Knepp Castle Estate Wildland Project
Conservation Area Audit for VCA

1. **INTRODUCTION**

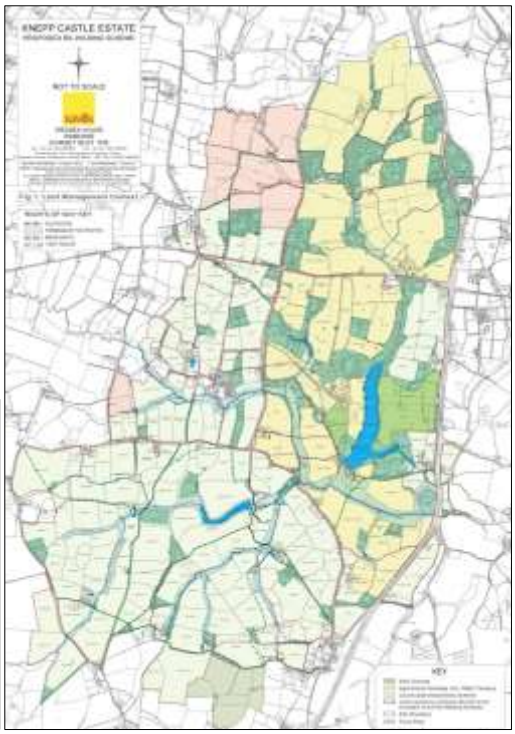
Executive Summary

The Knepp Castle Wildland Project is one the largest rewilding projects in lowland Europe, using a mix of grazing herbivores and the naturalisation of river and water systems to kick-start natural processes and monitor the response of plant and animal species. Begun in 2001, the project has seen extraordinary successes in terms of both biodiversity improvements and biomass. It has also led the way in elucidating and incorporating the economics of wildland restoration into Estate management practice in the densely populated lowlands of Western Europe. It has pioneered change from intensive farming practices to low intensity sustainable production of organic meat products, sustainable tourism and associated employment opportunities alongside wildland conservation. In making the underlying financial information freely available and in presenting the underlying costs and benefits of change, Knepp underpins our understanding of wildland economics and has inspired change and innovation in many other landscapes across the UK.

Knepp Wildland is now considered a breeding hotspot for numerous rare species, including turtle doves, nightingales and purple emperor butterflies, all of which are in steep decline across the surrounding landscape. An ecological baseline survey, considered one of the most comprehensive of any comparable project, was undertaken in 2005, and this provides a rare opportunity to monitor the changes in nature resulting from the removal of previous farming and forestry practices. A first comprehensive evaluation was made in 2015 with an analysis of results expected in early 2017. However the annual monitoring of flora and fauna already clearly indicates a positive and encouraging response to the rewilding efforts. The previous regime of mixed dairy and arable farming was proving to be both highly unprofitable and of considerable impact on both the soil and water environment and the local biodiversity and abundance. Since switching to rewilding the Estate's landholding now makes a profit and the wildlife continues to thrive and increase in both abundance and diversity.

A. Area Characteristics & Site Location

The Knepp Estate lies 45 miles from the centre of London in the heart of the Low Weald, an area of heavy clay soils. The Estate is criss-crossed by streams and rivers with large water bodies many of which have been restored to their floodplains.



Knepp Castle Estate comprises 1,400-hectares (3,500 acres) in the Low Weald in West Sussex in the southeast of England. The estate originates in the Middle Ages as one of King John's hunting parks. It has been intensively farmed since the Second World War, with increasing chemical inputs and inorganic fertilisers since the 1970s. The landscape of traditional small hedged fields and heavy clay, however, made it particularly unsuited to modern intensive farming practices and farming became more and more challenging. From 1980 to 2000 the present owner, Sir Charles Burrell (Charlie), took in hand the tenanted farms and created a single large farming business based on 600 dairy cows and 2,000 acres of arable, with some sheep and beef as minor enterprises. But over that twenty year period the farm only occasionally made profits and these were never large enough to pay for the working capital. In 2001, therefore, Charlie decided to give up intensive farming entirely and switch to a new land-use regime based on ecological management principles. Gradually, following a period of planning and consultation, over a period of six years, 1,100 ha of the land have been taken out of production and left to free development, influenced only by free-roaming grazing animals: fallow, red and roe deer, Exmoor ponies, old English longhorn cattle and a small number of Tamworth pigs.

