacent material, firmly bonded, of even and consistent appearance, free from rippling, hollows, ridges, cracks and crazing.
- Finish surfaces to a true plane, to correct line and level, with all angles and corners to a right angle unless specified otherwise, and with walls and reveals plumb and square
- Prevent excessively rapid or localised drying out.

## 6.4 PLASTERING AND RENDERING

### DUBBING OUT

- If necessary to correct inaccuracies, dub out in thicknesses of not more than 10mm in same mix as first coat. Allow each coat to set before the next is immediately applied. Cross scratch surface of each dubbing out coat immediately after set.

### KEYING

- Keying of undercoats is to be carried out with a wooden lath scratcher. Keying of floating coats is to be carried out with a devil float. Key to produce evenly spaced wavy horizontal lines, approximately 20mm apart and 5mm deep to provide a key for following coat. Do not penetrate through the coat

### DRYING

- Prevent from drying out too rapidly. Allow each coat to dry out thoroughly to ensure that drying shrinkage is substantially complete before applying next coat.

### SMOOTH FINISH

- Trowel, float and compact by scouring, to produce a tight, flat, smooth surface with no hollows, abrupt changes of level or trowel marks. Note the surface texture of the (undecorated) existing plaster. The intention is to match the texture of the existing finish by selection of the finishing coat mix and the extent of trowelling after scouring. Where directed in the schedule of works produce samples of finish coats for approval.

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## RENDERING

### APPLICATION GENERALLY

- Apply each coating firmly to achieve good adhesion and in one continuous operation between angles and joints.
- All coatings to be not less than the thickness of removed or adjacent material, firmly bonded, of even and consistent appearance, free from rippling, hollows and ridges.
- Finish surfaces to a true plane, to correct line and level, with all angles and corners to a right angle unless specified otherwise, and with walls and reveals plumb and square.
- Prevent excessively rapid or localised drying out.

### KEYING

- Keying of undercoats is to be carried out with a wooden lath scratcher. Keying of floating coats is to be carried out with a devil float. Key to produce evenly spaced wavy horizontal lines, approximately 20 mm apart and 5 mm deep to provide a key for following coat. Do not penetrate through the coat

### DRYING

- Keep each under and final coat damp for the first 3 days by covering with polythene sheet and/or spraying with water. Thereafter prevent from drying out too rapidly. Work in shade whenever possible. Allow each coat to dry out thoroughly to ensure that drying shrinkage is substantially complete before applying next coat.

### PROTECTION

- Adequately protect newly applied external coatings against wind and rain for the first 48 hours using polythene sheet, hung clear of the face, or other approved method.
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## 6.4 PLASTERING AND RENDERING

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### HARLING

#### PREPARATION HARLING MIX

- Wash a coarse aggregate sourced to match extant on site samples.
- Mix with hot lime in a basin with a larry hoe. Water to be added to workable consistency

#### APPLICATION GENERALLY

- Apply a coat of haired coarse stuff as before specified. Each coat to achieve good adhesion and in one continuous operation between angles and joints.
- All coatings to be not less than the thickness of removed or adjacent material, firmly bonded.
- Prevent excessively rapid or localised drying out.

#### KEYING

- Keying of undercoats is to be carried out with a wooden lath scratcher. Keying of floating coats is to be carried out with a devil float. Key to produce evenly spaced wavy horizontal lines, approximately 20 mm apart and 5 mm deep to provide a key for following coat. Do not penetrate through the coat

#### FINISH COAT

- Mix harling coat as before specified.
- Apply finish coat to thickness informed by extant samples on site, and through trials.

#### DRYING

- Keep each under and final coat damp for the first 3 days by covering with polythene sheet and/or spraying with water. Thereafter prevent from drying out too rapidly. Work in shade whenever possible. Allow each coat to dry out thoroughly to ensure that drying shrinkage is substantially complete before applying next coat.

