Scottish Natural Heritage
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RHYNIE CHERT
Site of Special Scientific Interest

SITE MANAGEMENT STATEMENT

Site code: 1350

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Purpose

This is a public statement prepared by SNH for owners and occupiers of the SSSI. It outlines the reasons it is designated as an SSSI and provides guidance on how its special natural features should be conserved or enhanced. This statement does not affect or form part of the statutory notification and does not remove the need to apply for consent for operations requiring consent.

We welcome your views on this statement.

Description of the site

The Rhynie Chert is one of the most important sites in the world for fossils of the earliest-known land plants and associated micro-fauna. The site represents one of the best examples of a complete terrestrial wetland ecosystem of the Devonian period, existing around 410 million years ago. Chert is a type of silica-rich rock, thought to have been formed here in a volcanic landscape of shallow lakes, marshy mudflats, geysers and hot springs, similar to that found in parts of New Zealand today. Despite the apparent hostility of the environment, it was a habitat for a variety of plants and small creatures. At intervals, these communities were inundated by boiling silica-saturated water which issued from nearby hot springs, petrifying the flora and fauna in a transparent silica gel known as “chalcedony” or chert.

The chert occurs in a sequence of rocks that record an environment evolving over time in a semi-arid but seasonally wet climate. The oldest rocks are pebbly sandstones laid down by rivers in alluvial fans. Lava was erupted as a period of volcanic activity began, and the area then became an alluvial plain with ephemeral lakes and ponds. Water, heated by the waning stages of the volcanic activity, flowed along geological faults and emerged on the alluvial plain as the hot springs which preserved the existing ecosystems.

Because of the process of fossilisation at this site, the anatomical details of the life forms, such as spore-bearing structures and water-conducting tissues, are exceptionally well preserved. This makes these fossils of primary importance to the understanding of plant evolution. Additionally, the site is the finest in the world (and the first to be discovered), for fossils of Devonian microarthropods, animals similar to the mites, spiders and shrimps of the present day.

The Rhynie Chert is also world famous for yielding the earliest known insect, only 1.5 mm long, which can be regarded as a primitive ‘collembolan’ or springtail. Numerous indications of the plant-animal interactions of the Devonian period have also been preserved in the chert and this provides a crucially important window into a time in the history of the Earth when plant life was beginning to colonise the land. The site is internationally famous and is visited by scientists from universities and museums across the world.

In 1997 SNH gave financial assistance to Aberdeen University and experts from other institutions to undertake deep boreholing. This was to gain a greater understanding of the rock layers in which the chert occurs, helping to refine knowledge of the past environment of this area. This work also helped to investigate the geology of the ancient hot springs system and document changes in mineralisation and alteration of rocks with depth.

A comprehensive description of the geology and the fossil specimens can be found in the SNH's, Earth Science Documentation Series (MacFadyen 1993, SNH). Staff from Aberdeen University, Department of Geology and Petroleum Geology, have written a numbers of papers on the research carried out on the Rhynie Chert.

Natural Features of Rhynie Chert SSSI	**Feature Condition (date monitored)**	
Arthropoda (excluding insects and trilobites)	Favourable Maintained (October 2006)	
Palaeoentomology	Favourable Maintained (October 2006)	
Palaeozoic Palaeobotany	Favourable Maintained (October 2006)	
Non-marine Devonian	Favourable Maintained (March 2016)	

The three palaeontology features at the site were in favourable condition when it was last assessed in 2006. Gorse surrounded the only exposure at the site, but it was still visible and accessible. The non-marine Devonian feature was in favourable condition when it was assessed in 2016.

Past and present management

The SSSI consists of agricultural land, which is currently seasonally grazed by stock.
Over the last 10 years, several small-scale management works have been undertaken to maintain the site's suitability for grazing livestock e.g. fencing and drainage works. Since 1992 the southern end of the site (approx 1 hectare), has been converted into a wetland area and associated trees planted. This requires periodic maintenance. None of these activities have a negative impact on the underlying geological interest.

Objectives for management (and key factors influencing the condition of natural features)

We wish to work with the owners and occupiers to protect the site and to maintain and where necessary enhance its features of special interest. SNH aims to carry out site survey, monitoring and research as appropriate, to increase our knowledge and understanding of the site and its natural features.

1. To maintain the remaining exposure of Rhynie Chert and associated exposed and buried sediments

Rhynie Chert and associated rocks are buried at variable depths beneath the soil and vegetation. The main factors, therefore, likely to affect the features of interest are thought to be man-induced. The current use of the site for stock grazing does not represent a threat to the scientific value and this can continue. Deep ploughing or construction of deep drains within the crucial area of the site feature would disturb the chert.

Past excavation trenches have deteriorated so the only exposure of the chert now remaining is at the western tip of the site beside the road. Although this is not currently causing the site to be

in unfavourable condition, the exposure is vulnerable to overgrowth by vegetation and should be monitored periodically to prevent deterioration of visibility and access to it.

2. To consider the potential for this site as an educational and research resource

3. To maintain and enhance the wetland area

Though it is not the primary interest of the site, some ongoing management will be required to maintain and enhance the wetland area.

Date last reviewed: 13 March 2017.