A long-term minimum intervention natural process-led area

These are the drivers of the rewilding project – Tamworth Pig, Fallow Deer, Exmoor Ponies, Roe Deer, Old English Longhorn Cattle and Red Deer

At the same time, the Estate embarked on the restoration of the wetlands, floodplains and natural water systems that wind through the landholding (see Annex 2). A principal target was the River Adur, which runs more or less west to east across the estate. In the 1860s the river had been canalised to facilitate agricultural drainage. As part of the restoration of this stretch of the river the canal channel was filled in and a 2.5km stretch of the river was returned to its old meanders on the floodplain. In addition, another 5 ½ km of streams, brooks and ditches have been naturalised and allowed free movement and behaviour. In association with these restoration actions, efforts have been made to establish a population of one of the country's most endangered tree species – the Black Poplar *Populus nigra*. The Knepp estate are actively considering the reintroduction of the Eurasian beaver *Castor fiber* into the river system as a means of driving structural and hydrological diversity and associated wildlife along the river course, though this project has yet to secure support from other riparian owners and managers along the length of the Adur.

Having proved unprofitable as a farming business, under rewilding Knepp's landholding now makes a profit. As well as subsidy from the UK Single Farm Payment (SP) and Higher Level Stewardship (HLS) considerable additional income is derived from the redeployment of assets tied up with the former agricultural activity; the rental of post-agricultural farm buildings, rental of cottages previously tied to farm labour, and a camping and wildlife safari tourism business. The project is still considered to be an agricultural enterprise in that it produces considerable volumes of organic meat from culling the grazing animals. This extensive method of meat production, somewhat like ranching, is very low cost – the animals live outside all year, there is no supplementary

feeding and only essential human intervention. With access to browsing as well as grazing, the animals are conspicuously healthy and low maintenance. Knepp sells 75 tonnes (live weight) of high value, organic, free-roaming, pasture-fed beef, pork and venison per annum.

In just over a decade Knepp estate has changed from a highly mechanised, fragmented landscape of fields and small scale forestry with sharp, linear edges, to a complex mosaic of habitats with shifting margins, including hundreds of hectares of an emerging open-grown oak wood pasture system. The driving ethos behind the project remains one of minimal intervention, of self-willed land – putting nature back in the driving seat. Managing the stocking density of the herbivores – a judgement that is made in consultation with Knepp Wildland's advisory board of 22 ecologists – is about the only ongoing intervention (Annexe 1).

B. Biodiversity Baseline Conditions

In 2005 a baseline survey was undertaken to set the scene for evaluating changes in landscape, habitats, flora and fauna as result of the Knepp rewilding programme. Many different groups were included, including vascular plants, lichens, butterflies & moths, beetles, amphibians, reptiles, breeding birds and bats. This is rarely done in conservation and provides a unique starting point for the rewilding process. Indeed the initial audit of the Knepp Wildlands area is regarded as one of the most comprehensive undertaken to date.

Knepp rewilding project is now a hotspot for rare species like long-eared owls, barn owls, ravens, peregrine falcons, red kites, lesser spotted woodpeckers, woodlarks, cuckoos, spotted flycatcher, stonechat, lapwing and yellowhammers, all of which are regionally scarce or declining species. It is one of the hotspots for both nightingales, and turtle doves – one of the few places where these bird, critically endangered in the UK, are actually increasing in numbers. It is also the top breeding locality in the UK for the rare and spectacular purple emperor butterfly *Apatura iris*. A total of 13 out of the UK's 18 species of bat can be found at Knepp, along with numerous rare moths and other red data species of beetle and fungi.

C. Conservation Impact Assessment & Stakeholders

Ongoing long-term monitoring, such as botanical quadrats, butterfly and bird transects, begun in 2001, continue to record how nature is responding to the project. Scientists from the Centre for Ecology and Hydrology have also set up a long-term monitoring project looking at changes in soil, invertebrate populations, and vegetation. Other ongoing monitoring includes fixed point photography, aquatic habitat and water quality surveys, and a variety of repeatable surveys across other taxonomic groups from molluscs to Lepidoptera, from mammals through to reptiles and amphibians. Targeted surveys on other groups, such as mosses and beetles, are also now underway.