#### PROTECTION

- Adequately protect newly applied external coatings against wind and rain for the first 48 hours using polythene sheet, hung clear of the face, or other approved method.
-

## 6.5 JOINERY REPAIRS

### OBJECTIVE AND OVERVIEW

The term joinery in the following specification includes all elements of exterior and interior timber features including but not limited to; door assemblies, window assemblies, architraves, skirting, timber columns, beadings, fret work, flooring, cupboards and fixed furniture, associated with buildings at KAVHA.

Due to the amount of re-construction found onsite it is important to assess remedial works against the significance of each joinery element. Those elements found to have high significance (known original fabric) should be treated with conservation best practise principals. Those elements known to be reconstructed can be approached with a pragmatic based outcome.

Joinery repairs to be carried out using best practise conservation techniques (as much as necessary, as least as possible).

Where damage to joinery exists repair using timber patches ensuring minimal addition of new material. Repair of broken, damaged or worn components should be undertaken compared to wholesale replacement. Timber used for joinery repair should, where possible, be the same species and correctly seasoned. Profiles of joinery repairs to match existing.

Joinery hardware should be repaired where possible with wholesale replacement reserved for total furniture failure. (e.g. hinges, door locks) Where metal joinery hardware may need treatment to inhibit corrosion ensure a correct treatment process.

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### DEFINITIONS

<b>Timber Patch</b>	Patches used to repair damaged timber joinery. They should match the existing timber species, have the grain running the same way and have the same profile. With clear finished work, select patches of a similar grain and colour.
<b>Fixings</b>	Nails, screws, bolts used to secure elements together.
<b>Splicing Joints</b>	Joining new timber into existing timber. Splice members together to provide a maximum area for fixing. Fix with glue and timber dowel or non-ferrous pins.
<b>Recording</b>	The recording of all repairs, replacements and additions made to timber joinery. Records should be kept on a database accessible for all users. Both written and photographic records to be taken and shall include place, date, extent of works.



## 6.5 JOINERY REPAIRS

### SPECIFICATION, METHODOLOGY AND WORKMANSHIP

#### MATERIALS

##### RECOMMENDED GLUES

INTERIOR GLUE	PVA-cross link	Titebond 1	<a href="https://titebond.com.au/products/titebond-original/">https://titebond.com.au/products/titebond-original/</a>
EXTERIOR GLUE	PVA-cross link	Titebond 3	<a href="https://titebond.com.au/products/titebond-iii/">https://titebond.com.au/products/titebond-iii/</a>

Timber: Timber for joinery repair should match existing I.E. Norfolk Island Pine

Paint: Paint system chosen for timber joinery. (See 6.6; Paints and Applied Surface Coating Systems)

Wax: Bees wax or Danish wax (or similar) can be used to maintain and protect timber elements.

#### GENERAL JOINERY REPAIR AND MAINTENANCE

Regular and consistent maintenance will avoid the need for costly repairs and replacements. It will also conserve significant original fabric. Moisture penetration causes decay and dimensional change in timber elements, particularly doors and windows. This is best prevented by regular and thorough painting or coating with an appropriate finish. Coatings such as paints, varnishes, waxes and oils are the principal means of controlling swelling as well as protecting and revitalising timbers. Once those coatings start to break down, moisture can penetrate the timber and set up conditions for fungal attack.

Repairs to joinery elements must be based on the principle of doing as little as possible and only as much as necessary to retain and protect the element. Repairs must match existing in material, form, dimensions and profile and there must be no damage to significant fabric. Repairs must not involve a high proportion of the fabric of the joinery element.

Polyester or epoxy based fillers are to be avoided due to the incompatibility with timber elements. In time these fillers will expand at a different rate to the surrounding material resulting in failure.

Consideration should be given to glues and adhesives; compatibility between glue and joinery element should consider durability, reversibility and compatibility. Internal joinery glue may differ from external joinery glue system. Glue used for internal repairs could be a high strength PVA (or similar) that is simple to use and dries clear. External glue needs to consider durability against weather, especially moisture.

