Assessment Information

[CoreTrustSeal Requirements 2020–2022](#)

Repository:	Historic Environment Scotland Archives (Digital Repository)
Website:	https://www.historicenvironment.scot/
Certification Date:	12 October 2021

This repository is owned by: **Historic Environment Scotland**

Historic Environment Scotland Archives (Digital Repository)

Notes Before Completing the Application

We have read and understood the notes concerning our application submission.

True

Reviewer Entry

Reviewer 1

Comments:

Reviewer 2

Comments:

CORE TRUSTWORTHY DATA REPOSITORIES REQUIREMENTS

Background & General Guidance

Glossary of Terms

BACKGROUND INFORMATION

Context

R0. Please provide context for your repository.

Repository Type. Select all relevant types from:

Domain or subject-based repository, National repository system; including governmental, Library, Archive

Brief Description of Repository

Historic Environment Scotland (HES) came into existence on 1 October 2015, bringing together Historic Scotland and the Royal Commission on the Ancient and Historical Monuments of Scotland (RCAHMS). Historic Environment Scotland is a Non-Departmental Public Body, a registered Scottish Charity (Scottish Charity No. SC045925), and is the lead public body established to investigate, care for and promote Scotland's historic environment. It is governed by a Board of Trustees appointed by Scottish Ministers and regulated by the Commissioner for Ethical Standards in Public Life in Scotland. The Board is accountable to Scottish Ministers and the Scottish Parliament and is responsible for setting the organisation's vision and strategic direction and for monitoring progress to achieve these as underpinned in the HES Framework Document (1). HES Archives (2) are considered to be one of Scotland's National Collections.

HES is also an Independent Research Organisation with the Arts and Humanities Research Council (AHRC) and part of the Scottish Cultural Heritage Consortium, which aims to deliver world-class research through doctoral partnerships, promoting collaboration between the academic community and Scotland's national collections.

HES is tasked with creating and maintaining a National Record of the Historic Environment – and the Archives are a key component of this. It has been developing for over 100 years and comprises material dating from the 17th century through to the most recent digital assets, and contains over 1.1 million digital assets and 1.6 million catalogue entries. The Digital Repository forms part of the Archive. Material in the Archives comes from three main sources:
1. The results from survey, recording and research by HES (and formerly RCAHMS)
2. The integration of different organisations, their records and archives
3. Active collecting of records and archives from individuals and organisations.

Online access to the National Record, the Archives and Digital Repository is provided via Canmore (3), bringing together some 338,000 site records and 1.6 million catalogue entries.

Comments:
Accept

Brief Description of the Repository's Designated Community.

HES Archives aims to serve a broad community, encompassing local, national and international audiences. This community comprises both users and stakeholders from the general public and from those with more defined professional and research agendas including:

• commercial archaeological units

• architectural practices

• engineering companies

• developers and related firms

• university and college researchers, students and staff

• independent researchers, both local and international

• HES staff

• staff from related heritage bodies

• members of Scottish Government

• the police, fire services and armed forces

• schools

• community heritage organisations

• broadcast and other media

• charities

• the creative industries

The Digital Repository designated community is wide ranging and includes a variety of skill levels and knowledge bases. Most digital content received from data producers is visible in Canmore for widespread public access. This public access allows users of any skill level or background to view our Digital Archive content online.

Depositors can range from single interested parties to large commercial archaeological units and government departments. The Digital Repository have a range of deposit agreements, licensing types and deposit forms to facilitate this range of user.

Reviewer Entry
Reviewer 1

Comments:
Accept

Reviewer 2

Comments:
Accept

Level of Curation Performed. Select all relevant types from:

C. Enhanced curation – e.g. conversion to new formats; enhancement of documentation

Comments

HES actively manages and preserves digital data assets from staff, other organisations and individual researchers in the Digital Repository. The majority of the digital content received from data producers is visible in Canmore for widespread public access. Assets deemed commercially or personally sensitive or have copyright restrictions are hidden from public view although every effort is made to make their discovery metadata available. At all times the HES Digital Repository employs the highest standard of ingest processing to ensure the quality and integrity of all its digital assets.

Digital objects are managed in the Digital Repository according to a range of functional guidelines, international standards and best practice across the digital curation lifecycle. Archive staff quarantine receipted digital files for 30 days prior to ingestion into an Accession database. Archive staff then manually check post-quarantine data and will work with data providers such as commercial archaeological units to resolve any missing information, inconsistencies, and discuss sensitivity issues that may be found prior to ingestion. Digital Repository staff check contextual documentation provided by the data provider for completeness. If incomplete, Digital Repository staff will work closely with the data provider to gather more information/documentation. Digital files are catalogued according to international archival standards (ISAD-G, MIDAS-Heritage) and published online via Canmore.

Insource/Outsource Partners. If applicable, please list them.

Outsource partners: The following contracted operations are outsourced: backup data storage and security through DataVita (4); active digital preservation through an enterprise-level Preservica (5) platform; IT and systems support portal through ServiceNow (6); IT & cyber security protocol and policy development through Protocol Policy Systems (7).

Within the Digital Repository, all aspects of support for data producer and consumer are managed throughout the digital curation life cycle in some cases utilising tools that have been developed externally to improve workflow and enhance service delivery. These include ArcGIS/QGIS for location creation and verification, AutoDesk's DWG TrueView (8), DROID (9) and Safe Software's FME (10) data integration tool to authenticate and characterise data formats prior to cataloguing and subsequent ingest.

Summary of Significant Changes Since Last Application (if applicable).

Other Relevant Information.

Other relevant information: The Digital Repository is aligned with the HES Digital Strategy 2020-23 (11) and wider HES organisational community and strategies sharing resources such as IT, administration and domain expertise to provide reciprocal support and capability for operational continuity.

Currently the Digital Repository contains over 1.1 million digital assets and 1.6 million catalogue records totalling 40TB. A HES-funded 4-year Digital Project will add a further 750,000 digital records totalling an additional c40 TB. In addition, HES Archive retains all original digital (and analogue) media received from data producers as well as maintaining 24.5km of physical archival material including 5 million drawings, photographs, models, negatives and manuscripts, along with 20 million aerial images of locations across the world.

HES Archives would like to note the significant contribution to this application by Stuart Macdonald, Digital Archivist at Historic Environment Scotland who sadly passed away very suddenly before this application was submitted. The success of HES Archives CTS application is down to Stuart's input, enthusiasm and dedication.

Links to supporting documentation:

(all visited 5/101/2020)

1. Historic Environment Scotland Framework Document -

https://www.historicenvironment.scot/about-us/who-we-are/corporate-information/framework-document/

2. Historic Environment Scotland Archives and Research - https://www.historicenvironment.scot/archives-and-research/

3. Canmore - https://canmore.org.uk/

4. DataVita - https://www.datavita.co.uk/

5. Preservica - https://preservica.com/

6. Servicenow - https://www.servicenow.com/

7. Protocol Policy Systems - https://protocolpolicy.com/

8. Autodesk - https://www.autodesk.co.uk/

9. DROID -

http://www.nationalarchives.gov.uk/information-management/manage-information/preserving-digital-records/droid/

10. Safe Software - https://www.safe.com/

11. Historic Environment Scotland Digital Strategy 2020-23 -

https://intranet.hes.scot/2019/12/13/hes-digital-strategy-2020-2023/ (HES Intranet)

Reviewer Entry

Reviewer 1

Comments:
Accept

Reviewer 2

Comments:
Accept

ORGANIZATIONAL INFRASTRUCTURE

1. Mission/Scope

R1. The repository has an explicit mission to provide access to and preserve data in its domain.

Compliance Level:

4 – The guideline has been fully implemented in the repository

Reviewer 1

Comments:
4 – The guideline has been fully implemented in the repository

Reviewer 2

Comments:
4 – The guideline has been fully implemented in the repository

Response:

As part of the HES Archives, the Digital Repository is an integral part of the Heritage Directorate and the wider HES body (1). Our mission is to:

• manage our cultural heritage digital assets across the entire digital curation lifecycle according to international standards and domain best practice
• ensure wide and continued access to our internationally significant digital collections
• support the evolving digital needs of our Designated Community
• collaborate and innovate to enhance knowledge and understanding of Scotland's cultural heritage

Senior management in HES Archives monitor both mission statement and policy documentation to ensure continued alignment with changes in technologies, standards and community best practice as well as wider organisational vision, values, and strategic themes.

HES Archives are managed in accordance with the functions as set out in the Historic Environment Scotland Act 2014 (2), UK Public Records Acts 1958 & 1967 (3), and the Public Records (Scotland) Act 2011 (4).

HES Archives achieved Archive Service Accreditation (5) in 2017 and is underpinned by Archive Data Standards (6), HES Archives: Digital Repository Management Policies (7), HES Archives and Collections Policies (8) including the Digital Preservation Policy, whose aim is to ensure that the authenticity, integrity and provenance of digital objects managed by HES, both born digital and digitised, are maintained.

The Historic Environment Scotland Act 2014 refers to collections as a whole and is implicit this includes both physical and digital. The Archives and Collecting Policy, as well as the Digital Repository Management Policies explicitly covers the management of digital objects in accordance with this act.

Through its Corporate Plan (9), and Annual Operating Plan (10) HES also outline key strategic themes, objectives and key performance indicators in relation to stewardship and management of archival materials and the curation of an open and accessible archive that is preserved for use by future generations. This also comes with a commitment to acknowledge and promote Gaelic language and culture through a Gaelic Language Plan 2018-2023 (11) developed in response to legislative requirements as part of the Gaelic Language (Scotland) Act 2005.

As custodians of digital assets HES comply with government and industry requirements including the EU Inspire Directive (12), Scotland's Digital Future strategy (13), and the Scottish Government Open Data Strategy (14). Digital Repository staff also engage in partnerships with curatorial colleagues in Scotland through Scotland's Historic Environment Data Strategy (15) and the Forum on Information Standards in Heritage (16).

Staff working with the Digital Repository also work closely with colleagues from the Archaeological Data Service, Historic England, English Heritage, Royal Commission on the Ancient and Historical Monuments of Wales, and DoE Northern Ireland Historic Environment Division to share and develop expertise in managing and curating digital assets relevant to the historic environment.

Links to supporting documentation:
(all visited 5/10/2020)

1. About Historic Environment Scotland -
https://www.historicenvironment.scot/about-us/who-we-are/our-vision-mission-and-values/
2. Historic Environment Scotland Act 2014 - https://www.legislation.gov.uk/asp/2014/19/contents
3. UK Public Records Acts 1958 (updated) - https://www.legislation.gov.uk/ukpga/Eliz2/6-7/51/contents
4. Public Records (Scotland) Act 2011 - https://www.legislation.gov.uk/asp/2011/12/contents
5. Accredited Archive Services -
https://www.nationalarchives.gov.uk/archives-sector/archive-service-accreditation/accredited-archive-services/
6. HES Archives Data Standards -
https://www.historicenvironment.scot/archives-and-research/our-research/data-standards/
7. HES Archives: Digital Repository Management Policies – https://www.historicenvironment.scot/archives-and-research/publications/publication/?publicationId=0eb12d93-32d0-4450-8ef7-ab7d00f85f54
8. HES Archives and Collections Policies 2017-2020 - https://www.historicenvironment.scot/archives-and-research/publications/publication/?publicationId=60a864e4-883b-4c72-af34-a87e009be26e
9. Historic Environment Scotland Corporate Plan 2019 onwards https://www.historicenvironment.scot/archives-and-research/publications/publication/?publicationId=1f65f457-a602-4ddc-af61-aa2500933d61
10. HES Action Plan 2020-2021 - https://www.historicenvironment.scot/archives-and-research/publications/publication/?publicationId=10584acb-1c6f-43f4-8d5f-abc901111106
11. Gaelic Language Plan 2018 – 2023 - https://www.historicenvironment.scot/archives-and-research/publications/publication/?publicationId=6100001d-485b-4d0e-90ea-a94900a2db24
12. INSPIRE Directive - http://inspire.ec.europa.eu/
13. Scotland's Digital Future strategy -
https://www.gov.scot/publications/scotlands-digital-future-high-level-operating-framework-version-2/
14. Scottish Government Open Data Strategy - https://www.gov.scot/publications/open-data-strategy/
15. Scotland's Historic Environment Data Strategy - http://smrforum-scotland.org.uk/shed/

16. Forum on Information Standards in Heritage - http://www.heritage-standards.org.uk/

2. Licenses

R2. The repository maintains all applicable licenses covering data access and use and monitors compliance.

