Historic Environment Scotland

Condition Monitoring System for properties in the care of Scottish Ministers and associated collections.

Purpose and Scope

This document sets out how HES will undertake condition monitoring of the properties in the care of Scottish Ministers and associated collections going forward and sets out the developing asset management system.

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1.0 Existing Inspection process: cycles, content and purpose

In order to present a new Condition Monitoring system it is important to understand the existing inspection arrangements and how they will transform into a single, live, system that can be interrogated at many levels to produce relevant monitoring reports as required.

At present condition is captured and stored for each monument in a 3 tier system in 3 separate formats. This is illustrated in the diagram below.

TYPICAL 5 YEAR LIFE CYCLE OF A MONUMENT
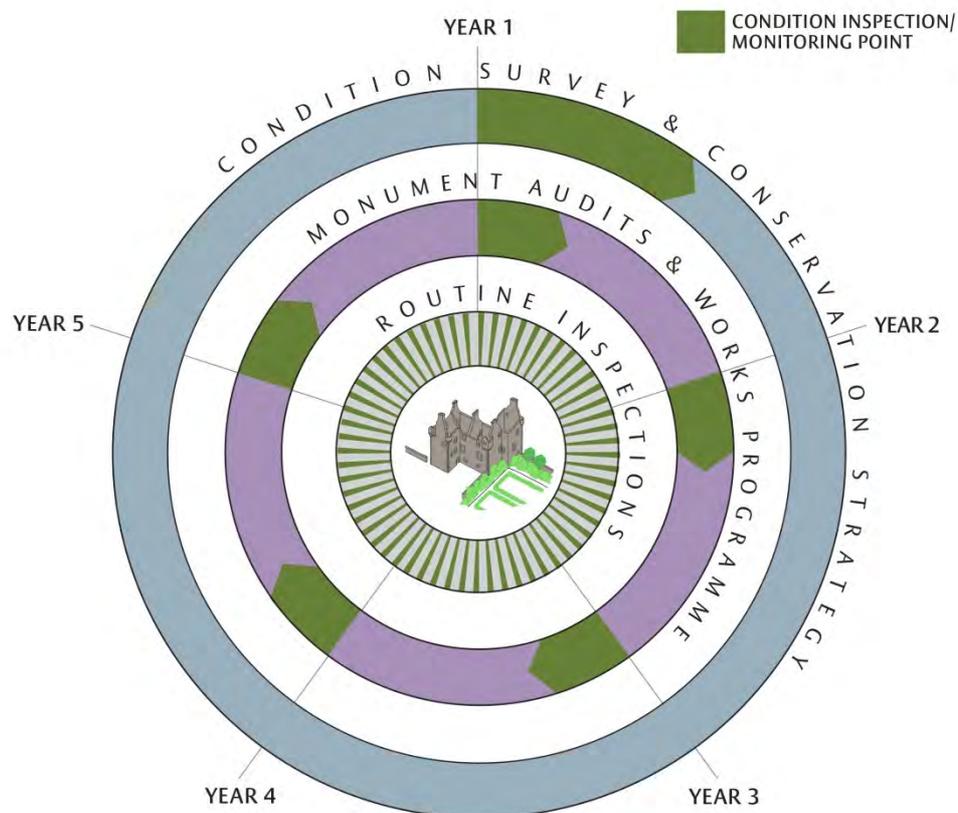
The green arrows indicate all the Condition Inspection and monitoring points over a typical 5 year period:

        Condition Surveys and Conservation Strategy completed on a 5-10 year cycle.

        Annual Monument Audits, on an annual or biannual cycle.

        Routine site inspections, on a 2 – 12 week cycle.

Condition Surveys take place every 5 – 10 years and are detailed condition assessments carried out by the Architects that define the Conservation Strategy for each monument and inform and prioritise all the conservation work on the Estate at a strategic level. We have in excess of 380 condition surveys and resurveys covering 335 properties in the care of Scottish Ministers. At present there is no means of transferring individual items to works programmes or recording works completed.