Repairs and maintenance to timber door and window assemblies will include:

- Refixing loose architraves, decorative trims and mouldings
- Cutting out decay and patching damaged door and window fabric
- Careful hand sanding of window elements in windows binding because of excessive or soft paint layers
- Replace worn cotton sash cords
- Replace deteriorated putty
- Replace missing glazing bars and tongues
- Replace deteriorated sill fronts.
- Record works where necessary.

## 6.5 JOINERY REPAIRS

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### DAMAGE TO DOORS AND WINDOWS

Identify and fix the cause of the damage before proceeding with repairs to timber doors and windows. Damage may be a result of:

- Structural movement or stump subsidence in the main frame (or after the re-levelling of stumps)
- Expansion of the joints between elements
- Moisture penetration, weathering or decay
- Normal wear and tear
- Loose hinges and screws.

Do not force timber doors or windows if they are jammed or binding as this can cause further damage.

It may be necessary to rectify stump subsidence or other causes of structural movement if binding doors and windows are a common feature throughout a building. After re-levelling, inspect all openings to reassess their condition and if repairs are necessary.

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### REPLACING DOORS AND WINDOWS

There are a number of circumstances in which replacement or reinstatement of doors and windows may be contemplated:

- They may be damaged beyond repair
- They may be missing
- Modern and/or inappropriate substitutes may have been installed.

Do not:

- Use epoxy patches as this repair method is irreversible and incompatible.
- Excessive painting of the edges of double hung window sashes as this prevents smooth running.

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### GLAZING

Take special care with original or early glass. Early glass does not have a flat uniform appearance. It is often distinguished by streaking or bubbles in the glazing. Ignore minor cracks in inaccessible places if it means the original glass can be retained.

Cracked, broken or missing glazing.

- Replace missing glass with glass matching the original or existing.
- It may be possible to match the original glass exactly with second-hand glass.
- When replacing glazing, check window sash cords and pulleys, as they may need adjusting to counter any difference in the weight of the new glass.
- Record glazing replacement.

Putty.

- Remove deteriorated putty with an organic solvent paint stripper or heat gun. Take special care to not damage fine glazing bars when removing the putty. Replace the deteriorated putty with linseed oil putty.

## 6.5 JOINERY REPAIRS

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### REPAIRING COLUMNS AND POSTS

Commonly posts and columns suffer rot at the bottom where connected to floor, or can crack due to weathering, and need to have a new piece spliced or patched in.

- Repair decayed timber by cutting back the affected timber and patching or splicing matching timber into the section (see patching and splicing in definitions).
- Use internal or external glue system as appropriate.
- Use timber dowels if necessary, avoid metal fixings.
- Complete painting system as soon as practical. See 6.6
- Record all works.

### REPAIR OF FLOORING

There are a number of circumstances in which replacement or reinstatement of flooring may be contemplated.

- They may be damaged beyond repair
- They may be missing
- Modern and/or inappropriate substitutes may have been installed.

If timber flooring has suffered from rot due to moisture ingress or rising damp, rectify source of damp prior to replacement or repair:

Repair or replacement flooring should.

- Be the same species, dimension and profile.
- Be appropriately seasoned.
- Use similar fixing type to original.

## 6.6 PAINTS AND APPLIED SURFACE COATINGS

### OBJECTIVE AND OVERVIEW

Several studies have found that the application of P.V.A and acrylic paints, selected for the durability in the harsh environmental conditions is impacting the integrity, condition and presentation of the significant fabric and structures of KAVHA.

The recommendations outlined within this technical specification and methodology are principally aimed at a departure from acrylic paint coatings applied to mortar and render substrates. The objective being to return to traditional lime-based coatings so as to improve breathability and authentic presentation. The determination of appropriate surface coatings for various applications should be determined through the implementation and monitoring of large scale trials as was recommended by Sections 5 and 6 of the Investigation into Paint Finishes, prepared by D. Ellsmore in 2011. This Manual supports a return to external Copperas pigments to exteriors walls which were previously rendered, together with highlights of lintels, sills and reveals in lighter tones, as is supported by archival images. In addition consideration may be given to a departure from white paint finishes to external timber work, as there is evidence of darker tones in archival images, and such a move could support the response to extensive biological growth to external timber elements across the site, improving presentation and reducing maintenance requirements.