Compliance Level:

4 – The guideline has been fully implemented in the repository

Response:

HES encourage open and free use and re-use of digital assets where licensing permits via Canmore (1) and is governed by Canmore Terms and Conditions(2). Free use is limited to personal, individual and educational use. General public users wishing to contribute digital assets to the national record do so through MyCanmore (3) and agree to an additional contributor licence giving permission to allow the use of their content on Canmore. This is in supplement to Canmore Terms and Conditions.

HES primary licensing frameworks persist through signed deposit agreements (4). A deposit agreement assigns ownership and all Intellectual Property Rights (IPR), including copyright, to HES. This allows HES to make material publicly accessible though Canmore and to licence and sub-licence the use of the material to users where appropriate. Depositors would have a perpetual non-exclusive licence to use any copies of the material from the archive for their own

use in the case of transfer. A limited deposit agreement exists in the cases where depositors wish to retain IPR and copyright whilst licensing HES to make digital material publicly accessible.

All HES Licence Agreements are governed by and construed in accordance with Scots law and have been written to reflect current legislation including Freedom of Information (Scotland) Act 2002 (5), Privacy and Electronic Communications (EC Directive) Regulations 2003 (6) , Environmental Information Regulations (EIR) 2004 (7), and the European Union GDPR (8) and UK Data Protection Act (DPA) 2018 (9).

Open licensing frameworks are deployed to comply with research funding requirements and service obligations including Creative Commons (10) e.g. Scotland's Urban Past digital collection (11) and Open Government Licenses (12) e.g. HES Canmore Mapping Layer (13) with the terms of use of digital assets and any attribution included. HES also utilise a range of open mapping products (14) for the purposes of site identification, context navigation, resource location, and spatial data download such as the Canmore Areas layer containing the Known Site Extents of over 80,000 sites in Scotland. (15)

Canmore Terms and Conditions are aligned to HES website Terms and Conditions (16) and Privacy Notice (17). HES also adhere to the Public Sector Information Directive (18) which aims to encourage enterprise by the re-use of information already created by the public sector. Examples include mapping data, basic metadata and certain types of imagery which are created via public funding and then re-purposed freely or commercially by third-parties as detailed in HES's Statement of Public Task (19)

Access to digital assets on Canmore is free of charge for personal and educational use. Charges are levied on a cost recovery basis where HES add value to the digital asset such as the provision of high-resolution digital imagery. The HES Charging Policy (20) aligns across all HES digital collections and describes the conditions of use and charging and licensing arrangements that apply to digital assets. As an organisation with charitable status charges levied are compliant with UK Government legislation and guidance (20) including the Public Sector Information Directive as detailed above. HES also work on a cost-recovery/cost-contribution basis with collaborative partners such as Local Authority Historic Environment Records. Resultant digital output is made available for the national record compliant with internationally recognised frameworks and standards such as INSPIRE and ISAD-G.

HES periodically monitor usage to identify instances of noncompliance with these terms and conditions. Users found to be exhibiting inappropriate behaviour may be subject to loss of user privileges. When addressing non-compliance, we use the terms of the appropriate licence that the user is governed by. If the non-compliance persists, we would, where appropriate, seek further legal advice.

Breaches of access is governed by IT policies, reference R10. The Digital Archive Manager has full control over approving access to the Digital Archive, and regularly monitors and audits users' roles and permissions. Users are trained by Digital Archive staff, and staff can monitor usage within the Digital Archive. Staff do not have direct access to the Digital Repository and can only download copies of Digital Archive material.

Links to supporting documentation:

(all visited 5/10/2020)

1. Canmore - https://canmore.org.uk

2. Canmore terms and Conditions - https://canmore.org.uk/content/legals

3. MyCanmore - https://canmore.org.uk/mycanmore

4. HES Deposit Agreement - https://canmore.org.uk/content/depositors-information

5. Freedom of Information (Scotland) Act 2002 - https://www.legislation.gov.uk/asp/2002/13/contents

6. Privacy and Electronic Communications (EC Directive) Regulations 2003 -

https://www.legislation.gov.uk/uksi/2003/2426/contents/made

7. Environmental Information Regulations (EIR) 2004 - https://www.legislation.gov.uk/uksi/2004/3391/contents/made

8. European Union GDPR https://www.itgovernance.co.uk/data-protection-dpa-and-eu-data-protection-regulation

9. UK Data Protection Act (DPA) 2018 - https://www.gov.uk/government/collections/data-protection-act-2018

10. Creative Commons - https://creativecommons.org/

11. Scotland's Urban Past digital collection - https://scotlandsurbanpast.org.uk/

12. Open Government Licenses - https://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/ and

https://www.ordnancesurvey.co.uk/business-government/licensing-agreements/one-scotland-mapping-agreement/

13. HES Canmore Mapping Layer - https://canmore.org.uk/content/data-downloads

14. Canmore Map - https://canmore.org.uk/site/search/result?view=map&layer=areas

15. Historic Environment Polygonisation standards (Scotland) -

https://canmore.org.uk/content/historic-environment-polygonisation-standards-scotland

16. HES website Terms and Conditions - https://www.historicenvironment.scot/terms-and-conditions/

17. HES Privacy Notice - https://www.historicenvironment.scot/privacy-notice/

18. Public Sector Information Directive -

https://www.nationalarchives.gov.uk/information-management/re-using-public-sector-information/

19. Statement of Public Task - https://www.historicenvironment.scot/media/4788/hes-statement-of-public-task.pdf

20. HES Charging Policy - https://canmore.org.uk/content/buying-images

21. Access to Information incl. FOI & re-using public sector information -

https://www.historicenvironment.scot/access-to-information/

Reviewer Entry

Reviewer 1

Comments:
Accept

Reviewer 2

Comments:
Accept

3. Continuity of access

R3. The repository has a continuity plan to ensure ongoing access to and preservation of its holdings.

Compliance Level:

4 – The guideline has been fully implemented in the repository

Response:

HES Archives is managed in accordance with the functions as set out in the Historic Environment Scotland Act 2014 (1) which details HES Collections and Archives as a national resource for reference and made accessible to the public and to persons wishing to carry out study and research. All digital items, once acquired and registered, are held in public trust and are considered inalienable and subsequently under the responsibility of the Scottish Government. There is a strong presumption against the disposal of any digital items except in the most exceptional of circumstances as detailed in the HES Archive Takedown Policy (2) and under the guidance the standards outlined in the National Archives Standard for Record Repositories (1st edition, 2004) (3)

The HES Corporate Plan Heritage For All (2019 onwards) (4) states that: "We will look after the historic environment assets in our care – managing the long term future of the properties, sites, collections and archives that we look after on behalf of the people of Scotland."

Through the HES Archives and Collections Policies: 2017-2020 (5) the purpose and guiding principles adopted by Historic Environment Scotland (HES) are set out for the acquisition and disposal of material and objects relating to its own archives and collections and, under delegated authority, those of Scottish Government Ministers. The HES Board will ensure that all acquisitions and disposals are carried out openly and with transparency. The adoption and implementation of this policy is a requirement of the Museum Accreditation Scheme, the Archives Accreditation Standard and Scottish Ministers' Scheme of Delegation. (6)

HES Archives: Digital Repository Management Policies (7) provides details for the long-term management, preservation and accessibility of digital objects held within the Digital Repository. It applies to all digital objects in the control and management of HES, both born digital and digitised. This policy relates closely to and is informed by the HES Archives and Collections Development Policy and the HES Collections Care and Conservation Policy (8).

Staff routinely monitor developments in the field of digital preservation, digital archiving and data curation though a range of outreach and engagement activities and technology watches via organisations such as the Digital Preservation Coalition (9), Archives and Records Association (10), Open Preservation Foundation (11) and the Digital Curation Centre (12). HES technical staff in consultation with Digital Repository managers and staff appraise, identify and implement suitable technological solutions for the Digital Repository's hardware, software and networking needs.

By way of succession planning, in the unlikely event that there should be any threat or risk to HES, the Archives or Digital Repository, HES will work with the Scottish Government and the National Records of Scotland (NRS) (13) to ensure the preservation of its archives, records and digital assets as stated in the NRS Public Records (Scotland) Act 2011 (14), Historic Environment Assessment Report (15) and HES Records Management Plan (16).

Operations and developments in the Digital Repository are subject to a range of controls, performance tracking, and action planning to mitigate identified risks that may impact on service continuity. Identified risks are captured in a Digital Repository Board Risk Register which feeds into an IT Risk Register detailing service technologies and developments (networks, storage, security, infrastructure, software and hardware) which are subsequently risk assessed for business continuity in accordance with the HES Risk Management Strategy and Policy. Major risks are escalated to the Corporate Risk Register. (17)

The Digital Repository is covered by the HES Business Continuity/DR Policy (18) in alignment with Standard ISO Audit Requirements. HES Business Continuity/DR Policy ensures that HES has the appropriate resources available for planning, establishing, implementing, operating, monitoring, reviewing, maintaining and continually improving a Business Continuity/DR capability that will enable HES to prepare for, respond to and recover from disruptive incidents when they arise. The scale of events covered by this Policy ranges from minor or partial system unavailability (business continuity) through to total system loss (disaster recovery).

HES IT conducts a daily, weekly and monthly back-up cycle to disk and to tape. Data copied onto tape is stored in secure on and offsite locations and managed by a Tape Storage Policy. Once a year a full End of Year (EoY) back up is run with the data retained for a standard 90-day period.

Links to supporting documentation:
(all visited 5/10/2020)

1. Historic Environment Scotland act 2014 - http://www.legislation.gov.uk/asp/2014/19/contents/enacted
2. HES Archives Takedown Policy - https://canmore.org.uk/content/takedown-policy
3. The National Archives Standard for Record Repositories - https://webarchive.nationalarchives.gov.uk/20110203000850 /http://www.nationalarchives.gov.uk/documents/standard2005.pdf
4. Historic Environment Scotland: Heritage for all Corporate Plan -
https://www.historicenvironment.scot/about-us/who-we-are/heritage-for-all/

5. HES Archives and Collections Policies 2017-2020 - https://www.historicenvironment.scot/archives-and-research/publications/publication/?publicationId=60a864e4-883b-4c72-af34-a87e009be26e

6. HES Schemes of Delegation

https://www.historicenvironment.scot/about-us/who-we-are/corporate-information/schemes-of-delegation/

7. HES Archives: Digital Repository Management Policies - https://www.historicenvironment.scot/archives-and-research/publications/publication/?publicationId=0eb12d93-32d0-4450-8ef7-ab7d00f85f54

8. HES Archives and Collections Policies 2017-2020 - https://www.historicenvironment.scot/archives-and-research/publications/publication/?publicationId=60a864e4-883b-4c72-af34-a87e009be26e

9. Digital Preservation Coalition - https://dpconline.org/

10. Archives and Records Association - https://www.archives.org.uk/

11. Open Preservation Foundation - https://openpreservation.org/

12. Digital Curation Centre - http://www.dcc.ac.uk/

13. National Records of Scotland - https://www.nrscotland.gov.uk/

14. National Records of Scotland Public Records (Scotland) Act 2011 -

https://www.nrscotland.gov.uk/record-keeping/public-records-scotland-act-2011

15. Historic Environment Assessment Report -

https://www.historicenvironment.scot/media/4828/public-records-act-submissions-agreement-report.pdf

16. HES Records Management Plan - https://www.historicenvironment.scot/archives-and-research/publications/publication/?publicationid=1799f1d4-14a5-4e0d-940e-a91500b296e4

17. HES Audit, Risk and Assurance Committee

https://www.historicenvironment.scot/about-us/who-we-are/our-board/audit-risk-and-assurance-committee/

18. Business Continuity/Disaster Recovery Policy - https://recmanpolicies.hes.scot/businesscontinuity3.html (firewall)

Reviewer Entry

Reviewer 1

Comments:
Accept

Reviewer 2

Comments:
Accept

4. Confidentiality/Ethics

R4. The repository ensures, to the extent possible, that data are created, curated, accessed, and used in compliance with disciplinary and ethical norms.