The Annual Monument Audits are completed in Spring with the majority of monuments inspected every 1 – 2 years by the district team comprising of Architect and MCU (Monument Conservation Unit) managers. Works completed within the previous year are reviewed and works required for the coming year are agreed. The assessment draws upon the Conservation Strategy for each monument and the resulting phased monument programme of work feeds into the annual depot programmes for each district. The output is a list of works required for inclusion in budget bid process which is filtered and prioritised at various levels and ultimately allocated by the Director of Conservation. There is no means of transferring individual items to works programmes or recording works completed. The output format is generally a word document.

Routine site inspections are carried out by the local MCU teams at staffed and unstaffed sites on an agreed cycle. With a few remote exceptions (usually island sites), this is usually monthly or 6 weekly, however it can be more frequently at, for example, sites with high visitor numbers or sites where vandalism is an issue. Inspection of the monument and some necessary routine maintenance work will be carried out – typically to rainwater goods, roofs, masonry elements, paths, steps, handrails, painting, drainage etc. Actions completed and issues to be escalated are recorded on the Routine Maintenance Inspection Record sheet. The output format is a word document or often a piece of paper, marked up by hand or even site notes recorded in a diary.

These three key recording and monitoring tools feed into the Conservation and Maintenance Works Process as shown on Figure 2. The boxes outlined in red show the items directly related to Condition Assessment and Monitoring.

ESTATES: CONSERVATION AND MAINTENANCE WORKS PROCESS
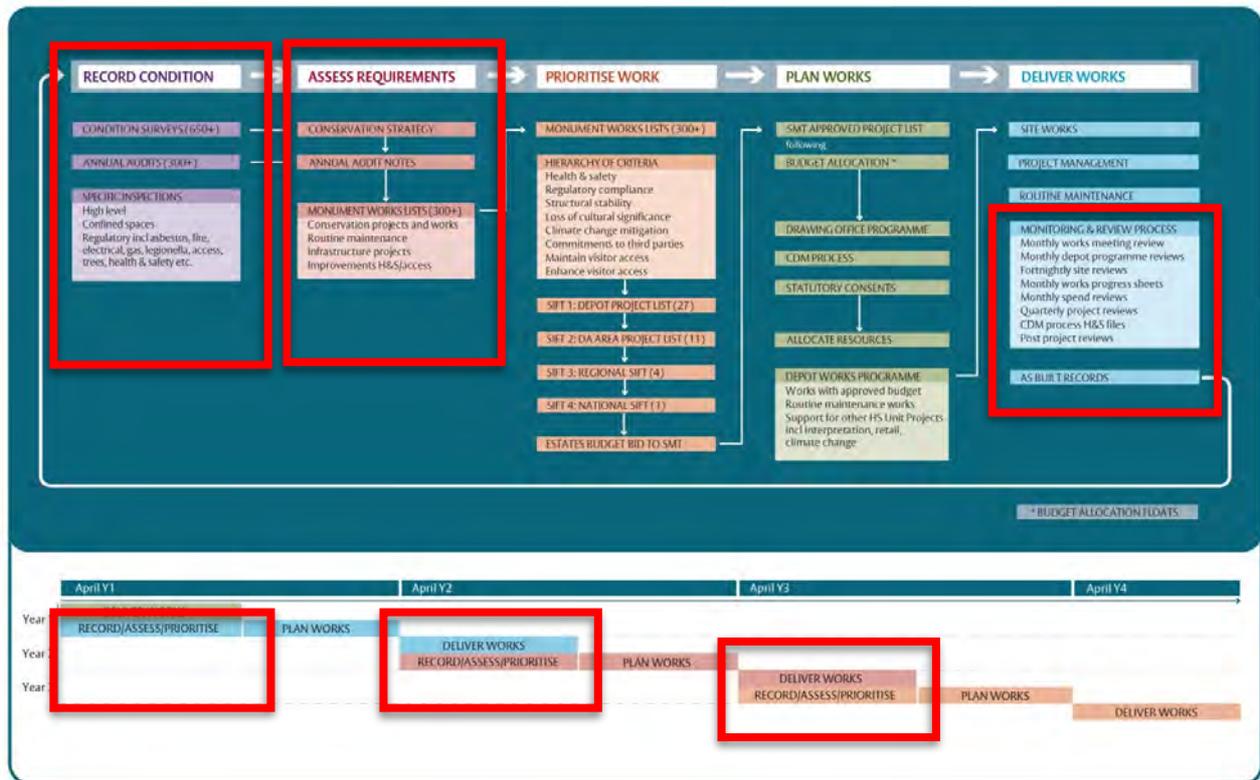
2.0 Towards a new Condition Capture and Monitoring System - PICAMS