The project is supported by Natural England and the Environment Agency (the UK body responsible for water quality, water and wetland management, floods and associated pollution incidents) . Numerous NGOs and conservation bodies have a close relationship with the Knepp Wildland project, notably the Sussex Wildlife Trust, Butterfly

Conservation (UK), The Million Ponds Project, Woodland Trust, Forestry Commission, and the RSPB (which held an Operation Turtledove workshop at Knepp in the summer of 2015). The National Trust has held numerous conferences and workshops at Knepp, looking at the project as a potential model for its own conservation efforts on extensive landholdings and lower grade farmland. Other engagement with the project includes Pasture for Life, Game & Wildlife Conservancy Trust, British Trust for Ornithology, Universities (Sussex, Sheffield Hallam, Oxford and Imperial College), Centre of Ecology & Hydrology, Country Landowners Association, National Farmers Union, Forest Enterprise England and Wildlife Trusts from all over the UK.

Some 2,500 people are Friends of the Knepp Wildland project, many of them from NGOs. In 2016, 2,200 people have come to look around Knepp, over 1,000 of them as paying guests on guided wildlife-watching safaris (www.kneppsafaris.co.uk). Knepp Wildland Safaris, in its second season, is one of the sustainable ecotourism ventures associated with the project. Charlie has himself guided around 400 landowners, journalists and representatives from NGOs on private tours of the project in 2016. The public are free to use the 28 km of public footpaths around the estate.

Schools and other educational groups are catered for and invited as part of specific educational programmes such as the Forest Schools programme and the National School Curriculum. Knepp hosts MA and PhD students studying a wide range of topics from nightingales, worms and soil, liverfluke occurrence in snails to free-roaming pigs, and habitat creation. Volunteer days engage the local community and other interested parties in data collection and recording.

Knepp Wildland Camping and Safaris – a new venture started in 2014 is now turning over £186,000 and employing 2 full time people – a campsite manager and an ecologist and several part-time safari guides www.kneppsafaris.co.uk

D. EXPERTISE

Knepp Wildland is supported by a very wide range of specialists in land use, land management, forest ecology, animal husbandry, soil ecology, hydrology etc. Annexe 1 lists the constituents of the Knepp Advisory Group that support the Knepp Estate in its planning and decision making. In addition the Estate has commissioned considerable additional expertise – soil surveys, assessments of economic options, engineering advice on potential bridges and underpasses to link parts of the project area over or under roads - from leading Universities, Institutions and Consultancies when specific requirements need to be addressed.

E. GENERAL OBSERVATIONS

Knepp Wildland is a unique project. It is the first and, to date, only major example in the UK where extensive tracts of former arable land have been allowed to evolve and develop under the untrammelled influence of a suite of grazing animals consciously assembled to represent the animals originally found in lowland western European temperate forests, alongside a major wetland and river restoration programme. It is uniquely blessed in having an owner and skilled management team fully committed to and interested in both the outcomes of the project and in the science applied to its understanding. It is the best example known to this author of a project where the environmental and biodiversity conditions have been fully tabulated at the outset ahead of the adoption of the regime of free range and free-willed animal management and unmanaged vegetation change as it evolves and progresses towards wild vegetation. It is also one of the few such projects where the economic outcomes, legal implications, financial decisions, and the constraints these impose, are both fully understood by the management team AND made freely and fully available to parties interested in such land management. In all these respects the Knepp Wildland project is both unique and invaluable.

Management structures in place

Knepp does not have a management plan typical of other areas managed for wildlife conservation and environmental gain. It has a management plan "**An Holistic Management Plan for a naturalistic grazing project on the Knepp Castle Estate, Sussex; FEASIBILITY ASSESSMENT February 2007".** This feasibility assessment examines in considerable detail all the issues arising from the move from tenanted and in hand orthodox farming to wildland and associated "ranching" of the assembled suite of animal species driving the grazing and browsing regimes.

As the main objective is to allow the emergence and evolution of vegetation and associated wildlife that result from the behaviour and activities of the suite of "wild herbivore analogues" there is no requirement for a detailed management plan. Management actions are confined to fence and infrastructure repair or installation, operational programmes identified in the Feasibility Assessment (such as a river restoration, establishment of ecotourism ventures etc.).

Consequently day to day management is clearly determined by the projects ambitions and largely confined to animal welfare, perimeter fencing care and maintenance, and decisions surrounding livestock husbandry and culling.