This specification and methodology makes recommendation of a limewash prepared from lime putty. Caution should be exercised in the selection of any proprietary alternative which may contain modern polymers, such as acrylics. While these modified limewashes have the benefit of increased adhesion to previous paint surfaces they have reduced breathability when compared to traditional limewashes. Notwithstanding this, amongst other things, the trials seek to determine if the inclusion of an acrylic resin to limewashes will enhance adhesion to cement substrates where removal of cement renders is unfeasible and for adhesion of limewashes directly to acrylic painted masonry substrates. Limewash modified through the addition of tallow is intended for trial to determine any enhanced performance with regard to water shedding and durability for external lime rendered walls. It is recognised that there are considerable issues on site with regard to black mould. The mould presentation is predominantly concentrated to painted joinery items, present both internally and externally. Mould is present on both vertical and horizontal elements, but to a lesser degree in areas of higher solar and uv exposure. To date cleaning trials have been unsuccessful. The following painting specification makes recommendation of paint systems, inclusive of preparation, additives and post application treatments. This methodology should be supported by trials for cleaning as outlined within 6.7 Cleaning and Biological Growth.

### TRIALS

The following trials are recommended so as to inform the performance and efficacy of nominated coatings:

	Substrate	System	Objective
1	Paint removal from cement render finishes	Heritage No. 1 Peel Away De-Lam 20	Seeking to determine the most cost and resource effective means for the removal of acrylic paints where cement renders are to be temporarily or permanently retained.
2	Cement render finishes	Limewash Distemper Mineral Paint Modified limewash with modern polymer	Seeking to determine adhesion, durability and performance to cement render surfaces in the presence of salt attack and damp.
3	Lime render finishes	Limewash Distemper Mineral Paint Modified limewash with tallow	Seeking to determine adhesion, durability and performance to lime render surfaces in the presence of salt attack, and extreme environmental conditions and high traffic areas.
4	Timber joinery (external)	DULUX AcraTex Prep Treat Dulux Precision Stain and Mould Blocker Dulux Weathershield~ Periodic cleaning with Wet and Forget	Seeking to determine performance and resistance to biological growth, principally black mould. Trail to be established in renewed painting program with full stripping and surface preparation followed by application of Wet and Forget with 6 - 12 month monitoring period. See 6.7 Cleaning of Biological Growth.

## 6.6 PAINTS AND APPLIED SURFACE COATINGS

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### SPECIFICATION, METHODOLOGY AND WORKMANSHIP

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#### PREPARATION GENERALLY

##### SUBSTRATES

- sufficiently dry in depth to suit coating.
- Generally prepared in accordance with manufacturers instructions, where applicable.

##### EFFLORESCENCE SALTS

- Remove. See Desalination.

##### DIRT, GREASE AND OIL

- Remove. Give notice if contamination of surfaces/substrates has occurred.

##### JOINTS, CRACKS, HOLES AND OTHER DEPRESSIONS

- Fill with stoppers/fillers. Work well in and finish off flush with surface. Abrade to smooth finish.

##### WATER BASED STOPPERS AND FILLERS

- Apply before priming unless recommended otherwise by manufacturer. If applied after priming, patch prime.

##### OIL BASED STOPPERS AND FILLERS

- Apply after priming.

##### SURFACE IRREGULARITIES

- Abrade to a smooth finish.
- Dust, particles and residues from abrasion: Remove

##### DOORS, OPENING WINDOWS AND OTHER MOVING PARTS

- Ease and adjust before coating. Primer to resulting bare areas.

##### ACRYLIC PAINT REMOVAL

- Paint removal to be undertaken in accordance with manufacturers specifications, following the trialling of nominated proprietary systems and the determination of a preferred system.
-

## 6.6 PAINTS AND APPLIED SURFACE COATINGS

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### LIMEWASH

#### MANUFACTURE

- To 12.5 kg lime putty from slaked high calcium lime. Putty to be thoroughly knocked up prior to addition of water
- Add 11 litres of water (with any pigment) and stir thoroughly. Thin resulting paste with fresh water to consistency of skim milk. Ensure that the limewash does not become contaminated with salt, alum or other additives (other than pigments).
- Sieve well to remove solids.