Compliance Level:

4 – The guideline has been fully implemented in the repository

Response:

HES makes every effort to confirm that data is collected, curated and used in compliance with disciplinary and ethical norms, and broader organisational privacy, disclosure and corporate governance requirements. Where this information is unavailable, the professional judgement of senior archive managers will be used to decide on the inclusion of such data, taking into account the relative risk and any sensitivities associated with the data as detailed in the Digital Repository Collections Policy: Appraisal.

Digital assets available through the Canmore website are openly available with terms and conditions, privacy policies and licences detailed in Canmore Legals (1). Depositor Agreements (as detailed in R. 2 – Licenses) attend to IPR, organisational rights, liabilities and Freedom of Information provisions and subsequent obligations. In the broader context all HES websites and sub-domains are regulated by overarching Terms and Conditions detailing user and usage obligations, content standards, breaches and consumer rights.

HES is a data controller for the purposes of the General Data Protection Regulation (Regulation (EU) 2016/679) (2) and related data protection legislation. The Canmore Privacy Notice (3) sets out the basis on which any personal data collected by or provided to HES, or that is acquired from a third party, will be processed and is in alignment with the wider organisational Privacy Notice (4).

Canmore Security Policy (see Canmore Legals) aligns with wider HES IT Protocols and Policies. A separate Contributor Licence (5) details undertakings by both HES and individuals contributing to the MyCanmore service. HES reserve the right to track the legal permission MyCanmore Users provide when they upload digital items on Canmore. Should use of Canmore or any digital assets be found to be illegal, subject to complaint, a breach of ethics or cause any other infringement, HES reserves the right to suspend or ban any User at any time.

HES Digital Repository maintains an ethical duty to manage all data to the level expected by the practice of the Designated Community. Ethical guidelines as detailed in the Code of Ethics for Museums, Museums Association 2015 (6), Archives and Records Association Code of Conduct and Code of Ethics May 2018 (7), Processing (of personal data) for archiving, research and statistical purposes under recent General Data Protection Regulation (Regulation (EU) 2016/679) in the UK as enforced by the Data Protection Act 2018 (8).

HES endeavour to improve access and widen participation in Scotland's historic environment and believe everyone should be treated fairly and that no one should be denied opportunities or discriminated against (9). As a lead public body HES act ethically and with integrity in all aspects of business and partnering in line with the Modern Slavery Act 2015 (10) and with all members of the HES Board bound by a Code of Conduct (11) which includes adherence to the Ethical standards in Public Life etc (Scotland) Act 2000 (12). HES are also working to deliver public sector equalities duties as detailed in the Equality Outcomes and Mainstreaming Report (13).

HES was instrumental in establishing the first Scottish Archaeology Strategy (14) as 'an open conversation about archaeology's contribution to society in Scotland'. HES also conforms to the Chartered Institute of Field Archaeologists Code (15) of conduct which details standards of ethical and responsible behaviour in the conduct of archaeological research and study.

Our other collecting focus, architecture, is governed in Scotland by the Royal Incorporation of Architects in Scotland and points to the Architects Registration Board's standard of professional conduct and practice (16).

Links to supporting documentation:
(all visited 5/10/2020)

1. Canmore Legals - https://canmore.org.uk/content/legals
2. General Data Protection Regulation (EU) 2016/679 - https://gdpr-info.eu/
3. Canmore Privacy Notice - https://canmore.org.uk/sites/default/files/Canmore_Privacy_Policy.pdf
4. HES Privacy Notice and Data Protection Policy - https://www.historicenvironment.scot/privacy-notice/
5. MyCanmore Contributor Licence - https://canmore.org.uk/mycanmore/register
6. Code of Ethics for Museums, Museums Association 2015 - https://www.museumsassociation.org/ethics/code-of-ethics
7. Archives and Records Association Code of Conduct and Code of Ethics May 2018 -
https://www.archives.org.uk/images/ARA_Documents/ARA_Code_Of_Ethics.pdf
8. UK Data Protection Act 2018 -
http://www.legislation.gov.uk/ukpga/2018/12/part/2/chapter/2/crossheading/specific-processing-situations/enacted
9. Equality, diversity and inclusion -
https://www.historicenvironment.scot/about-us/who-we-are/corporate-information/equality-diversity-and-inclusion/
10. Modern Slavery Act 2015 - https://www.historicenvironment.scot/modern-slavery-transparency-statement/
11. Historic Environment Scotland Board of Trustees Code of Conduct -
https://www.historicenvironment.scot/media/3343/board-members-code-of-conduct.pdf
12. Ethical Standards in Public Life etc. (Scotland) Act 2000 - http://www.legislation.gov.uk/asp/2000/7/contents
13. Equality Outcomes and Mainstreaming Report -
https://www.gov.scot/publications/equality-outcomes-mainstreaming-report-2019/pages/8/

14. Scotland's Archaeology Strategy -

http://archaeologystrategy.scot/files/2016/08/Scotlands_Archaeology_Strategy_Aug2016.pdf

15. Chartered Institute of Field Archaeologists Code of conduct - https://www.archaeologists.net/codes/cifa

16. Royal Incorporation of Architects in Scotland standard of professional conduct and practice -

https://www.rias.org.uk/members/statement-of-professional-conduct/

5. Organizational infrastructure

R5. The repository has adequate funding and sufficient numbers of qualified staff managed through a clear system of governance to effectively carry out the mission.

Compliance Level:

4 – The guideline has been fully implemented in the repository

Response:

HES Archives operates within the framework of the Historic Environment Scotland Act 2014 (1) and HES governance structure and financial arrangements. The Archives occupy significance in the HES corporate planning framework and has operational plans (2) that support HES strategic objectives. This includes developing digital collections and online delivery provision to complement physical assets.

The Digital Repository is part of HES Archives in the Heritage Directorate staffed by a full-time Digital Archives Manager and Digital Archivist responsible for the long-term preservation and accessibility of digital objects in their care. Substantial digitisation targets are being met by a 4-year digital project (currently in year 4) funded by a HES Investment Plan and employing a Project Manager, Digital Archivist, an Archivist (Digitisation) and two Archive assistants. Digital Project effort will process, catalogue and make accessible an additional 750,000 digital images both born digital and digitised and contributes significantly to streamlining of archival operations, including both policy and procedure, across the entire digital lifecycle.

There are 29 permanent HES Archive staff (plus volunteers), including professionally qualified staff. All are given personal professional development opportunities. The volunteers are supervised and given appropriate training and provide useful additional input and expertise on topics such as cataloguing and digitisation.

Staff structure made available to reviewers confidentially.

The stability and durability of the Digital Repository is maintained through the training and retention of competent and experienced staff recruited utilising a competency framework in line with HES Equal Opportunities Policy (3) and in accordance with the Civil Service Commissioners Recruitment Code (4), HES Employment Values (5) and Our People Strategy (6). To meet this aim, HES clearly define and document roles and responsibilities of staff working with the Digital Repository, and endeavour to acquire and maintain adequate staffing to fulfil specified roles whilst maintaining and cultivating skillsets through continual professional development.

HES Archives operates on a recurrent core annual budget with additional investment budget allocation. An internal scheme of financial delegation is authorised to Senior Archive staff with sanctions to direct and allocate resources for business purposes.

HES Archives provides training and professional development opportunities which are shared through regular communications with staff at all levels, as well as other opportunities that are shared with managers to offer their staff project or secondment activities to augment and develop existing skillsets. HES Archives senior managers recognise the importance of and actively pursue opportunities for training and professional development in general and for subject matter expertise including membership of professional organisations, conference and seminar attendance, and outreach and dissemination opportunities.

HES Archives retains a wide range of professional skills, knowledge and experience necessary for a leading cultural heritage institution. Staff hold doctorates in Scottish History, and Masters and Postgraduate qualifications in Prehistoric Archaeology, Museum Studies, Art History, Paper/Preventive Conservation, Management of Training & Development, Scottish History, Archaeology, Cultural Resource Management, Archives and Records Management, Information Management and Preservation (Digital), Library and Information Studies. Staff belong to a range of professional Associations and Institutes including Archives and Records Association, UK and Ireland; Chartered Institute of Library and Information Professionals; Museums Association; Institute of Conservation; Master Photographers Association;

Association of Historical and Fine Art Photographers; International Council on Archives; Chartered Institute for Archaeologists (CIFA); Society of Antiquaries of Scotland; Archaeological Archives Forum; and National Committee on the Carved Stones of Scotland.

The Head of Archives is a current member of the Advisory Council on National Records and Archives and the Forum on Historical Manuscripts and Academic Research; a past Vice-President of the Society of Antiquaries of Scotland (2008-2011); a former Secretary of the Council for Scottish Archaeology; and on the Management Committee for the Archaeology Data services (ADS). The Deputy Head of Archives is the Vice Chair of the Archives and Records Association (ARA), UK and Ireland; was Director and Board member of ARA, responsible for Professional and International Engagement (2007-2011); previously Joint Secretary of the Section for Professional Associations of the International Council on Archives, and currently a member of the Security and Access Group of the Archives and Records Association, UK and Ireland. HES is an Associate member of the Digital Preservation Coalition, an accredited MEDIN Data Archive Centre and a corporate member of the Archives and Records Association, UK and Ireland.

Links to supporting documentation:
(all visited 5/10/2020)

1. Historic Environment Scotland Act 2014 - https://www.legislation.gov.uk/asp/2014/19/contents
2. HES Annual operating Plan 2019-20 - https://www.historicenvironment.scot/archives-and-research/publications/publication/?publicationId=33fc749a-60c8-4402-bcfb-aa2400d24241
3. Equal opportunities policy - https://www.historicenvironment.scot/media/3367/equality-and-diversity-policy.docx
4. Civil Service Commissioners Recruitment Code - https://civilservicecommission.independent.gov.uk/code/
5. HES Employment Values - https://www.historicenvironment.scot/about-us/work-with-us/our-employment-values/
6. Our People Strategy - https://www.historicenvironment.scot/archives-and-research/publications/publication/?publicationid=8dc6c469-e181-456e-8aa0-a8bf00c49113

Reviewer Entry

Reviewer 1

Comments:
Accept

Reviewer 2

Comments:
Accept

6. Expert guidance

R6. The repository adopts mechanism(s) to secure ongoing expert guidance and feedback (either inhouse or external, including scientific guidance, if relevant).

