

# SCOTLAND'S WORLD HERITAGE AND CLIMATE CHANGE

“... climate change has become one of the most significant and fastest growing threats to people and their heritage worldwide ...”  
ICOMOS, 2017

“Climate change is fast becoming one of the most significant risks for World Heritage sites worldwide ... direct and indirect impacts of climate change may present a threat to their Outstanding Universal Value, integrity and authenticity”  
Markham et al 2016, UNESCO report: *World Heritage & Tourism in a Changing Climate*

CLIMATE  
VULNERABILITY  
INDEX



HISTORIC  
ENVIRONMENT  
SCOTLAND

ARAINNEACHD  
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ALBA

**RSE** *The Royal Society  
of Edinburgh*  
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# HISTORIC ENVIRONMENT SCOTLAND – A GLOBAL LEADER ADDRESSING CLIMATE CHANGE AND WORLD HERITAGE

Climate change is the fastest growing global threat to World Heritage. Historic Environment Scotland is therefore taking significant climate action now to protect our past for the future. As the climate crisis intensifies, there is an urgent need to understand the vulnerability of all types of heritage, including climate impacts upon Scotland's six World Heritage properties.

The Climate Vulnerability Index (CVI) is a rapid and systematic tool developed specifically to assess climate change vulnerability for all types of World Heritage (cultural, natural and mixed). The first global CVI assessment for a cultural World Heritage property took place at the Heart of Neolithic Orkney in April 2019.

A grant from the Royal Society of Edinburgh has enabled subsequent CVI assessments for the Old & New Towns of Edinburgh, the Antonine Wall, and St Kilda (plus a snapshot CVI for the forthcoming World Heritage nomination of the Flow Country).

The CVI has now been applied to four of Scotland's World Heritage properties, assessing a diverse array of heritage from the Neolithic to the 20th century. The CVI has been adopted as a standard tool for considering climate impacts on Scotland's World Heritage. In doing so, Scotland has set a benchmark for World Heritage properties in other countries. Our historic environment is on the front line of climate change, and Scotland is a global leader in heritage related responses.

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## THE CLIMATE VULNERABILITY INDEX

The Climate Vulnerability Index, developed in Australia, is a **values-based, science driven** and **community focused** assessment tool. It systematically assesses climate change vulnerability using a risk assessment approach. The CVI differs from other vulnerability assessments as it comprises two distinct stages:

- **OUV Vulnerability** assesses the values that comprise the Outstanding Universal Value (OUV), the central concept for World Heritage
- **Community Vulnerability** assesses the economic, social, and cultural dependencies upon the World Heritage property, and the adaptive capacity of these to cope with climate change.

Both assessments of vulnerability are highly relevant for many groups including site managers, responsible management agencies, the businesses that are dependent on the property and their local communities, especially as the CVI assesses the extent to which they may be able to adapt.

In addition to the formal management partners for each property, the involvement of the local community in a CVI workshop increases the public awareness of the impacts of climate change on heritage and the resulting effects on economic, social and cultural connections.

The CVI is increasingly becoming acknowledged as a systematic way to assess the impacts of climate change upon World Heritage properties in a transparent and replicable way. It has now been applied in other heritage locations showing its ability to assess a diverse array of heritage.

	Orkney	Edinburgh	Antonine Wall	St Kilda
Key climate stressors				
OUV Vulnerability				
Community Vulnerability				

Key climate stressors were identified for each of the four properties in Scotland and used in assessing the OUV and Community Vulnerability on a traffic-light scale (Low/Moderate/High).

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# OVERVIEW OF CLIMATE IMPACTS ON SCOTLAND'S WORLD HERITAGE

The four Scottish CVI applications revealed significant overlap in the key climate stressors selected with Temperature trend, Precipitation trend and Storm intensity & frequency each identified for three properties. Impacts from these stressors on the WH values varied within and between the properties, leading to a range of assessed vulnerabilities of the WH values (OUV) and the community.

## THE HEART OF NEOLITHIC ORKNEY

The Ring of Brodgar. © Rob McDougall

The Heart of Neolithic Orkney (HONO), comprising a group of four prehistoric monuments, is among the most important Neolithic sites in northern Europe. Inscribed on the UNESCO World Heritage List in 1999, these monuments today remain dominant in the rural landscape, providing a unique testimony to ceremonial, funerary and domestic components of cultural traditions which flourished between 3000BC and 2000BC.

The Orkney islands, on the north coast of Scotland, are in an exposed position between the Atlantic Ocean and the North Sea. Climate change therefore has the potential to have severe negative impacts on the site and the surrounding areas. As the first cultural CVI, HONO confirmed the validity of the CVI methodology for cultural applications; this was an important precedent leading to many further CVI applications worldwide. The results of the HONO CVI will be woven through the next Management Plan.



Coastal erosion and seawall at Skara Brae.

© Historic Environment Scotland

Changes in precipitation patterns exacerbate footfall erosion at Ring of Brodgar.

© Historic Environment Scotland

Waves at the Bay of Skail. © Colin Keldie





# OVERVIEW OF CLIMATE IMPACTS ON SCOTLAND'S WORLD HERITAGE



## THE OLD & NEW TOWNS OF EDINBURGH

© Rob McDougall

The character of Edinburgh is a result of the juxtaposition of the medieval Old Town, dominated by Edinburgh Castle, and the planned neo classical New Town, developed from the 18th century onwards. These two have created an outstanding urban landscape which had a far reaching influence on European urban planning.

The CVI workshop for Edinburgh represented its first application to a World Heritage city. The results were presented in a well attended online public event which is now available on [YouTube](#).

One direct and significant result of the CVI workshop was a recognition of the need for flood mapping, which is now underway. The workshop results are feeding into the new World Heritage Management Plan for the City. The analysis for Edinburgh has become a benchmark for future CVI applications in World Heritage cities.



Effects of flash flooding, Edinburgh.

© David Harkin

The Netherbow, Edinburgh.

© Neil Hanna



Dean Village, Edinburgh.

© Neil Hanna





# OVERVIEW OF CLIMATE IMPACTS ON SCOTLAND'S WORLD HERITAGE

## ST KILDA

Village Bay on Hirta with the island of Dun in the background.  
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St Kilda, comprising a tiny island group and the surrounding ocean, off the coast of the Hebrides is the only mixed (natural and cultural) World Heritage property in the UK and one of only 39 worldwide. The towering cliffs and sea stacks are a haven for hundreds of thousands of breeding seabirds, surviving on the rich marine resources. Abandoned by the island community nearly a century ago, the remaining relict cultural landscape provides a stark reminder of the harsh conditions facing those who lived there. Today, the island group is a destination for thousands of visitors each year, and is an important location for various research projects.

The CVI workshop was the first for a mixed World Heritage property, and identified some key knowledge gaps. These included the need for more frequent surveys of the marine environment to identify any changes in key species. Although not a selected climate stressor, the *Dynamic Coast* project undertook a rapid assessment identifying the effects of coastal erosion in Village Bay. A successful public event was held which helped to raise local awareness of the issues, including the need to evaluate the climate vulnerability of the Outer Hebrides.



The street on Hirta, the main settlement abandoned in 1930.  
© Crown Copyright HES

After heavy rainfall the drystone walls allow water to flow but are under stress.  
© National Trust for Scotland



Cruise ships enjoy visiting the village on a calm day.  
© Crown Copyright HES





# OVERVIEW OF CLIMATE IMPACTS ON SCOTLAND'S WORLD HERITAGE

## FRONTIERS OF THE ROMAN EMPIRE: THE ANTONINE WALL

The ditch of the Wall at Watling Lodge. © Crown Copyright HES

The Antonine Wall is the northwest frontier of the Roman Empire, occupied for a generation in the mid 2nd century AD. It is part of the Frontiers of the Roman Empire World Heritage property which includes two other components – Hadrian's Wall in England and the Upper German-Raetian Limes in Germany. The CVI workshop was its first application to a component part of a transboundary property. The CVI provided an important precedent for the remaining parts of the World Heritage property (which now includes two other Roman Frontiers World Heritage properties managed as a cluster) and has been presented to partners across Europe. This assessment also provides an exemplar for climate vulnerability analysis for other Roman frontiers in Europe and northern Africa.

The CVI application identified key research gaps which are being addressed in the new Research Agenda for the Wall and the results are feeding into the new Management Plan.



The Sylvanus Roman head sculpture at Nethercroy.  
© Historic Environment Scotland



Effects of rainfall on the presented remains of the fortlet at Kinneil.

© Marcin Klimek



Track leading up to Croy Hill.

© Marcin Klimek



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#### **Cover Image**

Maeshowe chambered tomb, Heart of Neolithic Orkney World Heritage Site. © Crown Copyright HES



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