#### ALTERNATIVES

- Westox Lime Wash, or equivalent

#### ADDITIVES

- Uncoated cement render and acrylic painted walls: Trial addition of acrylic resin (Crommelin Acrylic Modifier, or equivalent). Acrylic resin to be added to maximum 5% of limewash volume.
- External limewash to lime render finishes: Trial addition of tallow. Tallow to be of maximum 5% addition and both limewash and tallow to be heated prior to combination. Mix with a speed drill and continue to stir with a paddle during application. NOTE: solids will settle during application and are to be treated as waste material.

#### TINTING

- Copperas: Dilute 50g of Iron Sulfate crystals in 1 litre of warm water.
- Mix diluted crystals with equal proportions with limewash (1:1) for strong yellow colour.
- Mix diluted crystals with with limewash (1:2) for strong cream or orange colours.

#### PREPARATION

- Brush down with stiff bristle brush (wire brushes not to be used) to remove dust and loose particles.

#### INITIAL COAT(S)

- New untreated surfaces to receive 1 coat thinned 10% with clean water.

#### FINISHING COAT(S)

- 2 coats using block fibre brush, brushing in all directions.

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### DISTEMPER

#### MANUFACTURE

- Combine 1000grams of whiting in 400ml of water.
- Prepare animal glue to manufacturers instructions and heat glue in a double boiler to a soupy consistency.
- Combine Whiting and glue and colour with pigments. Mix well.
- Filter mix through fine muslin.

#### ALTERNATIVES

- Porters Paints, or equivalent

#### PREPARATION

- Lightly rub trowelled glossy plaster with a worn abrasive paper.
- Brush down with stiff bristle brush (wire brushes not to be used) to remove dust and loose particles.

#### APPLICATION

- New untreated surfaces to receive 1 coat thinned with 10% clean water.

#### FINISHING COAT(S)

- 2 coats using block fibre brush, brushing in all directions.

## 6.6 PAINTS AND APPLIED SURFACE COATINGS

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### MINERAL PAINTS

#### INTERNALLY

- Keim Ecosil -ME or equivalent.
- Tinted with compatible colour concentrates.
- New untreated surfaces to be pretreated in accordance with manufacturers instruction.

#### EXTERNALLY

- Keim Royalan or equivalent.
- On-site tinting with Royalan tinting concentrates.

#### PREPARATION

- Remove acrylic coatings as before specified
- External areas subject to strong environmental conditions to be pretreated in accordance with manufacturers instruction.

#### APPLICATION

- Application of 2 coats by brush or roller
- Following application of initial coat allow 12 hours drying time or as nominated by manufacturers instruction.

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### SURFACE CASTINGS FOR TIMBER

#### COATING SYSTEMS

- Dulux Weathershield

#### PREPARATION

- Prepare surfaces in accordance with manufacturers specification.
- Apply DULUX AcraTex Prep Treat for substrate cleaning, preparation and consolidating primer. Applied in accordance with manufacturers specifications.

#### APPLICATION

- Apply 1 coat of Dulux Precision Stain and Mould Blocker
- Apply 2 coats of Dulux Weathershield

#### FINISH

- EXTERNAL JOINERY: Gloss
- EXTERNAL WEATHERBOARDS: Gloss

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### APPLICATION GENERALLY

#### LIMEWASH

- Porous backgrounds to be dampened prior to application.
- Apply in thin even coats.
- Four to six coats may be required with up to six or seven on newly harled surfaces.

#### SURFACE COATINGS FOR TIMBER

- Apply in accordance with DULUX specification and instruction.