Compliance Level:

4 – The guideline has been fully implemented in the repository

Response:

The Digital Repository employs a variety of methods to obtain expert guidance and input to improve service provision. Archive staff work closely with colleagues in IT to appraise, identify and implement suitable technological solutions for the hardware, software and networking needs of the Digital Repository. Staff also routinely monitor developments in the field of digital preservation, digital archiving and data curation though a range of outreach and engagement channels and technology watches. On an ongoing basis staff participate in professional associations or discussion networks in a number of relevant subject areas such as the Archives and Records Association, the Business Archives Council of Scotland, the Archaeological Archives Forum UK, ALGAO, IASSIST, CILIP, the Digital Preservation Coalition, the Edinburgh Preserves Group, JISC digital preservation, the Scottish HER Forum, Preservica International User Group, Scottish Council of Archives, Digital Curation Centre and ICON. Digital Repository staff also engage in partnerships with curatorial colleagues in Scotland through Scotland's Historic Environment Data Strategy (1) and the Forum on Information Standards in Heritage (2). HES is an Associate member of the Digital Preservation Coalition and is an accredited Data Archive Centre as part of the Marine Environmental Data and Information Network (MEDIN) (3), and through this body staff work closely with the 14 sponsoring bodies and over 50 partner organisations. Exposure to and engagement with such expert bodies allow staff to gain a better understanding of the sectors we serve and facilitates knowledge exchange with fellow professionals.

In addition to seeking out expert guidance from professional communities as detailed in requirement 5. staff participate on a range of HES committees, expert panels and working groups ensuring access to specialists within the field of archaeology and architecture such as the in-house remote sensing group covering terrestrial and airborne laser scanning, photogrammetry and building information modelling, and the GIS champions. Staff also meet regularly with colleagues as part of the archaeology and archives group which covers paper, digital and artefactual curators, along with colleagues that manage the archaeology undertaken on HES properties in care to ensure that information and expertise is shared across this range of activities.

Staff also regularly seek feedback from our designated communities. The needs and interests of the Designated Community are identified through the daily work of the archive and captured through a range of both formal and informal feedback. Community groups with particular interests and needs are able to voice these through engagement activities

such as visits, tours and lectures where evaluation forms are issued. Professional knowledge gathered while working with stakeholders also highlights specific needs.

Periodic surveys and questionnaires, in paper and digital form, are used to proactively seek information from stakeholders, including the Archives and Records Association survey of visitors (2016 & 2018) and Survey of Distance Users (2019) (4). In 2012 and 2017 an online survey of Archaeological Units was undertaken to gauge the scale and condition of digital materials awaiting deposit, and to ascertain how the Digital Repository can assist the deposit process. A feedback tab on Canmore also provides a direct channel for stakeholder comments on a less formal basis. Web page analytics provide us with statistics on remote users, their interactions with our websites and relative interests.

To improve internal communication across HES Archives a range of fixed and regular meetings are held in HES Heritage Directorate to cascade information and in turn inform Digital Repository operations and planning through knowledge exchange. These include: a high-level bi-monthly Heritage Forum; strategic-level Directorate Senior Manager meetings; Archaeology Archives meetings with colleagues in Archaeology and World Heritage; Archives Department meetings; Archives Managers meetings and Team meetings plus Project Boards meetings established to carry out major pieces of work which require detailed planning, monitoring, risk assessment, budget and delivery, this includes Digital Repository preservation and digitisation projects. A quarterly Archives Steering group, reporting to the HES Board, meet to support the long-term vision and ambition for the HES Archive aligned to HES Corporate Planning.

Links to supporting documentation:
(all visited 5/10/2022)

1. Scotland's Historic Environment Data Strategy - https://www.historicenvironment.scot/archives-and-research/publications/publication/?publicationid=751d6dcd-98aa-4c52-992c-a57100acda87#:~:text=The%20purpose%20of%20the%20Strategy,that%20public%20benefit%20is%20maximised.
2. Forum on Information Standards in Heritage - http://www.heritagedata.org/blog/about-heritage-data/fish/
3. Marine Environmental Data and Information Network https://www.oceannet.org/
4. ARA National Surveys Group - https://www.archives.org.uk/what-we-do/archive-surveys.html

Reviewer Entry

Reviewer 1

Comments:
Accept

Reviewer 2

Comments:
Accept

DIGITAL OBJECT MANAGEMENT

7. Data integrity and authenticity

R7. The repository guarantees the integrity and authenticity of the data.

Compliance Level:

4 – The guideline has been fully implemented in the repository

Response:

The HES Digital Repository adheres where practicable to the ISO 14721:2012 Open Archival Information System (OAIS) reference model, ISO16363: 2012 Audit and certification of trustworthy digital repositories, and National Digital Stewardship Alliance (NDSA) Levels of Digital Preservation.

The Digital Repository accept transfers of data from our depositors through set channels. Depositors can transfer archive to us on physical storage media such as CDs, external hard discs. We also accept deposits via secure file transfer (WeTransfer, ShareFile). Upon acknowledged receipt and following quarantine, Digital Repository staff immediately recover digital material from external storage media and copy into an Accessions Database. The original storage media is retained within specially designed archival quality storage folders which prevents the oxidisation of CDs and neutralised corrosive gasses to prevent fungus and bacterial growth. These are then stored within our climate controlled archival strong rooms which are managed and controlled by professional preventative conservators.

HES will ensure that the authenticity, integrity and provenance of our digital assets are maintained in the Digital Repository. HES aims to collect and create digital objects in fully specified, standards-based open formats. Digital Archiving Workflow (1), based on the National Digital Stewardship Alliance (NDSA) (9) levels of digital preservation, outlines deposition, appraisal, quarantine, accessions and cataloguing processes.

To maintain the integrity of all digital objects in the Digital Repository checksums are also created upon ingest from the accessions database using an MD5 File Hash generator and stored within a table of the Sites and Archive System database (built in Oracle Application Express (Apex)). An automated fixity script is run daily to check and validate a subset of the total files against the stored checksum to ensure integrity of each file and verify files have not been altered or corrupted. The Digital Repository and IT follow set integrity management procedures to resolve non-matched checksums. All preservation actions carried out on digital objects including integrity errors are recorded in the Apex database for auditing purposes - see: HES Archives: Digital Repository Management Policies (2).

Work has been completed to integrate the Sites and Archive System, which currently performs all Digital Repository preservation actions, with an enterprise instance of the Preservica active digital preservation platform. Preservica will allow the Digital Repository to set up regular cycles of integrity checking to be performed on top of any integrity checking performed by storage platforms as well as self-healing capabilities utilising multiple storage adaptors.

Canmore provides the online access to HES Archives (and the Digital Archive), and any published digital material will be removed from online public view only in exceptional circumstances - see: HES Archives and Collections Policies (3). Permanent takedown will be considered in cases where a record contains sensitive personal information about a living individual, digital objects infringe copyright or are considered to be defamatory or obscene or could contravene equalities or other diversity legislation, digital materials were obtained illegally, or published in error. Requests for deletions are closely monitored by Digital Repository staff and are dealt with on a case-by-case basis on request through a formal review process. In instances where a physical equivalent of the digital object exists this will remain accessible to visitors upon request in the HES Search Room.

Once digital objects have been deposited version changes are rare with only minor changes to the metadata permitted. This may be the result of feedback from users or at the request of the depositor themselves. All changes to catalogue metadata are retained within the Sites and Archive system via audit trails and logs are available to Digital Archive staff. Bespoke monitoring tools have also been designed for Digital Archive staff to monitor these changes to catalogue record information. Digital Archive users are unable to make changes to digital files once ingested into the system and cannot edit digital instance technical metadata. Users can only edit catalogue descriptive information. Reporting tools for any changes to digital files (i.e. corruption) are built into the system using checksums as described above. All staff with access to the Sites and Archive system have unique log in ID's which track all additions and edits to records within the system. In rare instances where a digital object has to be replaced e.g. image has been rescanned to provide higher resolution, the original metadata record is marked as superseded with a note detailing the replacement object. The superseded image is retained but removed from public access so that it can be retrieved in case of error.

The Digital Repository deploy an internal system generated permalink to provide an immutable link to digital objects to aid discoverability and re-use. The Digital Repository plan to scope DOIs as unique identifiers upon completion of the phased move of the Digital Archival storage infrastructure and network to our data services partner DataVita (4) and full implementation of the Preservica active digital preservation platform (5). Currently in scope for further investigation are ARK, PURL and DataCite. ISAD-G metadata fields have been mapped onto Dublin Core to facilitate further mapping. This will inform future plans to openly licence metadata to comply with FAIR data principles and thus aid interoperability and re-use.

In order to ensure authenticity of objects within the Digital Repository HES IT operate and adhere to predefined access control standards as defined in ISO 27002 (6), ISO 27017 (7), ISO 29151 (8) which are underpinned by a hierarchy of delegated authority ensuring that write access to digital objects upon ingestion is managed and monitored. System privileges are re-evaluated on a regular basis. Full compliance details are available via IT Policies and Procedures.

Links to supporting documentation:

(all accessed 5/10/2020)

1. Digital Archiving Workflow - https://canmore.org.uk/sites/default/files/DigitalArchiveWorkflow_2018EXTERNAL.pdf
2. HES Archives: Digital Repository Management Policies - https://www.historicenvironment.scot/archives-and-research/publications/publication/?publicationId=0eb12d93-32d0-4450-8ef7-ab7d00f85f54
3. HES Archives and Collections Policies - https://www.historicenvironment.scot/archives-and-research/publications/publication/?publicationid=0eb12d93-32d0-4450-8ef7-ab7d00f85f54
4. DataVita - https://www.datavita.co.uk/
5. Preservica - https://preservica.com
6. ISO 27002 - https://www.iso.org/standard/69379.html
7. ISO 27017 - https://www.iso.org/standard/43757.html
8. ISO 29151 - https://www.iso.org/standard/62726.html

Reviewer Entry

Reviewer 1

Comments:
Accept

Reviewer 2

Comments:
Accept

8. Appraisal

R8. The repository accepts data and metadata based on defined criteria to ensure relevance and understandability for data users.

Compliance Level:

4 – The guideline has been fully implemented in the repository

Reviewer Entry

Reviewer 1

Comments:
4 – The guideline has been fully implemented in the repository

Reviewer 2

Comments:
4 – The guideline has been fully implemented in the repository

Response:

HES Archives: Digital Repository Management Policies (1) set out the purpose and guiding criteria adopted by Historic Environment Scotland (HES) for the acquisition and disposal of digital material. It complements and is informed by HES Archives (and Collections) Appraisal Policy (2017-2020) (2).

Digital Repository staff follow a set of detailed internal guidelines to check the validity and quality of digital files as part of an appraisal and disposal process. This occurs at key stages during the ingest workflow. Newly deposited digital objects go through a quarantine process and await transfer to the Sites and Archive System accessions database. Digital archivists arrange each accession according to set structures which mimic the Collection, Group, sub-group, batch hierarchy of the catalogue, and identify material suitable for disposal (such as duplicate files, early or incomplete versions etc). These are recorded in an Appraisal and Disposal log. Digital objects can be deleted at this stage prior to being ingested into the non-public accession database. In some cases, depositors may be asked to provide a replacement file to replace an appraised file marked for disposal. Digital objects deemed not suitable for cataloguing can also be appraised upon accessioning with objects marked for disposal in an Appraisal and Disposal log. IT services will de-index and dispose of the digital object. Upon transfer to the Sites and Archive System accessions database, DROID is used to calculate an MD5 hash sum and log file-specific information.

New acquisitions of digital materials are made according to the following collecting criteria:
- Digital material relating to the historic environment of Scotland, including architecture, archaeology, industry and maritime
- Digital material created during survey, recording and research activities across HES.

We appraise digital objects according to the following principles:
- Digital objects meet the collecting criteria of the archive as above.
- Digital objects are unique and are not duplicate of, or similar to, other objects in the collections.
- Digital objects meet the standards and accepted formats.
- Digital objects seemed to be inadequate documented; are potentially disclosive; are acquired or generated illegally; or are suspected or known to contain inaccuracies.