The new system will replace the three existing inspection systems and their separate, non-digital outputs by a live, digital, bespoke Condition Capture and Monitoring system. PICAMS (properties in care asset management system) is a structured data management system with functionality to push and pull data from other sources as the system develops.

condition survey

annual monument audit

routine maintenance

picams
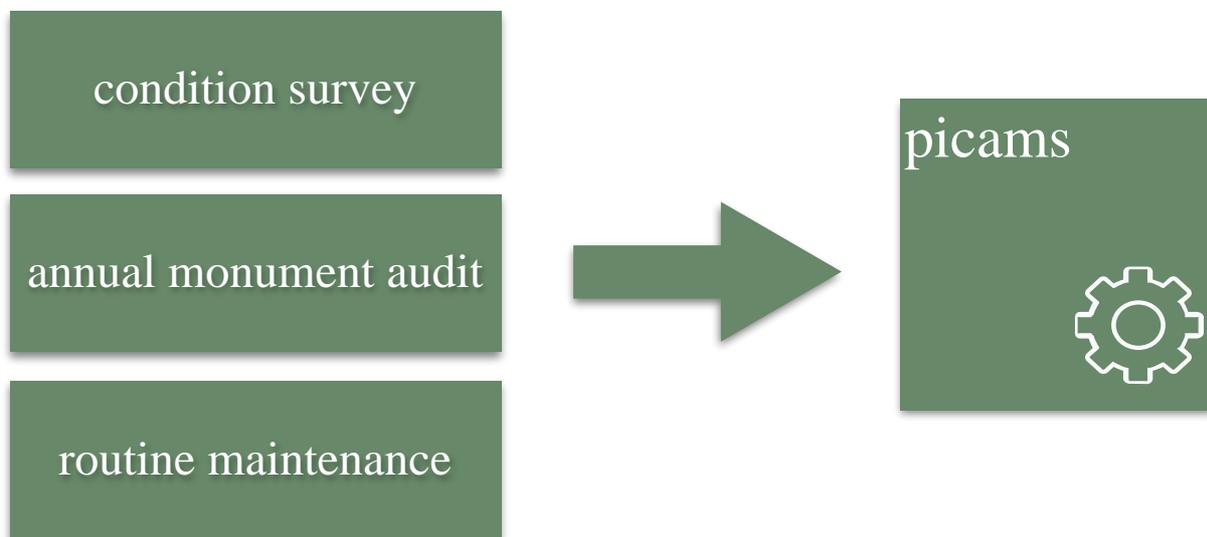
The system comprises a field data capture tool that transfers all current condition data into a single dynamic database, that can be accessed and interrogated by whatever reporting format is required for a particular purpose at a particular point in time.