## 6.7 CLEANING OF BIOLOGICAL GROWTH

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### OBJECTIVE AND OVERVIEW

There is prevalence of black mould and biological growth to painted timber surfaces across KAVHA, most notable on external timbers with concentrations to verandah soffits and eaves. It is acknowledged that the extreme environmental conditions are contributing factors and that several maintenance techniques have proved ineffective in the long term resulting in a high recurrence of maintenance works to maintain appropriate presentation of the Historic Area.

It is understood that the nominated treatment system, Wet & Forget has been previously used, however the establishment of a controlled trail, linked to the painting renewal for joinery as outlined within Section 6.6, with appropriate allowance for reaction times be considered.

The product is considered suitable for application adjacent to historic fabric as it contains no bleach or chlorine, and is non-caustic and non-acidic, with a PH of 8 and suitable for application to a range of materials and sub-strates..

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### TRIALS

The following trials are recommended so as to inform the performance and efficacy of nominated biological treatment

	SUBSTRATE	SYSTEM	OBJECTIVE
I	Painted timber surfaces finished in accordance with 6.6 Surface Coatings for Timber	Wet and Forget	Seeking to determine the efficacy of this biocide in the prevention and treatment of mould spores and other biological growth

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### SPECIFICATION, METHODOLOGY AND WORKMANSHIP

#### PREPARATION AND APPLICATION GENERALLY

- Dilute one part Wet & forget in five parts water (1:5) in a garden or backpack sprayer.
- Spray affected area to saturation.
- Do not hose off.
- Do not apply if rain is expected in the next 6 hours.

#### NOTES ON REACTION TIME

- Algae may disappear within days.
- Moss will decompose within weeks.
- Heavily contaminated black mould may 6-12 months to deliver noticeable improvements.
- Lichen requires two applications within 15 minutes and may take 8-12 months to decompose.

## 6.8 SHINGLE ROOFS

### OBJECTIVE AND OVERVIEW

Timber roof shingles found at KAVHA are of two species, Casuarina and Norfolk Island pine (NI pine). Although Casuarina has proven durability qualities Norfolk Island pine when tanalised has demonstrated a considerable life span. It is assumed that NI pine was the original source of roof shingles on all building and should remain the preferred shingle material. Within the planning cycle of roof shingle replacement the procuring of suitable trees for shingle production should be planned as part of a sustainable forestry strategy.

Roof shingles and battens should be tanalised on island to increase durability and to prevent possible borer activity.

Currently some buildings are clad in fibre cement shingles, future shingle replacement on these buildings should consider the return to NI pine. The introduction of a Roofing Strategy would assist in the development of an appropriate conservation policy prior to the implementation of such change.

The current process of tanalising NI Pine shingles is carried out on island and uses the Copper Chrome Arsenate (CCA) process which is now deemed not suitable for environmental and health reasons. The two main copper based timber treatments, other than copper chrome arsenate (CCA), are alkaline copper quaternary (ACQ) and copper azole (CA). Both are less hazardous to the environment and human health than CCA.

ACQ is a water-based timber treatment that uses copper to protect timber from fungi and a quaternary compound to protect timber from copper resistant fungi and insects. It is applied by vacuum pressure impregnation. ACQ is also called ammoniacal copper quaternary or amine copper quaternary. CA uses copper in the same way as ACQ, with the addition of the fungicide, tebuconazole.

Hazard level of timber treated with alkaline copper quaternary and copper azole: H3 to H5. Pests repelled by alkaline copper quaternary and copper azole repel: Moderate to very severe decay, borers and termites.

Light Organic Solvent Preservatives (LOSPs) are not deemed adequate protection for exterior timber elements such as NI pine.

To ensure durability of roof shingles is maximised a tanalising process should be undertaken on island that will also meet current Health & Safety requirements along with best timber treatment outcomes. It is recommended that an investigation be carried out to better understand if the timber treatment plant on island can embrace these new copper impregnation processes with existing plant and equipment.

### SPECIFICATION, METHODOLOGY AND WORKMANSHIP

#### MATERIALS

<b>Roof Shingles</b>	Tanalised NI Pine	400x100x12mm	
<b>Battens</b>	Tanalised NI Pine	75x25mm	Fixed at 150mm centres
<b>Sarking</b>	Breathable membrane	Installed below batten to allow air gap	AS4200.1; pliable building membranes and underlay
<b>Flashing</b>	Soaker flashing	Lead or butynol	To Rolled Lead Sheet Manual or butynol manufacturers specification.