There is a strong presumption against the disposal of any objects once ingested into the digital repository except in exceptional circumstances. These include:

- A record contains personal or sensitive personal information about a living individual and continued access to this would be unlawful or unfair under the General Data Protection Regulation (GDPR) (vii), Data Protection Act 2018 (viii) or the Human Rights Act 1998 (ix)
- A digital object is not unique and is a duplicate
- A digital object is no longer of use for the collection due to deterioration, corruption or damage e.g. through obsolescence, bit rot
- Information or images were obtained illegally

Digital Repository staff will work closely with depositors to ensure that all digital objects for deposit are accompanied with appropriate discovery metadata, supporting technical and contextual documentation. This is captured in Digital Repository Information templates as part of a suite of supporting materials and guidance (3) for depositors of both physical and digital materials, which includes guidance for accepted and preferred file formats. For guidance on technical archaeological fieldwork techniques, depositors are also directed to the Archaeological Data Service good practice guides (4) which provide advanced instruction on preserving digital records collected from archaeological investigations including aerial and marine surveys, laser scanning, close-range photogrammetry and dendrochronology.

Once digital objects have been catalogued and ingested into the Sites and Archive System they form part of the National Record in the HES Digital Repository collections and as such any further appraisal requires careful auditing and cross-checks. Any requests for deletions are monitored, logged and dealt with on a case-by-case basis through a formal review process. All deletions of digital objects are carried out by Digital Repository staff with special permissions as detailed in Requirement 7. Digital Repository staff can also restrict access to digital objects subject to an 'embargo' publication period with metadata only remaining in the public domain.

In order to ensure that all digital objects are recorded consistently, are discoverable and accessible for all users, the Digital Repository catalogue and appraise archival records according to a Catalogue Description Standard and a set of Minimum Standards for cataloguing at all levels of the digital collection down to an individual item (see Submission Policy (5)). This compliments the Minimum Standards for Canmore Records (6) and is underpinned by a set of Data Standards (7) (as detailed in Requirement 1.). The Canmore Glossary (8), Thesaurus (monument, object, and maritime) (9), Map interface (10), and User Guide (11) provide additional contextual support to augment finding aids such as keyword, site name and grid reference to allow users to search, access and use digital objects from HES Digital Repository more easily.

Links to supporting documentation:
(all accessed 5/10/2020)

1. HES Archives: Digital Repository Management Policies – https://www.historicenvironment.scot/archives-and-research/publications/publication/?publicationId=0eb12d93-32d0-4450-8ef7-ab7d00f85f54
2. HES Archives (and Collections) Appraisal Policy (2017-2020) - https://www.historicenvironment.scot/archives-and-research/publications/publication/?publicationId=60a864e4-883b-4c72-af34-a87e009be26e
3. Canmore Depositor Information - https://canmore.org.uk/content/depositors-information; with particular reference to Recommended File Formats here:
https://canmore.org.uk/sites/default/files/HESArchives_Recommended_File_Formats.pdf
4. Archaeology Data Service / Digital Antiquity Guides to Good Practice -
http://guides.archaeologydataservice.ac.uk/g2gpwiki/
5. HES Archives: Digital Repository Submission Policy – https://www.historicenvironment.scot/archives-and-research/publications/publication/?publicationid=0eb12d93-32d0-4450-8ef7-ab7d00f85f54
6. Minimum Standards for Canmore Records -
https://canmore.org.uk/sites/default/files/Minimum%20Record%20Standard.pdf

7. HES Archives Data standards -

https://www.historicenvironment.scot/archives-and-research/our-research/data-standards/

8. Canmore Glossary - https://canmore.org.uk/content/glossary

9. Canmore Thesaurus - https://canmore.org.uk/thesaurus

10. Canmore Map Search - https://canmore.org.uk/map/about

11. Canmore User Guide - https://canmore.org.uk/user-guide/menu/

9. Documented storage procedures

R9. The repository applies documented processes and procedures in managing archival storage of the data.

Compliance Level:

4 – The guideline has been fully implemented in the repository

Response:

HES Digital Repository storage infrastructure is designed to be scalable, reliable, resilient and sustainable. It is managed and administered in accordance with quality control requirements and security regulations and is aligned with ITIL framework practices including continual service improvement and process evaluation and benchmarking.

Digital Repository staff follow a set of detailed internal processes and procedures for managing storage of HES digital

assets as detailed in HES Digital Repository Operational Policy & Preservation and Storage Policy (1).

Guidance (2) (3) documents for internal and external users reflect current best practice in storing and curating digital objects including authenticity and integrity, resilience and replication, backup and retention, validation and continuity of access. These are developed and maintained by digital archivists and senior archive managers who routinely monitor and evaluate digital archival processes, technologies and tools that will enhance and future proof curatorial practices.

Policy documents are collaboratively managed and maintained by Digital Repository staff, senior managers and IT staff including the Hosting and Storage manager, Oracle Apex database administrators, IT architect, Portfolio and Methods Manager. Policies are ratified by the Senior Management Team and the HES Board and reviewed on a regular basis.

Access to core Digital Repository systems including the Sites and Archive System (test and live), database statistical and system monitoring tools is processed through an internal help desk system. Users include Digital Repository staff and internal HES users who regularly deposit digital assets into the archive, these include digital photographers, digitisation specialists, survey and project managers.

Users must complete a form and confirm what access they require and details of their business needs. This is then sent for approval to the Digital Archive Manager. User access to the Digital Repository is controlled through Windows Active Directory Groups. The groups are "Read-Only" and "Read-Write". Membership of these groups is administered by the HES IT staff. Additional access is required to the Sites and Archive System catalogue and this is restricted to those with an Oracle Apex "general" account and must be validated with the users HES email address. Access is controlled by HES Oracle Apex database administrators.

The Digital Repository accept transfers of data from depositors through set channels on physical storage media and secure file transfer. All newly acquired digital objects go through a quarantine process and are virus scanned prior to transfer into a non-public Accessions database. Checksums are also created upon ingest to the Sites and Archive System Accessions database and stored within a linked table. To ensure data integrity an automated fixity script is run every night to validate each object against the stored checksum to verify checksum, permissions, and record counts. The original bitstreams of all digital objects are retained once those have been ingested and catalogued into the Sites and Archive System and form part of the national record.

Original storage media is retained within archival quality storage folders which prevents oxidisation and neutralised corrosive gasses to prevent fungus and bacterial growth. These are then stored within our climate controlled archival strong rooms which are managed and controlled by professional preventative conservators to the standard required for UK Archive Service Accreditation.

The Digital Repository is presented as a network share hosted by a virtual server running Microsoft Server operating system and using storage from an enterprise class Storage Area Network. The Digital Repository share is automatically replicated to a backup container offsite at DataVita (4) as well as in Glacier storage. Secure and durable storage capacity is monitored and maintained by IT staff and reported to Digital Repository staff and senior managers through regular

communications and minuted meetings.

HES Digital Repository primary contents are backed up daily to disk. A backup policy creates a full copy of the primary archive every 30 days and is retained for 90 days and 3 copies. For additional resilience, an "auxiliary" copy of the archive data is made to tape and moved off-site to a secure location. The same retention policy applies to tape.

HES is currently implementing an extensive technical infrastructure modernisation project for the Digital Repository which will future-proof archival storage and preservation processes and workflows. This involves migrating archival storage containers and substructure in a Tier III datacentre DataVita, with planned integration and interoperation with Preservica, an enterprise-level platform which will offer a range of digital preservation functionality including normalisation, customised migration pathways, replication and automatic detection of file corruption and error loss and subsequent 'self-healing' functionality.

Further technical detail pertaining to resilience, security, failover and business continuity are covered in requirements 15 and 16.

Links to supporting documentation:
(all accessed 5/10/2020)

1. HES Archives: Digital Repository Management Policies – https://www.historicenvironment.scot/archives-and-research/publications/publication/?publicationId=0eb12d93-32d0-4450-8ef7-ab7d00f85f54
2. Canmore User Guide - https://canmore.org.uk/user-guide/menu
3. Canmore Depositors Information - https://canmore.org.uk/content/depositors-information
4. DataVita - https://www.datavita.co.uk/

Reviewer Entry
Reviewer 1

Comments:
Accept

Reviewer 2

Comments:
Accept

10. Preservation plan

R10. The repository assumes responsibility for long-term preservation and manages this function in a planned and documented way.

Compliance Level:

3 – The repository is in the implementation phase

Reviewer 1

Comments:
3 – The repository is in the implementation phase

Reviewer 2

Comments:
3 – The repository is in the implementation phase

Response:

The Historic Environment Scotland Act 2014 (1) outlines the functions of the organisation and in section 1.2.4(a) requires that the organisation undertake the functions of 'preserving, conserving and developing its collections'.

HES Archives: Digital Repository Management Policies (2) sets out the purpose and guiding principles adopted by Historic Environment Scotland (HES) for the long-term storage and preservation of digital objects in Canmore. The policy is informed by HES Archives and Collections Development Policy (3) and by community-driven frameworks and standards including Open Archival Information Systems (OAIS) reference model, Trusted Repositories Audit and Certification (TRAC), National Digital Stewardship Alliance (NDSA), and the Marine Environmental Data and Information Network (MEDIN).

Long-term digital preservation is integrated into archival operations and planning within HES. A set of detailed internal processes and guidelines is followed for the Digital Repository to ensure the authenticity, integrity and long-term preservation of HES digital assets. These feed into the Digital Repository Management Policies and are reviewed and developed by digital archivists and senior archive managers who routinely monitor and evaluate technologies and tools that support and enhance digital preservation actions, workflows and practices. A set of external guidance documents (4) are also maintained in order to ensure that depositors have sufficient information and support to ensure that metadata describing the digital assets deposited into the Digital Repository is relevant, accurate and of the highest quality to ensure discoverability, and that the content are licenced appropriately for further re-use.

It offers depositors a list of preferred and accepted formats (5) that the Digital Repository considers best suited for long-time preservation and continuity of access. The formats are commonly used within the archaeology and architecture domains, have open specifications, and are independent of specific software, developers or supplier.

Droid is used by Digital Archive staff to verify file formats at the point of transfer to the archive. Any formats deposited out with our standards are not ingested into the accessions database, though there are a small number of exceptions where migrations are possible by digital archive staff.

A deposit agreement (6) is signed before a digital deposit is made. Physical ownership is transferred to HES which allows

an investment of resources in digitisation and conservation of the deposited digital objects.

A deposit agreement means that ownership and all Intellectual Property Rights (IPR), including copyright, are assigned to HES. This allows us to make material accessible to researchers and to licence and sub-licence the use of the material to users. Depositors have a perpetual non-exclusive licence to use any copies of the material from the archive for their own use.

Digital Repository staff may modify metadata elements to correct minor errors, ensure consistency with Digital Repository policies, and add administrative metadata, but will not make substantive modifications to descriptive metadata without the prior approval of the Depositor. The accuracy and authority of the content of submissions will not be checked by Digital Repository staff and are the sole responsibility of the Depositor.

Digital repository operations and developments are subject to a range of controls, performance tracking, and action planning to mitigate identified risks that may impact on service continuity. Identified risks are captured in a Digital Repository Board Risk Register, and/or an IT Risk Register detailing service technologies and developments (networks, storage, security, infrastructure, software and hardware). All risk registers are routinely assessed for business continuity in accordance with the HES Risk Management Strategy and Policy and if serious are escalated to the Corporate Risk Register. (7) HES operates an Audit and Risk Committee and undertake a detailed review of issues identified on the Risk Register.