This 'snapshot' reporting of live condition data is one of the main benefits of the new system. The data is inputted on a building element analysis basis, attributing numeric levels of urgency and risk to each item on the monument, using the methodology for the Condition Indicator process developed for this purpose - see '*Baseline condition of the properties in the care of Scottish Ministers'.*

In development of this Condition Capture and Monitoring model many additional benefits have been incorporated into the creation of the live database that will improve our workflows and operational efficiencies in the management of the assets. These are outlined in section 4.0

3.0 HES Inspection process: cycles, content and purpose

The inspection process will be the same across the properties in the care of Scottish Ministers but the cycle of inspection will be individual to each monument. Monuments have been batched into 5, 10 or 15 year cycles reflecting high, medium and low risk sites.   These are based on an assessment of the MCI value for each monument.

Four Inspection points are proposed:

i. Full Condition Inspection - FCI
Purpose: to capture elemental condition data for all elements of a monument. This will be the trigger point to review the *Conservation Strategy* for the monument.
Cycle: every 5, 10 or 15 years depending on MCI band
Content: Condition assessment and Condition Indicator value attributed to all elements
Completed by: Conservation professional teams (Architects, Engineers, relevant specialists)

ii. High Risk Inspections - HRI
Purpose: to review high risk Condition Indicator elements only, as identified by the system
Cycle: every 1 – 2 years
Content: Condition inspection and assessment of all high risk elements across estate
Completed by: Conservation professional teams (Architects, Engineers, relevant specialists)

iii. Work completed inspections - WCI

Purpose: to close off elemental items as works completed. The system will automatically adjust the MCI value to reflect these changes.

Cycle: as works complete, and at least annually for each monument

Content: 'completed' status on database

Completed by: conservation professional teams in conjunction with works teams

iv. Routine Maintenance Inspections: RMI

Purpose: to record the condition of routine elements and any conservation maintenance works completed. Also to highlight any areas of concern or elements that require inspection or attention beyond routine maintenance.

Cycle: 1mth – 12 mths

Content: as purpose

Completed by: Works teams
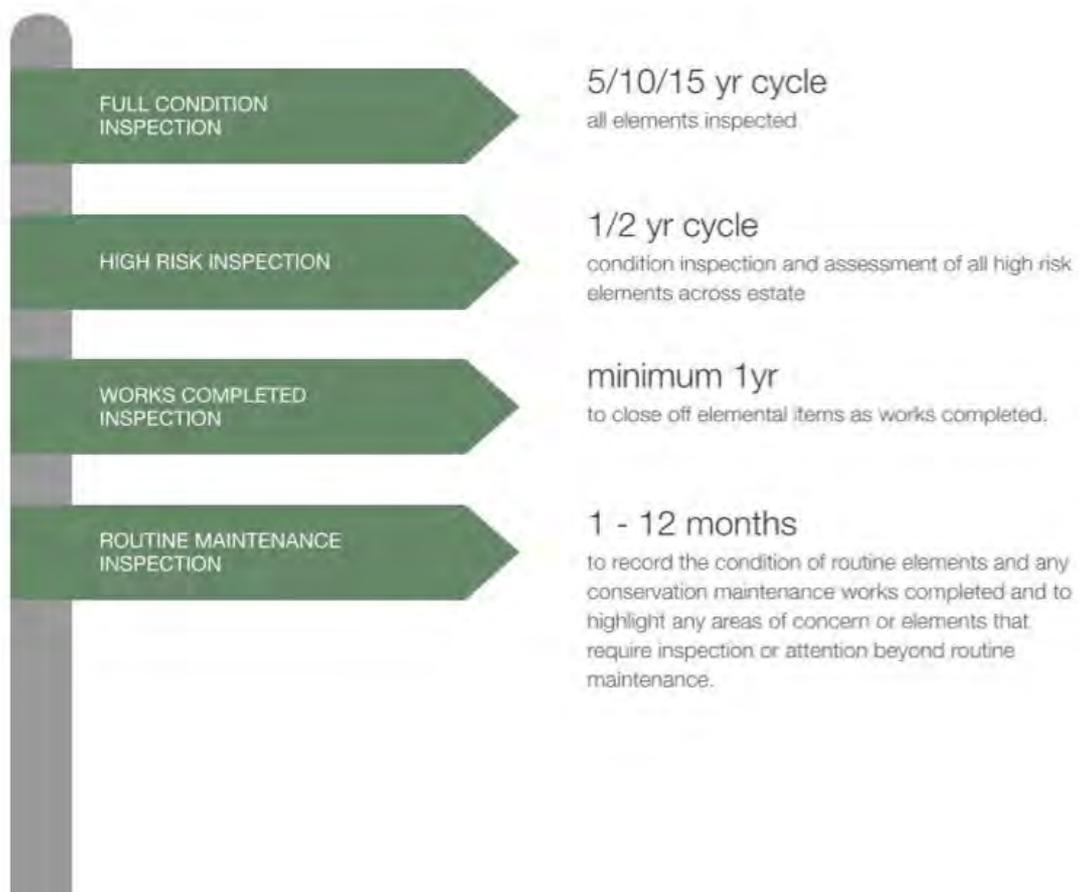
The batching process for resurvey the 5/10/15 year cycle has been completed. The splits and average Monument Condition Indicator for each cycle batch are illustrated below.