Issues of interpretation of the Feasibility Study and addressing larger issues either identified but not as yet enacted in the Feasibility Assessment (road crossings and species additions, such as beaver reintroduction) or arising as unforeseen issues at the time (such as ragwort control, a pioneer 'injurious' weed of disturbed soils, or the implications of stocking rates or control of rabbits etc.) are discussed widely within the Knepp Advisory Group before decisions are made and implemented by the Knepp Estate management team.

The feasibility and implementation plan concludes in 2021. Another plan, based on the ongoing unfolding lessons learnt at Knepp and the changing economic environment within which it operates will have to be redrafted and renewed. At present there is no obvious concern that the underlying approach and ambitions will not be deliverable in the next 20 year plan.

Mapping and data

The Knepp Wildland project is particularly well informed by the adoption and use of map and GIS based data. The estate is adept at adopting the latest in mapping and survey technology. It has recently adopted drone technology to inform vegetation change, the behaviour and numbers of deer across the project area and the behaviour of livestock. All records made by the project are supplied to the National Biological recording database, and as a result the context of species and their presence within Knepp is well understood. The integration of map and geographical information collated by the project, and associated with the biological records assembled by a wide array of professional and amateur recorders is a valuable resource though as yet not fully exploited by researchers and students.

Prognosis

The Knepp Wildland project is in its infancy. The oaks germinating in recent years on the former arable land have a lifespan measured in centuries. On similar soils and within landscapes with impressive continuity of purpose such trees may live for another 900 years and beyond. It is an ecological restoration programme that is open-ended in outlook and rich in "emergent possibilities". But already interesting and unexpected things are happening and to the enormous credit of the owners and their staff, these changes are both extremely well documented and extensively studied. No one generation can force its will for any extended period of time on successive generations…. But it can set things up so that the children and grandchildren of the present generation can reap the benefits of its ventures, learn from them, and carry on with them if they choose to do so. The Knepp project is particularly strongly placed to thrive over the coming decades being both ecologically and economically robust. There are few grounds for concern over the coming century. By then the changes will be profound and widely appreciated and with a following historical wind it should last for several centuries beyond that…. Then after that we will have to see!

More formally I find no disparity between the criteria for a VCA and the conditions on the ground as experienced first-hand, nor any obvious inconsistencies in the plans and governance structures required by VCA.

A summary of responses to the VCA Audit instructions can be found in Annexe 3.

DECLARATION
I declare the above to be my own work, free from outside influence and an objective and independent reflection of the condition and activities on the ground as evidenced in the area contemplated in this report.

Jonathan Spencer FRSA. FRSB
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Forestry Commission England

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Annexe 1 The Knepp Wildlands Advisory Panel

Knepp Wildland Project - Advisory Group		
Alexander, Keith	Mr	Independent Ecologist – specialist saprophytic beetles
Boers, Maarten	Mr	Livestock Partnership Veterinary Practice
Buckland, Paul	Prof.	Environmental Archaeology academic
Burrell, Ant	Mr	Landowning Partner in the Project
Burrell, Charlie	Sir	Owner of the Knepp Castle Estate
Butler, Jill	Miss	Woodland Trust Conservation Officer
Crawley, Mick	Prof.	Plant Ecology Department of Biological Sciences, Imperial Collage
Driver, Alastair	Prof.	Retired EA - Head of Environment
Emrich, Jason	Mr	Knepp Estate Land Agent
Field, Alison	Mrs	FC Regional Director for South East
Fuller, Rob	Prof.	BTO, Retired Director of Science (Ecological Change)
Goldberg, Emma	Miss	Forestry and Woodland Officer, Natural England
Goriup, Paul	Mr	Fieldfare International Ecological Development plc
Green, Penny	Mrs	Knepp Full Time Ecologist was head of the Sussex Record Centre
Green, Ted	Mr	Ancient Tree Forum
Greenaway, Theresa	Mrs	Retired Survey & Research Officer Sussex Biodiversity Record Centre
Heard, Matthew	Dr	Head of Biodiversity & Conservation Management Group NERC
Hewitt, Kristoffer	Mr	Natural England
Hulme, Neil	Mr	Chair of Butterfly Conservation in Sussex
Lavender, Jason	Mr	Joint Director High weald AONB Unit
Lawton, John	Prof.	Head of Natural Environment Research Council (NERC) , President of The Institution of Environmental Sciences
Lord, Alex	Dr	Department of Biological Sciences, Imperial Collage
Meadows, Andy	Mr	Stockman Bakers Estate
Nicolet, Pascale	Dr	Senior Freshwater Ecologist National Coordinator of the Million Ponds Project
Oates, Matthew	Dr	National Trust Nature Conservation Adviser
Seymour, James	Mr	South East Regional Land Management Programme Manager, Natural England
Smith, Julian	Mr	Trustee to the Knepp Castle Estate
Smith, Ken	Dr	Retired from the RSPB as head of Aquatic Research
Spencer, Jonathan	Mr	Forest Enterprise - Head of Planning & Environment
Toe, Patrick	Mr	Stockman Knepp Castle Estate
van de Vlasakker, Joep	Dr	Flaxfield Nature
Vera, Frans	Dr	Grazing Ecology and Forest History
Whitbread, Tony	Dr	Chief Executive Sussex Wildlife Trust

KNEPP CASTLE ESTATE

River Adur Floodplain Restoration

Pre-feasibility study of river restoration

Prepared by **Martin Janes, Jenny Mant and Alice Fellick**
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Summary

River restoration provides a mechanism for integrating biodiversity enhancement, landscape improvements and flood risk management within the concept of returning catchments to a more self-sustainable natural environment. It is also seen as a valuable tool for delivering government policy targets (national and European) relating to the above.
The landholding of Knepp Castle Estate, near Horsham in West Sussex contains a 2km length of the River Adur and tributaries. The river is over wide and deep and has undergone major engineering changes over many centuries, but still flows through a wide grassland floodplain. Re-wilding of the 3500Ha estate has introduced the possibility for lowland clay catchment river and floodplain restoration. Constraints and issues need to be built into the project and solutions identified as part of this study. The main constraints and issues are;

Channel

- Over-sized compared to the normal flows it carries and route realigned for a variety of reasons, with original planform lost;
- Large weir structures impacting the landscape, hydrology and fisheries potential;
- Lack of in-channel, marginal, bankside and floodplain habitat diversity;
- Maintenance implications for Environment Agency Operations staff (desilting and structures);

Floodplain

- The historically damp floodplain now sheds water quickly via ditches into the main Adur;
- Open landscape with a lack of vegetation diversity;

Flooding

- Low lying estate buildings located within the floodplain (flooded as often as every 10 years);
- A24 dual carriageway culvert at downstream limit of restoration reach;
- Two minor road bridges, both of which currently flood, at upstream limits of project reach.

To ensure this project is state-of-the-art, based on current best practice and demonstrates innovation in the field of river restoration, the RRC fielded a team of experienced experts. Expert judgement and available data have been applied to propose a project 'vision' of what is desirable, given the constraints and obvious opportunities. A summary of the discussion underlying this visioning process is given in Section 3, but principally considers:

1 Land ownership (landuse and landscape (open/ wooded/ mosaic));
2 Topography;
3 Catchment, floodplain and channel geomorphology;
4 Hydrology and hydraulics;

5 Channel ecology (fish, mammals, etc.);
6 Floodplain ecology;
7 Engineering (structures/services).

Objectives (stakeholder, local and national) have been set and targets identified to aid in the vision design. The vision is summarised in three Plans (A, B and C), with additional explanation provided in the text. The proposal is to return the river to a more appropriately dimensioned channel, dominated by woody debris, within an active floodplain, allowing increased floodplain wetting and supporting greater biodiversity potential.
Approx 1750m of new channel will convey low to moderate river flows alongside the existing/modified or infilled old course. Flood flows will occupy the new channel, preferential flood routes (sections of existing course) and the floodplain. Indicative engineering 'design' sections for hydraulic modelling and contract drawings purposes have been suggested. Desired as-built cross sections have also been suggested, showing the variation from the 'design' required of the contractor to achieve a 'natural' new river. Log jams will be constructed within the new channel.
Basic flooding scenarios have indicated the need to convey floodwaters away from sensitive locations, and areas where shallow flooding can be better accommodated. Further detailed hydraulic modelling is required in the next 'Technical Feasibility' stage to juggle flood risk management requirements with the new channel dimensions and floodplain re-wetting. Properties and infrastructure must be well protected and suggestions for this have been included.
Minor tributary streams should be utilised to create saturated areas of floodplain, providing different habitat to other flood inundation areas. Whilst floodplain woodland is desirable in this location, its development will depend greatly on the grazing pressure of the varied wild stock roaming the estate.
Technical feasibility is now required to define the hydraulic constraints, derive the most appropriate routing of flood flows and thus identify if the proposed new channel dimensions are appropriate. From this modelling work, most current uncertainties can be removed or reduced. This will enable a more accurate estimate of quantities and costs to be attributed to a detailed design specification for tendering purposes.
Preliminary estimates, based on this pre-feasibility 'vision' suggest project costs in the order of £500,000. This includes technical feasibility and contract documentation, background data collection, monitoring, management and post works adjustments, as well as the implementation works. Funding for a project of this scale will require a strong partnership between the landowner and government agencies, as well as a degree of external matched funding.
This river and floodplain restoration project has the potential to be a valuable national demonstration site, delivering target floodplain and channel objectives. It also has the potential to add considerably to the value of the Estate's re-wilding project, already keenly supported by English Nature and Defra. Technical feasibility is now required to finalise the design. At the same time funding initiatives and wider support needs to be identified, targeted monitoring begun and the required permissions identified.

The aim of the vision is:
"To enhance the channel and floodplain habitat diversity by physical manipulation of channel planform, bed levels and flow patterns with a particular emphasis on reconnecting the floodplain to the river channel."

Annexe 1 VCA Audit instructions with summary responses from JWS VCA Auditor

Management Plan Audit

In order to be listed on the VCA Registry, an independent **Management Plan Audit** must be submitted. The audit report must be prepared an approved VCA Auditor.

The VCA audit process is compatible with the IFC PS6 expectation that "credible globally, regionally, or nationally recognized standards for sustainable management of living natural resources" are adopted and that these "provide for independent verification or certification." It includes a review of key documents, a visit to the area, and interviews with key staff and stakeholders. The aim is to verify that the area's conservation management plan is compliant with the VCA Standard.

The Management Plan Audit should address the following questions:

a. Overview of the conservation area

- Is there an Executive Summary providing a concise description of the area and its conservation plan? YES
- Is there a map of the area and is its location identified? YES
- Is the area's size in hectares stated and its ecoregion specified? YES
- Are the names and contact details of the management authority provided? YES
- Is there supporting evidence of the manager's right to manage the area? YES

b. Biodiversity baseline conditions

- Is there evidence of a science-based assessment of the area's biodiversity baseline conditions? YES
- As appropriate, does it include an assessment of habitats, legally protected areas, invasive alien species, ecosystem services, and the production of living natural resources? YES
- Are any significant recent changes to the biodiversity status of the area documented? YES

c. Conservation impact assessment

- Have key stakeholders been identified and consulted? YES
- Have the area's internal 'inside-the-fence' Strengths and Weaknesses with respect to maintaining or improving its biodiversity status been assessed? YES
- Have the 'outside-the-fence' broader landscape Opportunities and Threats to conserving biodiversity been assessed? ASSESSED BUT NOT AS YET FULLY ADDRESSED; OF NOTE IS IMPACT OF ABSENCE OF CURRENT CONSENSUS ON HAVING BEAVER IN RIVER ADUR AND CONNECTING LINKS ACROSS INTERVENING ROADS.

d. Conservation actions & monitoring

- As appropriate, does the plan include a set of conservation actions that aim to minimise negative impacts, weaknesses and threats, and enhance positive impacts, strengths, and opportunities? YES

Are these actions consistent with the IFC biodiversity mitigation strategy and the IUCN definition of conservation? YES

- Do these actions address conservation priorities within the area? YES
- As appropriate, do these actions also address conservation priorities within the broader landscape?
- Are robust procedures in place to monitoring implementation of the actions? YES

e. Overall audit assessment

- Was the area visited and, if so, when? YES MANY TIMES OVER PAST DECADE AND SPECIFICALLY FOR PURPOSE OF AUDIT ON 9/12/2016
- Were staff and stakeholders interviewed and, if so, whom? YES. SIR CHARLES BURRELL, OWNER AND MR. JASON EMRICH, ESTATE LAND AGENT. PLUS TELEPHONE INTERVIEW WITH KNEPP ECOLOGIST PENNY GREEN.
- Are the assessment of baseline conditions and potential impacts sufficient to establish an effective set of conservation actions? YES
- Are the planned actions coherent, strategic and realistic? EXTREMELY WELL CONSTRUCTED AND CONSISTENT
- Is the management plan likely to have a positive impact on biodiversity? YES.
- Is the management plan compliant with the VCA Standard? YES
- Should the area be registered as a VCA? **YES, STRONGLY RECOMMENDED THAT IT SHOULD BE SO. JWS 10/12/2016**