As outlined in R3, in the event of a risk or threat to the Archive, Digital Repository, HES will work with the Scottish Government and the National Records of Scotland to ensure the safe transfer and long-term preservation of all material, including the digital assets, metadata and contextual documents in accordance with existing agreements (8) and planning (9).

HES have invested in an enterprise instance of Preservica (10) as the preservation platform for the Digital Repository. Preservica will provide us with the means to auto migrate (normalisation) certain file formats on ingest, as well as mass migrate at a later date if a specific file type becomes 'at risk' thus safeguarding data integrity, authenticity, provenance and enhancing system interoperation capability.

The digital repository has identified a number of normalisation routes for files upon ingest to Preservica, based on current preservation best practices. Normalisation has been utilised within the systems to create dissemination copies of digital material, and the original preservation file will be retained. No other auto migrations will be carried out by the system without authorisation from digital repository staff for mass migrations of at-risk formats.

At time of writing Preservica has been fully tested and integrated with Oracle Apex on existing infrastructure. Work will commence in 2021 to test and integrate Preservica into the technical environment of the secure data facility DataVita. This will be followed later in 2021 by ingest of all digital assets stored in existing storage infrastructure into Preservica.

Links to supporting documentation:

(all accessed 5/10/2020)

1. Historic Environment Scotland Act 2014 -
http://www.scottish.parliament.uk/S4_Bills/Historic%20Environment%20(Scotland)%20Bill/b47s4-introd.pdf

2. HES Archives: Digital Repository Management Policies - https://www.historicenvironment.scot/archives-and-research/publications/publication/?publicationId=0eb12d93-32d0-4450-8ef7-ab7d00f85f54

3. HES Archives and Collections Development Policy - https://www.historicenvironment.scot/archives-and-research/publications/publication/?publicationId=60a864e4-883b-4c72-af34-a87e009be26e

4. Canmore Guidance and Information - https://canmore.org.uk/content/resources

5. HES Guidelines for Archiving of Archaeological Projects - Appendix C -
https://canmore.org.uk/sites/default/files/HES_DepositorsGuidelines_ArchaeologicalProjects_2016.pdf

6. SAMPLE HES Collection Deposit Agreement - https://canmore.org.uk/sites/default/files/SAMPLE%20HES%20Collection%20Deposit%20Agreement%20-%20Full%20Assignation.pdf

7. HES Audit, Risk and Assurance Committee
https://www.historicenvironment.scot/about-us/who-we-are/our-board/audit-risk-and-assurance-committee/

8. Public Records (Scotland) Act 2011 Submissions – Historic Environment Scotland – Agreement Report -
https://www.historicenvironment.scot/media/4828/public-records-act-submissions-agreement-report.pdf

9. Historic Environment Scotland Records Management Plan - https://www.historicenvironment.scot/archives-and-research/publications/publication/?publicationId=1799f1d4-14a5-4e0d-940e-a91500b296e4

10. Preservica - https://preservica.com/

Reviewer Entry

Reviewer 1

Comments:
Accept

Reviewer 2

Comments:
Accept

11. Data quality

R11. The repository has appropriate expertise to address technical data and metadata quality and ensures that sufficient information is available for end users to make quality-related evaluations.

Compliance Level:

4 – The guideline has been fully implemented in the repository

Reviewer 1

Comments:
4 – The guideline has been fully implemented in the repository

Reviewer 2

Comments:
4 – The guideline has been fully implemented in the repository

Response:

HES technical staff in consultation with Senior Archive managers and Digital Repository staff identify, evaluate and implement appropriate technological solutions that ensure both quality and continuity of access to all digital assets for our designated community within the Digital Repository.

HES staff participate on a range of expert panels and working groups ensuring access to specialists within the field of archaeology and architecture such as the in-house remote sensing group covering terrestrial and airborne laser scanning, photogrammetry and building information modelling, and the GIS champions. Knowledge on new standards, tools, and techniques gained from exposure to such fora are exchanged and shared with digital repository staff. This takes place through informal discussion and formal meetings to inform decision-making about how best to organise, describe and preserve digital assets generated within a specific field or through a digital capture technique.

Staff also regularly seek feedback from our designated communities. The needs and interests of the designated community are identified through the daily work of the archive and captured through a range of both formal and informal feedback. Community groups with particular interests and requirements are able to voice these through engagement activities such as visits, tours and lectures. Professional knowledge gathered through work with key stakeholders including the public, university and independent researchers, and community heritage organisations also highlight and help identify specific areas where quality-related interventions may be required.

Digital Repository staff will work closely with depositors to ensure that all digital objects for deposit are accompanied with site and project-level metadata used to promote resource discovery, supporting technical and contextual documentation including file-level metadata, technical notes, reports, and errata in open and accessible formats to ensure onward comprehension and usability as detailed in requirement 8. This is captured in Digital Repository Information templates as part of a suite of supporting materials and guidance (1) for depositors of digital materials. Metadata capture at this stage also secures important provenance information about digital objects which can be included in the catalogue entry and contextual documentation and as such enable end users to make quality-related evaluations about the digital object and the overarching collection.

Work has commenced to streamline the metadata capture process through custom online submission allied to secure file transfer through Citrix ShareFile. An enhanced collection of metadata specifications have been developed in consultation with domain experts (2) (3) to assist depositors with the capture of optimal metadata about digital output generated from a

range of domain data capture techniques including 3D datasets and models from laser scanning and photogrammetry as well as terrestrial and marine geophysical survey data from ground penetrating radar, magnetometry, side scan sonar, and single-beam/multibeam echosounders. This is supplemented by a set of 'live' internal procedures including depositor checklists, accession assessments as well as quarantine and cataloguing workflows.

As part of this mediated process Digital Repository staff will also address ethical, privacy or rights management so that digital deposits can be fully understood and re-used by our designated community both now and into the future.

Non-digital documentation may be digitised if required. In cases where metadata or documentation is insufficient digital archivists work with depositors to ensure that digital files are useable and understandable by generating additional contextual information.

The Digital Repository adheres to a set of data standards (4), (5), (6) and follows the ISAD-G standard for metadata and are currently scoping additional extensible metadata mapping to standards such as EAD and OAI-PMH to facilitate metadata harvesting, interoperation and enhance rediscovery and reuse.

HES technical staff maintain and monitor database tables within the Sites and Archive System containing metadata about technical and administrative processes, and preservation actions carried out at the item and digital instance level. This is buttressed by authenticated statistical display and export capabilities established within Oracle Apex that provide multiple metrics on digital accessions, sites, events, ingests, key performance indicators, duplicates as well as outputs monitoring archive loads, missing files and manifestation information such as file paths, instance identifiers, TDR format type, SIP creator etc. These tools are used by Digital Archive staff for ongoing monitoring of digital archive assets. Additional dashboard facilities developed with Oracle Apex provide system logging and webservice monitoring as well as a range of data and maintenance applications and asset management features. Monitoring output is discussed in formal settings to inform planning and service development.

HES Digital Repository accepts feedback on all user issues including data and metadata quality through an online enquiry facility (7), a bespoke email account, through regular dialogue with our designated community (incl. archaeologists, family historians, architects) through formal and informal meetings and events.

The Digital Repository deploys an internal system-generated bibliographic permalink to provide an immutable link to digital objects to aid discoverability and re-use through citation. The Digital Repository plan to DOIs as unique identifiers upon completion of the phased move of the Digital Archival storage infrastructure to outsource partner DataVita and full implementation of the Preservica active digital preservation platform. Currently in scope for further investigation are ARK, PURL and DataCite.

We provide geographical site, event, people and organisation links to catalogue records where possible within the Sites and Archive system. This allows users to understand the relationships between records within the National Record for the Historic Environment.

Links to supporting documentation:

(all accessed 5/10/2020)

1. Canmore guidance and information - https://canmore.org.uk/content/resources

2. Aerial Survey and Remote Sensing -

https://www.historicenvironment.scot/archives-and-research/our-research/aerial-survey-and-remote-sensing/

3. Archaeology Field Survey -

https://www.historicenvironment.scot/archives-and-research/our-research/archaeology-and-landscape/

4. Data standards - https://www.historicenvironment.scot/archives-and-research/our-research/data-standards/

5. INSPIRE Directive - https://inspire.ec.europa.eu/

6. Scottish Government Open Data Strategy - https://www.gov.scot/publications/open-data-strategy/

7. HES Archives enquiry from - https://enterprises.rcahms.gov.uk/shop/image_sales/rcahms_general_enquiry.php

Reviewer Entry

Reviewer 1

Comments:
Accept

Reviewer 2

Comments:
Accept

12. Workflows

R12. Archiving takes place according to defined workflows from ingest to dissemination.

Compliance Level:

4 – The guideline has been fully implemented in the repository

Reviewer Entry

Reviewer 1

Comments:
4 – The guideline has been fully implemented in the repository

Reviewer 2

Comments:
4 – The guideline has been fully implemented in the repository

Response:

HES Digital Repository maintains a suite of management policies (1). These outline and define archival practice as it applies to digital assets managed across the curatorial lifecycle in accordance with international standards and domain best practice. The policies are aligned with the HES Archives and Collections Development Policy (2) and includes a Mission Statement, Collections Policy, Submissions Policy, Preservation and Storage Policy, Operational Policy, as well as Security and IT Policies and Procedures. These are informed and supported by a set of internal workflows based on the National Digital Stewardship Alliance (NDSA) (3) levels of digital preservation, which outline deposition, appraisal, quarantine, accessions, fixity, and cataloguing processes.

The Digital Repository also maintains specifications and guidance particular to types of digital assets accepted into the Repository for long-term preservation including geophysical survey data, 3-D and photogrammetry data, geospatial data, text, and digital imagery. These documents can be shared with depositors and are scheduled for review annually.

There are defined workflows for the Digital Repository, and these are depicted in a document showing the flow of data from depositor through to dissemination (4). In addition to this we have internal standards and process statements and that are used as a reference point for staff on how to prepare, process, or catalogue different classes of digital content.

As detailed in requirement 11. metadata (discovery, administrative, technical) and documentation are captured in Digital Repository Information templates as part of a suite of supporting materials and guidance (5) for depositors of digital materials. The Digital Repository accepts transfers of data from our depositors through set channels as detailed in requirement 3. Depositors can transfer archive to us on physical storage media such as CDs, external hard discs. We also accept deposits via secure file transfer (WeTransfer, ShareFile).

In line with the Digital Repository's Collections Policy staff follow a set of detailed internal guidelines to check the validity and quality of digital files as part of an appraisal and disposal process. This occurs at key stages during the ingest workflow. Newly deposited digital objects go through a quarantine process and await transfer to the Sites and Archive System accessions database.

To maintain the integrity of all digital objects in the Digital Repository checksums are also created upon ingest to the accessions database using an MD5 File Hash generator and stored within a table of the Sites and Archive System database. These checksums are retained upon transfer of the digital object from the accessions database into the Digital Archive and an automated fixity script is run daily to check and validate a subset of the total files against the stored checksum to ensure integrity of each file and verify files have not been altered or corrupted. There are set integrity management procedures to resolve non-matched checksums for IT and Digital Repository staff.

In order to ensure authenticity of objects within the Digital Repository HES IT operate and adhere to predefined access control standards as defined in ISO 27002 (6), ISO 27017 (7), ISO 29151 (8) which are underpinned by a hierarchy of delegated authority ensuring that write access to digital objects upon ingestion is managed and monitored.

Once digital objects have been catalogued and ingested into the Sites and Archive System they form part of the HES Archives and as such any further appraisal requires careful auditing and cross-checks. Any request for amendments or

deletions are monitored, logged and dealt with on a case-by-case basis through a formal review process.