No. sites per cycle

Average MCI per cycle
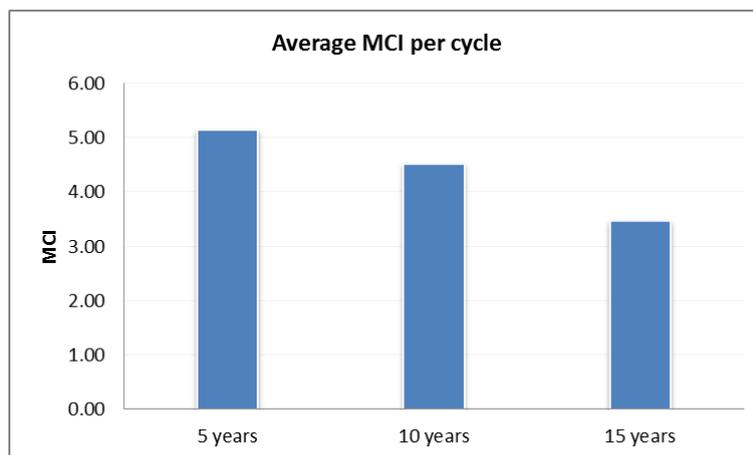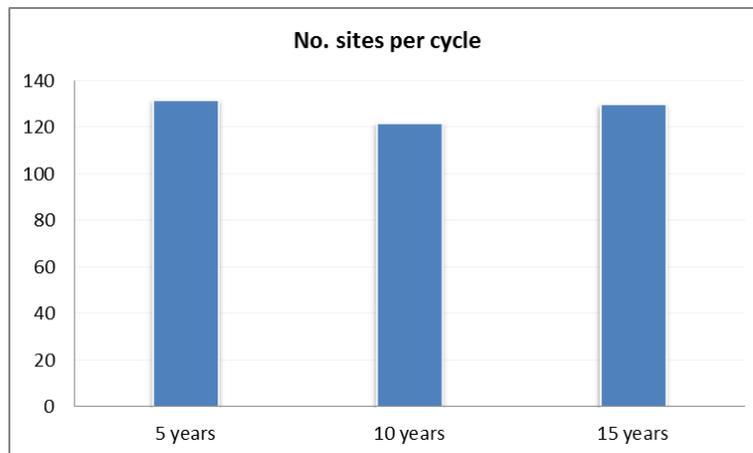
4.0 Dynamic status snapshot

PICAMS will provide a live 'snapshot' of condition across the Estate that can be delivered in many formats a report on the MCI values for all the monuments on the west coast; or an elemental condition indicator spread of values for a particular monument type.

A live dashboard style portal will provide key information presented on current estate condition, together with some facts reflecting a more detailed analysis of the data behind the top line figures.

The numerical condition indicator value is useful as an absolute measure, however the analysis, understanding and presentation of the data behind these MCI values is critical to obtain a true

measure of condition reflecting the worst and the best elements across the estate, and to allow meaningful comparisons to be made between monuments.

Each monument now has its own MCI value. It is important to note that e*ach value is dependent on the unique set of conditions, risks and constraints for that particular monument.* MCIs, although collated will not necessarily be comparable, or improvements over time achievable, across the entire estate. For example there will be some monuments where it will never be possible to ever achieve as low an MCI as at other monuments due to the underlying risks and constraints.

Therefore, a target range for an acceptable or optimal MCI value will be assigned to each monument on an individual basis.   This will reflect our intuitive and professional knowledge of each monument, an understanding of its exposure to risk, vulnerability, decay mechanisms and our ambitions for its condition improvement over a set period of time. The costs associated with achieving and maintaining a particular MCI range can be ascribed per monument.

5.0 Reporting cycles, content and purpose

The condition, inspection, targets and performance of the properties in the care of Scottish Ministers will be included as part of the Annual Report that will be prepared annually and presented to the Board of Historic Environment Scotland.

This will provide assurance to the Board of Historic Environment Scotland of conservation and maintenance works undertaken in relation to Scottish Minister's Estate and Associated Collections. In turn this will be used by the Board to provide assurance and information to Scottish Ministers.

A separate Condition Report for the properties in the care of Scottish Ministers will be provided by the end of May each year for inclusion within this Annual Conservation Report and will include:

- Monument Condition Indicator values (MCI's) for each monument
- Summary analysis of MCI data values by 1) an average numerical figure; 2) high, medium and low distribution ranges 3) regional distributions ranges; and 4) monument type distribution ranges.
- Record of inspections completed within the FY
- Record and analysis of performance against targets.

The condition reporting cycles, content and purpose will be initially driven by this need to provide

an annual assessment of condition of the properties in the care of Scottish Ministers using this defined methodology and an outline of our inspection and condition assessment targets and our performance.

The report simply becomes a tool to retrieve the required information from the system, rather than being the output or the end in itself as in the previous system. It will be possible to generate many other reports relating to condition for many different purposes at any point in time as required.

In order to be useful the information gathered should be relevant, accurate and proportionate. The added functionality of the system will allow conservation directorate to provide outputs that will be directly of benefit to our operations and asset management plan. The most useful examples would include:

- Snapshot at any point in time of the current condition of the Estate on an average, high/ medium/ low range, regional or monument type basis
- Condition of all elements within a particular monument at a set date
- Work items identified to be completed within the next financial year at a monument or a group
- of monuments
- Number of individual trade items eg masonry or joinery elements identified as high priority that
- require a resource to complete within a given time period
- Record of inspections and works to a particular area within a monument eg as part of a H&S
- investigation

It should be noted that the Baseline measure of the condition of the Estate at October 2015 will have to take cognisance of the data sources and methodology adopted. This initial baseline will not be a true reflection of the live condition of the estate as at October 2015 - (see *Baseline condition of the properties in the care of Scottish Ministers, Section 4.0)* however a good and reasonable baseline from which to start and the information will improve through time and delivery of programmed inspection.

6.0 Condition Monitoring

The system is live and dynamic. It will also be possible to retrieve and review legacy data within the system. This will allow comparisons of the current status of elements, monuments or the estate as a whole to past reference points. Reports can be generated and compared to historical data held in the database.

Other organisations managing assets have their own monitoring regimes and planning tools. Asset Management of non historic assets is generally predicated on obsolescence and managing repair to the point of replacement based on economic projections. For heritage assets of course the fundamental purpose is different in that it is our purpose to perpetuate the asset - which is often no longer performing as it was conceived or constructed as long as we can. They tend to be driven by cost of repair alone which is helpful but not entirely useful for our purpose. In researching other methodologies and systems it has been clear that other systems may not provide a live set of data that can be interrogated at any date or to any depth. It is also clear that it is challenging to keep any of these systems up to date.

Through this monitoring process we can provide a detailed and very transparent process with internal QA carried out within HES and in tandem be subject to independent peer review or can be used for monitoring purposes such as World Heritage Site Management Plans or to demonstrate to partners or communities how their monuments are being cared for.

This assessment of the MCI value will provide additional benefit to the system over a mere numeric value of condition. If the MCI for a particular monument is 5.9 that is a statement. By assessing that an acceptable range for this monument is between 4.0 and 5.5 we are then able to make a judgement on the acceptability of condition and more importantly, quantify what would be required to maintain that indicator annually and also shift that indicator to an acceptable range within a specified time period. There is then a clearer relationship between investment and impact, and it allows us to plan on the basis of the conservation strategy for the monument and would support the evidence based phased plans of work for each asset across the estate.

The following investment requirements could then be identified for each monument using the MCI value and acceptability band:

• Annual cost of care to maintain the existing MCI i.e minimise further decay
• Investment required to improve the condition of the monument to an acceptable level of condition over a period of time, including phases of work (this would equate to the required conservation investment when collated across the estate)
• Annual cost of care to retain the steady state at an acceptable level of condition (this would be the baseline' budget when collated across the estate)

This has the potential to link and track investment to benefits and addresses the non linear nature of our investments across an estate that is in relatively continuous decline. There is potential to carry out a range of investment vs change forecasts which could be correlated back to resource.

The relationship between the MCI values and strategic investment is of particular interest here and is one we are keen to explore further in the reporting and summary analysis of the MCI data.

7.0 Additional functionality of PICAMS

PICAMS provides both a mechanism for condition reporting and the identification of the works and investment required, which have a tangible and measurable outcome.

In addition to providing a baseline condition, the new process specifically provides:

• Identification and prioritisation of work, resource and skill requirements
• A basis for calculating investment requirements to both maintain and improve condition and build resilience
• The potential to model/ track the investment/benefit relationship across the estate

This will lead to major improvements in the efficiency of our workflows, operations, and resource allocation. The MCI and works required will be presented spatially as a RAG layout plan, so that they form the basis of the Monument Conservation Strategy. This will allow easy transfer of works required into depot works programmes and costed projects.

This information can then begin to be linked to other relevant data sets to provide meaningful evidence based information e.g the relationship between the west coast MCIs to the climate change vulnerability data.

As the system is GIS based it will also be possible to interrogate the data spatially and overlay maps, plans and drawings showing different data e.g. previous archaeological drawings and reports; historical landscape maps; or climate change meteorological data.The resulting new PICAMS database will be a central dynamic data system for asset management across the Estate, linking all data sets within Conservation Directorate, across all HES Directorates and to external stakeholders.

Condition monitoring data to 3D spatial data is a medium term aspiration for the system. In 2011 the First Minister announced the Rae Project, where Scotland would be one of the first countries to digitally document the heritage sites in state care. We have an active Rae Project survey plan at

present and a high level of expertise in this area. This opens up significant and very exciting opportunities to develop 3d asset management and demonstrate leadership within the sector. This will future-proof the system and provides potential commercial opportunities for HES moving forward. Phases 1 & 2 have been developed in collaboration with our research partners at British Geological Survey. We are presently scoping the delivery of a fully working system.

8.0 PICAMS outline

sigma

mci

inspection records

works outputs

legacy data

skills outputs

bpm

routine maintenance

pic collections

energy and carbon

climate change risk

oracle db

heritage management db

bgs natural stone db

canmore db

archaeology db

picams

portal
query tool
interface

conservation data

conservation network drive

spatial data

climate change risk

st of s

conservation principles

fire audits

h&s audits

drawings

specs

cdm

photos

tree audits

waste

technical standards

factoring info

mortar analysis

phase six