## 6.8 SHINGLE ROOFS

Fixing	Stainless steel or Silicon Bronze	35mm flathead	Available to suit gun application
Ridge and Hip Capping	Tanalised NI pine	125x25mm	

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### SHINGLE INSTALLATION METHODOLOGY

Typically timber shingles are fitted green to a system of battens laid across each roof plane with ridges and hips. Historically at KAVHA these appear to have been finished with a woven shingle detail, but have been specified and installed by way of timber capping since the 1980s. Consideration should be given to a return to woven ridges and hips, with detailing outlined within the English Heritage, *Practical Building Conservation: Roofing Manual, 2013*.

It is common for heritage buildings that remain in use to have a breathable membrane installed to the underside of the shingles to assist in the management of condensation. It is important to install the breathable membrane under the battens to allow for an air gap between shingle and membrane. This will allow shingles to breathe with change in relative humidity or during periods of rainfall.

Shingle Installation:

- Install sarking under battening except for batten against fascia known as tilting fillet. Sarking flows over tilting fillet;
- Start shingling from fascia with shingles nailed to tilting fillet.
- Nail shingles progressively up to ridges and hips fixing with 2 flathead nails for each shingle.
- Provide soaker flashing to all ridges and hips.
- Install NI pine ridge and hip capping or for woven hips and ridges finish in accordance with English Heritage, *Practical Building Conservation: Roofing Manual, 2013*.

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### MAINTENANCE OF SHINGLE ROOFS



## 8 RECORDING PROTOCOL

MAINTENANCE WORK	RECORDING PROTOCOL	
DATE:	WORKS UNDERTAKEN BY:	
LOCATION		
CATEGORY	REPAIR	REPLACEMENT
	NEW WORK	
FABRIC	ORIGINAL	INTRODUCED
TYPE OF WORK (TICK ALL THAT APPLY)	CARPENTRY	BRICK-MASONRY
	JOINERY	STONE-MASONRY
	METALWORKING	PAINTING
	EXCAVATION	CONCRETING
	ROOFING	TILING
	PLASTERING/RENDERING	ELECTRICAL
	PLUMBING	LANDSCAPING
	OTHER (PLEASE DESCRIBE)	
WORKS OVERVIEW (DESCRIPTION OF WORKS UNDERTAKEN)		
DURATION	COMPLETED	ONGOING
	DATE:	
NOTES (ANY ADDITIONAL DETAILS OF THE WORK OR OTHER RELEVANT INFORMATION)		
PLAN ATTACHED	YES	NO
PHOTOGRAPH REFERENCES		

# APPENDIX A - SAMPLE INVENTORY SHEET

## NO. 1 QUALITY ROW

### OVERVIEW

Built 1845-47 as residence for Stipendiary Magistrate occupied in 1856 by w. Quintal, a settler from Pitcairn Island, fired in 1908.

Part of an imposing streetscape of military houses and compounds. Extensively reconstructed with some departures from its known earlier appearance.

### CONDITION AT TIME OF INSPECTION

\* Define with reference to the tools outlined within 5.3 GUIDANCE NOTES ON APPLICATION

### OBSERVATIONS FROM PREVIOUS CONSERVATION WORKS

- Main building restored as Golf Club 1973/74/75 Annex restored 1974/75.
- Re-render and repaint to south and west elevations 1982.
- Double hung windows to south side added 1984.
- Plastic paint used internally.
- Consideration was given to use of hydrated lime in render mix.
- Boncote specified to Annex in 1984

### ARCHIVAL REPORTS

- KAVHA Archaeological Report 14, Part 1. January - February, 1983, by R.V.J. Varman.
- Annex Specification by Philip Cox, Storey and Partners 1974.
- Annex by Philip Cox and Partners Pty Ltd, August 1983.
- South Windows by Philip Cox and Partners Pty Ltd, May 1983.

### ARCHIVAL DRAWINGS

\* Populate as relevant to the asset.

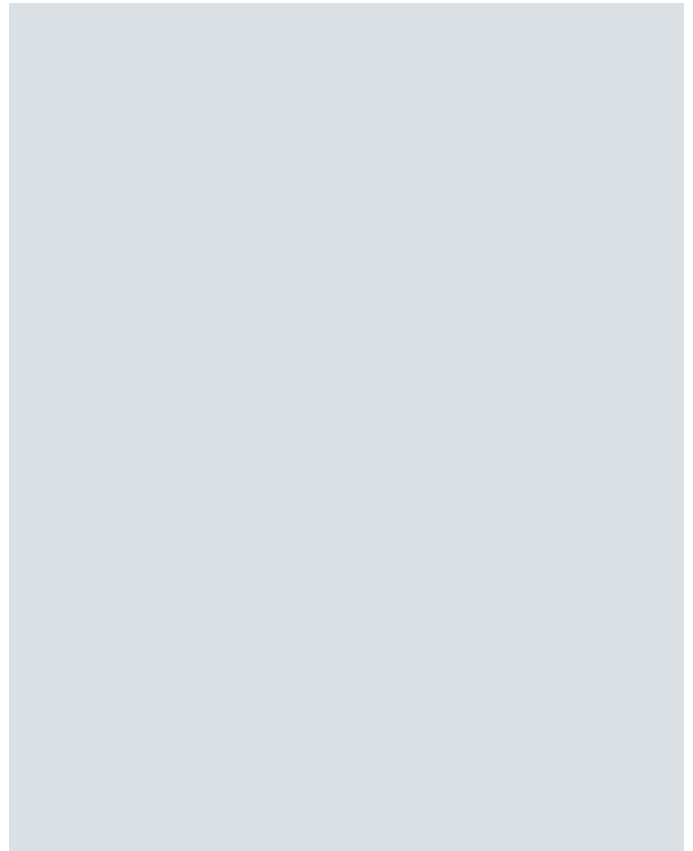


Image Caption

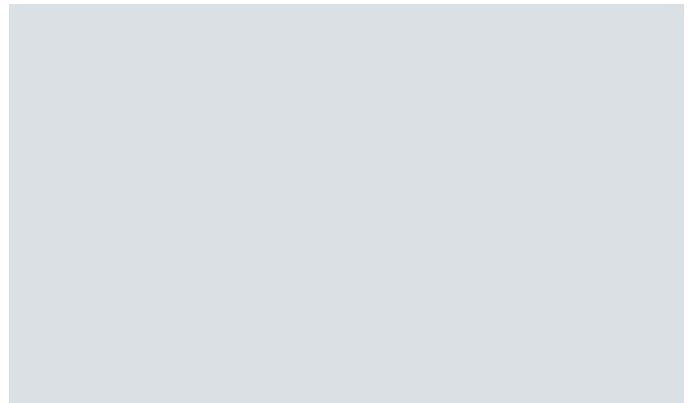


Image Caption

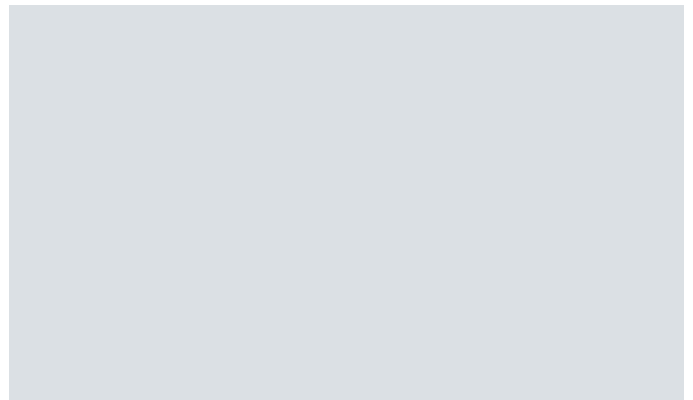


Image Caption