As detailed in Requirement 9. the Digital Repository is currently implementing an extensive technical infrastructure modernisation project which will future-proof archival storage and preservation processes and workflows. This involves migrating archival storage containers and substructure in a Tier III datacentre DataVita (9), with planned integration and interoperation with Preservica, an enterprise-level platform which will offer a range of digital preservation functionality including normalisation, customised migration pathways, automatic detection of file corruption and error loss and subsequent 'self-healing' functionality.

The repository currently has five defined ingest workflows transferring data from Oracle Apex into Preservica. These are:

• 1x Original, 1x Migrated, Standard Ingest: HES catalogue item contains a pair of digital instances – one original, one migrated. An example of this ingest type would be a MS Word document and a PDF, the PDF being used as an access copy.

• Single Original Standard Ingest: HES catalogue item can contain single digital instances.

• Single Original, Normalised Ingest: HES catalogue items can contain a single original digital instance without a migrated version. If the digital instance is of a format that Preservica has been set up to migrate, Preservica will create a new manifestation in a format defined by us and synchronise the new dissemination files back as new digital instances to the catalogue.

• 1x ZIP, ZIP Extract Ingest: Some HES digital instances contain aggregates of files in a single ZIP file. In this case Preservica will unzip the file creating a new preservation manifestation, the files of which will be synchronised back as new digital instances to the Sites and Archive System.

• 1x ZIP, 1x Migrated, ZIP Extract Ingest: Some HES digital instances contain aggregates of files in a single ZIP file and also have a dissemination digital instance for the ZIP. Preservica will create an unzipped preservation version as before but will also ingest the migrated digital instance as a separate presentation manifestation.

Any data that does not conform to one of these models will need to be rendered conformant prior to ingest.

The fixity of all digital objects is also calculated at the point of submission to Preservica using the MD5 algorithm. These checksums are used against stored values in the Sites and Archive System database to verify successful transfer and to check for any storage corruption If the file has been changed in any way, or indeed is missing, the checksum will be different and the administrator will be warned. The full integrity check process has the option to repair files which have been discovered to be damaged. In this case if the integrity check discovers a file which has changed since ingest on one storage adapter, and there exists another storage adapter on which a non-corrupt copy of the file resides, then Preservica will copy the non-corrupt copy back to the storage adapter for which the full integrity check failed. You can configure the system to alert an administrator to alert to a failed check, and again upon the repair, and receive on email per file.

Audit history is recorded within the Preservica system and reports can be set up and run from within the system to list all the file checks that have been run in a specified period, the date and time of the check and whether there was an error or a repair logged.

Links to supporting documentation:
(all accessed 5/10/2020)

1. HES Archives: Digital Repository Management Policies – https://www.historicenvironment.scot/archives-and-research/publications/publication/?publicationId=0eb12d93-32d0-4450-8ef7-ab7d00f85f54
2. HES Archives and Collections Development Policy - https://www.historicenvironment.scot/archives-and-research/publications/publication/?publicationId=60a864e4-883b-4c72-af34-a87e009be26e
3. National Digital Stewardship Alliance - https://ndsa.org/
4. Digital Repository workflow - https://canmore.org.uk/sites/default/files/DigitalArchiveWorkflow_2018EXTERNAL.pdf
5. Canmore Depositors Information - https://canmore.org.uk/content/depositors-information
6. ISO 27002 - https://www.iso.org/standard/69379.html
7. ISO 27017 - https://www.iso.org/standard/43757.html
8. ISO 29151 - https://www.iso.org/standard/62726.html
9. DataVita - https://www.datavita.co.uk/

Reviewer Entry
Reviewer 1

Comments:
Accept

Reviewer 2

Comments:
Accept

13. Data discovery and identification

R13. The repository enables users to discover the data and refer to them in a persistent way through proper citation.

Compliance Level:

3 – The repository is in the implementation phase

Reviewer 1

Comments:
3 – The repository is in the implementation phase

Reviewer 2

Comments:
3 – The repository is in the implementation phase

Response:

In order to ensure that all digital objects are discoverable and accessible staff catalogue digital assets according to a set of minimum standards for cataloguing (internal) complimented by Minimum Standards for Canmore Records (1). These are underpinned by the ISAD-G standard for metadata (2) and a set of Data Standards as detailed in Requirement 11. The Canmore Glossary, Thesauri, Map interface, and User Guide provide additional contextual support to augment finding aids such as keyword, collection name, site name, and grid reference to allow users to discover, use and reference digital objects from the Digital Repository.

Archaeological sites and events data are recorded in OASIS (3), a data capture utility designed to report information from developer-funded archaeological fieldwork by data producers, such as contracting units, to the local authority archaeology Sites and Monuments Record / Historic Environment Record (SMR/HER) community and to the National Record of the historic environment, Canmore. OASIS is underpinned by ASPIRE (4), an Archaeological Standard Protocol for the Integrated Reporting of Events which specifies data structure, data type and required fields for reporting new archaeological information to HES. ASPIRE forms one element of a coherent data management strategy comprising complementary projects such as OASIS, FISH (5) and Pastmap (6) which facilitate access to both national and local datasets, as well as making those datasets consistent and up to date. On completion, information gathered through OASIS will be validated by the relevant curatorial body (usually the SMR/HER) before inclusion in the respective local and national databases, Geographic Information Systems, and Archaeology Scotland's annual Discovery and Excavation in Scotland (7).

The Digital Repository is an accredited Data Archive Centre as part of the Marine Environmental Data and Information Network (MEDIN). The MEDIN (8) portal hosts metadata pertaining to a range of marine-themed datasets held by the digital repository. Records adhere to the MEDIN Discovery Metadata Standard, a marine profile of the UK government Standard GEMINI2 and contain a Locator URL as unique identifier. The standard is compliant with other international conventions such as INSPIRE and ISO19115, and descriptive metadata can be exported in CSV, Dublin Core, GML and GeoJSON for repurposing.

All records held in Canmore/Digital Repository are issued with a locally-minted Permalink unique identifier to aid citation. Once the digital repository is fully integrated with Preservica work will commence to scope additional extensible metadata mapping to standards and protocols such as CARARE, EAD, OAI-PMH and relevant schema to facilitate metadata harvesting and persistent identification through DOIs to comply with FAIR data principles.

HES Digital Repository/Canmore is recorded on re3data.org (9), a global registry of research data repositories which provides search and browse facilities to enable discovery of and access to digital assets held by HES.

Links to supporting documentation:
(all visited 5/10/2020)

1. Minimum Standards for Canmore Records -
https://canmore.org.uk/sites/default/files/Minimum%20Record%20Standard.pdf
2. ISAD-G: General International Standard Archival Description -
https://www.ica.org/en/isadg-general-international-standard-archival-description-second-edition
3. OASIS - https://oasis.ac.uk/pages/wiki/Main
4. ASPIRE - http://www.aspire-resource.info/
5. FISH (Forum on Information Standards in Heritage) - http://www.heritage-standards.org.uk/
6. Pastmap - https://pastmap.org.uk/
7. Discovery and Excavation in Scotland - https://des.rcahms.gov.uk/
8. MEDIN - https://www.medin.org.uk/
9. Registry of Research Data Repositories - https://www.re3data.org/

Reviewer Entry

Reviewer 1

Comments:
Accept

Reviewer 2

Comments:
Accept

14. Data reuse

R14. The repository enables reuse of the data over time, ensuring that appropriate metadata are available to support the understanding and use of the data.

Compliance Level:

4 – The guideline has been fully implemented in the repository

Reviewer Entry

Reviewer 1

Comments:
4 – The guideline has been fully implemented in the repository

Reviewer 2

Comments:
4 – The guideline has been fully implemented in the repository

Response:

Evidence relating to data relevance, quality evaluation, and discoverability are detailed in Requirements 8, 11, and 13 respectively and inform both the understandability and subsequent future use of HES digital assets over time.

To ensure re-use of digital content over time Digital Repository staff work closely with depositors to ensure that all digital objects for deposit are accompanied with appropriate discovery metadata, supporting technical and contextual documentation. This is captured in Digital Repository Information templates as part of a suite of supporting materials and guidance (1) for depositors of both physical and digital materials. The template captures Project and geographical or site-level metadata, used by staff to promote resource discovery, as well as File-level metadata information regarding the hardware and software environments in which each file was generated, a description of the file's contents, any linked files and any associated technical metadata that has been supplied. This allows Digital Repository staff and users to understand the operating environment in which a file was generated, and to replicate or emulate this in order future proof file access.

Metadata capture at this stage also secures important provenance information about digital objects held in trust and traceable from ingest through to publication and subsequent re-use.

To ensure and maintain data re-usability Digital Repository staff also work directly with domain experts such as the Archaeological Data Service, Archaeological units, and in-house survey specialists to develop technical metadata templates for more complex data captures from 3D laser scanning, photogrammetry, and geophysical tools and techniques.

Depositors are encouraged to provide any additional metadata or background information necessary for users to fully understand the digital materials for future understanding and re-use. As part of the mediated process Digital Repository staff will also address ethical, privacy or rights management so that digital deposits can be fully understood and re-used by our designated community both now and into the future.

Depositors are offered a list of preferred and accepted formats that are considered best suited for long-time preservation and continuity of access. The file formats are commonly used within the archaeological and architectural domains, have open specifications, and are independent of specific software, developers or supplier. These include formats for digital images, documents and raw text as well as more complex digital objects such as vector graphics (e.g. CAD drawings), as well as geophysical and topographic survey data.

Non-standard formats will be considered for ingestion where necessary, such as in the case of rescue-type deposits. This can occur when a commercial depositor such as an architectural firm enters administration and no communication with the data creators is possible. In such situations deposit agreements are reached with administrators.

Where practicable the Digital Repository will ensure that technical terms used to describe processes and workflows across the digital lifecycle are explained in non-technical language in correspondence with users and within guidelines and policy documents available to our designated community. All policy documents and guidelines are reviewed regularly to reflect changes in technology, disciplinary practices, or the requirements of our designated community. Versions of deposit forms, licencing types and deposit agreements are available to accommodate this range of users. Digital Repository staff also regularly survey depositors to ensure that the needs of the designated community are being met.

At time of writing planning has begun for Digital Repository staff to visit Archaeological units who deposit digital assets with HES for cataloguing and publication. This provides an opportunity to discuss developments in archival practice with a view to streamlining digital asset deposit and delivery mechanisms. This activity will be reinforced by an online survey to gauge the scale and condition of digital materials awaiting deposit, and to ascertain how HES can assist further with the deposit process.

Links to supporting documentation:
(all accessed 5/10/2020)

1. Canmore Depositors Information - https://canmore.org.uk/content/depositors-information

Reviewer Entry
Reviewer 1

Comments:
Accept

Reviewer 2

Comments:
Accept

TECHNOLOGY

15. Technical infrastructure

R15. The repository functions on well-supported operating systems and other core infrastructural software and is using hardware and software technologies appropriate to the services it provides to its Designated Community.

Compliance Level:

3 – The repository is in the implementation phase

Response:

The technical infrastructure for the Digital Repository aligns with the principles of the Open Archival Information System Reference Model (ISO 14721:2003) and is designed to be scalable, reliable, resilient and sustainable. It is managed and administered in accordance with quality control requirements and security regulations and is aligned with ITIL framework practices including continual service improvement and process evaluation and benchmarking.

HES is implementing an extensive technical infrastructure modernisation project which will future-proof archival storage and preservation processes and workflows. This has so far involved (June 2020) migrating archival storage containers and substructure in a Tier III datacentre DataVita, with planned integration and interoperation with Preservica, an enterprise-level platform which will offer a range of digital preservation functionality including normalisation, customised migration pathways, replication and automatic detection of file corruption and error loss and subsequent 'self-healing' functionality.

The existing digital preservation solution is comprised of two component parts – The Digital Archive (DA) and Preservica (Pvca) (see diagram 1).

The Digital Archive holds digitised objects and materials from the HES Archive, both digitally created and digital originals. These are available for access by HES staff only.

These digital objects are then ingested into the Preservica System for long term preservation. This includes the provision of a TEST environment as well as a LIVE environment thus allowing for integrity checks to be performed before ingest into LIVE and long term preservation.

The primary copy of LIVE preserved data is held on Near Line SAS storage (NL-SAS). Secondary and tertiary copies of data are held in different locations and on different technologies, specifically Object (S3) Storage in a separate data location and Glacier Storage with a cloud provider. This is enabled by Preservica's Adapter technology that provides for the ingest of data from LIVE to the secondary and tertiary copies as an automated function of the Repository.

Diagram 1 - made available to reviewers confidentially.

The solution makes use of commercial software (Windows Server 2016, RHEL, Oracle, Preservica). The solution is hosted in a Tier III data centre (DataVita) on an Infrastructure as a Service (IaaS) platform within its own separated Tenancy (see solution description below). Secondary copies of data utilise IaaS Object Storage, with tertiary copies on IaaS Glacier Storage with a Cloud Provider.

DataVita IaaS solution description

The IaaS solution used by the DA and Preservica environments is built on the Cisco Unified Computing System (UCS) and NetApp All Flash FAS (AFF) arrays, known as the "DataVita Cloud". As a next-generation datacentre platform, this unifies compute, network, storage access, and virtualization into a cohesive system, managed by state-of-the-art orchestration technology.

The DataVita Cloud integrates a low-latency, lossless multi-10 Gigabit Ethernet unified network. fabric with enterprise-class, x86-architecture servers, and fast enterprise all-flash storage array, delivering an integrated multi-tenanted platform in which all resources participate in a unified management domain.

Client tenants are logically isolated on shared network and storage infrastructure, but virtual machines reside on dedicated and resilient compute resource. Each virtual machine benefits from the high performance of solid-state disk and 10Gb network connectivity, and is allocated its own dedicated RAM, guaranteeing a high. level of performance as the total RAM available is never overprovisioned. Connectivity between HES and DataVita is over a resilient 1GB link provided by SWAN.

As an IaaS platform, the Repository is capable of expansion and re-configuration as needed to accommodate changes and upgrades to software and systems used.

Software used by the IaaS solution, the Digital Archive and Preservica

The IaaS solution uses VMWare as the Hypervisor to support the creation and use of the respective Virtual Machines for the Digital Archive and Preservica environments.

These environments exist within the Domain created for the tenancy which has a single Domain Controller running Windows Server 2016. This DC provides Domain and DNS services, which required for the Digital Archive and Preservica to function correctly in the tenancy.

The Digital Archive VM uses Windows Server 2016 with the following roles enabled: Internet Information Services (IIS), Remote Desktop Services (RDS), File and Storage Server.
Java Runtime Environment (JRE) is also enabled.

DROID is installed and used on this Server.

The Preservica LIVE and TEST VMs run Red Hat Enterprise Linux v6 (RHEL) as the Operating System.

Preservica Enterprise Edition v5.11 (on-premises) provides the platform for long term preservation of digital data.

Preservica uses Oracle 12c as its Database for SQL services.

SOAP Web Services are enabled providing web browser-based access to the Preservica environment for designated users.

The Preservica environment has a defined upgrade path from the current version. This includes minor point releases as well as major version releases.

The IaaS platform will be used to establish a Development instance of Preservica so that testing of both major and minor releases planned for the next years can be completed prior to any implementation. This will prevent any interruption of service to the LIVE and TEST environments.

System Documentation

As per standard procedure, the following systems documents are held for the Preservica and Digital Archive Environments in a central file share on HES storage sited in DataVita. These are backed up as per HES policy and practice:
• System Specification
• System Service Description
• System Build documents
• System Administration, Maintenance and User Guides

Digital Archive documents:
• System description – HES VMWare
• Digital Archive Ingest Process

Reviewer Entry

Reviewer 1

Comments:
Accept

Reviewer 2

Comments:
Accept

16. Security

R16. The technical infrastructure of the repository provides for protection of the facility and its data, products, services, and users.

Compliance Level:

4 – The guideline has been fully implemented in the repository

Reviewer Entry

Reviewer 1

Comments:
4 – The guideline has been fully implemented in the repository

Reviewer 2

Comments:
4 – The guideline has been fully implemented in the repository

Response:

The technical infrastructure of the Digital Repository is governed by a range of organisation-wide IT security platforms, protocols and policies.

HES has developed a range of information security policies and procedures which have been published and all staff are required to comply with these. The policies (1) have been approved by the Information and Information Security Governance Board (IISGB) and are reviewed on an annual basis.

HES IT & cyber security protocol and policies have been developed and maintained by outsource partner Protocol Policy Systems Ltd and provide a security and acceptable-use framework for Historic Environment Scotland as an organisation (2). These are published on the HES intranet to safeguard HES security systems and for HES staff. The protocols and policies address the need to protect confidential and sensitive information held on HES networks and computing equipment from disclosure, unauthorised access, loss, and corruption, and are relevant to information in both electronic and physical formats. They also help ensure that information is only made available or disclosed to those authorised to use it and that data integrity is safeguarded. The policies protect all users, stakeholders and the organisation from illegal or damaging actions through inappropriate or unauthorised use of computer systems, communications systems and networks. All users have a responsibility to ensure they are familiar with the Policies and abide by them.

The HES Information Security Manager ensures that Information Security policies are complied with and any breaches are reported promptly to the SIRO and Information Assurance Board. Information Security and Information Assurance in HES is organised in line with the guidance and requirements in the HMG Standards; namely the Security Policy Framework, the CESG IA Standards and Good Practice Guides. All these standards are closely aligned to the International Security standard, ISO27001.

As a minimum requirement all staff are subject to recruitment controls known as the Baseline Personnel Security Standard (BPSS) which provides a level of assurance as to the trustworthiness, integrity and reliability of all HES employees, contractors and temporary staff. HES has introduced bespoke eLearning courses containing an introduction to data protection as well as information security which are compulsory for all staff and must be completed annually.

A broad range of international codes of practice, standards, statutes, regulations, frameworks and guidelines are applicable to the operations of the HES infrastructures. These include GDPR; Public Sector Network Cyber Essentials Plus; COBIT; ITIL; ISO9000; Computer Misuse Act 1990; Privacy and Electronic Communications (EC Directive Amendment) Regulations 2015; Freedom of Information (Scotland) Act 2002; Environmental Information (Scotland) Regulations 2004.

HES IT Policies are also comply with a number of international security standards. These include:
• ISO 27002 - Organisational security management
• ISO 22313 - Resilience and business continuity management
• ISO 27017 - Cloud-based technology security controls
• ISO 29151 - Personally Identifiable Information (PII) protection-specific controls

HES has been certified through the Cyber Essential scheme (2) and is a key member of the Scottish Wide Area Network (SWAN) (3), a flexible and secure network infrastructure and information assurance framework for Scottish public sector bodies. As part of the HES technical infrastructure the Digital Repository storage platforms utilise SWAN to efficiently and securely share data and services across storage facilities. SWAN also provides connectivity and interfaces with other networks such as JANET, legacy N3 and the Internet.

Access to the Repository tenancy in DataVita is restricted to internal HES systems and users. No external access to the HES network and its designated IP address ranges is permitted. This is controlled by use of a secure, encrypted communications tunnel between HES and Data Vita over the SWAN network in which data traverses firewalls internal to HES (Palo Alto) and located in the specific tenancy in DataVita (Cisco vASA).

The tenancy has its own Domain Controller through which User accounts and Security Groups are maintained separately from HES's Active Directory. Single Sign On is not enabled and is not used to grant access to either the Digital Archive or Pvca environments. Administrative privileges are restricted to specific accounts and designated user groups.

Current Disaster Recovery Provision is delivered via a daily automatic back up to S3 storage at DataVita. This ensures the Digital Archive has a secondary instance in a separate location that can be invoked in the event of a failure of the Digital Archive in the primary location.

The Preservica environment will have its data stored in primary, secondary and tertiary locations and on different technologies thus enabling full restoration in the event of a failure of the primary LIVE system. This restoration would use the backup copies of the Preservica LIVE and TEST Virtual Machines which are stored in a separate location. These

copies are replaced with updated versions after any revisions or customisations are applied to the LIVE and TEST Preservica environments.

Roles, User accounts and access

Roles have been defined for both the Digital Archive and Digital Repository and are detailed below.
Access privileges are applied according to the level of access needed, and by user group used for the respective account. This enables tight control of access privileges based on defined and agreed needs.

Authentication is by user account name and password. As the systems are internal to HES and separated from the HES Corporate Domain, Single Sign On is not used and HES Active Directory Accounts do not provide access to either the Digital Archive or the Digital Repository.

Digital Archive

This system has 3 levels of access:

Domain administrators
These accounts have full access to administer the Digital Archive Server and the Tenancy Domain Controller

DA Server User accounts:
User accounts able to connect to and perform functions on the DA server according to the requirement of the process that the respective accounts are used for:

DA Server Groups:
Administrators:
These group members have Local server administration privileges.
This is separate to Domain Admin privileges and do not apply to the Domain Controller.

Remote Desktop Users:
These are User accounts, including administrators, that are able to connect remotely to the DA server using Remote Desktop Services.

Preservica

Access is granted to defined user accounts at the Application level (Preservica) and are detailed below:

Preservica System User accounts:
Preservica System User accounts are used and mapped to Preservica Menu Actions. This means that for a menu action

to be performed or executed, the user account needs to be a member of a specific role that has privileges to allow this action to be completed.

Roles currently in use are:

SDB_DATA_MANAGEMENT_USER
SDB_ACCESS_USER
SDB_MANAGER_USER
SDB_ADMIN_USER
SDB_INGEST_USER
SDB_SYSTEM_USER
SDB_TRANSFORM_USER
SDB_ANONYMOUS_USER
SDB_REGISTRY_ADMIN_USER
REPOSITORY_SYSTEM_ADMINISTRATOR

The roles listed above are standard for Preservica and can be described as being "out of the box" roles. No additional roles have been created or added. Additionally, none of these standard roles have had any customisations or changes applied.

There are a limited number of defined, LIVE Preservica User roles:

Role
SDB_DATA_MANAGEMENT_USER
SDB_ACCESS_USER
SDB_MANAGER_USER
SDB_ADMIN_USER
SDB_INGEST_USER
SDB_SYSTEM_USER
SDB_TRANSFORM_USER
SDB_ANONYMOUS_USER
SDB_REGISTRY_ADMIN_USER
REPOSITORY_SYSTEM_ADMINISTRATOR

Links to supporting documentation:
(all visited 5/10/2020)

1. HES IT Policies and Procedures – summarised in HES Archives: Digital Repository Management Policies - https://www

.historicenvironment.scot/archives-and-research/publications/publication/?publicationId=0eb12d93-32d0-4450-8ef7-ab7d00f85f54

2. Historic Environment Scotland IT Policy system Implementation Case Study -

https://protocolpolicy.com/historic-environment-scotland-case-study-preview/

3. Cyber Essentials Scheme -

https://www.itgovernance.co.uk/media/press-releases/it-governance-certifies-historic-environment-scotl

4. Scottish Wide Area Network (SWAN) - https://www.scottishwan.com/about/our-members/

APPLICANT FEEDBACK

Comments/feedback

These Requirements are not seen as final, and we value your input to improve the CoreTrustSeal certification procedure. Any comments on the quality of the Requirements, their relevance to your organization, or any other contribution, will be considered as part of future iterations.

Response: