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SMS Natura 2000 Restoration Award Evaluation Technical Annex-5

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Abbreviations Used in this Report

ARC	Amphibian and Reptile Conservation
BTO	British Trust for Ornithology
DECCA	Diversity, Extent, Condition. Connectivity and Adaptability
ERAMMP	Environment and Rural Affairs Monitoring & Modelling Programme
IEEP	Institute for European Environmental Policy
IMP	Integrated Modelling Platform
LIFE	L'Instrument Financier pour l'Environment *(the EU's funding instrument for the environment and climate action)*
N2K	Natura 2000
NRW	Natural Resources Wales
NRW/CCW	Natural Resources Wales/Countryside Council for Wales
PIP	Prioritised Improvement Plan
RIVPACS	River Invertebrate Prediction and Classification System
SAC	Special Areas of Conservation
SFARMOD	Silsoe Whole Farm Model
SFS	Sustainable Farming Scheme
SMNR	Sustainable Management of Natural Resources
SPA	Special Protection Areas
UKCEH	UK Centre for Ecology & Hydrology

Key: Assessment of strength of evidence: "traffic light categories"

Blue:	Well tested at multiple sites with outcomes consistent with accepted logic chain etc.
Amber:	Agreement in the expert community that there is an intervention logic chain, but evidence is limited/trade-offs exist
Pink:	Logic chain not supported/impractical/significant trade-offs/negligible positive impact

Abbreviations and some of the technical terms used in this report are expanded on in the programme glossaries: https://erammp.wales/en/glossary (English) and https://erammp.cymru/geirfa (Welsh)

Contents

1 PROJECT 1 ABERBARGOED GRASSLANDS

1.1 List of Actions

	Aberbargoed Grasslands		
	Action number/type	Action includes	Natura 2000 habitat/species/feature targeted
1	Stock-proof fencing	Installation of outer and inner stock-proof fencing	Marsh Fritillary - *Euphydryas* (E*urodryas, Hypodryas*) *aurinia*
2	Cut & collect	Cut and collect prior to reintroduction of grazers, taking care to avoid larval webs and non-rank vegetation.	Marsh Fritillary - *Euphydryas* (E*urodryas, Hypodryas*) *aurinia*
3	Scrub removal	Removal of scrub, bracken, bramble, willow and encroaching woodland.	Marsh Fritillary - *Euphydryas* (E*urodryas, Hypodryas*) *aurinia*
4	*Succisa pratensis* planting	Planting of *S. pratensis* seed/plants of local provenance, or scattering of seed (preferably collected from the site)	Marsh Fritillary - *Euphydryas* (E*urodryas, Hypodryas*) *aurinia*
5	GPS tracking of herd	The purchase of Digital Animal GPS Collars to track cattle grazing.	Unclear
6	Install kissing gate	Installation of kissing gate to encourage appropriate public access but remain stock proof.	Unclear

1.2 Assessment of Action 1

Action description and relationship with Natura 2000 features and priorities

Action 1 Aberbargoed Grasslands	Stock-proof fencing
Natura 2000 site(s) relevant to this action	Aberbargoed Grasslands SAC (+ 2 satellite sites)
Habitat/species/feature of the Natura 2000 site targeted by this action	Marsh Fritillary - Euphydryas (Eurodryas, Hypodryas) aurinia
Brief description of action	Installation of outer and inner stock-proof fencing
Scale of implementation	1,536 linear metres (outer) + 1,800 linear metres (inner) at core site, + further fencing at two satellite sites.
Potential direct/indirect impacts of the action on restoration of this habitat/species/feature, as identified in the application	This action is to facilitate herd management for spatially and temporally appropriate grazing by cattle.
Other wider benefits, as identified in the application	Slight implication of improved condition of *Molinia* meadows. Improved water quality, flood regulation and carbon storage.
Condition assessment of the target habitat/species in this/these Natura 2000 site(s)	Unfavourable
'Issue' or 'risk' for *this* habitat type/species/feature in *this* Natura 2000 site, which the action addresses	Grazing – type and/or timing

1.2.1 Evaluation Questions for Action 1

1.2.1.1 Q1 Is there good evidence for the potential impact of this action on the condition of targeted Natura 2000 habitat(s) and /or species

Weight of evidence that links potential direct impacts of this action on the condition of targeted Natura 2000 habitat(s) and /or species in the location where it will be applied:

Fencing is critical for herd management for spatially and temporally appropriate grazing by cattle. Appropriate grazing is critical to encourage growth of the host plant of the marsh fritillary (*Euphydryas aurinia*), devil's bit scabious (*Succisa pratensis*), particularly to encourage larger individual plants. Appropriate grazing by cattle is thus likely to benefit *E. aurinia*: Wild grazers are unable to carry out appropriate grazing in this region, while sheep are prone to selectively graze the larval host plant. In general *E. aurinia* prefers open conditions, which the proposed management sets out to achieve.

Additionality of this action is unclear as there is no reference to the existing state of fencing in the area. Restored fencing can be expected to provide benefits over ~10 years. There is a suggestion of capability for, and commitment to, ongoing management of Aberbargoed grasslands SAC for *E. aurinia.*

Sources: SFS Evidence Review (4.3 Management of unimproved (including semi-improved) pastures and hay-meadow habitats) and wider literature.

Assessment of strength of evidence: traffic light categories: Blue, assuming that appropriate grazing is achieved.

1.2.1.2 Q2 Are there potential environmental benefits at landscape scale within or beyond the Natura 2000 site itself?

Identified in the application*:* Appropriate grazing at satellite sites is likely to contribute to landscape connectivity for *E. aurinia*.

However, the applicant posited benefits for water quality, flood regulation and carbon storage. While appropriate grazing can feasibly provide these benefits to some extent, these were not identified as key benefits in the SFS evidence review and it is not clear that such benefits are likely to occur in this particular case.

Identified by this review: Assuming that fencing builds toward appropriate grazing at multiple sites, this is also likely to benefit *Molinia* meadows, which are the other priority feature in Aberbargoed grasslands SAC, and landscape connectivity of these habitats. These are also faced by issues related to type and timing of grazing. The SFS evidence review highlighted possible co-benefits for wider biodiversity and livestock management.

1.2.1.3 Q3: Are there simple metrics for monitoring/evaluating the impacts of this action?

Identified in the application: Metres of fencing.

Identified additionally by this review: Metrics more closely related to the SAC features could feasibly be produced. These would involve *E. aurinia* counts, *S. pratensis* surveys or *Molinia* meadow vegetation condition assessments.

1.2.1.4 Q4: Are there potential benefits for the local economy?

The application has sought quotes from a "framework contractor" for fencing. Thus, there are likely to be some benefits for the local economy through purchase of goods and employment of contractors.

1.2.1.5 Q5: Are there potential benefits for increasing engagement of the local community in the Natura 2000 site(s)?

Identified in the application*:* Fencing is unlikely to increase community engagement, although there are vague suggestions that a volunteer community will be engaged with this project. A general improvement in the condition of features of Aberbargoed SAC may provide some community benefits.

Identified additionally by this review*:* None.

1.3 ASSESSMENT OF ACTION 2

Action description and relationship with Natura 2000 features and priorities

Action 2 Aberbargoed Grasslands	Cut and collect
Natura 2000 site(s) relevant to this action	Aberbargoed Grasslands SAC (+ 1 satellite sites)
Habitat/species/feature of the Natura 2000 site targeted by this action	Marsh Fritillary - *Euphydryas* (E*urodryas, Hypodryas*) *aurinia*
Brief description of action	Cut and collect prior to reintroduction of grazers, taking care to avoid larval webs and non-rank vegetation.
Scale of implementation	Three fields and one satellite site.
Potential direct/indirect impacts of the action on restoration of this habitat/species/feature, as identified in the application	Necessary for restoration of appropriate grazing, which is expected to improve condition of habitat for *E. aurinia*.
Other wider benefits, as identified in the application	Slight implication of improved condition of *Molinia* meadows.
Condition assessment of the target habitat/species in this/these Natura 2000 site(s)	Unfavourable
'Issue' or 'risk' for *this* habitat type/species/feature in *this* Natura 2000 site, which the action addresses	Grazing - type and/or timing

1.3.1 Evaluation Questions for Action 2

1.3.1.1 Q1 Is there good evidence for the potential impact of this action on the condition of targeted Natura 2000 habitat(s) and /or species

Weight of evidence that links potential direct impacts of this action on the condition of targeted Natura 2000 habitat(s) and /or species in the location where it will be applied.

Temporally and spatially appropriate cutting of vegetation, particularly to establish appropriate grazing, is likely to have positive effects on habitat condition. It can also aid establishment of *S. pratensis*, with possible benefits for *E. aurinia.* In general *E. aurinia* prefers open conditions, which the proposed management sets out to achieve.

Additionality of this action is difficult to determine, as the current state or management of the proposed fields is not explicitly mentioned. Cutting is likely to have effects lasting at least one year. There is a suggestion of capability for, and commitment to, ongoing management of Aberbargoed grasslands SAC for *E. aurinia.*

Assessment of strength of evidence: traffic light categories: Blue, assuming that appropriate grazing is achieved.

1.3.1.2 Q2 Are there potential environmental benefits at landscape scale within or beyond the Natura 2000 site itself?

Identified in the application*:* Appropriate grazing at satellite sites is likely to contribute to landscape connectivity for *E. aurinia*.

Identified by this review: Appropriate cutting and grazing at multiple sites is also likely to benefit *Molinia* meadows, which are the other priority feature in Aberbargoed grasslands SAC, and landscape connectivity of these habitats. These are also faced by issues related to scrub invasion and type and timing of grazing. The SFS evidence review highlighted possible co-benefits for wider biodiversity and livestock management.

1.3.1.3 Q3 Are there simple metrics for monitoring/evaluating the impacts of this action?

Identified in the application: Metrics identified in the application: cutting of 3 fields and a satellite site.

Identified additionally by this review: Metrics more closely related to the SAC features could feasibly be produced. These would involve *E. aurinia* counts, *S. pratensis* surveys or *Molinia* meadow vegetation condition assessments.

1.3.1.4 Q4 Are there potential benefits for the local economy?

Quotes are in progress for this work, but there are likely to be some benefits for the local economy in terms of employing contractors.

1.3.1.5 Q5 Are there potential benefits for increasing engagement of the local community in the Natura 2000 site(s)?

Identified in the application: Cutting in itself is unlikely to increase community engagement, although there are vague suggestions that a volunteer community will be engaged with this project.

Identified additionally by this review: A general improvement in the condition of features of Aberbargoed SAC may provide some community benefits.

1.4 ASSESSMENT OF ACTION 3

Action description and relationship with Natura 2000 features and priorities

Action 3 Aberbargoed Grasslands	Scrub removal
Natura 2000 site(s) relevant to this action	Aberbargoed Grasslands SAC (+ 1 satellite sites)
Habitat/species/feature of the Natura 2000 site targeted by this action	Marsh Fritillary - *Euphydryas* (E*urodryas, Hypodryas*) *aurinia*
Brief description of action	Removal of scrub, bracken, bramble, willow and encroaching woodland.
Scale of implementation	Five fields and one satellite site.
Potential direct/indirect impacts of the action on restoration of this habitat/species/feature, as identified in the application	Necessary to encourage *S. pratensis* which is the food plant of the target species *E. aurinia.*
Other wider benefits, as identified in the application	Slight implication of improved condition of *Molinia* meadows. Improved water quality, flood regulation and carbon storage.
Condition assessment of the target habitat/species in this/these Natura 2000 site(s)	Unfavourable
'Issue' or 'risk' for *this* habitat type/species/feature in *this* Natura 2000 site, which the action addresses	Scrub invasion

1.4.1 Evaluation Questions for Action 3

1.4.1.1 Q1 Is there good evidence for the potential impact of this action on the condition of targeted Natura 2000 habitat(s) and /or species

Weight of evidence that links potential direct impacts of this action on the condition of targeted Natura 2000 habitat(s) and /or species in the location where it will be applied.

Site specific clearance of scrub is likely to have positive effects for the condition of habitats for *E. aurinia* and its food plant *S. pratensis.* This is particularly the case as scrub invasion and associated fire risk are considered to be high risk for *E. aurinia* at this site.

Additionality of this management is likely to be high as the application states that *S. pratensis* has often been lost to scrub encroachment, suggesting that scrub management would not happen by default.

The longevity of this action is closely tied to the longevity of subsequent appropriate grazing to suppress future scrub encroachment. There is a suggestion of capability for, and commitment to, ongoing management of Aberbargoed grasslands SAC for *E. aurinia.* This suggests the impacts of scrub control may be long-lasting.

Assessment of strength of evidence: traffic light categories: Blue

1.4.1.2 *Q2 Are there potential environmental benefits at landscape scale within or beyond the* Natura 2000 site itself?

Identified in the application: Scrub clearance followed by appropriate grazing at satellite sites is likely to contribute to landscape connectivity for *E. aurinia*.

However, the applicant posited benefits for water quality, flood regulation and carbon storage. This claim is basically unfounded; the SFS evidence review found no clear link between scrub removal and any of these benefits.

Identified by this review: Appropriate scrub removal at multiple sites is also likely to benefit *Molinia* meadows, which are the other priority feature in Aberbargoed grasslands SAC, and landscape connectivity of these habitats. These are also faced by issues related to scrub invasion. The SFS evidence review highlighted possible co-benefits for wider biodiversity and livestock management.

1.4.1.3 Q3 Are there simple metrics for monitoring/evaluating the impacts of this action?

Identified in the application*:* None.

Identified additionally by this review: Metrics more closely related to the SAC features could feasibly be produced. These would involve *E. aurinia* counts, *S. pratensis* surveys or *Molinia* meadow vegetation condition assessments.

1.4.1.4 Q4 Are there potential benefits for the local economy?

Quotes are in progress for this work, but there are likely to be some benefits for the local economy in terms of employing contractors.

1.4.1.5 Q5 Are there potential benefits for increasing engagement of the local community in the Natura 2000 site(s)?

Identified in the application: Scrub removal may increase community engagement. There are vague suggestions that a volunteer community will be engaged with this project, and scrub removal is an activity in which volunteers are often involved.

Identified additionally by this review: A general improvement in the condition of features of Aberbargoed SAC may provide some community benefits.

1.5 ASSESSMENT OF ACTION 4

Action description and relationship with Natura 2000 features and priorities

Action 4 Aberbargoed Grasslands	*Succise pratensis* planting
Natura 2000 site(s) relevant to this action	Aberbargoed Grasslands SAC
Habitat/species/feature of the Natura 2000 site targeted by this action	Marsh Fritillary - *Euphydryas* (E*urodryas, Hypodryas*) *aurinia*
Brief description of action	Planting of *S. pratensis* seed/plants of local provenance, or scattering of seed (preferably collected from the site)
Scale of implementation	Not disclosed
Potential direct/indirect impacts of the action on restoration of this habitat/species/feature, as identified in the application	Increase in the cover of *S. pratensis* to increase food plant availability for *E. aurinia* caterpillars.
Other wider benefits, as identified in the application	Slight implication of improved condition of *Molinia* meadows.
Condition assessment of the target habitat/species in this/these Natura 2000 site(s)	Unfavourable
'Issue' or 'risk' for *this* habitat type/species/feature in *this* Natura 2000 site, which the action addresses	Habitat loss and fragmentation

1.5.1 Evaluation Questions for Action 4

1.5.1.1 Q1 Is there good evidence for the potential impact of this action on the condition of targeted Natura 2000 habitat(s) and /or species

Weight of evidence that links potential direct impacts of this action on the condition of targeted Natura 2000 habitat(s) and /or species in the location where it will be applied.

Host plants are critical to sustain populations of wild butterfly species. *E. aurinia* in particular is known to have higher occupancy in patches with tall and abundant *S. pratensis* plants. Planting of *S. pratensis* seeds or plants is likely to increase abundance of this species, especially in combination with appropriate grazing.

It is likely that this intervention will provide additionality, although it is possible that harvesting seeds on site or from elsewhere could negatively affect local reproduction of those plants.

The application does not provide specific details of how they will ensure establishment and prolonged success of planted *S. pratensis,* despite that this may be difficult to achieve. On balance, in combination with appropriate grazing, this intervention could have long lasting (>1 year) benefits for both *S. pratensis* and *E. aurinia.*

Assessment of strength of evidence: traffic light categories: Blue, assuming successful establishment of plants for at least 1 year.

1.5.1.2 Q2 Are there potential environmental benefits at landscape scale within or beyond the Natura 2000 site itself?

Identified in the application: None.

Identified by this review: Increases in cover of *S. pratensis* is likely to contribute to landscape connectivity for *E. aurinia*.

There is a possibility of benefits to condition of *Molinia* meadows, which are the other priority feature in Aberbargoed grasslands SAC. *S. pratensis* is generally considered to be a positive indicator species for *Molinia* meadows.

1.5.1.3 Q3 Are there simple metrics for monitoring/evaluating the impacts of this action?

Identified in the application: Number of planted *S. pratensis* plants

Identified additionally by this review: Metrics more closely related to the SAC features could feasibly be produced. These would involve *E. aurinia* counts, *S. pratensis* surveys or *Molinia* meadow vegetation condition assessments.

1.5.1.4 Q4 Are there potential benefits for the local economy?

This depends on the sourcing of seeds/plants and labour, which are not finalised in the application.

1.5.1.5 Q5 Are there potential benefits for increasing engagement of the local community in the Natura 2000 site(s)?

Identified in the application*:* Planting may increase community engagement. There are vague suggestions that a volunteer community will be engaged with this project, and planting is an activity in which volunteers are often involved.

Identified additionally by this review: A general improvement in the condition of features of Aberbargoed SAC may provide some community benefits.

1.6 ASSESSMENT OF ACTION 5

Action description and relationship with Natura 2000 features and priorities

Action 5 Aberbargoed Grasslands	GPS tracking of herd
Natura 2000 site(s) relevant to this action	Aberbargoed Grasslands SAC
Habitat/species/feature of the Natura 2000 site targeted by this action	Unclear
Brief description of action	The purchase of Digital Animal GPS Collars to track cattle grazing.
Scale of implementation	Not provided.
Potential direct/indirect impacts of the action on restoration of this habitat/species/feature, as identified in the application	None.
Other wider benefits, as identified in the application	Knowledge enhancements and community benefits through education.
Condition assessment of the target habitat/species in this/these Natura 2000 site(s)	NA
'Issue' or 'risk' for *this* habitat type/species/feature in *this* Natura 2000 site, which the action addresses	NA

1.6.1 Evaluation Questions for Action 5

1.6.1.1 Q1 Is there good evidence for the potential impact of this action on the condition of targeted Natura 2000 habitat(s) and /or species

Weight of evidence that links potential direct impacts of this action on the condition of targeted Natura 2000 habitat(s) and /or species in the location where it will be applied.

It is unclear whether tracking cattle will be of any benefit in terms of the target features of Aberbargoed Grasslands SAC.

Assessment of strength of evidence: traffic light categories: No link

1.6.1.2 Q2 Are there potential environmental benefits at landscape scale within or beyond the Natura 2000 site itself?

Identified in the application: None.

Identified by this review*:* None.

1.6.1.3 Q3 Are there simple metrics for monitoring/evaluating the impacts of this action?

Identified in the application: None.

Identified additionally by this review: None

1.6.1.4 Q4 Are there potential benefits for the local economy?

It is unclear whether there will be potential benefits for the local economy.

1.6.1.5 Q5 Are there potential benefits for increasing engagement of the local community in the Natura 2000 site(s)?

Identified in the application: The applicant states that this element of the project will also provide significant educational opportunities by linking with The Education Centre and local schools and teen ranger projects.

Identified additionally by this review: None.

1.7 ASSESSMENT OF ACTION 6

Action description and relationship with Natura 2000 features and priorities

Action 6 Aberbargoed Grasslands	Install kissing gate
Natura 2000 site(s) relevant to this action	None – only on satellite site
Habitat/species/feature of the Natura 2000 site targeted by this action	Unclear
Brief description of action	Installation of kissing gate to encourage appropriate public access but remain stock proof.
Scale of implementation	NA
Potential direct/indirect impacts of the action on restoration of this habitat/species/feature, as identified in the application	None.
Other wider benefits, as identified in the application	Improved public access.
Condition assessment of the target habitat/species in this/these Natura 2000 site(s)	NA
'Issue' or 'risk' for *this* habitat type/species/feature in *this* Natura 2000 site, which the action addresses	NA

1.7.1 Evaluation Questions for Action 6

1.7.1.1 Q1 Is there good evidence for the potential impact of this action on the condition of targeted Natura 2000 habitat(s) and /or species

Weight of evidence that links potential direct impacts of this action on the condition of targeted Natura 2000 habitat(s) and /or species in the location where it will be applied.

Installation of a kissing gate is unlikely to benefit the target features of Aberbargoed Grasslands SAC.

Assessment of strength of evidence: traffic light categories: No link

1.7.1.2 Q2 Are there potential environmental benefits at landscape scale within or beyond the Natura 2000 site itself?

Identified in the application: None.

Identified by this review: None.

1.7.1.3 Q3 Are there simple metrics for monitoring/evaluating the impacts of this action?

Identified in the application: None.

Identified additionally by this review: None.

1.7.1.4 Q4 Are there potential benefits for the local economy?

It is unclear whether there will be potential benefits for the local economy.

1.7.1.5 Q5 Are there potential benefits for increasing engagement of the local community in the Natura 2000 site(s)?

Identified in the application: This action is likely to increase accessibility of one of a satellite nature reserve near the focal site. This is likely to benefit the local community by providing easy access to, and enjoyment of, that site.

Identified additionally by this review: None.

1.8 ADDITIONAL COMMENTS

In terms of habitat management for *E. aurinia,* the project appears to be well thought out with a sound ecological basis for management. The case for management is strong and the management is highly relevant to the features and threats in the SAC.

Management to achieve appropriate grazing by managed livestock is probably optimal for the target SAC features. However, fencing is not good for all wildlife; it may negatively affect some wild mammals, for example. It is also crucial to ensure proper access to fenced areas to ensure community benefits, and this is only assured for one of the satellite sites.

The application does not provide specific details on the current condition of the proposed fields, so there is little context for the cutting and collecting on these particular sites. Timing and intensity of grazing and cutting are also unclear, and potentially important in terms of outcomes for the habitats and species in question.

The applicant pledges a commitment to monitoring of the outcomes of the work, but does so only in a vague sense. There is little mention of specific metrics that will be measured, or how resulting data might be used.

2 PROJECT 2 CREATING A 100-ACRE HABITAT CORRIDOR

LIST OF ACTIONS

	Creating a 100-acre habitat corridor		
	Action number/type	**Action includes**	**Natura 2000 habitat/species/feature targeted**
1	Survey land for habitat suitability for *E. aurinia*	Survey and map habitat suitability for *E. aurinia* across the project land	*E. aurinia* not a documented priority feature of North West Pembrokeshire Commons SAC
2	Mow/clear and introduce appropriate grazing	Mow/clear soft rush/scrub and introduce appropriate grazing	*E. aurinia* not a documented priority feature of North West Pembrokeshire Commons SAC
3	Create scrape in drainage channel	Create scrape in drainage channel to re-wet a field and allow sowing with *S pratensis* and a mix of damp meadow species	*E. aurinia* not a documented priority feature of North West Pembrokeshire Commons SAC
4	*Succisa pratensis* and honeysuckle planting	Collect seed and propagate Succisa plugs – to be planted during, and post, project completion – and plant honeysuckle	*E. aurinia* not a documented priority feature of North West Pembrokeshire Commons SAC
5	Construct infrastructure for access and grazing	Complete access road surfacing, erect livestock fencing and gates on habitat land; create run-back; install livestock handling equipment and water troughs	*E. aurinia* not a documented priority feature of North West Pembrokeshire Commons SAC
6	Develop and translate project hub interpretation	Install project outreach hub with 10 bilingual interpretation boards	Unclear
7	Create education materials for schoolchildren and distribute	Education materials (presentation and leaflets) distributed to schools explaining how to behave responsibly around grazing livestock	Unclear
8	Public training on habitat suitability surveying and marsh fritillary surveying	One training day on habitat suitability surveying and marsh fritillary surveying	*E. aurinia* not a documented priority feature of North West Pembrokeshire Commons SAC

2.1 ASSESSMENT OF ACTION 1

Action description and relationship with Natura 2000 features and priorities

Action 1 Creating a 100-acre habitat corridor	Survey land for habitat suitability for *E. aurinia*
Natura 2000 site(s) relevant to this action	North West Pembrokeshire Commons SAC
Habitat/species/feature of the Natura 2000 site targeted by this action	*E. aurinia* not a documented priority feature of North West Pembrokeshire Commons SAC
Brief description of action	Survey and map habitat suitability for *E. aurinia* across the project land
Scale of implementation	All project land
Potential direct/indirect impacts of the action on restoration of this habitat/species/feature, as identified in the application	Take stock of habitat suitability for *E. aurinia* allowing for future assessments of change.
Other wider benefits, as identified in the application	Future research projects leading to environmental and economic benefits
Condition assessment of the target habitat/species in this/these Natura 2000 site(s)	*E. aurinia* not a documented priority feature of North West Pembrokeshire Commons SAC
'Issue' or 'risk' for *this* habitat type/species/feature in *this* Natura 2000 site, which the action addresses	*E. aurinia* not a documented priority feature of North West Pembrokeshire Commons SAC

2.1.1 Evaluation Questions for Action 1

2.1.1.1 Q1 Is there good evidence for the potential impact of this action on the condition of targeted Natura 2000 habitat(s) and /or species

Weight of evidence that links potential direct impacts of this action on the condition of targeted Natura 2000 habitat(s) and /or species in the location where it will be applied.

E. aurinia is not a documented priority feature of North West Pembrokeshire Commons SAC. There would be no direct impacts of this action on target or non-target features. However, if *E. aurinia* was a priority feature, this monitoring would be sensible to target further action. This action also sets out a long-term vision for improvement of conditions for *E. aurinia*, thus long term, indirect benefits for *E. aurinia* are plausible.

Assessment of strength of evidence: traffic light categories: No link.

2.1.1.2 Q2 Are there potential environmental benefits at landscape scale within or beyond the Natura 2000 site itself?

Identified in the application: Environmental benefits resulting from ongoing research projects.

Identified by this review: Mapping habitats around the N2K site may have unexpected benefits by flagging existing pockets of high-quality habitat, or opportunities for creation/restoration of new habitat – whether for *E. aurinia* or priority features of the SAC.

2.1.1.3 Q3 Are there simple metrics for monitoring/evaluating the impacts of this action?

Identified in the application: Surveys and mapping completed for start and end of project.

Identified additionally by this review: The action is in itself a process of monitoring.

2.1.1.4 Q4 Are there potential benefits for the local economy?

Economic benefits may result from academic funding for ongoing research projects for e.g. long-term monitoring.

2.1.1.5 Q5 Are there potential benefits for increasing engagement of the local community in the Natura 2000 site(s)?

Identified in the application: Involving local students and academics in long-term monitoring.

Identified additionally by this review: None.

2.2 ASSESSMENT OF ACTION 2

Action description and relationship with Natura 2000 features and priorities

Action 2 Creating a 100-acre habitat corridor	**Mow/clear and introduce appropriate grazing**
Natura 2000 site(s) relevant to this action	North West Pembrokeshire Commons SAC
Habitat/species/feature of the Natura 2000 site targeted by this action	*E. aurinia* not a documented priority feature of North West Pembrokeshire Commons SAC
Brief description of action	Mow/clear soft rush/scrub and introduce appropriate grazing to land near the SAC
Scale of implementation	>100 acres
Potential direct/indirect impacts of the action on restoration of this habitat/species/feature, as identified in the application	Improve habitat condition for *E. aurinia* and allow planting of *S. pratensis*
Other wider benefits, as identified in the application	Increased biodiversity and economic benefits from wildlife tourism
Condition assessment of the target habitat/species in this/these Natura 2000 site(s)	*E. aurinia* not a documented priority feature of North West Pembrokeshire Commons SAC
'Issue' or 'risk' for *this* habitat type/species/feature in *this* Natura 2000 site, which the action addresses	*E. aurinia* not a documented priority feature of North West Pembrokeshire Commons SAC

2.2.1 Evaluation Questions for Action 2

2.2.1.1 Q1 Is there good evidence for the potential impact of this action on the condition of targeted Natura 2000 habitat(s) and /or species

Weight of evidence that links potential direct impacts of this action on the condition of targeted Natura 2000 habitat(s) and /or species in the location where it will be applied.

E. aurinia is not a documented priority feature of North West Pembrokeshire Commons SAC. However, if *E. aurinia* was a priority feature this management would be likely to improve habitat condition for *E aurinia*, albeit mostly at a neighbouring site to the SAC. Site specific clearance of scrub followed by appropriate grazing is likely to have positive effects for the condition of habitats for *E. aurinia*, which prefers open, unimproved conditions, and its food plant *S. pratensis.*

There is likely to be high additionality of this action for *E. aurinia* based on the applicant's claim that the land is currently "either over-grazed, under-grazed or fertilised". However, there is some doubt as to the probability of natural recolonization of project land by *E. aurinia*.

There is a suggestion of capability for, and commitment to, ongoing management of the project land for *E. aurinia.* This suggests the impacts of scrub control and grazing management may be long-lasting. In the event of failure of *E. aurinia* to colonise, the project pledges to pursue a captive breeding and reintroduction programme.

Assessment of strength of evidence: traffic light categories: Amber but unclear to which, if any SAC features grazing might apply.

2.2.1.2 Q2 Are there potential environmental benefits at landscape scale within or beyond the Natura 2000 site itself?

Identified in the application: The application sets out to carry out habitat management and appropriate grazing on >100ha of land outside the SAC boundary. There are clearly potentially huge landscape-scale benefits of this management in terms of building habitat connectivity for E. aurinia. There are likely to be wider biodiversity benefits of this management.

Identified by this review: Possible benefits for landscape connectivity and condition for target SAC features, especially *Molinia* meadows.

2.2.1.3 Q3 Are there simple metrics for monitoring/evaluating the impacts of this action?

Identified in the application: Change in condition categories of land for E. aurinia, based on habitat surveys. Presence of a viable E. aurinia metapopulation.

Identified additionally by this review: Metrics related to the SAC features could feasibly be produced. These would involve e.g. vegetation condition assessments of the four featured habitats of this SAC; *Luronium natans* surveys.

2.2.1.4 Q4 Are there potential benefits for the local economy?

Wildlife tourism associated with this management could bring economic benefits.

2.2.1.5 Q5 Are there potential benefits for increasing engagement of the local community in the Natura 2000 site(s)?

Identified in the application: Increased wildlife tourism may include engagement from the local community, although this would not necessarily be focussed around the N2K site itself. However, the project demonstrates commitment to promoting the N2K site as well as private land.

Identified additionally by this review: The applicant appears to be a local champion for wildlife, so while management is not focussed on SAC land, benefits in terms of community awareness seem likely.

2.3 ASSESSMENT OF ACTION 3

Action description and relationship with Natura 2000 features and priorities

Action 3 Creating a 100-acre habitat corridor	**Create scrape in drainage channel**
Natura 2000 site(s) relevant to this action	North West Pembrokeshire Commons SAC
Habitat/species/feature of the Natura 2000 site targeted by this action	*E. aurinia* not a documented priority feature of North West Pembrokeshire Commons SAC
Brief description of action	Create scrape in drainage channel to re-wet a field and allow sowing with *S. pratensis* and a mix of damp meadow species
Scale of implementation	1 scrape
Potential direct/indirect impacts of the action on restoration of this habitat/species/feature, as identified in the application	Re-wet the field to enable it to be planted with *S. pratensis* and planted with a diverse mix of damp meadow species
Other wider benefits, as identified in the application	Increased biodiversity and economic benefits from wildlife tourism
Condition assessment of the target habitat/species in this/these Natura 2000 site(s)	*E. aurinia* not a documented priority feature of North West Pembrokeshire Commons SAC
'Issue' or 'risk' for *this* habitat type/species/feature in *this* Natura 2000 site, which the action addresses	*E. aurinia* not a documented priority feature of North West Pembrokeshire Commons SAC

2.3.1 Evaluation Questions for Action 3

2.3.1.1 Q1 Is there good evidence for the potential impact of this action on the condition of targeted Natura 2000 habitat(s) and /or species

Weight of evidence that links potential direct impacts of this action on the condition of targeted Natura 2000 habitat(s) and /or species in the location where it will be applied.

E. aurinia is not a documented priority feature of North West Pembrokeshire Commons SAC. However, if E. aurinia was a priority feature then re-wetting might improve habitat condition for E. aurinia, albeit at a neighbouring site to the SAC (it is slightly unclear where this intervention will occur without access to the maps provided with the application). Assuming appropriate moisture levels are restored, this could improve conditions for the host plant S. pratensis.

Assessment of strength of evidence: traffic light categories: No link.

2.3.1.2 Q2 Are there potential environmental benefits at landscape scale within or beyond the Natura 2000 site itself?

Identified in the application: There are likely to be wider biodiversity benefits of this management.

Identified by this review: The SFS evidence review noted possible benefits of drainage blocking for carbon sequestration, water quality and flood risk management.

2.3.1.3 Q3 Are there simple metrics for monitoring/evaluating the impacts of this action?

Identified in the application: Change in condition categories of land for E. aurinia, based on habitat surveys. Presence of a viable E. aurinia metapopulation.

Identified additionally by this review: Metrics related to the SAC features could feasibly be produced. These would involve e.g. vegetation condition assessments of the four featured habitats of this SAC; *Luronium natans* surveys.

2.3.1.4 Q4 Are there potential benefits for the local economy?

Wildlife tourism associated with this management could bring economic benefits, but given the scale of management this may be negligible.

2.3.1.5 Q5 Are there potential benefits for increasing engagement of the local community in the Natura 2000 site(s)?

Identified in the application: Increased wildlife tourism may include engagement from the local community, although this would not necessarily be focussed around the N2K site itself. However, the project demonstrates commitment to promoting the N2K site as well as private land.

Identified additionally by this review: The applicant appears to be a local champion for wildlife, so while management is not focussed on SAC land, benefits in terms of community awareness seem likely.

2.4 ASSESSMENT OF ACTION 4

Action description and relationship with Natura 2000 features and priorities

Action 4 Creating a 100-acre habitat corridor	***Succisa pratensis* and honeysuckle planting**
Natura 2000 site(s) relevant to this action	North West Pembrokeshire Commons SAC
Habitat/species/feature of the Natura 2000 site targeted by this action	*E. aurinia* not a documented priority feature of North West Pembrokeshire Commons SAC
Brief description of action	Collect seed and propagate *S. pratensis* plugs – to be planted during, and post, project completion – and plant honeysuckle
Scale of implementation	>5,000 *S. pratensis* seeds collected, 5,000 *S. pratensis* plugs planted, 1,000 secondary food plants planted
Potential direct/indirect impacts of the action on restoration of this habitat/species/feature, as identified in the application	Increase in cover of host plants, improving condition category of habitat for *E. aurinia*.
Other wider benefits, as identified in the application	Increased biodiversity and economic benefits from wildlife tourism
Condition assessment of the target habitat/species in this/these Natura 2000 site(s)	*E. aurinia* not a documented priority feature of North West Pembrokeshire Commons SAC
'Issue' or 'risk' for *this* habitat type/species/feature in *this* Natura 2000 site, which the action addresses	*E. aurinia* not a documented priority feature of North West Pembrokeshire Commons SAC

2.4.1 Evaluation Questions for Action 4

2.4.1.1 Q1 Is there good evidence for the potential impact of this action on the condition of targeted Natura 2000 habitat(s) and /or species

Weight of evidence that links potential direct impacts of this action on the condition of targeted Natura 2000 habitat(s) and /or species in the location where it will be applied.

E. aurinia is not a documented priority feature of North West Pembrokeshire Commons SAC. However, if E. aurinia was a priority feature then planting S. pratensis and secondary host plants might improve habitat condition for E. aurinia, albeit at a neighbouring site to the SAC (it is slightly unclear where this intervention will occur without access to the maps provided with the application). The applicant also goes beyond direct seeding, which makes the restoration of host plants more likely.

Host plants are critical to sustain populations of wild butterfly species. E. aurinia in particular is known to have higher occupancy in patches with tall and abundant S. pratensis plants. Planting of S. pratensis seeds or plants is likely to increase abundance of this species, especially in combination with appropriate grazing.

Assessment of strength of evidence: traffic light categories: No link

2.4.1.2 Q2 Are there potential environmental benefits at landscape scale within or beyond the Natura 2000 site itself?

Identified in the application: The applicant proposes wider biodiversity benefits of this management.

Identified by this review: There is a possibility of benefits to condition of *Molinia* meadows, which are a priority feature in North West Pembrokeshire Commons SAC. *S. pratensis* is generally considered to be a positive indicator species for *Molinia* meadows.

2.4.1.3 Q3: Are there simple metrics for monitoring/evaluating the impacts of this action?

Identified in the application: Change in condition categories of land for E. aurinia, based on habitat surveys. Presence of a viable E. aurinia metapopulation.

Identified additionally by this review: Metrics related to the SAC features could feasibly be produced. These would involve e.g. vegetation condition assessments of the four featured habitats of this SAC; *Luronium natans* surveys.

In this particular case a study of the success rates of *S. pratensis* establishment would be useful.

2.4.1.4 Q4 Are there potential benefits for the local economy?

Wildlife tourism associated with this management could bring economic benefits.

2.4.1.5 Q5 Are there potential benefits for increasing engagement of the local community in the Natura 2000 site(s)?

Identified in the application: Increased wildlife tourism may include engagement from the local community, although this would not necessarily be focussed around the N2K site itself. However, the project demonstrates commitment to promoting the N2K site as well as private land.

Identified additionally by this review: The applicant appears to be a local champion for wildlife, so while management is not focussed on SAC land, benefits in terms of community awareness seem likely.

2.5 ASSESSMENT OF ACTION 5

Action description and relationship with Natura 2000 features and priorities

Action 5 Creating a 100-acre habitat corridor	**Construct infrastructure for access and grazing**
Natura 2000 site(s) relevant to this action	North West Pembrokeshire Commons SAC
Habitat/species/feature of the Natura 2000 site targeted by this action	*E. aurinia* not a documented priority feature of North West Pembrokeshire Commons SAC
Brief description of action	Complete access road surfacing, erect livestock fencing and gates on habitat land; create run-back; install livestock handling equipment and water troughs
Scale of implementation	100 m x 3 m of road surfacing, 2,821 m of livestock fencing, 7 gates, 1 cattle weigh platform, 1 brush cutter, enabling >100 acres of project land to be grazed optimally
Potential direct/indirect impacts of the action on restoration of this habitat/species/feature, as identified in the application	Infrastructure will allow both the SAC and surrounding land to be grazed appropriately,
Other wider benefits, as identified in the application	Mitigation of biosecurity risks
Condition assessment of the target habitat/species in this/these Natura 2000 site(s)	*E. aurinia* not a documented priority feature of North West Pembrokeshire Commons SAC
'Issue' or 'risk' for *this* habitat type/species/feature in *this* Natura 2000 site, which the action addresses	*E. aurinia* not a documented priority feature of North West Pembrokeshire Commons SAC

2.5.1 Evaluation Questions for Action 5

2.5.1.1 Q1 Is there good evidence for the potential impact of this action on the condition of targeted Natura 2000 habitat(s) and /or species

Weight of evidence that links potential direct impacts of this action on the condition of targeted Natura 2000 habitat(s) and /or species in the location where it will be applied.

E. aurinia is not a documented priority feature of North West Pembrokeshire Commons SAC. However, if *E. aurinia* was a priority feature then appropriate grazing would be critical to improve habitat condition for *E. aurinia* in the SAC and surrounding area.

Insufficient grazing is a high priority issue for many features of the SAC. The proposed action – a short-term capital investment – is implied to be necessary to achieve appropriate grazing of the Dowrog Common SSSI. If this is the case then there is likely to be high additionality to this action.

Any benefits are likely to be long-term (>5 years) given the level of infrastructure to be introduced, and the applicant's suggestions of commitment to future management.

There are some risks that e.g. creating roads/surfacing may negatively impact some of the target features, but approval will be sought from NRW for the Dowrog Common component.

Assessment of strength of evidence: traffic light categories: Amber but unclear to which, if any SAC features grazing might apply.

2.5.1.2 Q2 Are there potential environmental benefits at landscape scale within or beyond the Natura 2000 site itself?

Identified in the application: There are likely to be wider biodiversity benefits of this management through facilitating appropriate grazing of a large area of land around the SAC.

Identified by this review: This management could potentially contribute to landscape connectivity of e.g. *Molinia* meadows through appropriate grazing of surrounding land.

2.5.1.3 Q3 Are there simple metrics for monitoring/evaluating the impacts of this action?

Identified in the application: Change in condition categories of land for E. aurinia, based on habitat surveys. Presence of a viable E. aurinia metapopulation.

Identified additionally by this review: Metrics related to the SAC features could feasibly be produced. These would involve e.g. vegetation condition assessments of the four featured habitats of this SAC; *Luronium natans* surveys.

2.5.1.4 Q4 Are there potential benefits for the local economy?

Wildlife tourism associated with this management could bring economic benefits. Benefits to management of the herd and agricultural productivity are mentioned.

2.5.1.5 Q5 Are there potential benefits for increasing engagement of the local community in the Natura 2000 site(s)?

Identified in the application: Increased wildlife tourism may include engagement from the local community, although this would not necessarily be focussed around the N2K site itself. However, the project demonstrates commitment to promoting the N2K site as well as private land.

Identified additionally by this review: The applicant appears to be a local champion for wildlife, so while management is not focussed on SAC land, benefits in terms of community awareness seem likely.

2.6 ASSESSMENT OF ACTION 6

Action description and relationship with Natura 2000 features and priorities

Action 6 Creating a 100-acre habitat corridor	**Develop and translate project hub interpretation**
Natura 2000 site(s) relevant to this action	North West Pembrokeshire Commons SAC
Habitat/species/feature of the Natura 2000 site targeted by this action	Unclear
Brief description of action	Install project outreach hub with 10 bilingual interpretation boards
Scale of implementation	10 bilingual interpretation boards; project page on website
Potential direct/indirect impacts of the action on restoration of this habitat/species/feature, as identified in the application	NA
Other wider benefits, as identified in the application	Community and wellbeing benefits for visitors; raised awareness
Condition assessment of the target habitat/species in this/these Natura 2000 site(s)	NA
'Issue' or 'risk' for *this* habitat type/species/feature in *this* Natura 2000 site, which the action addresses	NA

2.6.1 Evaluation Questions for Action 6

2.6.1.1 Q1 Is there good evidence for the potential impact of this action on the condition of targeted Natura 2000 habitat(s) and /or species

Weight of evidence that links potential direct impacts of this action on the condition of targeted Natura 2000 habitat(s) and /or species in the location where it will be applied.

None.

Assessment of strength of evidence: traffic light categories: No link

2.6.1.2 Q2 Are there potential environmental benefits at landscape scale within or beyond the Natura 2000 site itself?

Identified in the application: Raised awareness about biodiversity could bring long-term benefits.

Identified by this review: None.

2.6.1.3 Q3 Are there simple metrics for monitoring/evaluating the impacts of this action?

Identified in the application: Visitor enjoyment.

Identified additionally by this review: None.

2.6.1.4 Q4 Are there potential benefits for the local economy?

Wildlife tourism associated with this action could bring economic benefits.

2.6.1.5 Q5 Are there potential benefits for increasing engagement of the local community in the Natura 2000 site(s)?

Identified in the application: The action is designed to increase public engagement and is likely to do so.

Identified additionally by this review: None – the applicant is right that this could bring educational and cultural benefits.

2.7 ASSESSMENT OF ACTION 7

Action description and relationship with Natura 2000 features and priorities

Action 7 Creating a 100-acre habitat corridor	**Create education materials for schoolchildren and distribute**
Natura 2000 site(s) relevant to this action	North West Pembrokeshire Commons SAC
Habitat/species/feature of the Natura 2000 site targeted by this action	Unclear
Brief description of action	Education materials (presentation and leaflets) distributed to schools explaining how to behave responsibly around grazing livestock
Scale of implementation	1 presentation, 1 educational leaflet
Potential direct/indirect impacts of the action on restoration of this habitat/species/feature, as identified in the application	NA
Other wider benefits, as identified in the application	Community and wellbeing benefits for visitors; raised awareness
Condition assessment of the target habitat/species in this/these Natura 2000 site(s)	NA
'Issue' or 'risk' for *this* habitat type/species/feature in *this* Natura 2000 site, which the action addresses	NA

2.7.1 Evaluation Questions for Action 7

2.7.1.1 Q1 Is there good evidence for the potential impact of this action on the condition of targeted Natura 2000 habitat(s) and /or species

Weight of evidence that links potential direct impacts of this action on the condition of targeted Natura 2000 habitat(s) and /or species in the location where it will be applied:
None.

Assessment of strength of evidence: traffic light categories:
No link

2.7.1.2 Q2 Are there potential environmental benefits at landscape scale within or beyond the Natura 2000 site itself?

Identified in the application: Raised awareness about conservation could bring long-term benefits, removing constraints to appropriate grazing management.

Identified by this review: None.

2.7.1.3 Q3 Are there simple metrics for monitoring/evaluating the impacts of this action?

Identified in the application: None.

Identified additionally by this review*:* None.

2.7.1.4 Q4 Are there potential benefits for the local economy?

None.

2.7.1.5 Q5 Are there potential benefits for increasing engagement of the local community in the Natura 2000 site(s)?

Identified in the application: The action is designed to increase public engagement and is likely to do so.

Identified additionally by this review: None – the applicant is right that this could bring educational and cultural benefits.

2.8 ASSESSMENT OF ACTION 8

Action description and relationship with Natura 2000 features and priorities

Action 8 Creating a 100-acre habitat corridor	**Public training on habitat suitability surveying and marsh fritillary surveying**
Natura 2000 site(s) relevant to this action	North West Pembrokeshire Commons SAC
Habitat/species/feature of the Natura 2000 site targeted by this action	Unclear
Brief description of action	One training day on habitat suitability surveying and marsh fritillary surveying
Scale of implementation	1 training day
Potential direct/indirect impacts of the action on restoration of this habitat/species/feature, as identified in the application	NA
Other wider benefits, as identified in the application	Engagement of citizen scientists; capacity to monitor change; community and wellbeing benefits for visitors; raised awareness.
Condition assessment of the target habitat/species in this/these Natura 2000 site(s)	NA
'Issue' or 'risk' for *this* habitat type/species/feature in *this* Natura 2000 site, which the action addresses	NA

2.8.1 Evaluation Questions for Action 8

2.8.1.1 Q1 Is there good evidence for the potential impact of this action on the condition of targeted Natura 2000 habitat(s) and /or species?

Weight of evidence that links potential direct impacts of this action on the condition of targeted Natura 2000 habitat(s) and /or species in the location where it will be applied.

E. aurinia is not a documented priority feature of North West Pembrokeshire Commons SAC. However, monitoring is crucial in any effort to restore biodiversity. This action could have indirect impacts, because improved monitoring could enable further targeted actions. Upskilling and educating the community with respect to E. aurinia and its habitat may also have high longevity of impact, as skills and knowledge can then be shared within the community.

Assessment of strength of evidence: traffic light categories: No link

2.8.1.2 Q2 Are there potential environmental benefits at landscape scale within or beyond the Natura 2000 site itself

Identified in the application: Raised awareness about conservation could bring long-term benefits, while training of the community could increase capacity for wider ecological monitoring in the area.

Identified by this review: None.

2.8.1.3 Q3 Are there simple metrics for monitoring/evaluating the impacts of this action?

Identified in the application: None.

Identified additionally by this review: Monitoring the number of community-submitted surveys on the site/in the area.

2.8.1.4 Q4 Are there potential benefits for the local economy?

Training workshops could generate interest and income through wildlife tourism.

2.8.1.5 Q5 Are there potential benefits for increasing engagement of the local community in the Natura 2000 site(s)?

Identified in the application: The action is designed to increase public engagement and is likely to do so.

Identified additionally by this review: None – the applicant is right that this could bring educational and cultural benefits.

2.9 ADDITIONAL COMMENTS

This application sets out an impressive plan, largely to manage an area of privately owned land near the North West Pembrokeshire Commons SAC to encourage colonisation of the marsh fritillary butterfly *E. aurinia.* Considered strictly In terms of the SAC site priorities,

E. aurinia is not listed as a priority feature in the PIP, and the vast majority of the actions proposed apply to land near the SAC, not the SAC itself. Even if *E. aurinia* was assumed to be a priority, the project carries some risk that colonisation would not occur even if larval resources were provided.

However, while the application appears weak when viewed in light of criteria relating to the Natura 2000 site, it ultimately proposes a large-scale restoration of habitat in the agricultural matrix between SAC sites. If this were to be achieved, it would provide significant wider environmental benefits in terms of biodiversity and community engagement. Furthermore, the applicant appears to have a business platform for, and a record of, promoting biodiversity; plans to make very long term commitments to biodiversity in the area by putting land into a trust; and makes monitoring a priority in the proposal (albeit highly focussed on *E. aurinia*).

The application is quite thorough, although some management specifics were difficult to determine without access to the maps. Decisions to clear scrub and re-wet sites are difficult to evaluate without the context. The infrastructure for grazing appears to be quite extensive so could have some negative impacts. Fencing can negatively affect some wildlife, although sound in terms of achieving the priorities of the SAC. The applicant is committed to conservation grazing, although details of timing and intensity are not referenced.

3 PROJECT 3 ENHANCING SPA WETLANDS

List of Actions

	Enhancing SPA wetlands		
	Action number/type	**Action includes**	**Natura 2000 habitat/species/feature targeted**
1	Sluice installation in saline lagoons	Installing 2 stoplog sluices to reduce erosion pressure and manage water levels	Carmarthen Bay & Estuaries EMS (Inc. Burry Inlet & Carmarthen Bay SPA)
2	Repair banks for saline lagoons	Using excavator to repair banks, allowing lagoons to improve habitat	Carmarthen Bay & Estuaries EMS (Inc. Burry Inlet & Carmarthen Bay SPA)
3	Modify and create new islands in freshwater lagoon	• Create 3 new islands • Reduce height of existing islands	Carmarthen Bay & Estuaries EMS (Inc. Burry Inlet & Carmarthen Bay SPA)
4	Install new interpretation boards	2 new boards for visitor education	Carmarthen Bay & Estuaries EMS (Inc. Burry Inlet & Carmarthen Bay SPA)
5	Remove concrete and reprofile shoreline of freshwater lagoon	Contractor to create sloping shorelines to improve habitat provisioning	Carmarthen Bay & Estuaries EMS (Inc. Burry Inlet & Carmarthen Bay SPA)
6	Remove silt from freshwater lagoon	Contractors to remove silt to improve habitat condition	Carmarthen Bay & Estuaries EMS (Inc. Burry Inlet & Carmarthen Bay SPA) Carmarthen Bay & Estuaries EMS (Inc. Burry Inlet & Carmarthen Bay SPA)
7	Create causeways to islands in freshwater lagoon	Underwater causeways built to allow machinery access	Carmarthen Bay & Estuaries EMS (Inc. Burry Inlet & Carmarthen Bay SPA)
8	Coppicing, laying hedgerows and removing trees	Using volunteers to improve site condition	Carmarthen Bay & Estuaries EMS (Inc. Burry Inlet & Carmarthen Bay SPA)
9	Create new wetland treatment system reedbed	Create 120m^2 of reedbed and inputs into the Natura 2000 site	Carmarthen Bay & Estuaries EMS (Inc. Burry Inlet & Carmarthen Bay SPA)

3.1 ASSESSMENT OF ACTION 1

Action description and relationship with Natura 2000 features and priorities

Action 1 Enhancing SPA wetlands	Sluice instillation
Natura 2000 site(s) relevant to this action	**Carmarthen Bay & Estuaries EMS (Inc. Burry Inlet & Carmarthen Bay SPA)**
Habitat/species/feature of the Natura 2000 site targeted by this action	Waterfowl assemblage
Brief description of action	Installing a new water management system to improve water level control
Scale of implementation	Specific to saline lagoon
Potential direct/indirect impacts of the action on restoration of this habitat/species/feature, as identified in the application	Improve the habitat availability and quality for thousands of waterfowl that use lagoon each year
Other wider benefits, as identified in the application	none
Condition assessment of the target habitat/species in this/these Natura 2000 site(s)	Not assessed
'Issue' or 'risk' for *this* habitat type/species/feature in *this* Natura 2000 site, which the action addresses	Access/Use - erosion/disturbance/damage

3.1.1 Evaluation Questions for Action 1

3.1.1.1 Q1 Is there good evidence for the potential impact of this action on the condition of targeted Natura 2000 habitat(s) and /or species

Weight of evidence that links potential direct impacts of this action on the condition of targeted Natura 2000 habitat(s) and /or species in the location where it will be applied.

Well established evidence from other UK sites that management of water level enhances habitat for waterbirds.

Assessment of strength of evidence: traffic light categories: Blue.

3.1.1.2 Q2 Are there potential environmental benefits at landscape scale within or beyond the Natura 2000 site itself?

Identified in the application: None

Identified by this review: water level management of the saline lagoon habitat will provide one of a network of coastal lagoons across the UK.

3.1.1.3 Q3 Are there simple metrics for monitoring/evaluating the impacts of this action?

Identified in the application: None provided

Identified additionally by this review: increase in waterbird numbers.

3.1.1.4 Q4 Are there potential benefits for the local economy?

Use of contractor for repair works (although not specified if local contractor, in the application).

3.1.1.5 Q5 Are there potential benefits for increasing engagement of the local community in the Natura 2000 site(s)?

Identified in the application: None identified.

Identified additionally by this review: more birds could lead to more visitors, giving opportunities for increasing engagement.

3.2 ASSESSMENT OF ACTION 2

Action 2 Enhancing SPA wetlands	Repair banks for saline lagoons
Natura 2000 site(s) relevant to this action	Carmarthen Bay & Estuaries EMS (Inc. Burry Inlet & Carmarthen Bay SPA)
Habitat/species/feature of the Natura 2000 site targeted by this action	Waterfowl assemblage
Brief description of action	An excavator will be used to report banks around lagoon damaged by high tides
Scale of implementation	Saline lagoon
Potential direct/indirect impacts of the action on restoration of this habitat/species/feature, as identified in the application	Greater ability of lagoons to hold water and maintain high quality habitat
Other wider benefits, as identified in the application	None
Condition assessment of the target habitat/species in this/these Natura 2000 site(s)	Not assessed
'Issue' or 'risk' for *this* habitat type/species/feature in *this* Natura 2000 site, which the action addresses	Access/Use - erosion/disturbance/damage

3.2.1 EVALUATION QUESTIONS FOR ACTION 2

3.2.1.1 Q1 Is there good evidence for the potential impact of this action on the condition of targeted Natura 2000 habitat(s) and /or species

Weight of evidence that links potential direct impacts of this action on the condition of targeted Natura 2000 habitat(s) and /or species in the location where it will be applied.

Yes – holding water within the lagoon will maintain habitat for designated species.

Assessment of strength of evidence: traffic light categories: Blue

3.2.1.2 Q2 Are there potential environmental benefits at landscape scale within or beyond the Natura 2000 site itself?

Identified in the application: none

Identified by this review: water level management of the saline lagoon habitat will provide one of a network of coastal lagoons across the UK.

3.2.1.3 Q3 Are there simple metrics for monitoring/evaluating the impacts of this action?

Identified in the application: none specified.

Identified additionally by this review: increase in bird abundance and diversity.

3.2.1.4 Q4 Are there potential benefits for the local economy?

Not directly

3.2.1.5 Q5 Are there potential benefits for increasing engagement of the local community in the Natura 2000 site(s)?

Identified in the application: None specified for this action.

Identified additionally by this review*:* more birds could lead to more visitors, giving opportunities for increasing engagement.

3.3 ASSESSMENT OF ACTION 3

Action description and relationship with Natura 2000 features and priorities

Action 3 Enhancing SPA wetlands	Create new islands in freshwater lagoon
Natura 2000 site(s) relevant to this action	Carmarthen Bay & Estuaries EMS (Inc. Burry Inlet & Carmarthen Bay SPA)
Habitat/species/feature of the Natura 2000 site targeted by this action	Waterfowl assemblage
Brief description of action	Create new, cockle shell covered islands to provide suitable nesting, roosting and feeding habitat for ground nestling birds
Scale of implementation	local
Potential direct/indirect impacts of the action on restoration of this habitat/species/feature, as identified in the application	Supporting priority bird species through all or part of their lifecycle
Other wider benefits, as identified in the application	Improving habitat in the freshwater lagoon will increase habitat availability for species dependant on the SAC/SPA.
Condition assessment of the target habitat/species in this/these Natura 2000 site(s)	Not assessed
'Issue' or 'risk' for *this* habitat type/species/feature in *this* Natura 2000 site, which the action addresses	Access/Use - erosion/disturbance/damage

3.3.1 EVALUATION QUESTIONS FOR ACTION 3

3.3.1.1 Q1 Is there good evidence for the potential impact of this action on the condition of targeted Natura 2000 habitat(s) and /or species

Weight of evidence that links potential direct impacts of this action on the condition of targeted Natura 2000 habitat(s) and /or species in the location where it will be applied.

The creation of cockle shell islands to support priority bird species is a well-used and widespread technique which can have immediate impact. However the target species are not among those for which the SPA was designated.

Assessment of strength of evidence: traffic light categories: No link.

3.3.1.2 Q2 Are there potential environmental benefits at landscape scale within or beyond the Natura 2000 site itself?

Identified in the application: The freshwater lagoon has the potential to support a variety of priority species throughout the year providing additional habitat for birds that depend on the Bury inlet SPA. Providing additional habitat will help increase the resilience of the SPA to the increasing impact of storm events.

Identified by this review: nothing additional

3.3.1.3 Q3 Are there simple metrics for monitoring/evaluating the impacts of this action?

Identified in the application: none

Identified additionally by this review: increases in bird abundance and diversity.

3.3.1.4 Q4 Are there potential benefits for the local economy?

Contractors will be used to undertake the works – unspecified if they are local or not.

3.3.1.5 Q5 Are there potential benefits for increasing engagement of the local community in the Natura 2000 site(s)?

Identified in the application: volunteers will help add cockle shell to the islands

Identified additionally by this review: none

3.4 ASSESSMENT OF ACTION 4

Action description and relationship with Natura 2000 features and priorities

Action 4 Enhancing SPA wetlands	New interpretation boards
Natura 2000 site(s) relevant to this action	Carmarthen Bay & Estuaries EMS (Inc. Burry Inlet & Carmarthen Bay SPA)
Habitat/species/feature of the Natura 2000 site targeted by this action	none
Brief description of action	2 boards will be installed; 1 at the boardwalk hide and 1 at the Observatory to help 70,000 visitors learn about wetlands
Scale of implementation	local
Potential direct/indirect impacts of the action on restoration of this habitat/species/feature, as identified in the application	none
Other wider benefits, as identified in the application	Community engagement
Condition assessment of the target habitat/species in this/these Natura 2000 site(s)	NA
'Issue' or 'risk' for *this* habitat type/species/feature in *this* Natura 2000 site, which the action addresses	NA

3.4.1 EVALUATION QUESTIONS FOR ACTION 4

3.4.1.1 Q1 Is there good evidence for the potential impact of this action on the condition of targeted Natura 2000 habitat(s) and /or species

Weight of evidence that links potential direct impacts of this action on the condition of targeted Natura 2000 habitat(s) and /or species in the location where it will be applied.

NA

Assessment of strength of evidence: traffic light categories: No link.

3.4.1.2 Q2 Are there potential environmental benefits at landscape scale within or beyond the Natura 2000 site itself?

Identified in the application: None.

Identified by this review: None.

3.4.1.3 Q3 Are there simple metrics for monitoring/evaluating the impacts of this action?

Identified in the application: None.

Identified additionally by this review: None.

3.4.1.4 *Q4 Are there potential benefits for the local economy?*

None.

3.4.1.5 Q5 Are there potential benefits for increasing engagement of the local community in the Natura 2000 site(s)?

Identified in the application: Helping 70,000 visitors learn about coastal and freshwater wetlands.

Identified additionally by this review: None.

3.5 ASSESSMENT OF ACTION 5

Action description and relationship with Natura 2000 features and priorities

Action 5 Enhancing SPA wetlands	Remove concrete and profile freshwater lagoon shore line
Natura 2000 site(s) relevant to this action	Carmarthen Bay & Estuaries EMS (Inc. Burry Inlet & Carmarthen Bay SPA)
Habitat/species/feature of the Natura 2000 site targeted by this action	Waterfowl assemblage
Brief description of action	Contractor to remove concrete edges and create sloping shorelines around the freshwater lagoon
Scale of implementation	local
Potential direct/indirect impacts of the action on restoration of this habitat/species/feature, as identified in the application	'Natural' shore lines will provide feeing areas for birds, water voles, reptiles, amphibians and invertebrates
Other wider benefits, as identified in the application	Increased habitat provision adjacent to the SPA
Condition assessment of the target habitat/species in this/these Natura 2000 site(s)	Not assessed
'Issue' or 'risk' for *this* habitat type/species/feature in *this* Natura 2000 site, which the action addresses	Access/Use - erosion/disturbance/damage

3.5.1 EVALUATION QUESTIONS FOR ACTION 5

3.5.1.1 Q1 Is there good evidence for the potential impact of this action on the condition of targeted Natura 2000 habitat(s) and /or species

Weight of evidence that links potential direct impacts of this action on the condition of targeted Natura 2000 habitat(s) and /or species in the location where it will be applied.

Well established technique to improve habitat quality for multiple species, including some for which the adjacent SPA was designated.

Assessment of strength of evidence: traffic light categories: blue

3.5.1.2 Q2 Are there potential environmental benefits at landscape scale within or beyond the Natura 2000 site itself?

Identified in the application: Supporting bird populations dependant on the SPA by providing feeding habitat for chicks and migratory birds.

Identified by this review: No.

3.5.1.3 Q3 Are there simple metrics for monitoring/evaluating the impacts of this action?

Identified in the application: None.

Identified additionally by this review: Population surveys would be an effective method of assessing the impact of the works on the target species.

3.5.1.4 Q4 Are there potential benefits for the local economy?

Regular contractors will be used to remove the concrete – not stated if they are local.

3.5.1.5 Q5 Are there potential benefits for increasing engagement of the local community in the Natura 2000 site(s)?

Identified in the application: none

Identified additionally by this review: visitors will have increased exposure to a variety of species.

3.6 ASSESSMENT OF ACTION 6

Action description and relationship with Natura 2000 features and priorities

Action 6 Enhancing SPA wetlands	Remove silt from freshwater lagoon
Natura 2000 site(s) relevant to this action	Carmarthen Bay & Estuaries EMS (Inc. Burry Inlet & Carmarthen Bay SPA)
Habitat/species/feature of the Natura 2000 site targeted by this action	Waterfowl assemblage
Brief description of action	Removal of silt build up in deeper areas of the lagoon
Scale of implementation	local
Potential direct/indirect impacts of the action on restoration of this habitat/species/feature, as identified in the application	Improve conditions for diving ducks
Other wider benefits, as identified in the application	none
Condition assessment of the target habitat/species in this/these Natura 2000 site(s)	Not assessed
'Issue' or 'risk' for *this* habitat type/species/feature in *this* Natura 2000 site, which the action addresses	Access/Use - erosion/disturbance/damage

3.6.1 EVALUATION QUESTIONS FOR ACTION 6

3.6.1.1 Q1 Is there good evidence for the potential impact of this action on the condition of targeted Natura 2000 habitat(s) and /or species

Weight of evidence that links potential direct impacts of this action on the condition of targeted Natura 2000 habitat(s) and /or species in the location where it will be applied.

Benefits of variation in bed level structure for diving ducks food provisioning are well described.

Assessment of strength of evidence: traffic light categories: Blue.

3.6.1.2 Q2 Are there potential environmental benefits at landscape scale within or beyond the Natura 2000 site itself?

Identified in the application: additional habitat connectivity to support duck populations of the SPA

Identified by this review: None.

3.6.1.3 Q3 Are there simple metrics for monitoring/evaluating the impacts of this action?

Identified in the application: None.

Identified additionally by this review: increase in populations of diving ducks would be a simple metric to evaluate the impacts of this action

3.6.1.4 Q4 Are there potential benefits for the local economy?

Work for contractors, if they are local.

3.6.1.5 Q5 Are there potential benefits for increasing engagement of the local community in the Natura 2000 site(s)?

Identified in the application: None.

Identified additionally by this review: greater visibility of diving ducks for visitors

3.7 ASSESSMENT OF ACTION 7

Action description and relationship with Natura 2000 features and priorities

Action 7 Enhancing SPA wetlands	Create causeways to freshwater lagoon islands
Natura 2000 site(s) relevant to this action	Carmarthen Bay & Estuaries EMS (Inc. Burry Inlet & Carmarthen Bay SPA)
Habitat/species/feature of the Natura 2000 site targeted by this action	Waterfowl assemblage
Brief description of action	Create access routes to the islands with underwater causeways to all for future habitat management
Scale of implementation	local
Potential direct/indirect impacts of the action on restoration of this habitat/species/feature, as identified in the application	Improved habitat quality for roosting, breeding and feed birds
Other wider benefits, as identified in the application	None
Condition assessment of the target habitat/species in this/these Natura 2000 site(s)	Not assessed
'Issue' or 'risk' for *this* habitat type/species/feature in *this* Natura 2000 site, which the action addresses	Access/Use - erosion/disturbance/damage

3.7.1 EVALUATION QUESTIONS FOR ACTION 7

3.7.1.1 Q1 Is there good evidence for the potential impact of this action on the condition of targeted Natura 2000 habitat(s) and /or species

Weight of evidence that links potential direct impacts of this action on the condition of targeted Natura 2000 habitat(s) and /or species in the location where it will be applied.

The type of causeway is not well described in the application but the assumption is that the causeways are sub-surface structures that prevent predators crossing the open expenses of water to the islands.

Assessment of strength of evidence: traffic light categories: Amber, given the lack of detail.

3.7.1.2 Q2 Are there potential environmental benefits at landscape scale within or beyond the Natura 2000 site itself?

Identified in the application: None.

Identified by this review: None.

3.7.1.3 Q3 Are there simple metrics for monitoring/evaluating the impacts of this action?

Identified in the application: None.

Identified additionally by this review: records of island maintenance and predation incidence would show the effectiveness of the causeways

3.7.1.4 Q4 Are there potential benefits for the local economy?

Potential employment of local contractors.

3.7.1.5 Q5 Are there potential benefits for increasing engagement of the local community in the Natura 2000 site(s)?

Identified in the application: None.

Identified additionally by this review: None.

3.8 ASSESSMENT OF ACTION 8

Action description and relationship with Natura 2000 features and priorities

Action 8 Enhancing SPA wetlands	Tree and shrub management
Natura 2000 site(s) relevant to this action	Carmarthen Bay & Estuaries EMS (Inc. Burry Inlet & Carmarthen Bay SPA)
Habitat/species/feature of the Natura 2000 site targeted by this action	Waterfowl assemblage
Brief description of action	Cutting shrubs and trees the surround the freshwater lagoon
Scale of implementation	Local
Potential direct/indirect impacts of the action on restoration of this habitat/species/feature, as identified in the application	Improving flight lines from the SPA to the freshwater lagoon will increase connectivity between the two areas
Other wider benefits, as identified in the application	none
Condition assessment of the target habitat/species in this/these Natura 2000 site(s)	Not assessed
'Issue' or 'risk' for *this* habitat type/species/feature in *this* Natura 2000 site, which the action addresses	Access/Use - erosion/disturbance/damage

3.8.1 EVALUATION QUESTIONS FOR ACTION 8

3.8.1.1 Q1 Is there good evidence for the potential impact of this action on the condition of targeted Natura 2000 habitat(s) and /or species

Weight of evidence that links potential direct impacts of this action on the condition of targeted Natura 2000 habitat(s) and /or species in the location where it will be applied.

It is well established that flight lines can be interrupted by tree growth and support perches for predators. Improved sightlines and flight lines would increase use of the freshwater lagoon by birds from the SPA.

Assessment of strength of evidence: traffic light categories: Blue.

3.8.1.2 Q2 Are there potential environmental benefits at landscape scale within or beyond the Natura 2000 site itself?

Identified in the application: None.

Identified by this review: Improved connectivity between the SPA and freshwater lagoon.

3.8.1.3 Q3 Are there simple metrics for monitoring/evaluating the impacts of this action?

Identified in the application: None.

Identified additionally by this review: None.

3.8.1.4 Q4 Are there potential benefits for the local economy?

None identified.

3.8.1.5 Q5 Are there potential benefits for increasing engagement of the local community in the Natura 2000 site(s)?

Identified in the application: local volunteer time will be used to help with scrub control.

Identified additionally by this review: None.

3.9 ASSESSMENT OF ACTION 9

Action description and relationship with Natura 2000 features and priorities

Action 9 Enhancing SPA wetlands	Create new wetland treatment system
Natura 2000 site(s) relevant to this action	Carmarthen Bay & Estuaries EMS (Inc. Burry Inlet & Carmarthen Bay SPA)
Habitat/species/feature of the Natura 2000 site targeted by this action	Waterfowl assemblage
Brief description of action	Creation of reedbed
Scale of implementation	120m^2 of reedbed
Potential direct/indirect impacts of the action on restoration of this habitat/species/feature, as identified in the application	A wetland treatment system will improve the quality of water entering the freshwater lagoon
Other wider benefits, as identified in the application	Improved water quality flowing from freshwater lagoon to N2K site
Condition assessment of the target habitat/species in this/these Natura 2000 site(s)	Not assessed
'Issue' or 'risk' for *this* habitat type/species/feature in *this* Natura 2000 site, which the action addresses	Access/Use - erosion/disturbance/damage

3.9.1 EVALUATION QUESTIONS FOR ACTION 9

3.9.1.1 Q1 Is there good evidence for the potential impact of this action on the condition of targeted Natura 2000 habitat(s) and /or species

Weight of evidence that links potential direct impacts of this action on the condition of targeted Natura 2000 habitat(s) and /or species in the location where it will be applied.

Reedbed treatment systems are a well-established method of filtering particulates from land surface water flows.

Assessment of strength of evidence: traffic light categories: Blue.

3.9.1.2 Q2 Are there potential environmental benefits at landscape scale within or beyond the Natura 2000 site itself?

Identified in the application: Freshwater flows into the N2K site will be improved

Identified by this review:

3.9.1.3 Q3 Are there simple metrics for monitoring/evaluating the impacts of this action?

Identified in the application: none

Identified additionally by this review:

3.9.1.4 Q4 Are there potential benefits for the local economy?

None identified.

3.9.1.5 Q5 Are there potential benefits for increasing engagement of the local community in the Natura 2000 site(s)?

Identified in the application: use of volunteers for reed planting.

Identified additionally by this review: None.

3.10 ADDITIONAL COMMENTS

The application gives a comprehensive account of the actions required to improve the quality of the Natura 2000 site, both within the designated area and supporting habitat. There is little, if any, mention of how the impact of the actions could be addressed. However, given that all actions are commonplace there is a high probability of success.

This is a well described project with logical and well tested actions, the outcomes of which should have a high chance of improving the quality of the Natura 2000 site. The cumulative impact of each action should multiply the benefit of the outcomes. Consideration has also been given to reducing the impact of construction works on surrounding species, habitats and visitors to the Wetlands Centre.

An area for improvement in the application would be to evidence how monitoring and evaluation metrics could/would be collected to demonstrate value for money and the effectiveness of the actions implemented.

4 PROJECT 4A ERYRI N2K TRADITIONAL BOUNDARIES AND STOCK-PROOFING

LIST OF ACTIONS

	Eryri N2K traditional boundaries and stock-proofing		
	Action number/type	**Action includes**	**Natura 2000 habitat/species/feature targeted**
1	Boundary repair and stock-proofing, Eryri SAC	• Dry stone walling • Slate-pillar fencing • Hedgerow works	Unclear
2	Boundary repair and stock-proofing, Coedydd Derw Meirionnydd SAC	• Re-introducing and managing conservation grazing sites • More connectivity features and minimizing habitat fragmentation	Unclear

4.1 ASSESSMENT OF ACTION 1

Action description and relationship with Natura 2000 features and priorities

Action 1 Eryri N2K traditional boundaries and stock-proofing	**Boundary repair and stock-proofing**
Natura 2000 site(s) relevant to this action	Eryri SAC
Habitat/species/feature of the Natura 2000 site targeted by this action	Unclear
Brief description of action	Dry stone walling, slate-pillar fencing and hedgerow works
Scale of implementation	£100,000 at Glastir rates with 30% contributions from land managers
Potential direct/indirect impacts of the action on restoration of this habitat/species/feature, as identified in the application	Safeguard, introduce or exclude grazing based on ecological evidence.
Other wider benefits, as identified in the application	Landscape connectivity, increased water absorption, carbon sequestration and storage along with biodiversity gains.
Condition assessment of the target habitat/species in this/these Natura 2000 site(s)	Unclear
'Issue' or 'risk' for this habitat type/species/feature in this Natura 2000 site, which the action addresses	Unclear

4.1.1 EVALUATION QUESTIONS FOR ACTION 1

4.1.1.1 Q1 Is there good evidence for the potential impact of this action on the condition of targeted Natura 2000 habitat(s) and /or species

Weight of evidence that links potential direct impacts of this action on the condition of targeted Natura 2000 habitat(s) and /or species in the location where it will be applied.

It is unclear which feature of Eryri SAC is being targeted by this action. It could be intended to target a wide variety of habitat features, as >10 types of grassland, heathland and wetland habitats have threats related to grazing management – including under and/or over-grazing.

This boundary repair sets out to ensure appropriate grazing of habitats. This was identified in the SFS Evidence Review as beneficial for biodiversity in many semi-natural habitats. In fact, the evidence review highlighted that financial support for grazing often needs to be accompanied by capital payments for e.g. walling.

The applicant claims strongly that when it comes to boundary repair in the area, “demand always outstrips supply”. If this is true, it implies a high level of additionality for this action, whereby boundaries would not be repaired in the absence of this grant. The follow on impact of boundary repair on biodiversity does hinge on a corresponding change in grazing management, however.

Restored boundaries can be expected to facilitate appropriate grazing over ~10 years. Management will apparently meet the Snowdonia National Park Authority’s minimum 5-year maintenance obligation but, in many cases, well-delivered works will have no need for meaningful follow-up for at least 25 years.

Assessment of strength of evidence: traffic light categories: Amber (unclear to which, if any, SAC features grazing might apply).

4.1.1.2 Q2 Are there potential environmental benefits at landscape scale within or beyond the Natura 2000 site itself?

Identified in the application: The applicant claims benefits for landscape connectivity, increased water absorption, carbon sequestration and storage along with biodiversity gains. There is good evidence for the impacts of hedgerows with respect to all of the above points. Dry stone walls provide refugia for birds, insects, small mammals and lizards, but their contribution to water absorption and carbon storage is not well-evidenced.

Identified by this review: The SFS Evidence Review also identified benefits of management to facilitate appropriate grazing in terms of livestock management and reduced soil damage.

4.1.1.3 Q3 Are there simple metrics for monitoring/evaluating the impacts of this action?

Identified in the application: The applicant only pledges to monitor the completion of the actions proposed, and not their environmental effects. This is on the grounds that it would not be feasible given the funding and timescale.

Identified additionally by this review: Monitoring of habitat features of Eryri SAC might be achieved through repeat vegetation community condition assessments.

4.1.1.4 Q4 Are there potential benefits for the local economy?

Benefits for the local economy are likely in terms of contractors being employed, but also through increased efficiency of grazing systems and, potentially, sustained tourist footfall.

4.1.1.5 Q5 Are there potential benefits for increasing engagement of the local community in the Natura 2000 site(s)?

Identified in the application: Traditional boundaries are expected to contribute to communities by dispelling boundary disputes and "stock trespass". Aesthetic benefits are also likely to result.

Identified additionally by this review: None.

4.2 ASSESSMENT OF ACTION 2

Action description and relationship with Natura 2000 features and priorities

Action 2 Eryri N2K traditional boundaries and stock-proofing	**Boundary repair and stock-proofing**
Natura 2000 site(s) relevant to this action	Coedydd Derw Meirionnydd SAC
Habitat/species/feature of the Natura 2000 site targeted by this action	Unclear
Brief description of action	Re-introducing and managing conservation grazing sites. More connectivity features and minimizing habitat fragmentation.
Scale of implementation	£50,000 at Glastir rates with 30% contributions from land managers
Potential direct/indirect impacts of the action on restoration of this habitat/species/feature, as identified in the application	Provide invaluable connectivity corridors and foraging lines for biodiversity.
Other wider benefits, as identified in the application	Landscape connectivity, increased water absorption, carbon sequestration and storage along with biodiversity gains.
Condition assessment of the target habitat/species in this/these Natura 2000 site(s)	Unclear
'Issue' or 'risk' for *this* habitat type/species/feature in *this* Natura 2000 site, which the action addresses	Unclear

4.2.1 EVALUATION QUESTIONS FOR ACTION 2

4.2.1.1 Q1 Is there good evidence for the potential impact of this action on the condition of targeted Natura 2000 habitat(s) and /or species

Weight of evidence that links potential direct impacts of this action on the condition of targeted Natura 2000 habitat(s) and /or species in the location where it will be applied.

It is unclear which feature of Coedydd Derw Meirionnydd SAC is being targeted by this action. It could be intended to target a wide variety of habitat features, as >3 types of heathland and woodland habitats have threats related to grazing management – including under and/or over-grazing.

This intervention is quite vague, but broadly sets out to introduce or sustain appropriate grazing. This was identified in the SFS Evidence Review as beneficial for biodiversity in many semi-natural habitats. This action also has increased emphasis on features for connectivity, but the nature of these features is unclear. If this involves increases in woody features, the SFS Evidence Review highlighted mixed biodiversity outcomes, with benefits for some species but not others depending on the habitat in question.

Restored boundaries can be expected to facilitate appropriate grazing over ~10 years. Management will apparently meet Snowdonia National Park Authority's minimum 5-year maintenance obligation but, in many cases, well-delivered works will have no need for meaningful follow-up for at least 25 years.

Assessment of strength of evidence: traffic light categories: Amber (unclear to which, if any, SAC features grazing might apply).

4.2.1.2 Q2 Are there potential environmental benefits at landscape scale within or beyond the Natura 2000 site itself?

Identified in the application: The applicant claims benefits for landscape connectivity, increased water absorption, carbon sequestration and storage along with biodiversity gains. There is good evidence for the impacts of hedgerows with respect to all of the above points. Dry stone walls provide refugia for birds, insects, small mammals and lizards, but their contribution to water absorption and carbon storage is not well-evidenced.

Identified by this review: The SFS evidence review also identified benefits of appropriate grazing in terms of livestock management and reduced soil damage.

4.2.1.3 Q3 Are there simple metrics for monitoring/evaluating the impacts of this action?

Identified in the application: The applicant only pledges to monitor the completion of the actions proposed, and not their environmental effects. This is on the grounds that it would not be feasible given the funding and timescale.

Identified additionally by this review: Monitoring of habitat features of Coedydd Derw Meirionnydd SAC might be achieved through repeat vegetation community condition assessments.

4.2.1.4 Q4 Are there potential benefits for the local economy?

Benefits for the local economy are likely both in terms of contractors being employed, but also through increased efficiency of grazing systems and, potentially, sustained tourist footfall.

4.2.1.5 Q5 Are there potential benefits for increasing engagement of the local community in the Natura 2000 site(s)?

Identified in the application: Traditional boundaries are expected to contribute to communities by dispelling boundary disputes and “stock trespass”. Aesthetic benefits are also likely to result.

Identified additionally by this review: None.

4.3 ADDITIONAL COMMENTS

This project was difficult to assess because it is very vague, both with respect to the management to be undertaken and the features being targeted. Nonetheless, it is feasible that management to facilitate and sustain appropriate grazing will bring biodiversity benefits in both of the corresponding SACs, or at least help prevent biodiversity loss. The applicant’s intention to build connectivity through boundary features is laudable but their plan to make this happen is not clear.

The applicant suggests a commitment to grazing the right places at the right times, but they don’t specify at all which habitats will be grazed or when. Such information would allow a robust evaluation of the proposed actions in light of the evidence.

The vagueness of the application may have resulted from the narrow time window, and/or the page limit of the application form (this project is part of a single application covering multiple projects/sites). However, the sum requested for this sub-project (£150,000) is considerable; much larger than some single-site projects funded under the same scheme to carry out management to facilitate appropriate grazing (e.g. Aberbargoed Grasslands ~£75,000). From this perspective it is a shame that so little detail is given about which management will be carried out, how much of it, and where.

5 PROJECT 4C ERYRI N2K GWAITH POWDWR

LIST OF ACTIONS

	Eryri N2K Gwaith Powdwr		
	Action number/type	**Action includes**	**Natura 2000 habitat/species/feature targeted**
1	Repointing, rebuilding walls and/or concrete repairs	• Repointing, rebuilding walls and/or concrete repairs • Largely targeted at preventing structural failure • Sites: Acid plant, J2, K1, P11, P15	Lesser horseshoe bat - *Rhinolophus hipposideros*
2	Timber repairs, roof repairs, access & utility improvements	• Timber repairs, roof repairs, access & utility improvements • Targeted at structural improvements, but in some cases improved access and use of buildings • Sites: Pendulum shed, settling shed, T1, T2, T4, T7	Lesser horseshoe bat - *Rhinolophus hipposideros*

5.1 ASSESSMENT OF ACTION 1

Action description and relationship with Natura 2000 features and priorities

Action 1 Eryri N2K Gwaith Powdwr	**Repointing, rebuilding walls and/or concrete repairs**
Natura 2000 site(s) relevant to this action	Coedydd Derw a Safleoedd Ystlumod Meirion/ Meirionnydd Oakwoods and Bat Sites SAC
Habitat/species/feature of the Natura 2000 site targeted by this action	Lesser horseshoe bat - Rhinolophus hipposideros
Brief description of action	Repointing, rebuilding walls and/or concrete repairs. Largely targeted at preventing structural failure. Sites: e.g. Acid plant, J2, K1, P11, P15
Scale of implementation	~5 buildings
Potential direct/indirect impacts of the action on restoration of this habitat/species/feature, as identified in the application	Building improvements to prevent structural failure and improve conditions for lesser horseshoe bats.
Other wider benefits, as identified in the application	Maximise buildings' potential for biodiversity and community engagement
Condition assessment of the target habitat/species in this/these Natura 2000 site(s)	Favourable
'Issue' or 'risk' for this habitat type/species/feature in this Natura 2000 site, which the action addresses	Favourable

5.1.1 EVALUATION QUESTIONS FOR ACTION 1

5.1.1.1 Q1 Is there good evidence for the potential impact of this action on the condition of targeted Natura 2000 habitat(s) and /or species

Weight of evidence that links potential direct impacts of this action on the condition of targeted Natura 2000 habitat(s) and /or species in the location where it will be applied.

The action is to carry out structural works and repairs on a set of ~5 buildings, largely of some historical importance. The structures are in considerable disrepair and do not appear to receive regular use. Many, but not all, are within the SAC and SSSI, designated for presence of lesser horseshoe bats. Many, but not all, have had lesser horseshoe bats recorded within them. Works include, but are not limited to, repointing, rebuilding walls and concrete repairs. These measures are intended to improve conditions for the lesser horseshoe bat, which has been assessed as in favourable condition.

The importance of buildings as roosts for lesser horseshoe bats is well evidenced. Experts have suggested that maintenance of bat roosts is probably very important for this species, and if the works prolong the life of the buildings then they might allow them to be used as bat roosts further into the future. However, while there is a logic chain for this action to benefit the target SAC feature, such management is not well tested at multiple sites.

The action appears to have additionality as the applicant suggests these works will not occur in the absence of the grant. Many of the works are implied to be effective for >10 years.

Assessment of strength of evidence: traffic light categories: Amber.

5.1.1.2 Q2 Are there potential environmental benefits at landscape scale within or beyond the Natura 2000 site itself?

Identified in the application: Co-benefits are identified for landscape-scale availability of roosts for bats. Non-target biodiversity such as birds and small mammals may also benefit.

Identified by this review: None.

5.1.1.3 Q3 Are there simple metrics for monitoring/evaluating the impacts of this action?

Identified in the application: The applicant only pledges to monitor the completion of the actions proposed, and not their environmental effects. This is on the grounds that it would not be feasible given the funding and timescale.

Identified additionally by this review:

Structured monitoring of lesser horseshoe bat roosts.

5.1.1.4 Q4 Are there potential benefits for the local economy?

Yes – local contractors are likely to be employed for this work.

5.1.1.5 Q5 Are there potential benefits for increasing engagement of the local community in the Natura 2000 site(s)?

Identified in the application: Benefits are identified for social inclusion, volunteering, access and education – particularly with respect to the historic significance of the buildings.

Identified additionally by this review: None.

5.2 ASSESSMENT OF ACTION 2

Action description and relationship with Natura 2000 features and priorities

Action 2 Eryri N2K Gwaith Powdwr	**Timber repairs, roof repairs, access & utility improvements**
Natura 2000 site(s) relevant to this action	Coedydd Derw a Safleoedd Ystlumod Meirion/ Meirionnydd Oakwoods and Bat Sites SAC
Habitat/species/feature of the Natura 2000 site targeted by this action	Lesser horseshoe bat - *Rhinolophus hipposideros*
Brief description of action	Timber repairs, roof repairs, access & utility improvements. Targeted at structural improvements, but in some cases improved access and use of buildings. Sites: Pendulum shed, settling shed, T1, T2, T4, T7
Scale of implementation	~6 buildings
Potential direct/indirect impacts of the action on restoration of this habitat/species/feature, as identified in the application	Building improvements to prevent structural failure and improve conditions for lesser horseshoe bats.
Other wider benefits, as identified in the application	Maximise buildings' potential for biodiversity and community engagement
Condition assessment of the target habitat/species in this/these Natura 2000 site(s)	Favourable
'Issue' or 'risk' for *this* habitat type/species/feature in *this* Natura 2000 site, which the action addresses	Favourable

5.2.1 EVALUATION QUESTIONS FOR ACTION 2

5.2.1.1 Q1 Is there good evidence for the potential impact of this action on the condition of targeted Natura 2000 habitat(s) and /or species

Weight of evidence that links potential direct impacts of this action on the condition of targeted Natura 2000 habitat(s) and /or species in the location where it will be applied.

The action is to carry out structural works and repairs on a set of ~6 buildings, largely of some historical importance. The structures are in variable states of disrepair and appear to receive variable amounts of use. Many, but not all, are within the SAC and SSSI, designated for presence of lesser horseshoe bats. Many, but not all, have had lesser horseshoe bats recorded within them. Works include, but are not limited to, timber repairs, roof repairs, access and utility improvements. These measures are intended to improve conditions for the lesser horseshoe bat, which has been assessed as in favourable condition.

The importance of buildings as roosts for lesser horseshoe bats is well evidenced. Experts have suggested that maintenance of bat roosts is probably very important for this species, and if the works prolong the life of the buildings then they might allow them to be used as bat roosts further into the future.

This action differs from Action 1 (above) in that there is an emphasis on increased access and usage of several of the buildings, sometimes installing utilities such as water supply, electricity and solar panels. Some of the buildings are clearly intended to receive increased use following the works – even a few buildings in which lesser horseshoe bat roosts have been recorded in the past. Published studies show that lesser horseshoe bats (a) prefer disused buildings for roosts and (b) are a photophobic species. However, warmer parts of buildings are also often used by this species. Overall, the link between the action and the target SAC features is weak, and it is not inconceivable that bat roosts might be disturbed by this action. Specific options for bats are presented throughout the plan for these buildings, but they are optional additional extras and there is no clear indication that they will be taken up. Assurance is given that care will be taken to stay within SSSI/SAC rules where applicable. This should eliminate the risk of any negative impacts within the SSSI/SAC.

Many of the works are implied to be effective for >10 years.

Assessment of strength of evidence: traffic light categories: Pink

5.2.1.2 Q2 Are there potential environmental benefits at landscape scale within or beyond the Natura 2000 site itself?

Identified in the application: Co-benefits are identified for landscape-scale availability of roosts for bats. Non-target biodiversity such as birds and small mammals may also benefit.

Identified by this review: None.

5.2.1.3 Q3 Are there simple metrics for monitoring/evaluating the impacts of this action?

Identified in the application: The applicant only pledges to monitor the completion of the actions proposed, and not their environmental effects. This is on the grounds that it would not be feasible given the funding and timescale.

Identified additionally by this review: Structured monitoring of lesser horseshoe bat roosts.

5.2.1.4 Q4 Are there potential benefits for the local economy?

Yes – local contractors are likely to be employed for this work. Furthermore, the works are likely to add considerable value to property on-site.

5.2.1.5 Q5 Are there potential benefits for increasing engagement of the local community in the Natura 2000 site(s)?

Identified in the application: Benefits are identified for social inclusion, volunteering, access and education – particularly with respect to the historic significance of the buildings.

For this action in particular there are likely to be strong community benefits, giving activity space for local groups and volunteers.

Identified additionally by this review: None.

5.3 ADDITIONAL COMMENTS

This sub-project was difficult to assess because an indeterminate subset of the works highlighted in the building conservation plan are to be undertaken. As such, assessment assumes all the works will be undertaken.

The applicant proposes these works primarily on the grounds of benefits for the lesser horseshoe bat, especially in terms of wider landscape connectivity for this species. Some of the buildings and works proposed are clearly targeted at this species, and may confer benefits through improved state and longevity of buildings serving as bat roosts.

However, a large subset of the funding for the works is focussed around improving access to and usage of the buildings. These works will undoubtedly confer community and economic benefits to the site. However, for works focussed on water supply, electricity, flooring, solar panels etc. there is no clear link to the target SAC feature. In fact, it is not inconceivable that a small subset of the works might diminish the quality of roosts for lesser horseshoe bats. Some of the works specifically targeted at bats, e.g. bat boxes, are presented in the plan as optional additional extras and it is not clear whether they will actually be taken up.

Overall the community and economic benefits of these works are likely to be considerable, but outcomes for the target feature, in this case the lesser horseshoe bat, are highly uncertain.

6 PROJECT 6 GILFACH

LIST OF ACTIONS

	Gilfach		
	Action number/type	**Action includes**	**Natura 2000 habitat/species/feature targeted**
1	Cutting back Purple moor-grass (*Molinia caerula)*	Cutting up dense tussocks of *Molinia caerula*	Blanket Bog
2	Clearing vegetation to create firebreaks	Clearing firebreaks through gorse, heather, bracken and grass	Not clear but assumed to include dry heaths, grasslands and blanket bog, and the three SPA features, Merlin, Peregrine and Red Kite
3	Clear footpaths and rides	Clear vegetation from footpaths and woodland rides	Not clear but assumed to be on Dry Heath and Blanket Bog
4	Mowing to maintain waxcap grasslands	Maintain a short sward in waxcap grasslands	Grasslands on soils rich in heavy metals
5	Top leys to increase soil fertility	Top leys to build organic matter and increase soil fertility	Not clear but assumed to be Grasslands on soils rich in heavy metals, and two avian predators (Merlin, {Peregrine)
6	Cut back encroaching gorse	Cut areas of encroaching gorse	Not clear but assumed to be Grassland on soils rich in heavy metals and/or Blanket Bog Merlin, Peregrine

6.1 ASSESSMENT OF ACTION 1

Action description and relationship with Natura 2000 features and priorities

Action 1 Gilfach	**Cutting back *Molinia***
Natura 2000 site(s) relevant to this action	Elenydd Mallaen SPA and Elenydd SAC
Habitat/species/feature of the Natura 2000 site targeted by this action	Blanket bog
Brief description of action	Cut and break up dense tussocks of *Molinia caerula* (Purple Moor-grass)
Scale of implementation	1.2 ha
Potential direct/indirect impacts of the action on restoration of this habitat/species/feature, as identified in the application	Improves conditions for specialist Blanket Bog plants such as bog asphodel (*Narthecium ossifragum*) and round-leaved sundew (*Drosera rotundifolia*). Facilitates subsequent grazing by cattle and ponies to further manage the *Molinia*
Other wider benefits, as identified in the application	None identified
Condition assessment of the target habitat/species in this/these Natura 2000 site(s)	Unknown
'Issue' or 'risk' for *this* habitat type/species/feature in *this* Natura 2000 site, which the action addresses	Grazing – type and timing (medium risk). This action does not address over-grazing (medium risk) or inappropriate vehicle use

6.1.1 EVALUATION QUESTIONS FOR ACTION 1

6.1.1.1 Q1 Is there good evidence for the potential impact of this action on the condition of targeted Natura 2000 habitat(s) and /or species

Weight of evidence that links potential direct impacts of this action on the condition of targeted Natura 2000 habitat(s) and /or species in the location where it will be applied.

The potential impact of *Molinia* on bog flora is well known and cutting up the dense tussocks should yield desired outcome of improved conditions for specialist bog plants such as round-leaved sundew (*Drosera rotundifolia*) hence the 'blue' assessment of the strength of the evidence for this action). Without management, blanket bog can become dominated by a single species and cutting provides conditions for greater diversification. The condition of the bog can be further improved by planting of *Sphagnum* moss which underpins most bog communities in the UK, but cutting is often sufficient. Although the current condition of blanket bog in the Elenydd SAC is unknown, it was previously assessed as unfavourable.

Assessment of strength of evidence: traffic light categories: Blue

6.1.1.2 Q2 Are there potential environmental benefits at landscape scale within or beyond the Natura 2000 site itself?

Identified in the application: None

Identified by this review:

6.1.1.3 Q3 Are there simple metrics for monitoring/evaluating the impacts of this action?

Identified in the application: None provided.

Identified additionally by this review: Monitoring of the prevalence of specialist bog plants could be undertaken.

6.1.1.4 Q4 Are there potential benefits for the local economy?

None.

6.1.1.5 Q5 Are there potential benefits for increasing engagement of the local community in the Natura 2000 site(s)?

Identified in the application: None, except for subsequent grazing of areas where *Molinia* has been cut, and could be more easily grazed by cattle and ponies.

Identified additionally by this review: None.

6.2 ASSESSMENT OF ACTION 2

Action 2 Gilfach	Clearing vegetation to create firebreaks
Natura 2000 site(s) relevant to this action	Elenydd Mallaen SPA and Elenydd SAC
Habitat/species/feature of the Natura 2000 site targeted by this action	Blanket bog, dry heath, grasslands on soils rich in heavy metals, Merlin, Peregrine, Red Kite
Brief description of action	Clear firebreaks through gorse, heather, bracken and grass
Scale of implementation	1.4 km
Potential direct/indirect impacts of the action on restoration of this habitat/species/feature, as identified in the application	Unclear. The application states that the firebreaks are aimed to protect lichen-rich rocks (not a designated feature per se but could be aspects of blanket bog, grasslands or dry heath) from catastrophic fires
Other wider benefits, as identified in the application	None except the lichen-rich rocks
Condition assessment of the target habitat/species in this/these Natura 2000 site(s)	Dry heath – Unfavourable Blanket bog – Unknown Grasslands – Favourable Merlin, Peregrine and Red Kite – unknown
'Issue' or 'risk' for *this* habitat type/species/feature in *this* Natura 2000 site, which the action addresses	Fire is a Medium priority issue for all three SPA features (Merlin, Peregrine, Red Kite) and identified as a Low Risk for Dry Heath and Blanket Bog

6.2.1 EVALUATION QUESTIONS FOR ACTION 2

6.2.1.1 Q1 Is there good evidence for the potential impact of this action on the condition of targeted Natura 2000 habitat(s) and /or species

Weight of evidence that links potential direct impacts of this action on the condition of targeted Natura 2000 habitat(s) and /or species in the location where it will be applied.

Firebreaks minimise the spread of fire across critical habitats and are deployed widely in a wide range of situations. Merlin are ground nesters and Peregrine occasional ground-nesters in the UK, hence at risk to fires during the breeding season. Red Kite is a tree-nesting species hence also at risk if fires occur in wooded areas.

Assessment of strength of evidence: traffic light categories: Amber (not clear where the action will be undertaken).

6.2.1.2 Q2 Are there potential environmental benefits at landscape scale within or beyond the Natura 2000 site itself?

Identified in the application: None identified.

Identified by this review: Minimising the spread of catastrophic fire should have wider benefits to other plants, invertebrates and a range of bird species whether nesting on or off the ground.

6.2.1.3 Q3 Are there simple metrics for monitoring/evaluating the impacts of this action?

Identified in the application: None specified

Identified additionally by this review: None

6.2.1.4 Q4 Are there potential benefits for the local economy?

None

6.2.1.5 Q5 Are there potential benefits for increasing engagement of the local community in the Natura 2000 site(s)?

Identified in the application: None specified for this action

Identified additionally by this review:

6.3 ASSESSMENT OF ACTION 3

Action description and relationship with Natura 2000 features and priorities

Action 3 Gilfach	Clearing footpaths and woodland rides
Natura 2000 site(s) relevant to this action	Elenydd Mallaen SPA
Habitat/species/feature of the Natura 2000 site targeted by this action	Blanket bog, dry heath
Brief description of action	Clear vegetation from footpaths and woodland rides
Scale of implementation	9.65 km of footpaths, 0.68 km woodland rides
Potential direct/indirect impacts of the action on restoration of this habitat/species/feature, as identified in the application	Improved access for visitors Improved access for habitat management (vehicles and equipment)
Other wider benefits, as identified in the application	Improved connectivity to adjacent sites, increasing public engagement with the site and its key features Health and socio-economic benefits of walking and being able to access other sites Facilitates extraction of conifers from woodlands as part of woodland management
Condition assessment of the target habitat/species in this/these Natura 2000 site(s)	Dry heath – unfavourable Blanket bog – unknown
'Issue' or 'risk' for *this* habitat type/species/feature in *this* Natura 2000 site, which the action addresses	Not applicable

6.3.1 EVALUATION QUESTIONS FOR ACTION 3

6.3.1.1 Q1 Is there good evidence for the potential impact of this action on the condition of targeted Natura 2000 habitat(s) and /or species

Weight of evidence that links potential direct impacts of this action on the condition of targeted Natura 2000 habitat(s) and /or species in the location where it will be applied.

No evidence provided that clearing footpaths and rides will lead to increased visitor rates, and it is not clear that increased access to the site, or increased access by vehicles to undertake woodland habitat management, will have any direct benefits. Although improved access was not judged to cause any harm to the designated habitat features assumed to be affected (not clear in application), in the case of breeding raptors (red kite, merlin and

peregrine), increased disturbance by visitors and/or machinery may have negative consequences due to disturbance or direct exploitation. Hence this impact was considered to be either negligible, or with possible trade-offs due to disturbance for the raptors and the risk (low) of increased access increasing susceptibility to erosion.

Assessment of strength of evidence: traffic light categories: Pink.

6.3.1.2 Q2 Are there potential environmental benefits at landscape scale within or beyond the Natura 2000 site itself?

Identified in the application: None other than increased access to other natural areas in the same geographical area.

Identified by this review: None

6.3.1.3 Q3 Are there simple metrics for monitoring/evaluating the impacts of this action?

Identified in the application: Not specified.

Identified additionally by this review:

6.3.1.4 Q4 Are there potential benefits for the local economy?

Not clear – it was stated there could be socio-economic benefits, assumed to be related to the potential for better walks in the application area and consequent spending by visitors.

6.3.1.5 Q5 Are there potential benefits for increasing engagement of the local community in the Natura 2000 site(s)?

Identified in the application: Increased access has the potential to increase engagement in local communities, but it is not clear how this will have any direct positive impact on any of the designated features.

Identified additionally by this review: None.

6.4 ASSESSMENT OF ACTION 4

Action description and relationship with Natura 2000 features and priorities

Action 4 Gilfach	Mowing to maintain waxcap grasslands
Natura 2000 site(s) relevant to this action	Elenydd Mallaen SPA and Elenydd SAC
Habitat/species/feature of the Natura 2000 site targeted by this action	Grassland on soils rich in heavy metals
Brief description of action	Mowing to maintain a short sward in waxcap grasslands
Scale of implementation	0.4 ha
Potential direct/indirect impacts of the action on restoration of this habitat/species/feature, as identified in the application	Improved conditions for heath waxcap specialist species such as ballerina waxcap Expansion of heath heather specialists
Other wider benefits, as identified in the application	None identified for this action
Condition assessment of the target habitat/species in this/these Natura 2000 site(s)	Grassland on soil rich in heavy metals – Favourable
'Issue' or 'risk' for *this* habitat type/species/feature in *this* Natura 2000 site, which the action addresses	None identified for this feature, or this action

6.4.1 EVALUATION QUESTIONS FOR ACTION 4

6.4.1.1 Q1 Is there good evidence for the potential impact of this action on the condition of targeted Natura 2000 habitat(s) and /or species

Weight of evidence that links potential direct impacts of this action on the condition of targeted Natura 2000 habitat(s) and /or species in the location where it will be applied.

Regular mowing to maintain a short sward to benefit waxcap communities is well-established good practice (e.g. Plantlife (2014) *Waxcaps and grassland fungi – a guide to identification and management*) although care must be taken to avoid soil compaction through the use of heavy machinery.

Assessment of strength of evidence: traffic light categories: Blue

6.4.1.2 Q2 Are there potential environmental benefits at landscape scale within or beyond the Natura 2000 site itself?

Identified in the application: None provided.

Identified by this review: None.

6.4.1.3 Q3 Are there simple metrics for monitoring/evaluating the impacts of this action?

Identified in the application: Not specified

Identified additionally by this review: None

6.4.1.4 Q4 Are there potential benefits for the local economy?

No

6.4.1.5 Q5 Are there potential benefits for increasing engagement of the local community in the Natura 2000 site(s)?

Identified in the application: None

Identified additionally by this review: The site is visited and the range of plant/lichen/waxcap/bog specialists found on the site, as well as the breeding raptor species, has the potential to engage local communities.

6.5 ASSESSMENT OF ACTION 5

Action description and relationship with Natura 2000 features and priorities

Action 5 Gilfach	Top leys to increase soil fertility for wildlife crops
Natura 2000 site(s) relevant to this action	Elenydd Mallaen SPA and Elenydd SPA
Habitat/species/feature of the Natura 2000 site targeted by this action	Not clear but given the mention of wildlife cover crops to benefit bird and mammal species, assumed to be the SPA features Red Kite, Merlin and Peregrine
Brief description of action	Top leys with green manure to build organic matter and increase soil fertility for wildlife cover crops
Scale of implementation	0.5 ha
Potential direct/indirect impacts of the action on restoration of this habitat/species/feature, as identified in the application	Not clear - increased fertility for future growing of wildlife cover crops. This will benefit a range of small passerines, hares and invertebrates – which are not features – but the increased prey resource could benefit breeding raptors such as merlin and peregrine.
Other wider benefits, as identified in the application	Wildlife cover crops will benefit a wide range of non-target species groups
Condition assessment of the target habitat/species in this/these Natura 2000 site(s)	Merlin, Peregrine and Red Kite - unknown
'Issue' or 'risk' for *this* habitat type/species/feature in *this* Natura 2000 site, which the action addresses	Not applicable

6.5.1 EVALUATION QUESTIONS FOR ACTION 5

6.5.1.1 Q1 Is there good evidence for the potential impact of this action on the condition of targeted Natura 2000 habitat(s) and /or species

Weight of evidence that links potential direct impacts of this action on the condition of targeted Natura 2000 habitat(s) and /or species in the location where it will be applied.

The benefit of topping leys identified in the application is the increased soil fertility for growing cover crops. Topping leys is the practice of applying organic material such as green manure to small areas of land, often edges, of permanent pasture for a season or limited number of years. The application states that a subsequent conservation action – the planting

of wildlife crops - would be facilitated by the increased soil fertility achieved by topping leys. These crops are stated to benefit a wide range of seed-eating birds such as yellowhammer and chaffinch as well as brown hare and invertebrates. None of these species are themselves features of the SPA but include species found on the mosaic of habitats in the application area. Importantly, although it is not stated explicitly in the application, increased numbers of these birds and mammals could provide a food source for the raptor feature species such as Merlin, Peregrine and Red Kite. Although there is no good evidence for this chain of events and the benefit of cover crops to birds is questionable (*see ERAMMP Evidence Review 4 Ecosystem Resilience v1.1*) and much will depend on other factors such as the food resources provided by other habitats in the area, the logic is good – hence coded amber for those three species, two of which are avian predators (Merlin and Peregrine) and one a more omnivorous and scavenging species (Red Kite).

Although the location of the ley topping is not provided (and would probably change from year to year), it is likely to be undertaken on habitats such as permanent pasture and not on any of the designated habitat features of the SAC. Importantly, none of the SAC habitat features (Blanket Bog, Dry Heath or Grasslands on soils rich in heavy metals) would be benefitted by increased soil fertility, so the impact on those would have been coded 'Pink' at best and arguably a disbenefit.

Assessment of strength of evidence: traffic light categories: Amber for Merlin, Peregrine and Red Kite (assuming an increase in avian and other prey).

6.5.1.2 Q2 Are there potential environmental benefits at landscape scale within or beyond the Natura 2000 site itself?

Identified in the application: Not identified

Identified by this review: The wildlife cover crops that are the ultimate objective of the increased fertility by topping leys provide a food source for many passerines breeding or wintering on agricultural land, and given their mobility, especially outside the breeding season, this resource may help support broader populations in the landscape.

6.5.1.3 Q3 Are there simple metrics for monitoring/evaluating the impacts of this action?

Identified in the application: Not specified.

Identified additionally by this review: None, and given the small scale and short time period but most importantly the assumed chain of benefits upward through the food chain – unlikely to be detected.

6.5.1.4 Q4 Are there potential benefits for the local economy?

None

6.5.1.5 Q5 Are there potential benefits for increasing engagement of the local community in the Natura 2000 site(s)?

Identified in the application: Not identified

Identified additionally by this review:

6.6 ASSESSMENT OF ACTION 6

Action description and relationship with Natura 2000 features and priorities

Action 6 Gilfach	Cut back encroaching gorse
Natura 2000 site(s) relevant to this action	Elenydd Mallaen SPA and Elenydd SAC
Habitat/species/feature of the Natura 2000 site targeted by this action	Grasslands on soils rich in heavy metals Blanket Bog Dry Heath Also assumed to be: Merlin, Peregrine
Brief description of action	Cut back areas of encroaching gorse
Scale of implementation	0.2 ha
Potential direct/indirect impacts of the action on restoration of this habitat/species/feature, as identified in the application	Protection of acid grasslands from encroaching gorse and hence slowing and halting succession to woodland.
Other wider benefits, as identified in the application	Areas of ling *(Calluna vulgaris*) and bell heather (*Erica cinerea*) expanded Increased edge habitat for non-feature bird species such as linnet and yellowhammer
Condition assessment of the target habitat/species in this/these Natura 2000 site(s)	Grasslands on soils rich in heavy metals – Favourable) Dry Heath – Unfavourable Blanket Bog – Unknown Merlin, Peregrine- unknown
'Issue' or 'risk' for *this* habitat type/species/feature in *this* Natura 2000 site, which the action addresses	Insufficient grazing, which this action will to some extent replace, has been identified as a high priority issue for Merlin and a low priority issue for Peregrine Moreover, over-grazing and/or the type and timing of grazing were identified as medium priority issues for Blanket Bog, Dry Heath and Merlin

6.6.1 EVALUATION QUESTIONS FOR ACTION 6

6.6.1.1 Q1 Is there good evidence for the potential impact of this action on the condition of targeted Natura 2000 habitat(s) and /or species

Weight of evidence that links potential direct impacts of this action on the condition of targeted Natura 2000 habitat(s) and /or species in the location where it will be applied.

Not entirely clear in the application. The action is stated to be aimed at protecting acid grassland (Grasslands on soils rich in heavy metals are the explicitly designated feature) and the evidence for the value of halting/slowing gorse and shrub succession to woodland on grasslands, heaths and blanket bog is good ('blue'). The application is not entirely clear about where this action will be applied but the mention of ling heather and bell heather suggests it will include the Blanket Bog area. Given the proposed benefits to a number of bird species as a consequence of increased edge habitat (by keeping those habitats more open) and the assumed benefit of that prey resource to two specialists that depend on avian food resources (Merlin and Peregrine), there are also likely to be benefits to those two SPA features.

Gorse will be a feature of the Dry Heath habitat and important for nesting for some of the passerine species mentioned (e.g. Linnet) but keeping it under control and halting succession to woodland will be beneficial in maintaining that habitat feature.

Assessment of strength of evidence: traffic light categories: Blue for Grasslands, Dry Heath and Blanket Bog. Amber for Merlin and Peregrine

6.6.1.2 Q2 Are there potential environmental benefits at landscape scale within or beyond the Natura 2000 site itself?

Identified in the application: None identified

Identified by this review: The piece of equipment purchased has the possibility of being deployed elsewhere.

6.6.1.3 Q3 Are there simple metrics for monitoring/evaluating the impacts of this action?

Identified in the application: Not specified

Identified additionally by this review:

6.6.1.4 Q4 Are there potential benefits for the local economy?

None were identified, and the purchase of the equipment for future-proofed and self-contained means of habitat management (as opposed to using local contractors or livestock) makes that unlikely.

6.6.1.5 Q5 Are there potential benefits for increasing engagement of the local community in the Natura 2000 site(s)?

Identified in the application: Not identified

Identified additionally by this review: As for Q4, this seems unlikely.

6.7 ADDITIONAL COMMENTS

It was not clear on which habitat some of the conservation actions were to be undertaken.

Most of the costs for this application were for a bespoke piece of equipment to be used not only for the habitat management to be carried out during this short project but over the much longer term. The argument made in the application is that this piece of machinery (a Koppa crawler remote control power unit and a range of attachments) will make future habitat management more feasible due to the difficulty of managing machinery and livestock on steep slopes and the potential unsustainability of using grazers as economic conditions deteriorate. In that sense at least, purchase of the equipment might have a net negative impact on the local economy and community engagement if there is less subsequent use of local contractors or their livestock.

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7 PROJECT 7 GLOBE WAY

LIST OF ACTIONS

	Globe Way		
	Action number/type	**Action includes**	**Natura 2000 habitat/species/feature targeted**
1	Pond restoration and creation	• Creation of 1 pond • Restoration of 4 ponds	Deeside and Buckley SAC, great crested newt (*Triturus cristatus*)
2	Wildflower meadow management	• Planting wildflower plugs • Public engagement	Deeside and Buckley SAC - None

7.1 ASSESSMENT OF ACTION 1

Action description and relationship with Natura 2000 features and priorities

Action 1 Globe Way	Pond restoration and creation
Natura 2000 site(s) relevant to this action	Deeside and Buckley SAC
Habitat/species/feature of the Natura 2000 site targeted by this action	Great crested newt (*Triturus cristatus*)
Brief description of action	Expanding available pond habitat for amphibian breeding in site adjoined to Deeside and Buckley SAC. Method of restoration has been trialled on pond at this site.
Scale of implementation	1 pond created and 4 ponds restored in a cluster. Scale not given.
Potential direct/indirect impacts of the action on restoration of this habitat/species/feature, as identified in the application	Increased breeding population size for amphibians, including great crested newt. Improved habitat connectivity for all amphibians in Deeside and Buckley SAC.
Other wider benefits, as identified in the application	Improved access to wildlife in an urban landscape.
Condition assessment of the target habitat/species in this/these Natura 2000 site(s)	Unfavourable
'Issue' or 'risk' for *this* habitat type/species/feature in *this* Natura 2000 site, which the action addresses	Habitat loss and fragmentation

7.1.1 EVALUATION QUESTIONS FOR ACTION 1

7.1.1.1 Q1 Is there good evidence for the potential impact of this action on the condition of targeted Natura 2000 habitat(s) and /or species

Weight of evidence that links potential direct impacts of this action on the condition of targeted Natura 2000 habitat(s) and /or species in the location where it will be applied.

There is good evidence based on multiple studies that the creation and restoration of pond habitats is beneficial to amphibian populations and the great crested newt (GCN) specifically. Studies have consistently found that amphibians use created ponds in a similar way to natural ponds, and that created ponds support a similar or greater species richness of

breeding amphibians, although not all created or restored ponds see the establishment of a stable breeding population, or an increase in individual abundance. There is some evidence that the success of created ponds is affected by age, permanence, vegetation cover, distance to existing ponds, the presence of fish, and the surrounding landscape.

There is good evidence that GCN will use created ponds to establish breeding populations, particularly when translocated to the new site. Evidence of natural colonisation exists, but is more limited, and rates appear to be slow. As such, benefits for the GCN specifically may be slow to materialise without additional intervention, depending on the distance between newly constructed sites and existing habitat in Deeside and Buckley SAC.

There is a small risk that the creation of new pond habitat will encourage the establishment of non-native species, which would require additional management to maintain. Ongoing management at the site will be supported by long-term leasing from Flintshire County Council, which is dependent on continued funding.

Smith, R.K., Meredith, H. & Sutherland, W.J. (2020) Amphibian Conservation. Pages 9-64 in: W.J. Sutherland, L.V. Dicks, S.O. Petrovan & R.K. Smith (eds) What Works in Conservation 2020. Open Book Publishers, Cambridge, UK.

Assessment of strength of evidence: traffic light categories: Blue

7.1.1.2 Q2 Are there potential environmental benefits at landscape scale within or beyond the Natura 2000 site itself?

Identified in the application: Landscape scale benefits consist of improvements in habitat connectivity for amphibian species, as identified above.

Identified by this review: There is good evidence that creating an artificial water source can also benefit bird and bat populations, providing the water is not contaminated with diffuse runoff or other pollutants.

Berthinussen, A., Richardson O.C. and Altringham J.D. (2021) Bat Conservation: Global Evidence for the Effects of Interventions. Conservation Evidence Series Synopses. University of Cambridge, Cambridge, UK.

7.1.1.3 Q3 Are there simple metrics for monitoring/evaluating the impacts of this action?

Identified in the application: Pond species are monitored in an ongoing annual survey (not funded by this application) and all species data is uploaded to Cofnod[1] – All Wales GCN.

Identified additionally by this review: None

7.1.1.4 Q4 Are there potential benefits for the local economy?

Pond creation will be done by a local contractor, hired for the purpose.

[1] Local Environmental Records Centre for North Wales

7.1.1.5 Q5 Are there potential benefits for increasing engagement of the local community in the Natura 2000 site(s)?

Identified in the application: Passive benefits by improving enjoyment of people walking trails through the site. Potential active benefits, by providing additional volunteering opportunities at the site in the future.

Identified additionally by this review: None.

7.2 ASSESSMENT OF ACTION 2

Action description and relationship with Natura 2000 features and priorities

Action 2 Globe Way	Wildflower meadow management
Natura 2000 site(s) relevant to this action	Deeside and Buckley SAC
Habitat/species/feature of the Natura 2000 site targeted by this action	None
Brief description of action	Improving plant diversity in existing meadow (currently poor) with species favouring clay soil and insect biodiversity. Using plugs rather than seeds. Delivered by staff and volunteers.
Scale of implementation	Not given
Potential direct/indirect impacts of the action on restoration of this habitat/species/feature, as identified in the application	Wildlife corridor for SAC species.
Other wider benefits, as identified in the application	Increased wildflower diversity. Local engagement with the site. Improved resource availability for species dependent on wildflower habitat. Improved access to wildlife in an urban environment.
Condition assessment of the target habitat/species in this/these Natura 2000 site(s)	NA
'Issue' or 'risk' for *this* habitat type/species/feature in *this* Natura 2000 site, which the action addresses	NA

7.2.1 EVALUATION QUESTIONS FOR ACTION 2

7.2.1.1 Q1 Is there good evidence for the potential impact of this action on the condition of targeted Natura 2000 habitat(s) and /or species

Weight of evidence that links potential direct impacts of this action on the condition of targeted Natura 2000 habitat(s) and /or species in the location where it will be applied.

There is strong evidence that planting wildflowers can have a positive impact on insect abundance, small mammal abundance and bird abundance, but the majority of evidence is from an agricultural setting and all evidence considers the effect on abundance at the site of the wildflower patch or strip, not in surrounding habitats. The magnitude of the benefit to local diversity will be very dependent on the size of the wildflower patch and whether this habitat will be maintained by management long-term. Significant changes in the flower community can be expecting within 1-5 years, with associated changes in the invertebrate community,

depending on the species planted and the area affected. Evidence for a positive relationship between flower diversity and insect diversity is less abundant, and relationships often differ between sites, with some areas showing reduced insect diversity at high levels of flowing plant diversity. This is consistent with the current academic understanding of the ways in which pollinators use plants, which suggests that levels of pollinator specialisation and plant preference are highly variable. Although generalist pollinator species are likely to benefit from wildflower planting, more specialist species may require the planting of targeted flower types in higher abundance.

Wildflower corridors will not directly benefit the features of the Deeside and Buckley SAC. However, it is likely to benefit other species which are contributing to the overall biodiversity and resilience of the SAC by providing additional habitat and food sources, although primary evidence is lacking. The use of plugs rather than seeds is likely to increase the chances of successful establishment of new flower species.

Dicks, L.V., Ashpole, J.E., Dänhardt, J., James, K., Jönsson, A., Randall, N., Showler, D.A., Smith, R.K., Turpie, S., Williams, D.R. & Sutherland, W.J. (2020) Farmland Conservation. Pages 283-321 in: W.J. Sutherland, L.V. Dicks, S.O. Petrovan & R.K. Smith (eds) What Works in Conservation 2020. Open Book Publishers, Cambridge, UK.

Shackelford, G. E., Kelsey, R., Robertson, R. J., Williams, D. R. & Dicks, L. V. (2017) Sustainable Agriculture in California and Mediterranean Climates: Evidence for the effects of selected interventions. Synopses of Conservation Evidence Series. University of Cambridge, Cambridge, UK.

And personal expertise.

Assessment of strength of evidence: traffic light categories: No link

7.2.1.2 Q2 Are there potential environmental benefits at landscape scale within or beyond the Natura 2000 site itself?

Identified in the application: Evidence for the benefits of planting wildflowers at the site of the action (beyond the Natura site) is discussed above. Summarising, there is good evidence that planting wildflowers can increase the amount of wildlife supported in that area (including birds, small mammals and invertebrates) but this may be dependent on the quality of surrounding habitats. The majority of evidence for this relationship comes from agricultural systems.

Continued wildflower diversity may require some ongoing management to prevent encroachment by faster growing species.

Dicks, L.V., Ashpole, J.E., Dänhardt, J., James, K., Jönsson, A., Randall, N., Showler, D.A., Smith, R.K., Turpie, S., Williams, D.R. & Sutherland, W.J. (2020) Farmland Conservation. Pages 283-321 in: W.J. Sutherland, L.V. Dicks, S.O. Petrovan & R.K. Smith (eds) What Works in Conservation 2020. Open Book Publishers, Cambridge, UK.

Littlewood, N.A., Rocha, R., Smith, R.K., Martin, P.A., Lockhart, S.L., Schoonover, R.F., Wilman, E., Bladon, A.J., Sainsbury, K.A., Pimm S. and Sutherland, W.J. (2020) Terrestrial Mammal Conservation: Global Evidence for the Effects of Interventions for terrestrial mammals excluding bats and primates. Synopses of Conservation Evidence Series. University of Cambridge, Cambridge, UK.

Identified by this review: None.

7.2.1.3 Q3 Are there simple metrics for monitoring/evaluating the impacts of this action?

Identified in the application: The wildflower meadow will be monitored annually to determine whether planting was successful. Butterfly and bee surveys will also be undertaken to determine how other species at the site have benefited.

Identified additionally by this review: More general invertebrate surveys could also be conducted. Tracking the species composition of the wildflower meadow may help identify any problematic species invading the site at an early stage.

7.2.1.4 Q4 Are there potential benefits for the local economy?

None

7.2.1.5 Q5 Are there potential benefits for increasing engagement of the local community in the Natura 2000 site(s)?

Identified in the application: Active engagement involving volunteering to plant new flowering species.

Passive engagement by increasing enjoyment of visiting site, although it should be noted that there is evidence that botanical diversity is not closely linked to people's enjoyment when visiting a site.

Identified additionally by this review: None.

7.3 ADDITIONAL COMMENTS

A good level of habitat monitoring appears to be in place at this site. Although the site is outside the SAC, the applicants have identified two clear issues a) lack of pond permanence which is preventing successful amphibian breeding and b) low meadow biodiversity, and are addressing these in a robust fashion. This application states clearly the expected benefits from an ecological perspective, although it is missing some practical details (mainly spatial scope of the actions).

The applicants also consider ecological factors in their risk assessment, although it reports the risks of inaction, rather than the risks of problems that could arise from the intended actions.

8 PROJECT 10A SKOMER

LIST OF ACTIONS

	Skomer		
	Action number/type	**Action includes**	**Natura 2000 habitat/species/feature targeted**
1	Small mammal trapping on boats and landing area	Purchase and deployment of small mammal traps on boats and boat landing area of Skomer	Skomer, Skokholm and seas off Pembrokeshire SPA – Manx Shearwater, European Storm-petrel, Atlantic Puffin
2	Biosecurity signage on boats and landing area	Signage for visitors explaining the importance of preventing entry of non-native species, particularly mammals, to island (Skomer)	Skomer, Skokholm and seas off Pembrokeshire SPA – Manx Shearwater, European Storm-petrel, Atlantic Puffin
3	Live camera streaming and equipment maintenance	Deployment and maintenance of live cameras to show wildlife to potential visitors	Unclear but assumed to be: Manx Shearwater, European Storm-petrel, Atlantic Puffin, Short-eared Owl and Chough
4	Improved interpretative signage	Replacement of degraded interpretative signage	Skomer, Skokholm and seas off Pembrokeshire SPA; Pembrokeshire Marine SAC – no features specified

8.1 ASSESSMENT OF ACTION 1

Action description and relationship with Natura 2000 features and priorities

Action 1 Skomer	Invasive mammal trapping
Natura 2000 site(s) relevant to this action	Skomer, Skokholm and seas off Pembrokeshire SPA
Habitat/species/feature of the Natura 2000 site targeted by this action	Manx Shearwater, European Storm-petrel, Atlantic Puffin
Brief description of action	Purchase and deployment of small mammal traps on boats and boat landing area of Skomer
Scale of implementation	Deployment of 10 traps
Potential direct/indirect impacts of the action on restoration of this habitat/species/feature, as identified in the application	Preventing the entry of invasive non-native mammals such as rats and mice to Skomer. Controlling the spread of invasive non-native mammals such as rats and mice accidently introduced.
Other wider benefits, as identified in the application	None identified
Condition assessment of the target habitat/species in this/these Natura 2000 site(s)	Manx Shearwater and European Storm-petrel – not assessed Atlantic Puffin – not assessed
'Issue' or 'risk' for *this* habitat type/species/feature in *this* Natura 2000 site, which the action addresses	Medium – the only risk identified is 'vessel accidents and associated issues' which has been assumed, for the purposes of this assessment, to include the introduction of invasive non-native rats and mice.

8.1.1 EVALUATION QUESTIONS FOR ACTION 1

8.1.1.1 Q1 Is there good evidence for the potential impact of this action on the condition of targeted Natura 2000 habitat(s) and /or species

Weight of evidence that links potential direct impacts of this action on the condition of targeted Natura 2000 habitat(s) and /or species in the location where it will be applied.

The application emphasizes the importance of protecting the large numbers of burrow-nesting seabirds from predation (by invasive small mammals such as rats and mice). The serious negative consequences of colonisation by these species is well established globally (Jones et al. 2008) and eradication by trapping is one of the established methods for controlling them including in the UK (Stanbury et al. 2017). It was not made clear how many entry points are on the island and hence whether deployment of 10 traps would be sufficient but as the aim is to prevent colonisation rather than control existing mammal populations, this method is the safest and most cost-effective.

Jones, H., Tershy, B., Zavaleta, E., Croll, D., Keitt, B., Finkelstein, M. and Howald, G. (2008). 'Review of the global severity of the effects of invasive rats on seabirds'. Conservation Biology 22: 16–26.

Stanbury, A., Thomas, S., Aegerter, J., Brown, A., Bullock, A., Eaton, M., Lock, L., Luxmoore, R., Roy, S., Whitaker, S. and Oppel, S. (2017). Prioritising islands in the United Kingdom and crown dependencies for the eradication of invasive alien vertebrates and rodent biosecurity. European Journal of Wildlife Research 63: 31. doi.org/10.1007/s10344-017-1084-7

Assessment of strength of evidence: traffic light categories: Blue

8.1.1.2 Q2 Are there potential environmental benefits at landscape scale within or beyond the Natura 2000 site itself?

Identified in the application: None were identified.

Identified by this review: However, keeping Skomer free of rats and mice would have knock-on benefits by minimising further spread via boat traffic, of these species to other islands within the SPA or along the South Wales coast.

8.1.1.3 Q3 Are there simple metrics for monitoring/evaluating the impacts of this action?

Identified in the application: None.

Identified additionally by this review: Monitoring for the presence of invasive small mammals or their activities (attacks on seabird nestlings or eggs) or via the associated small mammal trapping

8.1.1.4 Q4 Are there potential benefits for the local economy?

The application stated that Skomer, one of the most popular nature reserves in the UK, normally hosts 20,000 visitors per year with consequent benefits to the local economy. Therefore, maintaining the site free of rats and mice and allowing the seabirds to flourish, and thus helping to ensure that the island continues to be a popular place to visit, will be important in sustaining those benefits in the future.

8.1.1.5 Q5 Are there potential benefits for increasing engagement of the local community in the Natura 2000 site(s)?

Identified in the application: None were identified in the application and this action is unlikely to engage the local community.

Identified additionally by this review:

8.2 ASSESSMENT OF ACTION 2

Action description and relationship with Natura 2000 features and priorities

Action 2 Skomer	Biosecurity signage
Natura 2000 site(s) relevant to this action	Skomer, Skokholm and seas off Pembrokeshire SPA
Habitat/species/feature of the Natura 2000 site targeted by this action	Manx Shearwater, European Storm-petrel, Atlantic Puffin
Brief description of action	Signage for visitors explaining the importance of preventing entry of non-native species to island (Skomer).
Scale of implementation	5 biosecurity signs
Potential direct/indirect impacts of the action on restoration of this habitat/species/feature, as identified in the application	Maintaining Skomer free of invasive small mammals such as rats and mice, which are a direct and serious threat to the survival of burrow-nesting seabirds.
Other wider benefits, as identified in the application	No others identified.
Condition assessment of the target habitat/species in this/these Natura 2000 site(s)	Manx Shearwater and European Storm-petrel – not assessed Atlantic Puffin – favourable (unclassified)
'Issue' or 'risk' for *this* habitat type/species/feature in *this* Natura 2000 site, which the action addresses	Medium – the only risk identified is 'vessel accidents and associated issues' which has been assumed, for the purposes of this assessment, to include the introduction of invasive non-native rats and mice.

8.2.1 EVALUATION QUESTIONS FOR ACTION 2

8.2.1.1 Q1 Is there good evidence for the potential impact of this action on the condition of targeted Natura 2000 habitat(s) and /or species

Weight of evidence that links potential direct impacts of this action on the condition of targeted Natura 2000 habitat(s) and /or species in the location where it will be applied.

Although there is not a lot of published evidence on the effectiveness of biosecurity signs aimed at educating visitors to islands about the serious threat of invasive small mammals to breeding seabirds, it is an established method (see Stanbury et al. 2017) and there is a wealth of evidence on the negative impact of species such as rats and mice on seabird colonies (see Jones et al. 2008). Burrow-nesting species (three of the feature species) are particularly vulnerable because nestlings grow slowly, remain in the burrow unattended for long periods of time and have a prolonged nestling stage. The target species for this action are not identified but there are likely to be benefits of keeping the island free of rodents for other ground nesting species, although the predatory Short-eared Owl (a feature of the

Pembrokeshire Marine SAC) may benefit, especially in the short-term, by colonisation by rodents such as Brown Rat or House Mouse.

Assessment of strength of evidence: traffic light categories: Blue for the positive impact on Natura 2000 feature species of keeping the island free of invasive mammals (But amber for the effectiveness of biosecurity signs as a means of ensuring this).

8.2.1.2 Q2 Are there potential environmental benefits at landscape scale within or beyond the Natura 2000 site itself?

Identified in the application: None were identified in the application.

Identified by this review: Educating tourists interested in wildlife (and hence likely to visit other seabird sites) about the serious threat posed by invasive small mammals, which will have benefits for other islands within this SPA (e.g. Skokholm) as well as further afield.

8.2.1.3 Q3 Are there simple metrics for monitoring/evaluating the impacts of this action?

Identified in the application: None.

Identified additionally by this review: Monitoring for the presence of invasive small mammals or their activities (attacks on seabird nestlings or eggs) or via the associated small mammal trapping

8.2.1.4 Q4 Are there potential benefits for the local economy?

Like the trapping, the biosecurity signage will help maintain flourishing populations of vulnerable burrow-nesting seabirds including three species which are designated features of the island. The presence of a large seabird colony accessible to visitors is important to the local economy through boat tours, local hotels, restaurants and shops.

8.2.1.5 Q5 Are there potential benefits for increasing engagement of the local community in the Natura 2000 site(s)?

Identified in the application: None identified

Identified additionally by this review:

8.3 ASSESSMENT OF ACTION 3

Action description and relationship with Natura 2000 features and priorities

Action 3 Skomer	Live camera streaming and maintenance
Natura 2000 site(s) relevant to this action	Skomer, Skokholm and seas off Pembrokeshire SPA (and potentially the broader Pembrokeshire Marine SAC in which the islands are situated)
Habitat/species/feature of the Natura 2000 site targeted by this action	No specific features identified in the application but likely to be flagship seabird species and/or seals and terrestrial wildlife.
Brief description of action	Deployment and maintenance of live cameras to show wildlife to potential visitors.
Scale of implementation	2 cameras
Potential direct/indirect impacts of the action on restoration of this habitat/species/feature, as identified in the application	Maintain and improve public interest in the site during Covid-19 lockdown restrictions. Reduced disturbance to breeding seabirds with consequent improvement in breeding success.
Other wider benefits, as identified in the application	It was discovered that people struggling with pressures of lockdown in unnatural environments found great comfort in the livestreaming of the island's wildlife. The livestreaming also allowed reach to a much larger audience. This activity therefore provides social and cultural benefits as well as the environmental benefits of showing people wildlife on Skomer without the negative consequences of disturbance.
Condition assessment of the target habitat/species in this/these Natura 2000 site(s)	Unclear Manx Shearwater and European Storm-petrel – not assessed Atlantic Puffin – favourable (unclassified) Short-eared Owl and Chough – unknown
'Issue' or 'risk' for *this* habitat type/species/feature in *this* Natura 2000 site, which the action addresses	None

8.3.1 EVALUATION QUESTIONS FOR ACTION 3

8.3.1.1 Q1 Is there good evidence for the potential impact of this action on the condition of targeted Natura 2000 habitat(s) and /or species

There is no immediate direct benefit of livestreaming the island's wildlife activities other than reducing disturbance from visitors. At the time of writing the number of visitors is still constrained due to Covid-19 requirements, but this direct benefit could be extended beyond the period of the project if it proves an effective disturbance-free means of maintaining and increasing public interest in nature on Skomer. Although not cited, there is considerable evidence that disturbance at seabird colonies can have negative impact on breeding colonies by interrupting food delivery to nestlings, facilitating predation by avian predators such as gulls and also through the trampling of burrows. Other wildlife species on Skomer, including seals, may also suffer negative consequences of high visitor numbers.

Weight of evidence that links potential direct impacts of this action on the condition of targeted Natura 2000 habitat(s) and /or species in the location where it will be applied.

The application did not provide evidence of the consequences of high visitor rates on the seabird species features but the effects of disturbance to seabird colonies have been well established elsewhere and therefore 'amber'.

Assessment of strength of evidence: traffic light categories: Amber

8.3.1.2 Q2 Are there potential environmental benefits at landscape scale within or beyond the Natura 2000 site itself?

Identified in the application: None were identified in the application.

Identified by this review: However, if livestreaming wildlife proves an effective substitute for high visitor rates and their negative consequences, this could be extended to other islands in the Pembrokeshire Marine SAC and along the South Wales coast which also host vulnerable seabirds.

8.3.1.3 Q3 Are there simple metrics for monitoring/evaluating the impacts of this action?

Identified in the application: None were identified.

Identified additionally by this review: Seabird species productivity rates, if measurable in 2020, could be used to compare with years with normal high visitor numbers.

8.3.1.4 Q4 Are there potential benefits for the local economy?

It was stated in the application that Skomer, one of the most popular nature reserves in the UK, normally hosts 20,000 visitors per year with consequent benefits to the local economy. Therefore, maintaining public interest in the site is important in sustaining those benefits in the future. However, given the trade-off with the negative consequences of too much disturbance, increased engagement by the public through live-streaming could conceivably lower visitor numbers in the future with potential negative impact on the local economy.

8.3.1.5 Q5 Are there potential benefits for increasing engagement of the local community in the Natura 2000 site(s)?

Identified in the application: The application mentions the cultural and social benefits that some local people, including hundreds of dedicated volunteers, have with the islands and their history, and the livestreaming may be a means of maintaining this important connection.

Identified additionally by this review: Livestreaming could be expanded in the future to encompass the cultural connection.

8.4 ASSESSMENT OF ACTION 4

Action description and relationship with Natura 2000 features and priorities

Action 4 Skomer	Improved interpretative signage
Natura 2000 site(s) relevant to this action	Skomer, Skokholm and seas off Pembrokeshire SPA (and potentially the broader Pembrokeshire Marine SAC in which the islands are situated)
Habitat/species/feature of the Natura 2000 site targeted by this action	None were identified but assumed to include the wildlife
Brief description of action	Replacement of degraded interpretative signage.
Scale of implementation	
Potential direct/indirect impacts of the action on restoration of this habitat/species/feature, as identified in the application	Unclear but the application implied that improved signage was needed to improve public support for the conservation work on the island.
Other wider benefits, as identified in the application	No other wider benefits of this action were identified.
Condition assessment of the target habitat/species in this/these Natura 2000 site(s)	Manx Shearwater and European Storm-petrel – not assessed Atlantic Puffin – favourable (unclassified) Short-eared Owl and Chough – unknown
'Issue' or 'risk' for *this* habitat type/species/feature in *this* Natura 2000 site, which the action addresses	None

8.4.1 EVALUATION QUESTIONS FOR ACTION 4

8.4.1.1 Q1 Is there good evidence for the potential impact of this action on the condition of targeted Natura 2000 habitat(s) and /or species

Weight of evidence that links potential direct impacts of this action on the condition of targeted Natura 2000 habitat(s) and /or species in the location where it will be applied.

No direct consequence of this action were explicitly identified other than it was aimed at reducing the impact of visitor pressure, which had been identified in the CMP as a significant issue on the island. It is difficult to assess evidence for this action without knowing whether the signs would be largely educating visitors about the wildlife or about how to behave on the island.

Assessment of strength of evidence: traffic light categories: Pink

8.4.1.2 Q2 Are there potential environmental benefits at landscape scale within or beyond the Natura 2000 site itself?

Identified in the application: None were identified.

Identified by this review: Whether aimed at providing ecological information or influencing visitor behaviour on the island, the messages would be applicable to other islands hosting seabird colonies in the same SPA and along the South Wales coast.

8.4.1.3 Q3 Are there simple metrics for monitoring/evaluating the impacts of this action?

Identified in the application: None

Identified additionally by this review: There may be opportunities post-lockdown to assess visitor behaviour (if that was the aim) by looking for changes in the extent of vegetation trampling off trails on the site

8.4.1.4 Q4 Are there potential benefits for the local economy?

Not from this action, particularly, although all actions that help maintain Skomer Island as a popular tourist attraction will have benefits.

8.4.1.5 Q5 Are there potential benefits for increasing engagement of the local community in the Natura 2000 site(s)?

Identified in the application: None.

Identified additionally by this review: As for the camera livestreaming (see Action 3), there may be opportunities to improve the cultural connection to local communities through new interpretative signage.

8.5 ADDITIONAL COMMENTS

This project is part of a single application covering a wide range of (sometimes overlapping) actions in different places and targeted towards different features of the Natura 2000 sites at those locations. In the case of this project it was sometimes difficult to attribute the stated benefits (and occasionally also the action and extent of it) appropriately, based on the information in the application. Some aspects of the application were low in detail for specific actions, although most of these are relatively small scale and low cost.

It would be easier to attribute the actions to sites and features if the application was structured more toward being site-specific.

9 PROJECT 10C PENGELLI FOREST

LIST OF ACTIONS

	Pengelli Forest		
	Action number/type	**Action includes**	**Natura 2000 habitat/species/feature targeted**
1	Machinery purchase	• Purchase of ATV to transport equipment around site • Purchase of ATV ramps • Purchase of electric chainsaws	Barbastelle bats Western acidic oak woodland
2	Volunteer equipment purchase	• Purchase of equipment for volunteers for vegetation management	None
3	Visitor facilities purchase	• Purchase of shelter and management base for visitors	None

9.1 ASSESSMENT OF ACTION 1

Action description and relationship with Natura 2000 features and priorities

Action 1 Pengelli Forest	Machinery purchase
Natura 2000 site(s) relevant to this action	North Pembrokeshire Woodlands/ Coedydd Gogledd Sir Benfro SAC
Habitat/species/feature of the Natura 2000 site targeted by this action	Barbastelle bats Western acidic oak woodland
Brief description of action	Purchase of one ATV to replace existing pick-up for equipment transfer around the site, which will allow easier access to some parts of the site. Purchase of ramps to transport ATV to the site. Purchase of two electric chainsaws (presumably replacing petrol driven chainsaws) to reduce noise and CO_2 emissions.
Scale of implementation	N/A
Potential direct/indirect impacts of the action on restoration of this habitat/species/feature, as identified in the application	Reduced noise disturbance from new chainsaws, reducing disturbance of Barbastelle bats. Improved access to areas of western acidic oak woodland for future management.
Other wider benefits, as identified in the application	Reduced CO_2 emissions from chainsaws.
Condition assessment of the target habitat/species in this/these Natura 2000 site(s)	Barbastelle bats: Unknown Western acidic oak woodland: Unknown
'Issue' or 'risk' for *this* habitat type/species/feature in *this* Natura 2000 site, which the action addresses	Woodland management and tree felling: Barbastelle bats: M Western acidic oak woodland: H

9.1.1 EVALUATION QUESTIONS FOR ACTION 1

9.1.1.1 Q1 Is there good evidence for the potential impact of this action on the condition of targeted Natura 2000 habitat(s) and /or species

Weight of evidence that links potential direct impacts of this action on the condition of targeted Natura 2000 habitat(s) and /or species in the location where it will be applied.

Noise pollution is not identified as an issue or risk for barbastelle bats at the site. One study has shown that high noise levels in caves during visits can cause greater numbers of bats to be flying during the visit, but found no effect on overall bat abundance. There is no evidence to suggest that a quieter chainsaw would be of significant benefit to barbastelle bats. There is some evidence that bats are more active (used as a measure of relative abundance) in thinned forests although some site comparison studies have also found no effect of thinning. The retention of large trees to act as roosts is thought to be beneficial for bat conservation.

Purchase of machinery when existing machinery is functional contributes a significant additional carbon footprint. The necessity of these purchases has not been fully explained, specifically in terms of new area made available for management. As the management required in currently hard to reach areas is not described, it is difficult to assess an evidence base underlying this action and behind this purchase. Both the barbastelle bat and western acidic oak woodland are identified as requiring additional woodland management and tree felling, therefore if the ATV facilitates additional management of this kind, it may benefit these features. Reducing damage to ground flora through vehicle access is desirable, but if the intention is to drive the ATV in areas that have not been previously damaged by vehicle access there is a risk of doing additional harm.

Berthinussen, A., Richardson O.C. and Altringham J.D. (2021) Bat Conservation: Global Evidence for the Effects of Interventions. Conservation Evidence Series Synopses. University of Cambridge, Cambridge, UK.

Assessment of strength of evidence: traffic light categories: Amber for potential benefits of managing currently unreachable areas.

9.1.1.2 Q2 Are there potential environmental benefits at landscape scale within or beyond the Natura 2000 site itself?

Identified in the application: Reduced CO_2 emissions due to the use of electric chainsaws. Other GHG benefits will be dependent on the life cycle of the new equipment and whether this is replacing functional equipment. Any benefits are likely to be small, and if the equipment is not maintained or powered with specifically green energy there will be no net benefit.

Identified by this review: Reduced air pollution at the site, due to use of electric chainsaws is possible, but the effects are likely to be small.

9.1.1.3 Q3 Are there simple metrics for monitoring/evaluating the impacts of this action?

Identified in the application: Meetings between staff and use of spreadsheet to record outputs

Identified additionally by this review: Monitoring ground flora in areas that the ATV is used compared with the footprint of the previous vehicle and within areas where vehicles had not previously been.

9.1.1.4 Q4 Are there potential benefits for the local economy?

None.

9.1.1.5 Q5 Are there potential benefits for increasing engagement of the local community in the Natura 2000 site(s)?

Identified in the application: None.

Identified additionally by this review: None.

9.2 ASSESSMENT OF ACTION 2

Action description and relationship with Natura 2000 features and priorities

Action 2 Pengelli Forest	Volunteer equipment purchase
Natura 2000 site(s) relevant to this action	North Pembrokeshire Woodlands/ Coedydd Gogledd Sir Benfro SAC
Habitat/species/feature of the Natura 2000 site targeted by this action	Unclear – implied western oak acidic woodland
Brief description of action	Purchase of equipment for volunteers to use when assisting with site management, with an emphasis on coppicing and species monitoring. Specifically: loppers, shears, gloves and PPE for spraying herbicide.
Scale of implementation	None mentioned
Potential direct/indirect impacts of the action on restoration of this habitat/species/feature, as identified in the application	Continued coppice management and species monitoring. Herbicide application (implied from equipment list).
Other wider benefits, as identified in the application	Social, physical and mental health benefits for volunteers from engagement opportunities. Improved volunteer skill sets to enhance job seeking opportunities.
Condition assessment of the target habitat/species in this/these Natura 2000 site(s)	Western acidic oak woodland: unknown
'Issue' or 'risk' for *this* habitat type/species/feature in *this* Natura 2000 site, which the action addresses	Unclear Woodland management and tree felling: H Scrub Invasion: H

9.2.1 EVALUATION QUESTIONS FOR ACTION 2

9.2.1.1 Q1 Is there good evidence for the potential impact of this action on the condition of targeted Natura 2000 habitat(s) and /or species

Weight of evidence that links potential direct impacts of this action on the condition of targeted Natura 2000 habitat(s) and /or species in the location where it will be applied.

No direct benefits will result from the equipment purchase.

However, if it facilitates continued management of the site by volunteers there may then be benefits to the Western acidic oak woodland, for which scrub invasion and a lack of

woodland management are an issue. Insufficient evidence is provided about planned activities to allow accurate assessment of the evidence base for this management.

Significant evidence gaps remain regarding the long-term benefits of traditional woodland management for the resilience of woodland ecosystems, although there is good evidence that management for structural diversity can promote an increase in species richness in bird and butterfly species.

Assessment of strength of evidence: traffic light categories:

Amber, dependent of further action.

9.2.1.2 Q2 Are there potential environmental benefits at landscape scale within or beyond the Natura 2000 site itself?

Identified in the application: None.

Identified by this review: Any benefits would be dependent on the management carried out by volunteers. The control of invasive species can improve habitat quality and connectivity for native vegetation. Maintaining an open forest structure can improve habitat connectivity for wider biodiversity that prefers open woodland.

9.2.1.3 Q3 Are there simple metrics for monitoring/evaluating the impacts of this action?

Identified in the application: Meetings between staff and use of spreadsheet to record outputs.

Identified additionally by this review: Volunteer numbers and use of equipment.

Management outputs and monitoring of community responses to management.

9.2.1.4 Q4 Are there potential benefits for the local economy?

In the long term, volunteers may develop skills that help them gain employment, which this equipment might facilitate, but these is no robust link between this and any benefit to the local economy.

9.2.1.5 Q5 Are there potential benefits for increasing engagement of the local community in the Natura 2000 site(s)?

Identified in the application: The purchase of this equipment facilitates continued volunteer management of the site.

Volunteer programme predates this application, but the purchase of new equipment will enable continued participation (or possibly expand the programme depending on the intention of the purchase).

Identified additionally by this review: None.

9.3 ASSESSMENT OF ACTION 3

Action description and relationship with Natura 2000 features and priorities

Action 3 Pengelli Forest	Visitor Facilities Purchase
Natura 2000 site(s) relevant to this action	North Pembrokeshire Woodlands/ Coedydd Gogledd Sir Benfro SAC
Habitat/species/feature of the Natura 2000 site targeted by this action	None
Brief description of action	Purchase of new facilities for visitor comfort and enjoyment of the site (shelter and a management base)
Scale of implementation	1 shelter, 1 base
Potential direct/indirect impacts of the action on restoration of this habitat/species/feature, as identified in the application	None
Other wider benefits, as identified in the application	Improved local engagement and education at the site and visitor experience.
Condition assessment of the target habitat/species in this/these Natura 2000 site(s)	*None*
'Issue' or 'risk' for *this* habitat type/species/feature in *this* Natura 2000 site, which the action addresses	None

9.3.1 EVALUATION QUESTIONS FOR ACTION 3

9.3.1.1 Q1 Is there good evidence for the potential impact of this action on the condition of targeted Natura 2000 habitat(s) and /or species

Weight of evidence that links potential direct impacts of this action on the condition of targeted Natura 2000 habitat(s) and /or species in the location where it will be applied.

No relevant impact.

Assessment of strength of evidence: traffic light categories: No link.

9.3.1.2 Q2 Are there potential environmental benefits at landscape scale within or beyond the Natura 2000 site itself?

Identified in the application: None.

Identified by this review: None.

9.3.1.3 Q3 Are there simple metrics for monitoring/evaluating the impacts of this action?

Identified in the application: Visitor feedback via social media, TripAdvisor and emails. Visitor numbers.

Identified additionally by this review: Feedback specifically on the content in the management centre and whether it was educational and helpful.

9.3.1.4 Q4 Are there potential benefits for the local economy?

If this investment increases visitor turnover there may be an indirect benefit, but there is no suggestion of a direct impact.

9.3.1.5 Q5 Are there potential benefits for increasing engagement of the local community in the Natura 2000 site(s)?

Identified in the application: Improved local engagement and education at the site via the management centre and visitor experience due to greater comfort.

Identified additionally by this review: The building of the management centre is being co-funded by Coppicewood College (along with WTSWW legacy income). This connection could further facilitate community engagement.

9.4 ADDITIONAL COMMENTS

This project is part of a single application covering multiple projects, locations, Natura 2000 sites and actions. The application reached the page limit specified for this funding application, and this may explain why there is not sufficient detail about planned management using the purchased equipment to accurately assess any evidence base underlying these actions. Some purchases appear to be replacing existing functional equipment, which may be fully justified, but that is not communicated well.

More detail regarding the planned engagement activities in the management centre would have been a useful indication that activities have been carefully planned.

10 PROJECT 10F TEIFI MARSHES

LIST OF ACTIONS

	Teifi Marshes		
	Action number/type	**Action includes**	**Natura 2000 habitat/species/feature targeted**
1	Visitor access and information	• Provision of boardwalk and interpretation panel • Felling hazardous trees • Picnic bench	unclear
2	Meadow management	• Fencing wet meadows to allow conservation grazing (supporting habitat) • Cut and collect on dry meadow	non-feature habitat
3	Pond habitat restoration	• Pond restoration	*Lutra lutra/* Otter
4	Bracken management change	• Bracken roller purchase to replace herbicide use	Issue targeted: water pollution - diffuse sources Feature not identified
5	Water level management	• New sluices to control water levels	unclear

10.1 ASSESSMENT OF ACTION 1

Action description and relationship with Natura 2000 features and priorities

Action 1 Teifi Marshes	Visitor access and information
Natura 2000 site(s) relevant to this action	Afon Teifi SAC
Habitat/species/feature of the Natura 2000 site targeted by this action	Unspecified Features affected by erosion and disturbance: • *Lampetra planeri* / Brook Lamprey • *Salmo salar* / Atlantic Salmon
Brief description of action	• Provision of boardwalk (to manage high number of visitors) • Interpretation panel • Felling hazardous trees • Picnic bench
Scale of implementation	150m boardwalk 1 bench Other metrics not given
Potential direct/indirect impacts of the action on restoration of this habitat/species/feature, as identified in the application	Signage helps protect sensitive features (unspecified). Reduced erosion.
Other wider benefits, as identified in the application	Public safety and comfort. Improved access. Greater engagement with the site.
Condition assessment of the target habitat/species in this/these Natura 2000 site(s)	• *Lampetra planeri* / Brook Lamprey: Favourable (low confidence) April 2020 • *Salmo salar* / Atlantic Salmon: Unfavourable (high confidence) April 2020
'Issue' or 'risk' for *this* habitat type/species/feature in *this* Natura 2000 site, which the action addresses	Access/Use - erosion/disturbance/damage • *Lampetra planeri* / Brook Lamprey: L (2012) • *Salmo salar* / Atlantic Salmon: L (2012)

10.1.1 EVALUATION QUESTIONS FOR ACTION 1

10.1.1.1 Q1 Is there good evidence for the potential impact of this action on the condition of targeted Natura 2000 habitat(s) and /or species

Weight of evidence that links potential direct impacts of this action on the condition of targeted Natura 2000 habitat(s) and /or species in the location where it will be applied.

Improved access ways and signage to encourage visitors remain on paths is a reasonable step to reduce damage to the site associated with high visitor turn over. Providing spaces for visitors to eat where damage to the environment from heavy foot traffic is less likely is also a sensible step, although there is no peer reviewed evidence to quantify the magnitude of any benefits.

Assessment of strength of evidence: traffic light categories: Amber

10.1.1.2 Q2 Are there potential environmental benefits at landscape scale within or beyond the Natura 2000 site itself?

Identified in the application: None

Identified by this review: None

10.1.1.3 Q3 Are there simple metrics for monitoring/evaluating the impacts of this action?

Identified in the application: Visitor feedback via social media, Trip Advisor and direct emails. Visitor counts and reports of antisocial behaviour incidence. Site condition monitoring by NRW.

Identified additionally by this review: Monitoring for signs of erosion around pathways. Monitoring of sedimentation and erosion in water ways

10.1.1.4 Q4 Are there potential benefits for the local economy?

A local contractor will be hired to build the boardwalk.

Minimising the signs of erosion and damage to a highly popular tourist attraction will help maintain the site to the benefit of the local economy. However, benefits to the local economy are dependent on the response of people to the new paths, which may cause crowding. Therefore, it cannot be assumed that measures taken to reduce the impact of tourism on a site will ultimately increase or preserve visitor numbers in the short or medium term.

10.1.1.5 Q5 Are there potential benefits for increasing engagement of the local community in the Natura 2000 site(s)?

Identified in the application: Providing easier access around the site and additional facilities will enable greater engagement with the site. This is a passive form of engagement, but the provision of a boardwalk could meaningfully improve equality of access to the site.

In the long-term if this action reduces erosion it may result in the site remaining appealing to visitors, but it's unclear if this would increase engagement overall.

The felling of dangerous trees will also enable continued engagement as without this, access to the site would have to be regulated in a stricter fashion due to safety concerns.

Identified additionally by this review:

10.2 ASSESSMENT OF ACTION 2

Action description and relationship with Natura 2000 features and priorities

Action 2 Teifi Marshes	Meadow management
Natura 2000 site(s) relevant to this action	Afon Teifi SAC
Habitat/species/feature of the Natura 2000 site targeted by this action	None
Brief description of action	Erect livestock fencing around wet meadows to allow conservation grazing over a greater area. Cut and collect on dry meadow
Scale of implementation	Not given
Potential direct/indirect impacts of the action on restoration of this habitat/species/feature, as identified in the application	Maintain marsh integrity
Other wider benefits, as identified in the application	Support pollinator habitat and flowing plant diversity. Protect meadow habitat and prevent natural succession. Increased habitat resilience to drought. Tourism benefits.
Condition assessment of the target habitat/species in this/these Natura 2000 site(s)	NA
'Issue' or 'risk' for *this* habitat type/species/feature in *this* Natura 2000 site, which the action addresses	NA

10.2.1 EVALUATION QUESTIONS FOR ACTION 2

10.2.1.1 Q1 Is there good evidence for the potential impact of this action on the condition of targeted Natura 2000 habitat(s) and /or species

Weight of evidence that links potential direct impacts of this action on the condition of targeted Natura 2000 habitat(s) and /or species in the location where it will be applied.

Lack of structural diversity an encroachment of shrubland has been identified of one of the most significant issues in Welsh dry meadow habitats, but signs of overgrazing are also common in places. In wet heaths, a lack of grazing is also a significant factor at the national scale. Preventing succession in wetland habitats can also help maintain a wetland environment and any water bodies at the site. Management to maintain appropriate grazing and successional states can be beneficial to animal and plant biodiversity in general.

The application does not specify what specific indirect benefits these actions would confer on the Natura 2000 site features, or what the specific challenges are being addresses, but do suggest that maintaining these sites would be generally supportive of marsh integrity, giving an example of nutrient management. Without further information this is difficult to access.

Although fencing is important when allowing grazing to take place to ensure management is well targeted, excessive cutting and mowing has been identified as an issue at the Afon Teifi SAC, negatively affecting bullhead, river lampreys, brook lamprey, otters, sea lamprey, Atlantic salmon and Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation. This raises significant questions about the intended management and its potential side effects in the SAC, in spite of any benefits to terrestrial

biodiversity. However, as the scale and location of this management is not provided in relation to waterways, it is possible this management is not relevant to the features at all.

Environment and Rural Affairs Monitoring & Modelling Programme (ERAMMP) Sustainable Farming Scheme Evidence Review Technical Annex Annex 4: Building ecosystem resilience

Assessment of strength of evidence: traffic light categories: No link

10.2.1.2 Q2 Are there potential environmental benefits at landscape scale within or beyond the Natura 2000 site itself?

Identified in the application: None

Identified by this review: As discussed above, meadow management may benefit local biodiversity within the meadows themselves and arrest succession.

10.2.1.3 Q3 Are there simple metrics for monitoring/evaluating the impacts of this action?

Identified in the application: Visitor feedback via social media. Trip Advisor and direct emails. Visitor counts and reports of antisocial behaviour incidence. Site condition monitoring by NRW.

Identified additionally by this review: Monitoring water quality for undesirable responses to changing nutrient inputs.

10.2.1.4 Q4 Are there potential benefits for the local economy?

Local contractors will build the fencing and provide cut and collect services. If the grazing animals have commercial value, then an expansion of herd size may also benefit the local economy.

10.2.1.5 Q5 Are there potential benefits for increasing engagement of the local community in the Natura 2000 site(s)?

Identified in the application: None

Identified additionally by this review: None

10.3 ASSESSMENT OF ACTION 3

Action description and relationship with Natura 2000 features and priorities

Action 3 Teifi Marshes	Pond habitat restoration
Natura 2000 site(s) relevant to this action	Afon Teifi SAC
Habitat/species/feature of the Natura 2000 site targeted by this action	*Lutra lutra* / Otter
Brief description of action	Restoration of a pond to expand otter feeding habitat
Scale of implementation	1 pond – scale not given
Potential direct/indirect impacts of the action on restoration of this habitat/species/feature, as identified in the application	Additional feeding habitat for otters
Other wider benefits, as identified in the application	Protect pond habitat and habitat for specialist plants
Condition assessment of the target habitat/species in this/these Natura 2000 site(s)	Unfavourable (medium confidence) (2020)
'Issue' or 'risk' for *this* habitat type/species/feature in *this* Natura 2000 site, which the action addresses	Risk: Freshwater non-native: M (Mar 2010) Issue: River restoration: L (Mar 2010)

10.3.1 EVALUATION QUESTIONS FOR ACTION 3

10.3.1.1 Q1 Is there good evidence for the potential impact of this action on the condition of targeted Natura 2000 habitat(s) and /or species

Weight of evidence that links potential direct impacts of this action on the condition of targeted Natura 2000 habitat(s) and /or species in the location where it will be applied.

Ponds often require management to maintain their presence in the landscape, to prevent them from silting up or being overwhelmed with invasive species. Restoring pond habitat has been shown to have positive outcomes for biodiversity, but any significant outcomes for local otter populations will be dependent on the size of the pond being restored, which is not given, its proximity to existing otter habitat and whether otter populations are currently restricted by habitat loss. The most significant threats to otter populations at the Afon Teifi site are reported to be terrestrial non-native species, freshwater fisheries management and diffuse sources of pollution.

Environment and Rural Affairs Monitoring & Modelling Programme (ERAMMP) Sustainable Farming Scheme Evidence Review Technical Annex Annex 9: Flood mitigation

Smith, R.K., Meredith, H. & Sutherland, W.J. (2020) Amphibian Conservation. Pages 9-64 in: W.J. Sutherland, L.V. Dicks, S.O. Petrovan & R.K. Smith (eds) What Works in Conservation 2020. Open Book Publishers, Cambridge, UK.

Assessment of strength of evidence: traffic light categories: Amber

10.3.1.2 Q2 Are there potential environmental benefits at landscape scale within or beyond the Natura 2000 site itself?

Identified in the application: Ponds can help buffer water availability in the landscape in the case of droughts or floods. The evidence that ponds can reduce flood risk is mixed and will

be dependent on the scale of the structure and any additional management to increase their capacity to store additional water in winter. Likewise, the volume of water contained in the pond will influence its ability to provide a refuge in drought conditions.

Environment and Rural Affairs Monitoring & Modelling Programme (ERAMMP) Sustainable Farming Scheme Evidence Review Technical Annex Annex 9: Flood mitigation

Identified by this review:

10.3.1.3 Q3 Are there simple metrics for monitoring/evaluating the impacts of this action?

Identified in the application: Site condition monitoring by NRW.

Identified additionally by this review: Monitoring pond for otter activity.

10.3.1.4 Q4 Are there potential benefits for the local economy?

A local contactor will be used.

10.3.1.5 Q5 Are there potential benefits for increasing engagement of the local community in the Natura 2000 site(s)?

Identified in the application: None

Identified additionally by this review: None

10.4 ASSESSMENT OF ACTION 4

Action description and relationship with Natura 2000 features and priorities

Action 4 Teifi Marshes	Bracken management change
Natura 2000 site(s) relevant to this action	Afon Teifi / River Teifi
Habitat/species/feature of the Natura 2000 site targeted by this action	Unspecified in application Features affected by diffuse pollution: • *Cottus gobio* / Bullhead • *Lampetra fluviatilis* / River Lamprey • *Lampetra planeri* / Brook Lamprey • *Luronium natans* / Floating Water – Plantain • *Lutra lutra* / Otter • *Petromyzon marinus* / Sea Lamprey • *Salmo salar* / Atlantic Salmon • Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation
Brief description of action	Purchase of bracken roller to allow management of invasive bracken without the use of herbicides (used in the absence of the new equipment)
Scale of implementation	Not given
Potential direct/indirect impacts of the action on restoration of this habitat/species/feature, as identified in the application	Reduced diffuse pollution of waterways. Removal of a terrestrial invasive species
Other wider benefits, as identified in the application	None
Condition assessment of the target habitat/species in this/these Natura 2000 site(s)	Features affected by diffuse pollution: • *Cottus gobio* / Bullhead: Unknown • *Lampetra fluviatilis* / River Lamprey: Favourable (low confidence) • *Lampetra planeri* / Brook Lamprey: Favourable (low confidence) • *Luronium natans* / Floating Water – Plantain: Favourable (high confidence) • *Lutra lutra* / Otter: Unfavourable (medium confidence) • *Petromyzon marinus* / Sea Lamprey: Unfavourable (medium) • *Salmo salar* / Atlantic Salmon: Unfavourable (high confidence) • Rivers with floating vegetation often dominated by water-crowfoot: Unfavourable (medium confidence)
'Issue' or 'risk' for *this* habitat type/species/feature in *this* Natura 2000 site, which the action addresses	Features affected by diffuse pollution: • *Cottus gobio* / Bullhead: H • *Lampetra fluviatilis* / River Lamprey: H • *Lampetra planeri* / Brook Lamprey: H • *Luronium natans* / Floating Water – Plantain: M • *Lutra lutra* / Otter: H • *Petromyzon marinus* / Sea Lamprey: H • *Salmo salar* / Atlantic Salmon: H • Rivers with floating vegetation often dominated by water-crowfoot: H

10.4.1 EVALUATION QUESTIONS FOR ACTION 4

10.4.1.1 Q1 Is there good evidence for the potential impact of this action on the condition of targeted Natura 2000 habitat(s) and /or species

Weight of evidence that links potential direct impacts of this action on the condition of targeted Natura 2000 habitat(s) and /or species in the location where it will be applied.

Herbicide sprays can be detrimental to non-target species in the terrestrial environment and associated waterways, depending on the type of herbicide used. They can also have health risks to the general public and people applying the herbicide, again dependent on the specific herbicide being used and the level of exposure. As an example, glyphosate, which is a widely used herbicide, has been widely reported to leach into associated waterways and can be relatively persistent in the environment. At high concentrations this can be toxic to aquatic species, although the thresholds for this are variable. The risk of acute toxicity to people (and other mammals) from glyphosate residue is minimal, although risks of chronic exposure (including carcinogenic effects) are debated in the literature (Bai and Ogbourne, 2016).

Eliminating the use of herbicide and substituting with mechanical control will remove the risk of unintended side effects from the use of herbicide. Manual invasive species management can be challenging in its own right, particularly if a large area has been colonised, but this is dependent on having appropriate manpower.

Whether this substitution will benefit Natura 2000 site features will depend on whether herbicide contamination was contributing significantly to diffuse pollution at the site, which is more typically associated with agricultural runoff.

Bai, S.H., Ogbourne, S.M. Glyphosate: environmental contamination, toxicity and potential risks to human health via food contamination. Environ Sci Pollut Res 23, 18988–19001 (2016). https://doi.org/10.1007/s11356-016-7425-3

Assessment of strength of evidence: traffic light categories: Amber

10.4.1.2 Q2 Are there potential environmental benefits at landscape scale within or beyond the Natura 2000 site itself?

Identified in the application: As discussed above, reduced risk of herbicide contamination effecting non-target species.

Identified by this review: None

10.4.1.3 Q3 Are there simple metrics for monitoring/evaluating the impacts of this action?

Identified in the application: Site condition monitoring by NRW.

Identified additionally by this review: Monitoring for decreased diffuse pollution and herbicide presence in waterways (if historically present) and monitoring of bracken coverage.

10.4.1.4 Q4 Are there potential benefits for the local economy?

None

10.4.1.5 Q5 Are there potential benefits for increasing engagement of the local community in the Natura 2000 site(s)?

Identified in the application: None

Identified additionally by this review: None

10.5 ASSESSMENT OF ACTION 5

Action description and relationship with Natura 2000 features and priorities

Action 5 Teifi Marshes	Water level management
Natura 2000 site(s) relevant to this action	Afon Teifi / River Teifi
Habitat/species/feature of the Natura 2000 site targeted by this action	None specified
Brief description of action	New sluices in place to help manage water levels. Unclear if these are to replace existing sluices or not - replacement is implied in the annex.
Scale of implementation	2 sluices
Potential direct/indirect impacts of the action on restoration of this habitat/species/feature, as identified in the application	Better management of water levels
Other wider benefits, as identified in the application	Improved resilience to floods and droughts
Condition assessment of the target habitat/species in this/these Natura 2000 site(s)	None specified
'Issue' or 'risk' for *this* habitat type/species/feature in *this* Natura 2000 site, which the action addresses	None specified

10.5.1 EVALUATION QUESTIONS FOR ACTION 5

10.5.1.1 Q1 Is there good evidence for the potential impact of this action on the condition of targeted Natura 2000 habitat(s) and /or species

Weight of evidence that links potential direct impacts of this action on the condition of targeted Natura 2000 habitat(s) and /or species in the location where it will be applied.

The management of wetland, particularly when surrounded by agricultural land or in a fragmented landscape, will often require artificial maintenance of water levels to preserve wetland ecology. Improving the tools available to do so may help facilitate wetland protection in the face of increasing climatic variability due to climate change. However, the presence of in-channel structures is a significant issue for multiple species at the Afon Teifi SAC. Although this might be a necessity for wetland maintenance, if these sluices are new (rather than replacing existing sluices, which is unclear in the application) and depending on their placement, they may exacerbate problems faced by migratory species that are of value in this SAC.

Assessment of strength of evidence: traffic light categories: None

10.5.1.2 Q2 Are there potential environmental benefits at landscape scale within or beyond the Natura 2000 site itself?

Identified in the application: Improving the tools available to do so may help facilitate wetland protection in the face of increasing climatic variability due to climate change.

However, in-stream flood barriers also carry a risk of synchronising flood peaks.

Environment and Rural Affairs Monitoring & Modelling Programme (ERAMMP) Sustainable Farming Scheme Evidence Review Technical Annex Annex 9: Flood mitigation

Identified by this review: None

10.5.1.3 Q3 Are there simple metrics for monitoring/evaluating the impacts of this action?

Identified in the application: Site condition monitoring by NRW.

Identified additionally by this review: If new sluices added, monitor biodiversity above and below the sluice to identify any negative effects on Natura 2000 features as quickly as possible.

10.5.1.4 Q4 Are there potential benefits for the local economy?

None

10.5.1.5 Q5 Are there potential benefits for increasing engagement of the local community in the Natura 2000 site(s)?

Identified in the application: None

Identified additionally by this review: None

10.6 ADDITIONAL COMMENTS

This project is part of a single application covering multiple projects, locations, Natura 2000 sites and actions, and the links between actions and sites are hard to follow throughout the entire application.

In the case of this project, the location of actions within or adjacent to the SAC are unclear, the scale of actions is not given, the justifications are vague and rarely indicate which features would benefit from each action. Very little space given over to monitoring and the ecological consequences of each action.

This application is likely to have been impacted by the page limit.

11 PROJECT 10H SOUTH GOWER COAST

LIST OF ACTIONS

	South Gower Coast		
	Action number/type	**Action includes**	**Natura 2000 habitat/species/feature targeted**
1	Invasive species management (INNS) and survey	• Consultant ecologist hired to carry out rare plants survey and guide INNS treatment plan • Purchase of equipment	Not specified (possibly subject to survey results)

11.1 ASSESSMENT OF ACTION 1

Action description and relationship with Natura 2000 features and priorities

Action 1 South Gower Coast	Invasive species management and survey
Natura 2000 site(s) relevant to this action	Limestone coast of South West Wales / Afordir Calchfaen de Orllewin Cymru SAC
Habitat/species/feature of the Natura 2000 site targeted by this action	None specified Features of SAC site not present at Gower have been assumed non-target features, as have caves and the greater horseshoe bat
Brief description of action	Consultant ecologist to conduct rare plant survey to direct invasive species management. Management of invasive species using purchased equipment. Based on previous successful, small-scale control programmes in the area.
Scale of implementation	Not given
Potential direct/indirect impacts of the action on restoration of this habitat/species/feature, as identified in the application	Prevent loss of site features. Potential eradication of invasive species at the site with continued management.
Other wider benefits, as identified in the application	Protection of tourist revenue.
Condition assessment of the target habitat/species in this/these Natura 2000 site(s)	All possible targets included: Vegetated sea cliffs: unfavourable (medium) Dry heaths: unfavourable (high) Dry grasslands and scrublands or chalk or limestone: unfavourable
'Issue' or 'risk' for *this* habitat type/species/feature in *this* Natura 2000 site, which the action addresses	All possible targets included: Scrub Invasion: • Vegetated sea cliffs: H • Dry heaths: H • Dry grasslands and scrublands or chalk or limestone: H Terrestrial non-native species: • Vegetated sea cliffs: H • Dry heaths: NA • Dry grasslands and scrublands or chalk or limestone: H

11.1.1 EVALUATION QUESTIONS FOR ACTION 1

11.1.1.1 Q1 Is there good evidence for the potential impact of this action on the condition of targeted Natura 2000 habitat(s) and /or species

Weight of evidence that links potential direct impacts of this action on the condition of targeted Natura 2000 habitat(s) and /or species in the location where it will be applied.

Invasive species management can be very important for maintaining valued species populations and habitats, particularly when landscapes are largely fragmented, by reducing competition and providing additional habitat. If invasive species are present and spreading, then management can be critical for maintaining a functional ecosystem and breeding populations of rare flora and invertebrates that use those systems. The specific method of invasive species management used and the invasive species requiring control have a significant impact on how beneficial management is likely to be for native species, and any risks of management to those native species. Without more detail about the methods of management used it is not possible to comment more precisely on these risks and benefits.

However, the application states that the methods being used have been successfully trialled at the site on a smaller spatial scale (the scale of proposed management is not given) and ecological surveys have been commissioned to ensure that treatment is well targeted. This will also allow any negative consequences to valued species to be minimised and facilitate a greater understanding of the nature of the value of the site.

The purchase of the equipment requested in this application will apparently be sufficient to support future invasive species management with a potential goal of eradication.

Assessment of strength of evidence: traffic light categories: Blue

11.1.1.2 Q2 Are there potential environmental benefits at landscape scale within or beyond the Natura 2000 site itself?

Identified in the application: None

Identified by this review: None

Eliminating invasive species reduces the size of the pool available to spread to other local sites of value. At the same time, increasing the population size of native species can increase community resilience to change.

11.1.1.3 Q3 Are there simple metrics for monitoring/evaluating the impacts of this action?

Identified in the application:

Ongoing monitoring of site condition via Natural Resources Wales

Identified additionally by this review:

In the short to medium term, confirming that invasive species are not re-establishing and that native species are colonising areas that have been managed.

11.1.1.4 Q4 Are there potential benefits for the local economy?

None

11.1.1.5 Q5 Are there potential benefits for increasing engagement of the local community in the Natura 2000 site(s)?

Identified in the application: Passive benefits resulting from improved site quality, with positive consequences for local tourism. However, these benefits are described in a very general sense and will be dependent on the success of the management, the scale of the management and the response of tourists to that management. Previous research has shown that enjoyment does not necessarily correlate with the conservation value of a site. As such, there is no reliable link between INNS management and community engagement.

Identified additionally by this review: None

11.2 ADDITIONAL COMMENTS

This project is part of a single application covering multiple projects, locations, Natura 2000 sites and actions. Despite the lack of detail in the funding application, the level of planning and preparation that seems to be associated with this action is high and should be commended.

However, the application lacks detail about the specific form of invasive species management planned and what the invasive species of concern are. It also does not comment on the area over which the action is planned, which is presumably known if the applicant has budgeted for sufficient supplies.

12 PROJECT 11 RESOW

LIST OF ACTIONS

	RESOW		
	Action number/type	**Action includes**	**Natura 2000 habitat/species/feature targeted**
1	Stakeholder mapping	• Reports on stakeholder interests • Strategic vision for seagrass restoration in Welsh SACs	Penllyn A'r Sarnau SAC/Large shallow inlets and bays(seagrass is not a feature of the SAC)
2	Stakeholder workshop	• report	Welsh SACs
3	Legal management and governance framework	• short statement	Welsh SACs
4	Habitat suitability modelling	• directing site selection	Penllyn A'r Sarnau / Pembrokeshire Marine SAC
5	Benthic site assessments of restoration locations	• report	Penllyn A'r Sarnau / Pembrokeshire Marine SAC
6	Develop comms material	• create comms board • report and 3D video	Penllyn A'r Sarnau / Pembrokeshire Marine SAC
7	Seagrass planting	• planting 10,000 seeds	Penllyn A'r Sarnau SAC/Large shallow inlets and bays/seagrass
8	Acoustic assessment of fish connectivity between habitats	• tagging 10 cod, pollock or whiting	Penllyn A'r Sarnau / Pembrokeshire Marine SAC

12.1 ASSESSMENT OF ACTION 1

Action description and relationship with Natura 2000 features and priorities

Action 1 RESOW	Stakeholder mapping
Natura 2000 site(s) relevant to this action	Penllyn A'r Sarnau SAC
Habitat/species/feature of the Natura 2000 site targeted by this action	Large shallow inlets and Bays (seagrass is not a feature of the SAC)
Brief description of action	Understanding local community users with interest in seagrass within the SAC
Scale of implementation	Site wide (and possibly further?)
Potential direct/indirect impacts of the action on restoration of this habitat/species/feature, as identified in the application	Improved understanding of interested parties allows targeted action
Other wider benefits, as identified in the application	Greater acceptance of benefits facilitates restoration efforts
Condition assessment of the target habitat/species in this/these Natura 2000 site(s)	Not assessed, but the NRW report 234 states that seagrass beds to the south of the Lyn are in favourable condition[2]
'Issue' or 'risk' for *this* habitat type/species/feature in *this* Natura 2000 site, which the action addresses	Damage due to bait digging, cockling, boating and anchoring, and water quality

12.1.1 EVALUATION QUESTIONS FOR ACTION 1

12.1.1.1 Q1 Is there good evidence for the potential impact of this action on the condition of targeted Natura 2000 habitat(s) and /or species

Weight of evidence that links potential direct impacts of this action on the condition of targeted Natura 2000 habitat(s) and /or species in the location where it will be applied.

No direct impact of this action on habitat. Evidenced in scientific literature for indirect impacts: increased community engagement, which leads to increased understanding which in turn leads to reduction in damage to the feature and resistance to restoration.

Assessment of strength of evidence: traffic light categories: Blue

12.1.1.2 Q2 Are there potential environmental benefits at landscape scale within or beyond the Natura 2000 site itself?

Identified in the application: Yes – identification of stakeholders will lead to increased engagement and greater social acceptance of seagrass restoration and thus benefit restoration projects across Wales.

Identified by this review: It is well known that early identification of stakeholders (and subsequent engagement) leads to greater success in implementing restoration projects.

[2]NRW Evidence Report: Pen Llŷn a`r Sarnau / Lleyn Peninsula and the Sarnau Special Area of Conservation: Indicative site level feature condition assessments 2018. Report number 234.

12.1.1.3 Q3 Are there simple metrics for monitoring/evaluating the impacts of this action?

Identified in the application: None provided

Identified additionally by this review:

12.1.1.4 Q4 Are there potential benefits for the local economy?

Not directly

12.1.1.5 Q5 Are there potential benefits for increasing engagement of the local community in the Natura 2000 site(s)?

Identified in the application: Significant – active public engagement in coastal activities and restoration will lead to improved environmental status of the SAC

Identified additionally by this review:

12.2 ASSESSMENT OF ACTION 2

Action description and relationship with Natura 2000 features and priorities

Action 2 RESOW	Stakeholder workshop
Natura 2000 site(s) relevant to this action	Welsh coastal SACs
Habitat/species/feature of the Natura 2000 site targeted by this action	Estuaries; seagrass beds / Large Shallow inlets and bays; (seagrass is not a feature of the SAC)
Brief description of action	Workshop with stakeholders from coastal SACs.
Scale of implementation	National
Potential direct/indirect impacts of the action on restoration of this habitat/species/feature, as identified in the application	A strategic vision will lead to greater stakeholder acceptance implementation of restoration schemes.
Other wider benefits, as identified in the application	Strategic vision for seagrass restoration in Welsh SACs.
Condition assessment of the target habitat/species in this/these Natura 2000 site(s)	not assessed (see comment for action 1)
'Issue' or 'risk' for *this* habitat type/species/feature in *this* Natura 2000 site, which the action addresses	Damage due to bait digging, cockling, boating and anchoring, and water quality

12.2.1 EVALUATION QUESTIONS FOR ACTION 2

12.2.1.1 Q1 Is there good evidence for the potential impact of this action on the condition of targeted Natura 2000 habitat(s) and /or species

Weight of evidence that links potential direct impacts of this action on the condition of targeted Natura 2000 habitat(s) and /or species in the location where it will be applied.

Understanding stakeholder needs to implement successful restoration interventions is well documented.

Assessment of strength of evidence: traffic light categories: Blue

12.2.1.2 Q2 Are there potential environmental benefits at landscape scale within or beyond the Natura 2000 site itself?

Identified in the application: A framework for seagrass restoration across Welsh SACs through a joined up set of works that bring existing projects and expertise together

Identified by this review: There is no strategic framework in place for Wales – a coordinated approach would accelerate resonation and associated benefits.

12.2.1.3 Q3 Are there simple metrics for monitoring/evaluating the impacts of this action?

Identified in the application: None specified

Identified additionally by this review:

12.2.1.4 Q4 Are there potential benefits for the local economy?

Not directly

12.2.1.5 Q5 Are there potential benefits for increasing engagement of the local community in the Natura 2000 site(s)?

Identified in the application: None specified for this action

Identified additionally by this review:

12.3 ASSESSMENT OF ACTION 3

Action description and relationship with Natura 2000 features and priorities

Action 3 RESOW	Legal management and governance framework
Natura 2000 site(s) relevant to this action	Welsh coastal SACs
Habitat/species/feature of the Natura 2000 site targeted by this action	(seagrass is not an SAC feature)
Brief description of action	Assessment of legislation and governance around seagrass restoration
Scale of implementation	Welsh coastal SACs
Potential direct/indirect impacts of the action on restoration of this habitat/species/feature, as identified in the application	Improved high level stakeholder acceptance of seagrass restoration
Other wider benefits, as identified in the application	'A springboard for the environmental renewal of our seas'
Condition assessment of the target habitat/species in this/these Natura 2000 site(s)	not assessed (see comment for action 1)
'Issue' or 'risk' for *this* habitat type/species/feature in *this* Natura 2000 site, which the action addresses	Damage due to bait digging, cockling, boating and anchoring, and water quality

12.3.1 EVALUATION QUESTIONS FOR ACTION 3

12.3.1.1 Q1 Is there good evidence for the potential impact of this action on the condition of targeted Natura 2000 habitat(s) and /or species

Weight of evidence that links potential direct impacts of this action on the condition of targeted Natura 2000 habitat(s) and /or species in the location where it will be applied.
No evidence provided – assumptive

Assessment of strength of evidence: traffic light categories: Amber

12.3.1.2 Q2 Are there potential environmental benefits at landscape scale within or beyond the Natura 2000 site itself?

Identified in the application: The application suggests improved environmental status of SACs

Identified by this review: More efficient legislative and governance structures will undoubtedly accelerate restoration activities on the seabed.

12.3.1.3 Q3 Are there simple metrics for monitoring/evaluating the impacts of this action?

Identified in the application: Not specified

Identified additionally by this review:

12.3.1.4 Q4 Are there potential benefits for the local economy?

Not clear

12.3.1.5 Q5 Are there potential benefits for increasing engagement of the local community in the Natura 2000 site(s)?

Identified in the application: Not though this action

Identified additionally by this review: Not through this action

12.4 ASSESSMENT OF ACTION 4

Action description and relationship with Natura 2000 features and priorities

Action 4 RESOW	Habitat suitability modelling
Natura 2000 site(s) relevant to this action	Pen Liyn A'r Sarnau / Pembrokeshire Marine SAC
Habitat/species/feature of the Natura 2000 site targeted by this action	Estuaries / Large Shallow inlets and bays (seagrass is not a feature of the SAC)
Brief description of action	Develop model for directed site selection for seagrass restoration including marine use, stakeholders and communities
Scale of implementation	Across both SACs
Potential direct/indirect impacts of the action on restoration of this habitat/species/feature, as identified in the application	Establish whether restoration can be more focussed towards ensuring inter-habitat connectivity, therefore increasing the effectiveness of any future investments.
Other wider benefits, as identified in the application	Improved social acceptance and understanding of seagrass restoration.
Condition assessment of the target habitat/species in this/these Natura 2000 site(s)	not assessed (see comment for action 1)
'Issue' or 'risk' for *this* habitat type/species/feature in *this* Natura 2000 site, which the action addresses	Damage due to bait digging, cockling, boating and anchoring, and water quality

12.4.1 EVALUATION QUESTIONS FOR ACTION 4

12.4.1.1 Q1 Is there good evidence for the potential impact of this action on the condition of targeted Natura 2000 habitat(s) and /or species

Weight of evidence that links potential direct impacts of this action on the condition of targeted Natura 2000 habitat(s) and /or species in the location where it will be applied.

No evidence provided – the model is under development. However, modelling for seagrass habitat suitability is well established in the Netherlands and the US.

Assessment of strength of evidence: traffic light categories: Amber

12.4.1.2 Q2 Are there potential environmental benefits at landscape scale within or beyond the Natura 2000 site itself?

Identified in the application: The modelling focus is within the site.

Identified by this review: None

12.4.1.3 Q3 Are there simple metrics for monitoring/evaluating the impacts of this action?

Identified in the application: None

Identified additionally by this review:

12.4.1.4 Q4 Are there potential benefits for the local economy?

Not directly

12.4.1.5 Q5 Are there potential benefits for increasing engagement of the local community in the Natura 2000 site(s)?

Identified in the application: none directly

Identified additionally by this review:

12.5 ASSESSMENT OF ACTION 5

Action description and relationship with Natura 2000 features and priorities

Action 5 RESOW	Benthic site assessments of restoration locations
Natura 2000 site(s) relevant to this action	Pen Liyn A'r Sarnau / Pembrokeshire Marine SAC
Habitat/species/feature of the Natura 2000 site targeted by this action	Estuaries; / Large shallow inlets and bays; (seagrass is not a feature of the SAC)
Brief description of action	No detail of what the action entails
Scale of implementation	Unclear
Potential direct/indirect impacts of the action on restoration of this habitat/species/feature, as identified in the application	Take stock of habitat suitability for seagrass allowing for implementation in future
Other wider benefits, as identified in the application	None specifically identified
Condition assessment of the target habitat/species in this/these Natura 2000 site(s)	not assessed (see comment for action 1)
'Issue' or 'risk' for *this* habitat type/species/feature in *this* Natura 2000 site, which the action addresses	Damage due to bait digging, cockling, boating and anchoring, and water quality

12.5.1 EVALUATION QUESTIONS FOR ACTION 5

12.5.1.1 Q1 Is there good evidence for the potential impact of this action on the condition of targeted Natura 2000 habitat(s) and /or species

Weight of evidence that links potential direct impacts of this action on the condition of targeted Natura 2000 habitat(s) and /or species in the location where it will be applied.

Benthic assessment is essential in identifying suitable donor habitat for seagrass planting and well described for similar projects.

Assessment of strength of evidence: traffic light categories: Blue

12.5.1.2 Q2 Are there potential environmental benefits at landscape scale within or beyond the Natura 2000 site itself?

Identified in the application: None identified

Identified by this review: The assessments are targeted within site.

12.5.1.3 Q3 Are there simple metrics for monitoring/evaluating the impacts of this action?

Identified in the application: none directly identified

Identified additionally by this review:

12.5.1.4 Q4 Are there potential benefits for the local economy?

Local suppliers will be used to conduct planned works, presumably the work boat will be used to conduct the surveys – so indirect benefits there.

12.5.1.5 Q5 Are there potential benefits for increasing engagement of the local community in the Natura 2000 site(s)?

Identified in the application: not directly

Identified additionally by this review:

12.6 ASSESSMENT OF ACTION 6

Action description and relationship with Natura 2000 features and priorities

Action 6 RESOW	Develop comms material
Natura 2000 site(s) relevant to this action	Pen Liyn A'r Sarnau / Pembrokeshire Marine
Habitat/species/feature of the Natura 2000 site targeted by this action	Estuaries; Large shallow inlets and bays; (seagrass is not a feature of the SAC)
Brief description of action	Public communication boards
Scale of implementation	1 per site
Potential direct/indirect impacts of the action on restoration of this habitat/species/feature, as identified in the application	• NA
Other wider benefits, as identified in the application	Raised awareness and community engagement
Condition assessment of the target habitat/species in this/these Natura 2000 site(s)	NA
'Issue' or 'risk' for *this* habitat type/species/feature in *this* Natura 2000 site, which the action addresses	NA

12.6.1 EVALUATION QUESTIONS FOR ACTION 6

12.6.1.1 Q1 Is there good evidence for the potential impact of this action on the condition of targeted Natura 2000 habitat(s) and /or species

Weight of evidence that links potential direct impacts of this action on the condition of targeted Natura 2000 habitat(s) and /or species in the location where it will be applied.

The global scientific literature shows public engagement is essential in delivering restoration interventions

Assessment of strength of evidence: traffic light categories: Blue

12.6.1.2 Q2 Are there potential environmental benefits at landscape scale within or beyond the Natura 2000 site itself?

Identified in the application: Not directly

Identified by this review:

12.6.1.3 Q3 Are there simple metrics for monitoring/evaluating the impacts of this action?

Identified in the application: None

Identified additionally by this review:

12.6.1.4 Q4 Are there potential benefits for the local economy?

Not directly

12.6.1.5 Q5 Are there potential benefits for increasing engagement of the local community in the Natura 2000 site(s)?

Identified in the application: '…equipment purchased …. would support…… community engagement of the Dale seagrass restoration project and the Porthdinllaen seagrass project.'

Identified additionally by this review:

12.7 ASSESSMENT OF ACTION 7

Action description and relationship with Natura 2000 features and priorities

Action 7 RESOW	Seagrass planting
Natura 2000 site(s) relevant to this action	Pen Liyn A'r Sarnau / Pembrokeshire Marine
Habitat/species/feature of the Natura 2000 site targeted by this action	Estuaries; Large shallow inlets and bays; (seagrass is not a feature of the SAC)
Brief description of action	Planting 100 seed bags (10,000 seeds) into mooring scars at Porthdinllaen
Scale of implementation	Local – area unspecified
Potential direct/indirect impacts of the action on restoration of this habitat/species/feature, as identified in the application	Directly improving the status of the existing seagrass bed
Other wider benefits, as identified in the application	None identified
Condition assessment of the target habitat/species in this/these Natura 2000 site(s)	not assessed (see comment for action 1)
'Issue' or 'risk' for *this* habitat type/species/feature in *this* Natura 2000 site, which the action addresses	Damage due to bait digging, cockling, boating and anchoring, and water quality.

12.7.1 EVALUATION QUESTIONS FOR ACTION 7

12.7.1.1 Q1 Is there good evidence for the potential impact of this action on the condition of targeted Natura 2000 habitat(s) and /or species

Weight of evidence that links potential direct impacts of this action on the condition of targeted Natura 2000 habitat(s) and /or species in the location where it will be applied.

There is good evidence that planting seeds will improve existing and create new seagrass beds

Assessment of strength of evidence: traffic light categories: Amber

12.7.1.2 Q2 Are there potential environmental benefits at landscape scale within or beyond the Natura 2000 site itself?

Identified in the application: expansion of seagrass beds will increase ecological functioning and resilience of Welsh seas

Identified by this review: Seagrasses have many well documented benefits with the wider land(sea)scape including carbon storage, nursery grounds for fish

12.7.1.3 Q3 Are there simple metrics for monitoring/evaluating the impacts of this action?

Identified in the application: none stated

Identified additionally by this review: the impacts would be seen outside the timescale of this project although it would have been reassuring to have seen some high level plan outlined in the application

12.7.1.4 Q4 Are there potential benefits for the local economy?

Indirectly through the creation of nursery grounds for commercial fish species

12.7.1.5 Q5 Are there potential benefits for increasing engagement of the local community in the Natura 2000 site(s)?

Identified in the application: none identified

Identified additionally by this review:

12.8 ASSESSMENT OF ACTION 8

Action description and relationship with Natura 2000 features and priorities

Action 8 RESOW	Acoustic assessments of fish connectivity between habitats
Natura 2000 site(s) relevant to this action	Pen Liyn A'r Sarnau / Pembrokeshire Marine SAC
Habitat/species/feature of the Natura 2000 site targeted by this action	Estuaries; Large shallow inlets and bays; (seagrass is not a feature of the SAC)
Brief description of action	Tags to be placed on fish to track movement between habitats
Scale of implementation	10 fish
Potential direct/indirect impacts of the action on restoration of this habitat/species/feature, as identified in the application	Data collection to populate habitat suitability models
Other wider benefits, as identified in the application	Greater understanding of habitat connectivity
Condition assessment of the target habitat/species in this/these Natura 2000 site(s)	not assessed (see comment for action 1)
'Issue' or 'risk' for *this* habitat type/species/feature in *this* Natura 2000 site, which the action addresses	Damage due to bait digging, cockling, boating and anchoring, and water quality

12.8.1 EVALUATION QUESTIONS FOR ACTION 8

12.8.1.1 Q1 Is there good evidence for the potential impact of this action on the condition of targeted Natura 2000 habitat(s) and /or species

Weight of evidence that links potential direct impacts of this action on the condition of targeted Natura 2000 habitat(s) and /or species in the location where it will be applied.

Acoustic assessments are a well-established method for tracking fish movement and describing connectivity between habitats. Improved understanding will lead to better implementation of restoration interventions and, ultimately enhanced condition of the habitat

Assessment of strength of evidence: traffic light categories: Blue

12.8.1.2 Q2 Are there potential environmental benefits at landscape scale within or beyond the Natura 2000 site itself?

Identified in the application: none identified

Identified by this review: understanding fish usage within the site and adjacent habitats could potentially give benefits at the landscape scale

12.8.1.3 Q3 Are there simple metrics for monitoring/evaluating the impacts of this action?

Identified in the application: none

Identified additionally by this review: a review of the quality/quantity of data collected and evidence that the Habitat Suitability Model outputs we're credible and testable would be an expected metric to test impact

12.8.1.4 Q4 Are there potential benefits for the local economy?

No direct benefits

12.8.1.5 Q5 Are there potential benefits for increasing engagement of the local community in the Natura 2000 site(s)?

Identified in the application: No

Identified additionally by this review:

12.9 ADDITIONAL COMMENTS

This is a high value project for the SMS Natura 2000 restoration grant and one that is part of a larger and well publicised seagrass restoration programme. The justification for the work is well described. However the detail is often lacking and requires knowledge of the subject area – or some searching of the literature - for reassurance that the works and capital expenditure proposed are credible and will have impact. Although the application states that the work will be carried out in both SACs there is some ambiguity within the text and it is difficult to work out which site will receive what action.

13 PROJECT 12 RIVERS OF PEMBROKESHIRE

LIST OF ACTIONS

	Rivers of Pembrokeshire		
	Action number/type	**Action includes**	**Natura 2000 habitat/species/feature targeted**
1	Fish pass feasibility investigation	Fish pass feasibility study around dam for salmonids and eel	Pembrokeshire Marine SAC – no features targeted directly
2	Livestock exclusion fencing	Riparian fencing to exclude livestock	Afonydd Cleddau SAC – All fish species: • *Cottus gobio* / Bullhead • *Lampetra fluviatilis* / River Lamprey • *Lampetra planeri* / Brook Lamprey • *Petromyzon marinus* / Sea Lamprey
3	Riparian restoration - tree planting	Riparian tree planting	Afonydd Cleddau SAC – no features specified
4	Community engagement	• Citizen science macroinvertebrate monitoring • Public talks	Pembrokeshire Marine SAC and Afonydd Cleddau SAC – no features specified

13.1 ASSESSMENT OF ACTION 1

Action description and relationship with Natura 2000 features and priorities

Action 1 Rivers of Pembrokeshire	Fish pass feasibility investigation
Natura 2000 site(s) relevant to this action	Pembrokeshire Marine SAC
Habitat/species/feature of the Natura 2000 site targeted by this action	None directly identified Features affected by in-channel structures: coastal lagoons
Brief description of action	Feasibility assessment and design plans for the creation of a fish pass at Pembroke Millponds, targeting salmonids and eels.
Scale of implementation	1 study for implementation of a fish pass
Potential direct/indirect impacts of the action on restoration of this habitat/species/feature, as identified in the application	Implementation of a fish pass in the future. Leading to more fish and eels in the Pembroke river. Greater nursery habitat availability.
Other wider benefits, as identified in the application	Benefits to food production and economies relying on species migrating upriver. Reduced habitat fragmentation. Increased fish diversity. Cultural value of increased fish presence in river.
Condition assessment of the target habitat/species in this/these Natura 2000 site(s)	Coastal lagoons: Favourable - maintained
'Issue' or 'risk' for *this* habitat type/species/feature in *this* Natura 2000 site, which the action addresses	Siltation: H Weirs and other in-channel structures: H

13.1.1 EVALUATION QUESTIONS FOR ACTION 1

13.1.1.1 Q1 Is there good evidence for the potential impact of this action on the condition of targeted Natura 2000 habitat(s) and /or species

Weight of evidence that links potential direct impacts of this action on the condition of targeted Natura 2000 habitat(s) and /or species in the location where it will be applied.

There will be no direct consequences of this action on the status of the Natura site. However, if the feasibility report leads to the establishment of a fish passage (which will presumably require additional funding to be sourced) there is good evidence that facilitating instream connectivity can benefit migratory fish species, providing access to nursery habitats and diet diversification. It is notable that the majority of studies consider short term consequences only and the dependence of outcomes on physical habitats and the biota involved are not clear (Roni et al. 2008). The majority of studies consider the impacts of fish passes on salmonid species, although logic would suggest that other migratory species will also benefit. The rate of repopulation above the dam is also likely to be rapid (Roni et al. 2008).

Also under the assumption that a fish pass is ultimately constructed, there is a risk that increased connectivity will facilitate the spread of invasive species in the future should they become prevalent in either the Pembrokeshire Marine SAC or upstream.

The application identifies salmonids and eels as target species of this action. In-channel structures are not a priority issue for any fish species in the Pembrokeshire Marine SAC, but they are for coastal lagoons. Any benefit of a potential fish passage on coastal lagoons will be linked to the design of the fish passage and its ability to restore tidal movement at this section of the river. The allis shad and twait shad (*Alosa alosa* and *Alosa Fllax*) are features of the Pembrokeshire Marine SAC that migrate inland to spawn and therefore may benefit from the construction of a fish pass, but are not considered limited by in-channel structures at this site.

Although these benefits require a fish passage to be built, the reviewer considered it appropriate to highlight these potential benefits, for which a feasibility study is a prerequisite.

Roni P., Hanson K., and Beechie T. 2008, Global Review of the Physical and Biological Effectiveness of Stream Habitat Rehabilitation Techniques. North American Journal of Fisheries Management 28:856–890.

Assessment of strength of evidence: traffic light categories: Amber

13.1.1.2 Q2 Are there potential environmental benefits at landscape scale within or beyond the Natura 2000 site itself?

Identified in the application: Reduced habitat fragmentation and upstream community integrity – good evidence.

In addition to the benefits identified in the previous section the provision of a fish passage could have wider benefits for fish populations outside of the Pembroke Marine SAC. In river barriers are considered a priority issue for many species in the Afonydd Cleddau SAC, which may ultimately benefit from increased breeding opportunities in other river systems, particularly the allis and twait shad. Upstream communities would also benefit from the return of species currently excluded from the ecosystem, which would have been historically

present, by restoring nutrient distributions throughout the aquatic ecosystem (Roni et al. 2008).

Identified by this review:

13.1.1.3 Q3 Are there simple metrics for monitoring/evaluating the impacts of this action?

Identified in the application: Report produced of fish passage feasibility and design

Identified additionally by this review: none

13.1.1.4 Q4 Are there potential benefits for the local economy?

A contractor will be paid to conduct the investigation, benefitting the local economy.

Additional economic benefits outlined in the proposal depend on the implementation of a fish passage following the feasibility study, which could benefit the local economy via improved angling, food production, and tourism.

13.1.1.5 Q5 Are there potential benefits for increasing engagement of the local community in the Natura 2000 site(s)?

Identified in the application: none

Identified additionally by this review:

13.2 ASSESSMENT OF ACTION 2

Action description and relationship with Natura 2000 features and priorities

Action 2 Rivers of Pembrokeshire	Livestock exclusion fencing
Natura 2000 site(s) relevant to this action	Afonydd Cleddau SAC
Habitat/species/feature of the Natura 2000 site targeted by this action	None specified All features affected by diffuse pollution: • *Cottus gobio* / Bullhead • *Lampetra fluviatilis* / River Lamprey • *Lampetra planeri* / Brook Lamprey • *Petromyzon marinus* / Sea Lamprey • *Lutra lutra* / Otter • Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation Features affected by overgrazing: • Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion*) • *Lampetra fluviatilis* / River Lamprey • *Lampetra planeri* / Brook Lamprey • *Petromyzon marinus* / Sea Lamprey Brook Lamprey
Brief description of action	Erect fencing around riverbanks to exclude livestock and reduce bankside poaching
Scale of implementation	10km riparian fencing
Potential direct/indirect impacts of the action on restoration of this habitat/species/feature, as identified in the application	• Reduced over-grazing • Reduced diffuse source pollution and nutrient inputs to the river • Reduced sedimentation rates • Increased fish populations
Other wider benefits, as identified in the application	• Economic and cultural benefits of improved fish populations and biodiversity • Improved water quality in Pembroke Marine SAC • Cleaner bathing waters and associated human health and tourism benefits
Condition assessment of the target habitat/species in this/these Natura 2000 site(s)	• Cottus gobio / Bullhead: Unfavourable (low confidence) (2020) • Lampetra fluviatilis / River Lamprey: Unfavourable (medium) (2020) • Lampetra planeri / Brook Lamprey: Unfavourable (medium) (2020) • Petromyzon marinus / Sea Lamprey: Unfavourable (medium) (2020) • Lutra lutra / Otter: Unfavourable (medium) (2020) • Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion: Unfavourable (low) (2020) • Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion): Unfavourable (low) (2020)
'Issue' or 'risk' for *this* habitat type/species/feature in *this* Natura 2000 site, which the action addresses	For diffuse pollution: • Cottus gobio / Bullhead: L (2012) • Lampetra fluviatilis / River Lamprey: H (2012) • Lampetra planeri / Brook Lamprey: L (2012) • Petromyzon marinus / Sea Lamprey: H (2012) • Lutra lutra / Otter:

	• Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion: • Lutra lutra / Otter: L • Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion: M For features affected by overgrazing: • Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion): M (2012) • Lampetra fluviatilis / River Lamprey: M (2012) • Lampetra planeri / Brook Lamprey: M (2012) • Petromyzon marinus / Sea Lamprey Brook Lamprey: M (2012)

13.2.1 EVALUATION QUESTIONS FOR ACTION 2

13.2.1.1 Q1 Is there good evidence for the potential impact of this action on the condition of targeted Natura 2000 habitat(s) and /or species

Weight of evidence that links potential direct impacts of this action on the condition of targeted Natura 2000 habitat(s) and /or species in the location where it will be applied.

There are very few studies reporting the effects of livestock exclusion on fish communities, and existing studies show mixed results (some positive and some negative) for fish biomass and abundance in areas with livestock excluded (Shackelford, 2017). There is good evidence that the exclusion of livestock from riparian areas can reduce erosion rates and the amount of sediment entering river systems (Roni, 2008). The impacts of exclusion on aquatic communities can be highly variable, as they are dependent on catchment characteristics and biota (O'Callaghan, 2019). As over-grazing and diffuse pollution sources have been identified as issues in the Afonydd Cleddau SAC for a number of species and habitats, it is logically consistent that the exclusion of livestock would improve the condition of these features, particularly with regards to bank stability and sedimentation rates.

However, there is a significant risk that grazing displacement to elsewhere in the catchment (likely adjacent to the fenced off area) will mean that rates of diffuse pollution are not substantially reduced, particularly during rainfall events and if overland flow is a common occurrence.

It should also be noted that the exclusion of grazers is likely to positively impact the success of action 3 and improve the status of Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion) in the target SAC.

Roni P., Hanson K., and Beechie T. 2008, Global Review of the Physical and Biological Effectiveness of Stream Habitat Rehabilitation Techniques. North American Journal of Fisheries Management 28:856–890.

O'Callaghan P., Kelly-Quinn M., Jennings E., Antunes P., O'Sullivan M. Fenton, Huallacháin D. 2019, The Environmental Impact of Cattle Access to Watercourses: A Review, *Journal of Environmental Quality 48(2)*. 340-351.

Shackelford, G. E., Kelsey, R., Robertson, R. J., Williams, D. R. & Dicks, L. V. (2017) Sustainable Agriculture in California and Mediterranean Climates: Evidence for the effects of selected interventions. Synopses of Conservation Evidence Series. University of Cambridge, Cambridge, UK.

Assessment of strength of evidence: traffic light categories: Amber

13.2.1.2 Q2 Are there potential environmental benefits at landscape scale within or beyond the Natura 2000 site itself?

Identified in the application: Improved water quality in the Pembroke Marine SAC:

Reduced sediment and nutrient inputs in the Afonydd Cleddau SAC would be expected to also increase water quality in the Pembroke Marine SAC, where diffuse pollution and sedimentation have been identified as issues. However, these benefits will be contingent on the nature of the grazing displacement that occurs. Given the diverse sources of inputs to the Pembroke Marine SAC, it is questionable whether the exclusion of grazers from a riparian strip (albeit 10km long) would have a significant impact on the amount of diffuse pollution reaching the SAC.

Identified by this review:

13.2.1.3 Q3 Are there simple metrics for monitoring/evaluating the impacts of this action?

Identified in the application: GIS mapping of length and location of fence.

Identified additionally by this review: Monitoring for evidence of soil erosion and for changes in river silt and nutrient levels.

13.2.1.4 Q4 Are there potential benefits for the local economy?

Potential economic benefits identified in the application are associated with improved angling opportunities, but are contingent on fish populations responding positively to the exclusion of grazers.

13.2.1.5 Q5 Are there potential benefits for increasing engagement of the local community in the Natura 2000 site(s)?

Identified in the application: Increased angling

Identified additionally by this review:

13.3 ASSESSMENT OF ACTION 3

Action description and relationship with Natura 2000 features and priorities

Action 3 Rivers of Pembrokeshire	Riparian restoration - tree planting
Natura 2000 site(s) relevant to this action	Afonydd Cleddau SAC
Habitat/species/feature of the Natura 2000 site targeted by this action	No features specified
Brief description of action	Planting trees along riverbanks.
Scale of implementation	1km of riverbank
Potential direct/indirect impacts of the action on restoration of this habitat/species/feature, as identified in the application	Improved bank stability and reduced silt in stream. Reduced predation on fish populations. Microclimate buffering.
Other wider benefits, as identified in the application	Ecosystem resilience.
Condition assessment of the target habitat/species in this/these Natura 2000 site(s)	unclear
'Issue' or 'risk' for *this* habitat type/species/feature in *this* Natura 2000 site, which the action addresses	unclear

13.3.1 EVALUATION QUESTIONS FOR ACTION 3

13.3.1.1 Q1 Is there good evidence for the potential impact of this action on the condition of targeted Natura 2000 habitat(s) and /or species

Weight of evidence that links potential direct impacts of this action on the condition of targeted Natura 2000 habitat(s) and /or species in the location where it will be applied.

Riparian woodland can have an important impact on in-stream processes and provide and increased diversity of habitats for aquatic a terrestrial wildlife. The establishment of trees is likely to reduce sedimentation rates by increasing bank stability, but these improvements may be slow, as they are tied to the development of root networks over many years. This process can have significant addition consequences for fluvial geomorphological processes. An increase in riparian vegetation can also increase microclimatic buffering below tree canopies (increasing climate change resilience) and may change the nutrient profile of the river, increasing coarse organic matter inputs and affecting the composition of invertebrate communities, potentially increasing biodiversity but evidence for this is unclear and likely to be highly context specific. There is some, species specific evidence that riparian vegetation reduces rates of fish predation by avian species, but this is based on a very small number of studies.

No target species were identified in the application, and no feature species have been identified as being vulnerable to sedimentation rates. It is not stated whether planted trees are intended to expand the alluvial forest feature.

Russell I., Parrott D., Ives M., Goldsmith D., Fox S., Clifton-Dey D., Prickett A. & Drew T. (2008) Reducing fish losses to cormorants using artificial fish refuges: an experimental study. Fisheries Management and Ecology, 15, 189-198

Roni P., Hanson K., and Beechie T. 2008, Global Review of the Physical and Biological Effectiveness of Stream Habitat Rehabilitation Techniques. North American Journal of Fisheries Management 28:856–890.

ERAMMP SFS Evidence Review 9 – Flood mitigation

Assessment of strength of evidence: traffic light categories: No link

13.3.1.2 Q2 Are there potential environmental benefits at landscape scale within or beyond the Natura 2000 site itself?

Identified in the application: The application suggests ecosystem resilience will increase as a result of riparian woodland planting. Increased tree cover can improve microclimatic buffering under the canopy, which may increase climatic resilience. However, all aquatic species have been identified as having a low risk to future climate change.

Identified by this review: Planting riparian vegetation can contribute to natural flood mitigation, by slowing floodplain flows, but this is largely based on modelling studies.

13.3.1.3 Q3 Are there simple metrics for monitoring/evaluating the impacts of this action?

Identified in the application: GIS mapping of planted trees and area covered.

Identified additionally by this review: Changes to river sedimentation rates and monitoring for changes in channel features.

13.3.1.4 Q4 Are there potential benefits for the local economy?

No

13.3.1.5 Q5 Are there potential benefits for increasing engagement of the local community in the Natura 2000 site(s)?

Identified in the application: none

Identified additionally by this review: none

13.4 ASSESSMENT OF ACTION 4

Action description and relationship with Natura 2000 features and priorities

Action 4 Rivers of Pembrokeshire	Community engagement
Natura 2000 site(s) relevant to this action	Pembrokeshire Marine SAC and Afonydd Cleddau SAC
Habitat/species/feature of the Natura 2000 site targeted by this action	None
Brief description of action	Community engagement on water quality and community led improvements, involving macroinvertebrate monitoring and public talks and events and river dipping.
Scale of implementation	Minimum 50 volunteers trained to monitor stream health.
Potential direct/indirect impacts of the action on restoration of this habitat/species/feature, as identified in the application	None
Other wider benefits, as identified in the application	Socio-economic, mental health and educational benefits associated with spending time outdoors and learning about local SAC.
Condition assessment of the target habitat/species in this/these Natura 2000 site(s)	NA
'Issue' or 'risk' for *this* habitat type/species/feature in *this* Natura 2000 site, which the action addresses	NA

13.4.1 EVALUATION QUESTIONS FOR ACTION 4

13.4.1.1 Q1 Is there good evidence for the potential impact of this action on the condition of targeted Natura 2000 habitat(s) and /or species

Weight of evidence that links potential direct impacts of this action on the condition of targeted Natura 2000 habitat(s) and /or species in the location where it will be applied.

No direct consequence on Natura features

Assessment of strength of evidence: traffic light categories: No link

13.4.1.2 Q2 Are there potential environmental benefits at landscape scale within or beyond the Natura 2000 site itself?

Identified in the application: Local communities better able to monitor indications of pollution, resulting in cleaner rivers (this requires some intermediate steps to be effective).

Greater understanding in the local community of behaviours that can reduce river pollution

Identified by this review: Macroinvertebrate monitoring and river dipping can promote a wider appreciation and interest in aquatic biodiversity.

13.4.1.3 Q3 Are there simple metrics for monitoring/evaluating the impacts of this action?

Identified in the application: Number of attendants recorded

Identified additionally by this review: Species recorded in community monitoring events to keep a record of river quality indicators

Opinion surveys on event quality and feedback on messaging effectiveness.

13.4.1.4 Q4 Are there potential benefits for the local economy?

no

13.4.1.5 Q5 Are there potential benefits for increasing engagement of the local community in the Natura 2000 site(s)?

Identified in the application: Significant, active public engagement is the core of this action, including the training of volunteers to monitor water quality, and 10 water quality events including public talks and river dipping.

Identified additionally by this review:

13.5 ADDITIONAL COMMENTS

The impacts anticipated as a result of tree planting and fencing are difficult to distinguish in the words of the applicant and have been attributed in this document, as best possible. In part this is due to the structure of the application form, causing the applicants to distribute related information throughout the form, which they do not always expand fully in each case.

Although any immediate impacts of this project on the status of the target Natura 2000 sites is uncertain or likely to be small, the public engagement activities are of particular quality and actions are likely to benefit to the overall health of the river systems, not reflected in the Natura 2000 site features. Planning for future management should also be regarded as an important step to ensuring an ultimately successful outcome.

14 PROJECT 13C SOUTH STACK

LIST OF ACTIONS

	Supporting Natura 2000 Restoration in Wales (RSPB; sub-project south Stack)		
	Action number/type	**Action includes**	**Natura 2000 habitat/species/feature targeted**
1	Boundary repair	• Cloddiau site: repair boundaries and stock-proof heathland habitats. Stone walling. • Fencing repair around traditional 'quillets'[3]. • Fencing and wall maintenance of Chough feeding pastures at Cors Goch site	Dry heaths; Wet heathland with cross-leaved heath (*Erica tetralix*); Chough (*Pyrrhocorax pyrrhocorax*) breeding.
2	Contruct shed	• Construct a shed to hold livestock (in case unwell) and equipment	Unclear
3	Purchase Gator XUV	• Vehicle to transport kit to lowland heath for management works	Dry heaths; Wet heathland with cross-leaved heath (Erica tetralix);
4	Annual heather cutting, removal and disposal	• Annual heather cutting, removal and disposal to improve heathland condition in "no burn zone".	Dry heaths; Wet heathland with cross-leaved heath (*Erica tetralix*).

[3] Small plots of land

14.1 ASSESSMENT OF ACTION 1

Action description and relationship with Natura 2000 features and priorities

Action 1 Supporting Natura 2000 Restoration in Wales (RSPB; sub-project south Stack)	**Boundary repair**
Natura 2000 site(s) relevant to this action	Glannau Ynys Gybi / Holy Island Coast SAC and SPA
Habitat/species/feature of the Natura 2000 site targeted by this action	European dry heaths; Northern Atlantic wet heaths with *Erica tetralix*; Chough (breeding and wintering)
Brief description of action	Cloddiau site: Repair boundaries and stock-proof heathland habitats. Stone walling Fencing repair around traditional 'quillets'. Fencing and wall maintainence of Chough feeding pastures at Cors Goch site
Scale of implementation	185m boundary repair at Cloddiau; 652m at Cors Goch
Potential direct/indirect impacts of the action on restoration of this habitat/species/feature, as identified in the application	Maintain heathland habitat condition at Cloddiau; maintain grazing for Chough at Cors Goch
Other wider benefits, as identified in the application	None
Condition assessment of the target habitat/species in this/these Natura 2000 site(s)	Dry heaths: Unfavourable Wet heathland with cross-leaved heath: Unfavourable Chough - *Pyrrhocorax pyrrhocorax* - breeding: not assessed
'Issue' or 'risk' for *this* habitat type/species/feature in *this* Natura 2000 site, which the action addresses	Grazing – insufficient grazing Grazing – type and/or timing

14.1.1 EVALUATION QUESTIONS FOR ACTION 1

14.1.1.1 Q1 Is there good evidence for the potential impact of this action on the condition of targeted Natura 2000 habitat(s) and /or species

Weight of evidence that links potential direct impacts of this action on the condition of targeted Natura 2000 habitat(s) and /or species in the location where it will be applied.

The proposed actions are to maintain appropriate grazing of heathland habitats, as well as pastures which are feeding areas for chough. The SFS evidence review highlighted that action to facilitate appropriate grazing, including improvement of fencing and gates, can be critical to improve structure and condition of semi-natural habitats including heathland and grassland. In this SAC/SPA grazing issues are listed as high priority and urgency for all three relevant features, suggesting there is particular need for appropriate grazing management here. However, for heathland habitats and chough, tailored grazing regimes will be necessary to prevent over or undergrazing. For chough in particular, it is critical that areas of short sward (<2cm) are nested within a mosaic of semi-natural vegetation[4], and that rabbits

[4] Sian Whitehead , Ian Johnstone & Jeremy Wilson (2005) Choughs Pyrrhocorax pyrrhocorax breeding in Wales select foraging habitat at different spatial scales, Bird Study, 52:2, 193-203, DOI: 10.1080/00063650509461391

are not controlled or excluded. While this is not explicitly stated, it is assumed that such management is/will be associated with boundary repairs.

If boundary disrepair is a hindrance to appropriate grazing management, as the applicant claims, then additionality of this option would be high. Restored boundaries are expected to provide benefits over ~10 years.

Assessment of strength of evidence: traffic light categories: Blue

14.1.1.2 Q2 Are there potential environmental benefits at landscape scale within or beyond the Natura 2000 site itself?

Identified in the application: None

Identified by this review: Improved condition of habitats within the SAC/SPA could improve effective connectivity of heathland habitats in the area, and improve landscape connectivity for chough. The SFS evidence review highlighted possible benefits of boundary restoration for grazers for soils and ease of livestock management.

14.1.1.3 Q3 Are there simple metrics for monitoring/evaluating the impacts of this action?

Identified in the application: The applicant pledges habitat condition monitoring at the start and end of the project, but does not provide details on this other than that NRW-approved methods would be used. Monitoring is apparently to be provided in kind as there is no budget identified for this work.

Identified additionally by this review:

Vegetation condition assessments of heathland habitats. Systematic surveys (counts) of chough, including data on feeding/breeding behaviour.

14.1.1.4 Q4 Are there potential benefits for the local economy?

There could be benefits for the local economy in terms of reduced stock losses, but also contractors carrying out boundary restoration (it is not clear in the application if these providers will be local).

14.1.1.5 Q5 Are there potential benefits for increasing engagement of the local community in the Natura 2000 site(s)?

Identified in the application: The applicant pledges to work with local communities and "spread the value of good conservation management and enhance the benefits for the reserves and elsewhere".

Identified additionally by this review: None.

14.2 ASSESSMENT OF ACTION 2

Action description and relationship with Natura 2000 features and priorities

Action 2 Supporting Natura 2000 Restoration in Wales (RSPB; sub-project south Stack)	**Construct shed**
Natura 2000 site(s) relevant to this action	Glannau Ynys Gybi / Holy Island Coast SAC and SPA
Habitat/species/feature of the Natura 2000 site targeted by this action	European dry heaths; Northern Atlantic wet heaths with *Erica tetralix*
Brief description of action	Construct a shed to hold livestock (in case unwell) and equipment
Scale of implementation	1 shed
Potential direct/indirect impacts of the action on restoration of this habitat/species/feature, as identified in the application	Facilitate grazing of SAC grassland
Other wider benefits, as identified in the application	Prolong life of, and prevent theft of, grazing-related equipment
Condition assessment of the target habitat/species in this/these Natura 2000 site(s)	Unclear
'Issue' or 'risk' for *this* habitat type/species/feature in *this* Natura 2000 site, which the action addresses	Unclear

14.2.1 EVALUATION QUESTIONS FOR ACTION 2

14.2.1.1 Q1 Is there good evidence for the potential impact of this action on the condition of targeted Natura 2000 habitat(s) and /or species

Weight of evidence that links potential direct impacts of this action on the condition of targeted Natura 2000 habitat(s) and /or species in the location where it will be applied.

The shed is supposed to house sheep should they become unwell, and store equipment related to grazing. As such it will facilitate grazing management on the reserve. There is sound evidence for benefits of appropriate grazing for the target features of the SAC & SPA. While very important for animal welfare and maintenance of equipment, additionality of this action for biodiversity may be low. There is not a clear case that grazing is unable to continue without the shed, and no direct link to SAC heathland, cliffs or SPA chough. Benefits of a shed for grazing in the area may persist for >10 years.

Assessment of strength of evidence: traffic light categories: Amber

14.2.1.2 Q2 Are there potential environmental benefits at landscape scale within or beyond the Natura 2000 site itself?

Identified in the application: None.

Identified by this review: The SFS evidence review highlighted possible benefits of works which facilitate grazing for soil health and ease of livestock management. Depending on construction and management of the building, it could provide nesting/roosting habitats for birds/bats.

14.2.1.3 Q3 Are there simple metrics for monitoring/evaluating the impacts of this action?

Identified in the application: The applicant pledges habitat condition monitoring at the start and end of the project, but this is unlikely to relate strongly to the shed construction action.

Identified additionally by this review: None – unlikely to be possible to isolate the benefits of the shed for SAC/SPA features.

14.2.1.4 Q4 Are there potential benefits for the local economy?

The shed is likely to save money in the long term and is probably a good investment for the reserve.

14.2.1.5 Q5 Are there potential benefits for increasing engagement of the local community in the Natura 2000 site(s)?

Identified in the application: None.

Identified additionally by this review: None.

14.3 ASSESSMENT OF ACTION 3

Action description and relationship with Natura 2000 features and priorities

Action 3 Supporting Natura 2000 Restoration in Wales (RSPB; sub-project south Stack)	**Purchase Gator XUV**
Natura 2000 site(s) relevant to this action	Glannau Ynys Gybi / Holy Island Coast SAC and SPA
Habitat/species/feature of the Natura 2000 site targeted by this action	Dry heaths Wet heathland with cross-leaved heath
Brief description of action	Vehicle to transport kit to lowland heath for management works
Scale of implementation	1 Gator XUV
Potential direct/indirect impacts of the action on restoration of this habitat/species/feature, as identified in the application	Facilitate management of SAC heathland
Other wider benefits, as identified in the application	None
Condition assessment of the target habitat/species in this/these Natura 2000 site(s)	Dry heaths: Unfavourable Wet heathland with cross-leaved heath: Unfavourable
'Issue' or 'risk' for *this* habitat type/species/feature in *this* Natura 2000 site, which the action addresses	Cutting/Mowing - insufficient

14.3.1 EVALUATION QUESTIONS FOR ACTION 3

14.3.1.1 Q1 Is there good evidence for the potential impact of this action on the condition of targeted Natura 2000 habitat(s) and /or species

Weight of evidence that links potential direct impacts of this action on the condition of targeted Natura 2000 habitat(s) and /or species in the location where it will be applied.

The purchase of this vehicle is intended to support management of heathland, particularly cutting and burning. The SFS evidence review highlighted that appropriate cutting and burning could be beneficial to heathland condition, although burning frequency and rotation affect outcomes for biodiversity. It is clear that at this site there are at least some no-burn zones, suggesting that management is not homogenous.

Provided that the vehicle enables appropriate management, it is likely to benefit the heathland features of this SAC, both of which are threatened by a lack of cutting or mowing. They are also threatened by fire, which proactive burning and cutting are likely to prevent.

The additionality of this intervention is difficult to determine, because the application does not discuss possible alternative options – for example whether or not similar vehicles are (or are not) available to hire in the surrounding area. The vehicle is likely to deliver benefits for ~10 years.

Assessment of strength of evidence: traffic light categories: Amber

14.3.1.2 Q2 Are there potential environmental benefits at landscape scale within or beyond the Natura 2000 site itself?

Identified in the application: None.

Identified by this review: The actions proposed might help prevent uncontrolled fires in the area. Improvements in heathland condition would contribute to overall landscape connectivity of these habitats.

14.3.1.3 Q3 Are there simple metrics for monitoring/evaluating the impacts of this action?

Identified in the application: The applicant pledges habitat condition monitoring at the start and end of the project.

Identified additionally by this review: Vegetation condition assessments of heathland habitats. Systematic surveys (counts) of chough, including data on feeding/breeding behaviour.

14.3.1.4 Q4 Are there potential benefits for the local economy?

The Gator may save money in the long term and is probably a good investment for the reserve. If it prevents hire of vehicles from the nearby area, that could negatively affect the local economy.

14.3.1.5 Q5 Are there potential benefits for increasing engagement of the local community in the Natura 2000 site(s)?

Identified in the application: The Gator may specifically help volunteers to help manage the reserve. As such, the Gator is likely to make managing the reserve a better experience for volunteers, thus increasing engagement.

Identified additionally by this review: None.

ASSESSMENT OF ACTION 4

Action description and relationship with Natura 2000 features and priorities

Action 4 Supporting Natura 2000 Restoration in Wales (RSPB; sub-project south Stack)	**Annual heather cutting, removal and disposal**
Natura 2000 site(s) relevant to this action	Glannau Ynys Gybi / Holy Island Coast SAC and SPA
Habitat/species/feature of the Natura 2000 site targeted by this action	Dry heaths Wet heathland with cross-leaved heath
Brief description of action	Annual heather cutting, removal and disposal to improve heathland condition in "no burn zone"
Scale of implementation	2.1 ha
Potential direct/indirect impacts of the action on restoration of this habitat/species/feature, as identified in the application	Direct management of SAC heathland to improve condition
Other wider benefits, as identified in the application	None
Condition assessment of the target habitat/species in this/these Natura 2000 site(s)	Dry heaths: Unfavourable Wet heathland with cross-leaved heath: Unfavourable
'Issue' or 'risk' for *this* habitat type/species/feature in *this* Natura 2000 site, which the action addresses	Cutting/Mowing - insufficient

14.3.2 EVALUATION QUESTIONS FOR ACTION 4

14.3.2.1 Q1 Is there good evidence for the potential impact of this action on the condition of targeted Natura 2000 habitat(s) and /or species

Weight of evidence that links potential direct impacts of this action on the condition of targeted Natura 2000 habitat(s) and /or species in the location where it will be applied.

The SFS evidence review identified appropriate cutting of semi-natural habitats as having positive outcomes for biodiversity. Assuming that cutting management maintains heather at a variety of heights, this management is likely to improve condition of the heathland features of the SAC – especially given the threat of insufficient cutting attached to these features. Cutting is also likely to reduce the threat of uncontrolled fire. Interestingly, inappropriate vehicle use is also listed as a threat to these habitats, and it is unclear whether cutting management will contribute to this.

Additionality of this management is high, assuming the management would not have gone ahead without this grant. The management is likely to have impacts over 1-5 years, given the action is proposed to be "annual" implying follow-up management will be carried out.

Assessment of strength of evidence: traffic light categories: Blue

14.3.2.2 Q2 Are there potential environmental benefits at landscape scale within or beyond the Natura 2000 site itself?

Identified in the application: None.

Identified by this review: The actions proposed might help prevent uncontrolled fires in the area. Improvements in heathland condition would contribute to overall landscape connectivity of these habitats.

14.3.2.3 Q3 Are there simple metrics for monitoring/evaluating the impacts of this action?

Identified in the application: The applicant pledges habitat condition monitoring at the start and end of the project.

Identified additionally by this review: Vegetation condition assessments of heathland habitats. Systematic surveys (counts) of chough, including data on feeding/breeding behaviour.

14.3.2.4 Q4 Are there potential benefits for the local economy?

If local contractors are employed to carry out the works, there are potential benefits for the local economy.

14.3.2.5 Q5 Are there potential benefits for increasing engagement of the local community in the Natura 2000 site(s)?

Identified in the application: Volunteers are expected to be involved with this management, therefore there are community engagement opportunities associated with it.

Identified additionally by this review: None.

14.4 ADDITIONAL COMMENTS

This project is highly focussed on the priority SAC/SPA features of heathland habitats and chough populations. The actions proposed are highly relevant to both the features and the threats to them. Not much detail is provided on the specifics of management, for example whether and how cutting or burning forms a part of a rotation; how the intensity of grazing varies across the reserve. However, the applicant has experience of managing these habitats and appropriate management is strongly implied. Additionality of the actions appears generally high, although the need for intervention – e.g. amounts of broken boundaries, uncontrolled fires, undergrazed heathland – could be stated more clearly.

On the whole this seems a good example of a sub-project proposing appropriate management that is highly focussed on the features and threats of the SAC/SPA in question. The applicant's pledge for monitoring is welcome, but vague. Little detail is provided on how/where/when monitoring will take place, and it is unclear how that will be funded.

15 PROJECT 13G LLYN DINAM/VALLEY WETLANDS

LIST OF ACTIONS

	Llyn Dinam/Valley wetlands		
	Action number/type	**Action includes**	**Natura 2000 habitat/species/feature targeted**
1	Bed-lowering to manage water levels and succession	Hire of excavator for bed-lowering in wetlands and reedbeds	Naturally nutrient-rich lakes which are often dominated by pondweed
2	Creation of ponds, open water and back-waters	Hire of excavator to create additional ponds, open waters and back-waters	Naturally nutrient-rich lakes which are often dominated by pondweed
3	Willow removal in reedbeds	Hire of excavator to remove willow scrub and maintain fringing reed-bed habitat and fen margins	Naturally nutrient-rich lakes which are often dominated by pondweed

15.1 ASSESSMENT OF ACTION 1

Action description and relationship with Natura 2000 features and priorities

Action 1 Llyn Dinam/Valley wetlands	**Bed-lowering to manage water levels and succession**
Natura 2000 site(s) relevant to this action	Llyn Dinam SAC
Habitat/species/feature of the Natura 2000 site targeted by this action	Naturally nutrient-rich lakes which are often dominated by pondweed
Brief description of action	Hire of excavator for bed-lowering in Llyn Dinam Valley Wetland reedbeds
Scale of implementation	Not specified
Potential direct/indirect impacts of the action on restoration of this habitat/species/feature, as identified in the application	Creation of fish and plant refuges through water level management. Protect reedbed habitat enhancing conditions for breeding and wintering wildfowl and bittern.
Other wider benefits, as identified in the application	Aid connectivity. Facilitate climate change adaption by providing suitable habitat in a region where conditions for breeding bittern and wildfowl are deteriorating .
Condition assessment of the target habitat/species in this/these Natura 2000 site(s)	Unfavourable (confidence high)
'Issue' or 'risk' for *this* habitat type/species/feature in *this* Natura 2000 site, which the action addresses	Medium risk and priority for the feature habitat– this action is aimed at managing water levels and habitat resources for a flagship constituent species

15.1.1 EVALUATION QUESTIONS FOR ACTION 1

15.1.1.1 Q1 Is there good evidence for the potential impact of this action on the condition of targeted Natura 2000 habitat(s) and /or species

Weight of evidence that links potential direct impacts of this action on the condition of targeted Natura 2000 habitat(s) and /or species in the location where it will be applied.

The Core Management Plan for this SAC (2008) states that the site should continue to support a clear-water aquatic plant community characterised by a wide variety of pondweeds, while the lakes persist. Reed swamp and fen should support, amongst other things, marsh fern, while providing suitable habitat for breeding and wintering wildfowl and other wetland birds. The mixture of lakes, ponds, ditches and other water habitats; together with the reedbeds, marshland, scrub and wet grassland, should display the process of natural succession from open water to marshy grassland.

The use of bed-lowering to rapidly change a reedbed / wetland to an early successional stage by scraping off the top layer of vegetation and organic matter is a well-established and rapid technique for creating a mosaic of reedbed habitat in early successional stages with patches of open water and connecting channels and has been used successfully in the UK, for example at RSPB Minsmere, to greatly enhance breeding bittern populations.

Assessment of strength of evidence: traffic light categories: Blue

15.1.1.2 Q2 Are there potential environmental benefits at landscape scale within or beyond the Natura 2000 site itself?

Identified in the application: One important aim of this work is to increase connectivity for aquatic species in this landscape. A second is to facilitate climate change adaptation through the maintenance and creation of good quality reedbed habitat in Wales under a climate change scenario where populations of breeding and wintering wildfowl and wading species are shifting their distribution eastwards. This site may constitute an outpost of western populations of species such as bittern, which has recently returned to breed at a few key sites in Wales as a consequence of bespoke conservation action.

Identified by this review:

15.1.1.3 Q3 Are there simple metrics for monitoring/evaluating the impacts of this action?

Identified in the application: Not specified

Identified additionally by this review: Analysis of on-site monitoring (e.g. bittern) and national monitoring data-sets for wetland birds (e.g. Wetland Bird Survey data)

15.1.1.4 Q4 Are there potential benefits for the local economy?

The excavator will be hired locally, providing benefit to the local economy.

15.1.1.5 Q5 Are there potential benefits for increasing engagement of the local community in the Natura 2000 site(s)?

Identified in the application: Not identified

Identified additionally by this review:

15.2 ASSESSMENT OF ACTION 2

Action description and relationship with Natura 2000 features and priorities

Action 2 Llyn Dinam/Valley wetlands	**Creation of ponds, open water and back-waters**
Natura 2000 site(s) relevant to this action	Llyn Dinam SAC
Habitat/species/feature of the Natura 2000 site targeted by this action	Naturally nutrient-rich lakes which are often dominated by pondweed
Brief description of action	Erect fencing around river banks to exclude livestock and reduce bankside poaching
Scale of implementation	Not specified
Potential direct/indirect impacts of the action on restoration of this habitat/species/feature, as identified in the application	Create fish and plant refuges. Provide additional habitat for designated plants and plant community. Facilitate revegetation and natural succession. Enhance conditions for breeding and wintering wildfowl and bittern.
Other wider benefits, as identified in the application	Aid connectivity for aquatic species. Facilitate climate change adaptation by creating suitable habitat in a region where conditions are deteriorating.
Condition assessment of the target habitat/species in this/these Natura 2000 site(s)	Unfavourable (confidence high)
'Issue' or 'risk' for *this* habitat type/species/feature in *this* Natura 2000 site, which the action addresses	Medium risk and priority for the feature habitat– this action is aimed at managing water levels and habitat resources for a flagship constituent species

15.2.1 EVALUATION QUESTIONS FOR ACTION 2

15.2.1.1 Q1 Is there good evidence for the potential impact of this action on the condition of targeted Natura 2000 habitat(s) and /or species

Weight of evidence that links potential direct impacts of this action on the condition of targeted Natura 2000 habitat(s) and /or species in the location where it will be applied.

As for the related action 1 (bed-lowering), there is considerable published evidence and case studies within the UK showing the effectiveness of water level management using excavation to maintain a mosaic of wetland / reedbed habitats and allow natural succession.

Assessment of strength of evidence: traffic light categories: Blue

15.2.1.2 Q2 Are there potential environmental benefits at landscape scale within or beyond the Natura 2000 site itself?

Identified in the application: One important aim of this work is to increase connectivity for aquatic species in this landscape. A second is to facilitate climate change adaptation through

the maintenance and creation of good quality reedbed habitat in Wales under a climate change scenario where populations of breeding and wintering wildfowl and wading species are shifting their distribution eastwards. This site may constitute an outpost of western populations of species such as bittern, which has recently returned to breed at a few key sites in Wales as a consequence of bespoke conservation action.

Identified by this review:

15.2.1.3 Q3 Are there simple metrics for monitoring/evaluating the impacts of this action?

Identified in the application: None specified

Identified additionally by this review: On site monitoring of populations of key breeding birds (e.g. bittern) and use of national monitoring data-sets (e.g. Wetland Bird Survey) to assess patterns of change at this site in relation to regional trends

15.2.1.4 Q4 Are there potential benefits for the local economy?

Hire of the excavator to carry out the work will provide a benefit to the local economy.

15.2.1.5 Q5 Are there potential benefits for increasing engagement of the local community in the Natura 2000 site(s)?

Identified in the application: None specified

Identified additionally by this review:

15.3 ASSESSMENT OF ACTION 3

Action description and relationship with Natura 2000 features and priorities

Action 3 Llyn Dinam/Valley wetlands	**Willow removal in reedbeds**
Natura 2000 site(s) relevant to this action	Llyn Dinam SAC
Habitat/species/feature of the Natura 2000 site targeted by this action	Naturally nutrient-rich lakes which are often dominated by pondweed
Brief description of action	Hire of excavator to remove willow scrub from fringing reedbeds and fen margins
Scale of implementation	Not specified
Potential direct/indirect impacts of the action on restoration of this habitat/species/feature, as identified in the application	Maintains the designated fringing reedbeds and fen margins. Reduced predation on fish populations. Microclimate buffering.
Other wider benefits, as identified in the application	Increases connectivity. Slows succession to scrub.
Condition assessment of the target habitat/species in this/these Natura 2000 site(s)	Unfavourable (confidence high)
'Issue' or 'risk' for *this* habitat type/species/feature in *this* Natura 2000 site, which the action addresses	Not applicable – this action aimed at encroachment by a native successional species

15.3.1 EVALUATION QUESTIONS FOR ACTION 3

15.3.1.1 Q1 Is there good evidence for the potential impact of this action on the condition of targeted Natura 2000 habitat(s) and /or species

Weight of evidence that links potential direct impacts of this action on the condition of targeted Natura 2000 habitat(s) and /or species in the location where it will be applied.

Scrub removal in wetlands is a well-established method of slowing succession to scrub and in maintaining the integrity of reedbeds. Colonisation by target species such as bittern or breeding wildfowl assemblages will also depend on other factors such as the nearby presence of source populations. Bittern also require suitable fish resources in water bodies of the right depth for foraging so there are several requirements to be met to provide for breeding birds, but the complementary conservation actions aimed at water management by bed-lowering and creating new open water habitats and backwaters provide this.

Assessment of strength of evidence: traffic light categories: Blue

15.3.1.2 Q2 Are there potential environmental benefits at landscape scale within or beyond the Natura 2000 site itself?

Identified in the application: The application focuses on increased connectivity for aquatic species and climate change adaptation.

Identified by this review:

15.3.1.3 Q3 Are there simple metrics for monitoring/evaluating the impacts of this action?

Identified in the application: None identified

Identified additionally by this review: On site monitoring of breeding bird populations.

15.3.1.4 Q4 Are there potential benefits for the local economy?

Hire of the excavator to carry out willow removal could have benefits for the local economy if, as expected, local contractors are used.

15.3.1.5 Q5 Are there potential benefits for increasing engagement of the local community in the Natura 2000 site(s)?

Identified in the application: None identified

Identified additionally by this review:

15.4 ADDITIONAL COMMENTS

The focus of the proposed management was on bittern, a bird species which is not a designated feature through an SPA but would be an expected species of the designated habitat feature when this is in good condition.

Inclusion within a single application covering multiple projects, locations, Natura 2000 sites and actions made this project more difficult to assess, but the structure, breaking benefits

down in each section by site, helped. The extent (area) of proposed habitat management on site was not specified.

16 PROJECT 14 TYWYDD TYWI WEATHER

LIST OF ACTIONS

	Tywydd Tywi Weather		
	Action number/type	**Action includes**	**Natura 2000 habitat/species/feature targeted**
1	Research Infrastructure	• Set up weather stations (measuring rainfall, soil moisture, soil temperature, air temperature and wind speed). • Fencing around weather stations • Web platform design	*None specified.* *Features affected by diffuse pollution:* • *Alosa alosa*/Allis Shad, • *Alosa fallax*/Twait shad, • *Cottus goblo*/Bullhead, • *Lametra fluviatillis*/ River lamprey, • *Lampetra planeri*/ Brook lamprey, • *Lutra lutra*/ Otter, • *Petromyzon marinus*/ Sea Lamprey.

16.1 ASSESSMENT OF ACTION 1

Action description and relationship with Natura 2000 features and priorities

Action 1 Tywydd Tywi Weather	**Research infrastructure**
Natura 2000 site(s) relevant to this action	Afon Tywi / River Tywi
Habitat/species/feature of the Natura 2000 site targeted by this action	*Alosa alosa*/Allis Shad, *Alosa fallax*/Twait shad, *Cottus goblo*/Bullhead, *Lametra fluviatillis/* River lamprey, *Lampetra planeri/* Brook lamprey, *Lutra lutra/* Otter *Petromyzon marinus/* Sea Lamprey.
Brief description of action	Six weather stations set up (measuring rainfall, soil moisture, soil temperature, air temperature and wind speed) to estimate leaf moisture and soil moisture on catchment farms and provide on-farm weather forecasts. Protective fencing to be erected around stations. Web design, hosting and development of online platform to present analyses of collected weather data.
Scale of implementation	6 weather stations along the length of the catchment. 40 farmer initially involved with the project. Scale of planned climate projections is not described.
Potential direct/indirect impacts of the action on restoration of this habitat/species/feature, as identified in the application	Appropriate slurry spreading and pesticide spraying, reducing diffuse pollution and wind drift. Appropriate timing of use of large machinery, leading to i) reduced sediment erosion and nutrient input to Afon Tywi, and ii) reduced soil compaction and runoff generation.
Other wider benefits, as identified in the application	Reduced costs to farmers from efficient slurry and pesticide use, and reduced NRW enforcement
Condition assessment of the target habitat/species in this/these Natura 2000 site(s)	*Alosa alosa/*Allis Shad: Favourable (medium confidence) *Alosa fallax*/Twait shad: Favourable (medium) *Cottus goblo/*Bullhead: Unfavourable (low) *Lametra fluviatillis/* River lamprey: Unfavourable (medium) *Lampetra planeri/* Brook lamprey: Unfavourable (medium) *Lutra lutra/* Otter: Unfavourable (med) *Petromyzon marinus/* Sea Lamprey: Unfavourable (low)
'Issue' or 'risk' for *this* habitat type/species/feature in *this* Natura 2000 site, which the action addresses	Water pollution - diffuse sources: *Alosa alosa/*Allis Shad: H *Alosa fallax*/Twait shad: H *Cottus goblo/*Bullhead: M *Lametra fluviatillis/* River lamprey: M *Lampetra planeri/* Brook lamprey: H *Lutra lutra/* Otter: H *Petromyzon marinus/* Sea Lamprey.: H

16.1.1 EVALUATION QUESTIONS FOR ACTION 1

16.1.1.1 Q1 Is there good evidence for the potential impact of this action on the condition of targeted Natura 2000 habitat(s) and /or species

Weight of evidence that links potential direct impacts of this action on the condition of targeted Natura 2000 habitat(s) and /or species in the location where it will be applied.

There are good evidence links showing that reduced nutrient inputs to agricultural systems, and better timing of nutrient inputs, can reduce excess nutrient loading and pollution in associated aquatic systems (Sustainable Farming Scheme Evidence Review Technical Annex. Annex 1: Soil nutrient management for improved land). One of the major barriers preventing the reduction of nutrient and pesticide inputs faced by farmers is a lack of appropriate decision support tools that are not over-complicated and are of practical use (Sustainable Farming Scheme Evidence Review Technical Annex. Annex 1 and Annex 5). The positive effects of reducing nutrient and fertiliser inputs are most significant in high output systems, including dairy farms, which are the primary target of this application. Benefits from reduced fertiliser application are likely to be felt rapidly but require changes in management practice to be maintained long term, and therefore any monitoring or decision support systems would also need to be supported long-term, beyond the provision of this capital grant. The application indicates that provisions for the maintenance of the project are in place. However, little is known about how access to these tools ultimately changes management practices and input rates, but results are likely to depend on current input rates and whether farmers were previously following a nutrient management plan (Sustainable Farming Scheme Evidence Review Technical Annex. Annex 1). The overall effect of this project on diffuse pollution in the Afon Tywi will also depend on farmer uptake, and the success of the climatic modelling approach used.

There is some evidence that soil moisture at the time of mechanised farm management influences the risk and quantity of soil erosion that occurs as a result (Pulley & Collins, 2020). However, the equipment used and the frequency of use also have large effects on rates of soil erosion and compaction, indicating a large variation in baseline conditions might exist.

This project is a pilot test of an integrated micro-climate monitoring and prediction platform, and as such the accuracy of predictions for local climatic conditions, which will be based on six point-measurements, is unknown. The success of this modelling approach will be dependent on 1) the area over which climate must be extrapolated from each point measurement, 2) the amount of variation in terrain and vegetation across the area for which climate is being predicted and 3) the quality and resolution of any additional data that is being used to augment this process. No detail is given about this process in the application, but the successful modelling of local microclimate is a key step to guiding the timing of farm management and maintaining farmer trust in this project's potential.

Therefore, if the project is successful in producing a usable guidance platform, which is needed in the sector, there is good evidence that this application will benefit the Afon Tywi by facilitating a decreasing in diffuse pollution. Although less certainty exists around changes in soil erosion due to lack of evidence, a reduction in soil erosion as a result of management timing is consistent with existing logic chains.

S. Pulley, A.L. Collins, 2020, Sediment loss in response to scheduled pasture ploughing and reseeding: The importance of soil moisture content in controlling risk, *Soil and Tillage Research*, *204*, 104746.

Assessment of strength of evidence: traffic light categories: Amber

16.1.1.2 Q2 Are there potential environmental benefits at landscape scale within or beyond the Natura 2000 site itself?

Identified in the application: Improved catchment water quality and community integrity as a result of reduced diffuse pollution. This is contingent on the successful implementation of the modelling platform and an effective user response.

Identified by this review: If the project is successful in reducing overall rates of fertiliser application and improving the timing of fertiliser applications, there is good evidence that this can reduce nitrous oxide and ammonia emissions, resulting in improved air quality for the environment and for human health. These changes can occur over 5-10 years, over small spatial scales, however, as air pollution is diffuse, reductions might be difficult to measure unless there are widespread changes in fertiliser application.

The application of organic fertiliser has been linked to an increasing in soil organic carbon (SOC), and so a decrease in fertiliser application may decrease soil organic carbon, if this is not fully compensated for by an increase in efficacy, based on the timing of fertiliser application. SOC does not itself constitute climate change mitigation and improvements in SOC have also been found to plateau with continued fertiliser application. Therefore, risks of decreasing SOC following a reduction in fertiliser application is likely low in this context.

16.1.1.3 Q3 Are there simple metrics for monitoring/evaluating the impacts of this action?

Identified in the application: Monitoring use of web platform by farmers

Identified additionally by this review: Validation of weather predictions away from the 6 monitoring sites.

Requesting feedback from farmers on any changes in expenditure on pesticides and slurry application quantities. Monitoring of local water quality and rates of local runoff generation would also be beneficial.

16.1.1.4 Q4 Are there potential benefits for the local economy?

More efficient use of pesticides and fertilisers may reduce farm business costs. Reduced rates of diffuse pollution my also reduce the financial impact on farmers as a result of the enforcement of water pollution regulations and associated penalties.

There is good evidence that effective and trusted knowledge transfer to and between farmers can improve overall farm resilience, as can additional training (SFS 25).

Contractors involved in the setup of fencing and in web design could be locally based, but that is unclear.

Capital expenses supported by this grant will enable addition work and projects to be carried out by Coleg Sir Gâr using this equipment, as stated in the application.

16.1.1.5 Q5 Are there potential benefits for increasing engagement of the local community in the Natura 2000 site(s)?

Identified in the application: Local farmer engagement with the monitoring process and end products is described as an intrinsic part of the project, although not one that is directly

funded by this capital grant. The application states that farmers will be trained in the use of the interface designed through this application, to communicate local climatic conditions and guide farm management practices. The project is said to be capitalising and building on existing engagement of farmers with the condition of the Afon Tywi. The application also indicated that reducing diffuse pollution from participant farms will encourage better relations between the dairy farming community and local anglers, potentially facilitating greater positive engagement with communities using the river. Overall, this project is actively engaging with the community regarding the status of the focal Natura 2000 site, in a manner that is intrinsic to the project.

Identified additionally by this review: This project is testing a pilot platform, largely run through a college that is training future farmers. The management and development of this project is likely to offer additional teaching opportunities in that setting. The immediate topic of engagement is one step removed from the Natura site itself, as it is focused on farm conditions and management, however, as the status of the Natura 2000 site is stated as a strong motivator for the project it is to be hoped that the impacts of diffuse pollution on site quality will feature in any outreach.

16.2 ADDITIONAL COMMENTS

This project is very innovative and is seeking to provide a solution to a notable existing problem in farm management that is contributing to a decline in quality in local Natura 2000 sites. The project is trying to address these problems by actively engaging with the agricultural community. The system they are developing has the potential to contribute substantially to knowledge about local climatic variation and it impact on diffuse pollution, and the value of this should be kept in mind when considering some of the limitations previously described (e.g. the fact that this technology has not previously been tested on this scale).

Some text in the application seems to be describing another project, run from the same campus, but otherwise apparently not involved with the grant application. This text contains statistics, and is difficult to know what weight to put on these, or how they are related to the rest of the application.

17 PROJECT 15 WYE VALLEY WOODLAND

LIST OF ACTIONS

	Wye Valley Woodland		
	Action number/type	**Action includes**	**Natura 2000 habitat/species/feature targeted**
1	Woodland restoration (felling and coppicing)	• Tree felling • Coppicing	Mixed woodland on base-rich soils associated with rocky slopes; Beech forests on neutral rich soils; and Yew dominated woodland
2	Veteran tree management	• Pollarding • Halo-thinning	Mixed woodland on base-rich soils associated with rocky slopes,; Beech forests on neutral rich soils; and Yew dominated woodland
3	Veteran tree planting	• Tree planting	Lesser horseshoe bat
4	Livestock fencing replacement	• Fence replacement around woodland • Fence replacement around woodland pasture	Mixed woodland on base-rich soils associated with rocky slopes
5	Invasive species management	• Invasive species removal via hebicide	Mixed woodland on base-rich soils associated with rocky slopes; Beech forests on neutral rich soils; and Yew dominated woodland
6	Pond restoration and creation (natural flood management)	• Pond building and restoration	Unclear
7	Leaky dam creation (natural flood management)	• Leaky dam building	Unclear
8	Visitor access and information	• Path clearing • Entrance restoration • Information boards	None
9	Investigation of deer browsing and invertebrate biodiversity	• Deer impact survey • Bast bark beetle survey • Invertebrate trapping	Mixed woodland on base-rich soils associated with rocky slopes; Beech forests on neutral rich soils; and Yew dominated woodland

17.1 ASSESSMENT OF ACTION 1

Action description and relationship with Natura 2000 features and priorities

Action 1 Wye Valley Woodland	Woodland restoration (felling and coppicing)
Natura 2000 site(s) relevant to this action	Wye Valley Woodlands SAC and Wye River SAC
Habitat/species/feature of the Natura 2000 site targeted by this action	Wye Valley Woodlands SAC: Mixed woodland on base-rich soils associated with rocky slopes Beech forests on neutral rich soils Yew dominated woodland Wye River SAC: No features targeted
Brief description of action	Felling of dead and dying trees and coppicing to create open glades and open rides in areas of closed canopy forest.
Scale of implementation	365-380 trees felled or coppiced. No information on extent of area covered.
Potential direct/indirect impacts of the action on restoration of this habitat/species/feature, as identified in the application	Promote natural regeneration of woodland Improve light conditions for ground flora Increase lying deadwood
Other wider benefits, as identified in the application	Enhance connectivity for wildlife Improve climate change adaptability Improve access safety
Condition assessment of the target habitat/species in this/these Natura 2000 site(s)	Mixed woodland on base-rich soils associated with rocky slopes: Unfavourable (high confidence) Beech forests on neutral rich soils: Unfavourable (high Yew dominated woodland: Unknown
'Issue' or 'risk' for *this* habitat type/species/feature in *this* Natura 2000 site, which the action addresses	"Woodland management and tree felling": Mixed woodland on base-rich soils associated with rocky slopes: L Beech forests on neutral rich soils: L Yew dominated woodland: L (

17.1.1 EVALUATION QUESTIONS FOR ACTION 1

17.1.1.1 Q1 Is there good evidence for the potential impact of this action on the condition of targeted Natura 2000 habitat(s) and /or species

Weight of evidence that links potential direct impacts of this action on the condition of targeted Natura 2000 habitat(s) and /or species in the location where it will be applied.

Maintaining structural complexity and habitat connectivity has been promoted as a strategy for woodland biodiversity conservation, although practices originated as methods of timber production. Substantial evidence gaps remain regarding the utility of practices such as coppicing for tree health and for the resilience of woodland ecosystems. Existing evidence is not based on to the specific mixed woodland systems that are the focus of this action, and responses are likely highly species specific.

There is good evidence that management for structural diversity in woodlands can promote an increase in species richness more generally, particularly for native bird and butterfly species, which can benefit from patches of increased sunlight and sparse tree cover. There is also strong evidence that the presence of deadwood is associated with greater woodland species richness, but this applies to both standing and lying deadwood. Increased

biodiversity has been broadly associated with greater ecosystem resilience, although this is not always the case, and evidence demonstrating a direct link between tree felling and greater woodland resilience is lacking. Specifically, there is a lack of long-term studies of the effects of gaps and age heterogeneity on overall woodland resilience. The benefits of gap creation will also vary with woodland extent and natural rates of disturbance, which are likely to increase in the future as a result of climate change.

The longevity of benefits from gap creation for species richness will be tied to the presence of the gaps, which will be gradually undermined through forest regeneration, which can occur relatively quickly (5 years). Although some responses of biodiversity to gap presence would be apparent in this time frame, the maintenance of structural heterogeneity would require ongoing management not supported by this application.

Assessment of strength of evidence: traffic light categories: Amber

Q2 Are there potential environmental benefits at landscape scale within or beyond *the Natura 2000 site itself?*

Identified in the application: Maintaining an open woodland structure can preserve habitat connectivity for gap-loving species in adjacent habitats. There is unlikely to be any significant change in the resilience of the site to climate change as a result of this action.

Identified by this review: The maintenance of woodland cover and woodland cover on slopes has been associated with reduced flood peak magnitude and reduced runoff in catchments. In general, the management of woodland to promote asynchronous regeneration will support these processes, but the clearing of large patches could also undermine them. As the area affected by tree felling and the sizes of patches to be generated are not specified, the importance of this action for catchment flood risk is unclear.

ERAMMP SMS Evidence Review (9 – Flood risk)

17.1.1.2 Q3 Are there simple metrics for monitoring/evaluating the impacts of this action?

Identified in the application: The applicant is responsible for the long-term management of the sites at which this action will occur and state in the application that the following will be monitored in association with this action:

- Coppice regrowth for felled trees
- Woodland regeneration
- Ground flora growth
- Tree safety
- Species monitoring

Methods of observation were not specified.

The applicant will also record before and after images of the areas coppiced and felled, along with the area coppiced and number of trees felled.

Identified additionally by this review:

17.1.1.3 Q4 Are there potential benefits for the local economy?

Contractors will be hired for the completion of this work however the application does not specify whether these will be local.

17.1.1.4 Q5 Are there potential benefits for increasing engagement of the local community in the Natura 2000 site(s)?

Identified in the application: The felling of standing deadwood will also increase the safety of the site for visitor access, but the action does not support engagement directly.

Identified additionally by this review:

17.2 ASSESSMENT OF ACTION 2

Action description and relationship with Natura 2000 features and priorities

Action 2 Wye Valley Woodland	Veteran tree management
Natura 2000 site(s) relevant to this action	Wye Valley Woodlands
Habitat/species/feature of the Natura 2000 site targeted by this action	Mixed woodland on base-rich soils associated with rocky slopes Beech forests on neutral rich soils Yew dominated woodland
Brief description of action	Re-pollarding of and halo thinning around veteran trees to increase longevity of individual trees.
Scale of implementation	Re-pollarding of over 19 trees and halo thinning for 5 veteran trees involving the felling of approximately 50 trees.
Potential direct/indirect impacts of the action on restoration of this habitat/species/feature, as identified in the application	Increased tree survival Habitat provision
Other wider benefits, as identified in the application	Cultural and historic continuity of the landscape Maintain landscape connectivity
Condition assessment of the target habitat/species in this/these Natura 2000 site(s)	Mixed woodland on base-rich soils associated with rocky slopes: Unfavourable (high confidence) Beech forests on neutral rich soils: Unfavourable (highYew dominated woodland: Unknown
'Issue' or 'risk' for *this* habitat type/species/feature in *this* Natura 2000 site, which the action addresses	"Woodland management and tree felling": Mixed woodland on base-rich soils associated with rocky slopes: L Beech forests on neutral rich soils: L Yew dominated woodland: L

17.2.1 EVALUATION QUESTIONS FOR ACTION 2

17.2.1.1 Q1 Is there good evidence for the potential impact of this action on the condition of targeted Natura 2000 habitat(s) and /or species

Weight of evidence that links potential direct impacts of this action on the condition of targeted Natura 2000 habitat(s) and /or species in the location where it will be applied.

Peer-reviewed evidence linking pollarding or halo-thinning with overall forest status are rare, despite both being fairly widespread forest management practices. Pollarding was originally performed to promote wood production that is suitable for extraction, and produces trees with cultural value due to their distinctive structures. It is thought that by removing large, heavier limbs pollarding can promote tree survivorship by reducing the weight of the canopy

(particularly when growth forms have been affected by previous pollarding) but evidence for or against this in the scientific literature is lacking. The outcome of pollarding will also be dependent on the extent of crown removal and the species of the tree, as some species are more likely to respond poorly to cutting, particularly at maturity. Evidence for the effects of thinning on the growth of any remaining mature trees is mixed across studies (with some finding an increase in growth rate and some seeing no effect) and is based on a small number of studies across a wide range of ecosystems. The benefits of halo thinning for woodland status are most acute when removing non-native species that are overshadowing smaller species that are desirable, but it can also risk damaging valued features. Veteran trees are thought to play an important role in woodland landscapes by providing habitat for invertebrate communities. Local habitat benefits and increases in species richness may occur as a result of a greater amount of light reaching the understory and the provisioning of deadwood. This action is being applied to a small number of individuals and is likely affecting a small area of woodland as a result. It is also worth noting that pollarding is not recommended over a large number of valuable trees in close succession, given the risk of adverse reactions.

Agra, H., Schowanek, S., Carmel, Y., Smith, R.K. & Ne'eman, G. (2020) Forest Conservation. Pages 323-366 in: W.J. Sutherland, L.V. Dicks, S.O. Petrovan & R.K. Smith (eds) *What Works in Conservation 2020*. Open Book Publishers, Cambridge, UK

Assessment of strength of evidence: traffic light categories: Amber

17.2.1.2 Q2 Are there potential environmental benefits at landscape scale within or beyond the Natura 2000 site itself?

Identified in the application: Maintaining landscape connectivity:

By pollarding and halo thinning more gaps will be opened in the woodland. This will provide more connectivity for gap-loving animal species but less for those that prefer coverage.

Identified by this review:

17.2.1.3 Q3 Are there simple metrics for monitoring/evaluating the impacts of this action?

Identified in the application: The applicant is responsible for the long-term management of the sites at which this action will occur and state in the application that pollard regrowth will be monitored, but do not specify how long this will be carried out for or how it will be funded.

Identified additionally by this review:

17.2.1.4 Q4 Are there potential benefits for the local economy?

Contractors will be hired for the completion of this work, however the application does not specify whether these will be local.

17.2.1.5 Q5 Are there potential benefits for increasing engagement of the local community in the Natura 2000 site(s)?

Identified in the application: Veteran trees can act as a tourist attraction, and their preservation may promote continued engagement, however no engagement activities relating to this action are specified in the application.

Identified additionally by this review: Pollarding where standing deadwood poses a risk to the public may increase visitor safety, but this is not discussed as a potential benefit in the application.

17.3 ASSESSMENT OF ACTION 3

Action description and relationship with Natura 2000 features and priorities

Action 3 Wye Valley Woodland	Veteran tree planting
Natura 2000 site(s) relevant to this action	Wye Valley Woodlands
Habitat/species/feature of the Natura 2000 site targeted by this action	Lesser Horseshoe Bat
Brief description of action	Planting hedgerow trees to connect SAC habitat to surrounding non-SAC habitats to provide additional bat flight lines and the next generation of veteran trees
Scale of implementation	14 trees planted over unknown extent
Potential direct/indirect impacts of the action on restoration of this habitat/species/feature, as identified in the application	Provides additional flight paths for lesser horseshoe bats, supported by adjacent woodland habitats Next generation of veteran trees supported Enhance historic and cultural continuity
Other wider benefits, as identified in the application	Landscape connectivity Climate change adaptability
Condition assessment of the target habitat/species in this/these Natura 2000 site(s)	Unknown (2020)
'Issue' or 'risk' for *this* habitat type/species/feature in *this* Natura 2000 site, which the action addresses	Habitat loss and fragmentation: L (2012)

17.3.1 EVALUATION QUESTIONS FOR ACTION 3

17.3.1.1 Q1 Is there good evidence for the potential impact of this action on the condition of targeted Natura 2000 habitat(s) and /or species

Weight of evidence that links potential direct impacts of this action on the condition of targeted Natura 2000 habitat(s) and /or species in the location where it will be applied.

There is good evidence that the planting of hedgerows can have a strong, positive effect of biodiversity by providing habitat for a number of species. The types of species that benefit from hedgerow formation are highly sensitive to the structure of the hedgerow, in terms of height, width, the size of buffer strips and frequency of cutting, which are not specified in the application. Linear features like hedgerows provide important commuting features for bats, which are thought to have potential to divert bats from more dangerous commute paths along roads, but evidence for this is mixed, ad based on a single study in mainland Europe, which found that bats were more likely to use underpasses along original commute lines than divert to hedgerow or treeline routes (Berthinussen et al., 2020). Hedgerow establishment is a long term process, requiring many years or decades to mature and provide their full potential value, in terms of the biodiversity they can support. The importance of a hedgerow for habitat connectivity will be highly dependent on the extent of the structure, and the landscape context and placement relative to existing flight paths for lesser horseshoe bats.

Benefits of tree planting for biodiversity overall would be expected in the first five years, but full maturity will not be achieved for many more years, and the establishment of trees which could be considered veterans would take many decades of management.

Berthinussen, A., Richardson, O.C. & Altringham, J.D. (2020) Bat Conservation. Pages 65-135 in: W.J. Sutherland, L.V. Dicks, S.O. Petrovan & R.K. Smith (eds) What Works in Conservation 2020. Open Book Publishers, Cambridge, UK.

Assessment of strength of evidence: traffic light categories: Amber

17.3.1.2 Q2 Are there potential environmental benefits at landscape scale within or beyond the Natura 2000 site itself?

Identified in the application: Planting new trees will have a positive climate effect by increasing carbon fixation rates. Rates of sequestration will be dependent on tree species but will be limited by the number of trees being planted and their density. The benefits of hedgerow planting for habitat connectivity in the wider landscape are unclear, despite a wide acceptance of the importance of habitat connectivity for ecosystem resilience and population stability among ecologists. There is particularly little evidence for the roles of hedgerows in animal dispersal, but some evidence that hedgerows are used by birds as navigational aids.

Identified by this review:

17.3.1.3 Q3 Are there simple metrics for monitoring/evaluating the impacts of this action?

Identified in the application: The applicant will monitor planted tree growth and weed suppression needs. Specific metrics are not provided.

Identified additionally by this review: Further monitoring to determine the use of developing hedgerows by lesser horseshoe bats could have been proposed.

17.3.1.4 Q4 Are there potential benefits for the local economy?

No notable benefits

17.3.1.5 Q5 Are there potential benefits for increasing engagement of the local community in the Natura 2000 site(s)?

Identified in the application: No notable benefits

Identified additionally by this review:

17.4 ASSESSMENT OF ACTION 4

Action description and relationship with Natura 2000 features and priorities

Action 4 Wye Valley Woodland	Livestock fencing replacement
Natura 2000 site(s) relevant to this action	Wye Valley Woodlands
Habitat/species/feature of the Natura 2000 site targeted by this action	Mixed woodland on base rich soils associated with rocky slopes
Brief description of action	Livestock fencing replaced around feature habitat. Livestock fencing replaced around a woodland meadow.
Scale of implementation	300m fence replaced around 6ha of woodland 950m fencing replaced, plus 5 access gates and one pedestrian gate around a woodland pasture
Potential direct/indirect impacts of the action on restoration of this habitat/species/feature, as identified in the application	Prevent livestock trespass Prevent browsing of natural regeneration Promote habitat continuity and benefits established by management Enhanced management of supporting habitats
Other wider benefits, as identified in the application	Improved landscape connectivity Improved climate change adaptability
Condition assessment of the target habitat/species in this/these Natura 2000 site(s)	Unfavourable (high confidence) (2020)
'Issue' or 'risk' for *this* habitat type/species/feature in *this* Natura 2000 site, which the action addresses	Unclear

17.4.1 EVALUATION QUESTIONS FOR ACTION 4

17.4.1.1 Q1 Is there good evidence for the potential impact of this action on the condition of targeted Natura 2000 habitat(s) and /or species

Weight of evidence that links potential direct impacts of this action on the condition of targeted Natura 2000 habitat(s) and /or species in the location where it will be applied.

Over-grazing by livestock and wild deer has been identified as one of the principal pressures affecting Welsh woodland at the national scale. Published evidence suggests that excluding livestock from an area of forest is likely to have a positive effect on forest status, by increasing biomass and tree density. In some studies, excluding livestock has also been associated with an increase in understory vegetation cover and species richness, but others found mixed or non-significant effects. There is also good evidence for a positive effect of grazer exclusion from areas with newly planted trees on survival, size and vegetation cover, although the evidence base for this is smaller. Grazer exclusion is also intended to safeguard existing management interventions from disturbance. The application states that the relevant area of woodland is coppiced in places, and regeneration is being promoted. New growth, particularly near browsing height is likely to benefit more from grazing exclusion, although this will be dependent on the type of grazers being excluded and the severity of the issue prior to exclusion, which are not specified. As this action comprises fencing replacement, it is implied (but not stated) that the current fence is in a state of disrepair. Fencing would be expected to take immediate effect and be effective for an extended period of time, barring occasional maintenance. If the woodland is prone to grazing by non-domesticated animal (as is suggested in the PIP and the application) the exclusion of livestock may offer fewer benefits, however.

Fencing around an area of woodland pasture is likely to confer similar benefits to adjacent woodland by preventing any resident livestock from grazing outside of the pasture. It may also help to maintain the required grazing levels with the pasture.

Agra, H., Schowanek, S., Carmel, Y., Smith, R.K. & Ne'eman, G. (2020) Forest Conservation. Pages 323-366 in: W.J. Sutherland, L.V. Dicks, S.O. Petrovan & R.K. Smith (eds) What Works in Conservation 2020. Open Book Publishers, Cambridge, UK.

Assessment of strength of evidence: traffic light categories: Blue

17.4.1.2 Q2 Are there potential environmental benefits at landscape scale within or beyond the Natura 2000 site itself?

Identified in the application: Consequences of this action are likely to be locally contained. Maintaining livestock fencing will potentially displace grazing activities from the protected woodland into habitat that remains available for grazing, possibly supporting intended levels of grazing, but without additional context it cannot be said whether restricting grazing to the intended habitat will offer additional environmental benefits. An increase in biomass promoted by livestock exclusion would contribute to local carbon storage, but benefits are likely to be small given existing forest cover at the protected sites. By continuing to facilitate appropriate levels of grazing it could be argued that habitat connectivity will be maintained, but not improved, as is suggested in the application. Capacity to adapt to climate change is unlikely to be affected.

Identified by this review:

17.4.1.3 Q3 Are there simple metrics for monitoring/evaluating the impacts of this action?

Identified in the application: The application states that monitoring of woodland regeneration will occur, although no metrics are proposed. It is unclear whether planned actions involving monitoring for grazing and browsing damage to vegetation falls within this site, which would be helpful in determining whether significant browsing is occurring in the absence of domestic livestock, as a result of deer presence.

Identified additionally by this review: Checking the integrity of fencing on a regular basis would be desirable, to allow repairs to be made quickly and to make the most of the investment.

17.4.1.4 Q4 Are there potential benefits for the local economy?

No potential economic benefits are identified in the application for this action.

17.4.1.5 Q5 Are there potential benefits for increasing engagement of the local community in the Natura 2000 site(s)?

Identified in the application: Although erecting the fence may involve engagement with adjacent landowners there is little basis to assume this action will result in engagement for the Natura 2000 site.

Identified additionally by this review:

17.5 ASSESSMENT OF ACTION 5

Action description and relationship with Natura 2000 features and priorities

Action 5 Wye Valley Woodland	Invasive species management
Natura 2000 site(s) relevant to this action	Wye Valley Woodlands
Habitat/species/feature of the Natura 2000 site targeted by this action	Mixed woodland on base rich soils associated with rocky slopes Beech forests on neutral rich soils Yew dominated woodland
Brief description of action	Removal of cherry laurel, Himalayan balsam, buddleia and lesser periwinkle. Use of 'ecoplugs' herbicide treatment for laurel and buddleia.
Scale of implementation	2ha of cherry laurel, buddleia and lesser periwinkle. Unspecified are of a 6ha woodland affected by Himalayan balsam. 700 ecoplugs purchased.
Potential direct/indirect impacts of the action on restoration of this habitat/species/feature, as identified in the application	• Removal of non-native species • Improve habitat quality • Improved quality of experience of historic and cultural site features • Improved accessibility along long distance access routes
Other wider benefits, as identified in the application	• Enhanced landscape and habitat connectivity • Improved climate change adaptability
Condition assessment of the target habitat/species in this/these Natura 2000 site(s)	Mixed woodland on base-rich soils associated with rocky slopes: Unfavourable (high confidence) Beech forests on neutral rich soils: Unfavourable (high) Yew dominated woodland: Unknown
'Issue' or 'risk' for *this* habitat type/species/feature in *this* Natura 2000 site, which the action addresses	Mixed woodland on base-rich soils associated with rocky slopes: L Beech forests on neutral rich soils: M Yew dominated woodland: L

17.5.1 EVALUATION QUESTIONS FOR ACTION 5

17.5.1.1 Q1 Is there good evidence for the potential impact of this action on the condition of targeted Natura 2000 habitat(s) and /or species

Weight of evidence that links potential direct impacts of this action on the condition of targeted Natura 2000 habitat(s) and /or species in the location where it will be applied.

Invasive species can significantly affect native woodland habitat, supressing the growth of desirable species and reducing the amenity value of a site. Preventing the dominance of invasive species can be critical to maintaining environmental value. The success and risks of any individual action will depend on the extent of invasive species cover, the invasive species being targeted, and the method of removal. Effects of invasive species management tend to be positive, where management has a significant effect, but evidence suggests that the efficacy of management is variable. Specific evidence for the effect of invasive species removal on species richness and native species growth rates is inconsistent (some positive effects and some finding no effect) and limited by a small number of studies. The complete removal of invasive species is challenging, and management is likely to be an ongoing requirement. Reduced coverage of invasive plant species will likely provide an immediate

improvement in access and site aesthetics and there is accepted logic linking invasive species removal with increased cover by native species. Reducing coverage is also likely to slow the expansion of invasive species to other areas.

The use of chemical herbicides does carry a greater potential risk to non-target vegetation, staff and the public if recommended management practices are not followed and treatments are being applied in a location with public access, although risks to human health from environmental residue are very low. Ecoplugs are designed to minimise contamination, relative to glyphosate sprays, and have been shown to be effective at stand thinning in the single published study investigating their use. The lower labour requirements of chemical herbicides can make management feasible in conditions that could not be managed with mechanical treatment.

On balance, this action is likely to have some positive effect, but would need to be supported by ongoing invasive species management and control in subsequent years to increase the likelihood of a positive outcome.

Agra, H., Schowanek, S., Carmel, Y., Smith, R.K. & Ne'eman, G. (2020) Forest Conservation. Pages 323-366 in: W.J. Sutherland, L.V. Dicks, S.O. Petrovan & R.K. Smith (eds) What Works in Conservation 2020. Open Book Publishers, Cambridge, UK.

ERAMMP SFS Evidence Review (4) and expert opinion

Assessment of strength of evidence: traffic light categories: Blue

17.5.1.2 Q2 Are there potential environmental benefits at landscape scale within or beyond the Natura 2000 site itself?

Identified in the application: Invasive species management can prevent their spread to other protected habitats within and beyond the Natura 2000 site and can be helpful in protecting the long-term viability of native populations, if effective. However, if multiple sources of invasive species exist outside the managed area, controlling invasive species' establishment is difficult and will require ongoing monitoring.

Clearing invasive species will not directly affect habitat connectivity for other species, unless they recover to treated areas, and will not affect climate change resilience.

Identified by this review:

17.5.1.3 Q3 Are there simple metrics for monitoring/evaluating the impacts of this action?

Identified in the application: The application states that species monitoring will occur, but not whether this will be applied to this action specifically.

Identified additionally by this review: Monitoring of native and invasive species in proximity to the sites of chemical herbicide use would be desirable, to determine whether the action is effective and whether any negative consequences are occurring at an early stage. Ongoing monitoring of the presence and spread of invasive species would be desirable following this treatment, if the action is to have a long-term effect.

17.5.1.4 *Q4 Are there potential benefits for the local economy*?

No benefits to the local economy are apparent.

17.5.1.5 Q5 Are there potential benefits for increasing engagement of the local community in the Natura 2000 site(s)?

Identified in the application: Providing easier visitor access to sites of cultural and historic value by clearing invasive vegetation would passively enable greater engagement from the community.

Identified additionally by this review:

17.6 ASSESSMENT OF ACTION 6

Action description and relationship with Natura 2000 features and priorities

Action 6 Wye Valley Woodland	Pond restoration and creation (natural flood management)
Natura 2000 site(s) relevant to this action	Wye valley woodlands and River wye SACs
Habitat/species/feature of the Natura 2000 site targeted by this action	unclear
Brief description of action	Creation of 3 ponds as natural flood management. At one site trees will be coppiced. Desilting on one existing pond.
Scale of implementation	3 ponds created (areas: 80m^2, 20m^2, 30 m^2). Desilted pond is 8m^2. 15 riparian trees will be coppiced.
Potential direct/indirect impacts of the action on restoration of this habitat/species/feature, as identified in the application	Increased pond habitat Increased landscape connectivity Reduced leaf fall and transpiration rates Improved climate change adaptability
Other wider benefits, as identified in the application	Slowing of overland flow Reduced diffuse pollution and education, by using these sites as demonstration features.
Condition assessment of the target habitat/species in this/these Natura 2000 site(s)	unclear
'Issue' or 'risk' for *this* habitat type/species/feature in *this* Natura 2000 site, which the action addresses	unclear

17.6.1 EVALUATION QUESTIONS FOR ACTION 6

17.6.1.1 Q1 Is there good evidence for the potential impact of this action on the condition of targeted Natura 2000 habitat(s) and /or species

Weight of evidence that links potential direct impacts of this action on the condition of targeted Natura 2000 habitat(s) and /or species in the location where it will be applied.

There is some evidence that enhanced connections between aquatic systems can be beneficial to biodiversity. Few studies consider the effect of establishing ponds on river flow and flood risk. For structures to buffer periods of intense rainfall and flood risk, draining may be required around periods of peak flow and in winter. There is some evidence that offline storage areas for flood water can reduce local flood risk from small events, and their effectiveness is linked to their size. The effect of structures of the scale described in this application is unlikely to be significant for the wider catchment of the River Wye SAC, although further research is needed to determine the effect on flood-peak synchronisation. Periodic draining for local flood relief would likely undermine some of the value of the pond

as permanent aquatic habitat. Lentic bodies of water can allow pollutants and sediment to settle from water, increasing catchment water quality to some degree.

Riparian inputs to pond systems have a strong influence on aquatic productivity, nutrient loads and the presence of invertebrate detritivores. Reducing these inputs by coppicing will affect the community in the short term by reducing the number of detritivores that can be supported and potentially increase the oxygen levels in the pond. The magnitude of this effect will depend on what percentage of aquatic organic matter is sourced from the 15 riparian trees to be coppiced. The intended effect of litter reductions on the aquatic community was not described in the application. Coppicing will reduce transpiration rates, as the removal of leaves will prevent water loss to the atmosphere, but the reason for this objective is unclear. By preventing transpiration, the use of local ground water by vegetation will be reduced until leaves re-grow, as is necessary for the survival for the tree. It is unclear what benefits a temporary cessation of transpiration would provide, although at such a small spatial scale effects are likely to be minor.

ERAMMP SFS Evidence Review (9) and expert opinion

Assessment of strength of evidence: traffic light categories : No link

17.6.1.2 Q2 Are there potential environmental benefits at landscape scale within or beyond the Natura 2000 site itself?

Identified in the application: Evidence suggests that local scale actions of this type are unlikely to influence flood risk in the wider catchment. Benefits for water quality are also likely to be local, but inferences are limited by a lack of primary research.

ERAMMP SFS Evidence Review (9)

Identified by this review:

17.6.1.3 Q3 Are there simple metrics for monitoring/evaluating the impacts of this action?

Identified in the application: Pond water levels will be monitored.

Identified additionally by this review: The effects of coppicing on the composition of the aquatic community could also be monitored, using species counts or an assessment of changes in water colouration and clarity.

17.6.1.4 Q4 Are there potential benefits for the local economy?

There is no clear evidence that this action will benefit the local economy. If ponds serve as a tourist attraction, they may increase visitor turnover.

17.6.1.5 Q5 Are there potential benefits for increasing engagement of the local community in the Natura 2000 site(s)?

Identified in the application: The ponds may be used to demonstrate any benefits of the structures to others. Although not stated, this could include local landowners and visitors to the site. Little detail is provided about the form these demonstrations would take, but they would provide an opportunity for active engagement with the community.

Identified additionally by this review:

17.7 ASSESSMENT OF ACTION 7

Action description and relationship with Natura 2000 features and priorities

Action 7 Wye Valley Woodland	Leaky dam creation (natural flood management)
Natura 2000 site(s) relevant to this action	Wye valley woodlands and River wye SACs
Habitat/species/feature of the Natura 2000 site targeted by this action	unclear
Brief description of action	Creation of leaky dams as natural flood management in woodland streams
Scale of implementation	12 dams created over unspecified length of woodland stream
Potential direct/indirect impacts of the action on restoration of this habitat/species/feature, as identified in the application	Enhanced wetland habitat Improved woody debris in watercourses Improved woodland habitat mosaic Improved landscape connectivity Improved climate change adaptability
Other wider benefits, as identified in the application	Slowing of overland flow Reduced diffuse pollution and education, by using these sites as demonstration features.
Condition assessment of the target habitat/species in this/these Natura 2000 site(s)	unclear
'Issue' or 'risk' for *this* habitat type/species/feature in *this* Natura 2000 site, which the action addresses	unclear

17.7.1 EVALUATION QUESTIONS FOR ACTION 7

17.7.1.1 Q1 Is there good evidence for the potential impact of this action on the condition of targeted Natura 2000 habitat(s) and /or species

Weight of evidence that links potential direct impacts of this action on the condition of targeted Natura 2000 habitat(s) and /or species in the location where it will be applied.

The effects of leaky barrier construction are site specific but there is evidence that their construction in waterways slows river flow and increases the connectivity between a river and its flood plain. Much of the evidence for the effect of leaky barriers on local flood risk and the timing of flood waves is based on modelling, rather than experimental evidence. Where evidence is experimental, authors warn that leaky barriers may not be a predictable flood mitigation measure. Construction should ideally be supported by hydrological modelling. By slowing rates of river flow, opportunities for sediment and pollutants to fall out of suspension will be increased, but the effectiveness of this will be highly site specific as a result of stream velocity and dam construction.

The application does not discuss the effect of dam construction on any specific species and the nature of the connection of these woodland streams to the River Wye SAC is not specified. Whilst the presence of instream barriers could prevent the allis and twait shad from reaching spawning grounds in the River Wye, spawning is likely to occur in relatively wide, fast moving bodies of water.

Benefits for flood prevention and the risks of any adverse effects on SAC features are highly dependent on the size of the rivers affected and their connectivity to the River Wye SAC.

ERAMMP SMS Evidence Review (9)

Maitland PS & Hatton-Ellis TW (2003). Ecology of the Allis and Twaite Shad. Conserving Natura 2000 Rivers Ecology Series No. 3. English Nature, Peterborough.

Assessment of strength of evidence: traffic light categories: No link

17.7.1.2 Q2 Are there potential environmental benefits at landscape scale within or beyond the Natura 2000 site itself?

Identified in the application:

Identified by this review: Restored floodplains and wetlands can have co-benefits for sediment and nutrient removal from waters, for biodiversity by increasing habitat availability, and promoting ecosystem resilience at the landscape scale. The benefits of leaky barrier construction for flood risk mitigation are likely to be greatest in small catchments and for small flood events, occurring on a 5-10 year frequency. Larger floods risk damaging smaller leaky dam structures and overwhelming defences.

ERAMMP SFS Evidence Review (9)

17.7.1.3 Q3 Are there simple metrics for monitoring/evaluating the impacts of this action?

Identified in the application:

Identified additionally by this review:

17.7.1.4 Q4 Are there potential benefits for the local economy?

There is no clear evidence that this action will benefit the local economy.

17.7.1.5 Q5 Are there potential benefits for increasing engagement of the local community in the Natura 2000 site(s)?

Identified in the application: The leaky barriers may be used to demonstrate any benefits of the structures to others. Although not stated, this could include local landowners and visitors to the site. Little detail is provided about the form these demonstrations would take, but they would provide an opportunity for active engagement with the community.

Identified additionally by this review:

17.8 ASSESSMENT OF ACTION 8

Action description and relationship with Natura 2000 features and priorities

Action 8 Gwent WT	Visitor access and information
Natura 2000 site(s) relevant to this action	Wye Valley Woodland SAC
Habitat/species/feature of the Natura 2000 site targeted by this action	Mixed woodland on base rich soils associated with rocky slopes Beech forests on neutral rich soils Yew dominated woodland
Brief description of action	Replacement of 3 access gates, improvement of site entrance, and flailing of vegetation around historic features and access points of a public walkway using a remote flail unit and forestry flail. Erection of 8 interpretation panels on site.
Scale of implementation	Three 12' gates replaced. 5x5m hard surface created at site entrance. Unspecified area of vegetation clearing to facilitate public access. 8 interpretation panels across all managed sites.
Potential direct/indirect impacts of the action on restoration of this habitat/species/feature, as identified in the application	Access upgrade Visitor experience improved Habitat management facilitated Visitor awareness and understanding
Other wider benefits, as identified in the application	Enhanced habitat connectivity Improved climate change adaptability
Condition assessment of the target habitat/species in this/these Natura 2000 site(s)	Mixed woodland on base-rich soils associated with rocky slopes: U (high confidence) Beech forests on neutral rich soils: U (high) Yew dominated woodland: Unknown
'Issue' or 'risk' for *this* habitat type/species/feature in *this* Natura 2000 site, which the action addresses	None

17.8.1 EVALUATION QUESTIONS FOR ACTION 8

17.8.1.1 Q1 Is there good evidence for the potential impact of this action on the condition of targeted Natura 2000 habitat(s) and /or species

Weight of evidence that links potential direct impacts of this action on the condition of targeted Natura 2000 habitat(s) and /or species in the location where it will be applied.

This action is primarily targeted at visitor experiences of the site and does not seek to improve the condition of Natura 2000 habitat features. There is no probable link between improving site access and the environmental resilience of the site or the condition of its features. The intended use of the flail purchased in association with this action is not described but may facilitate future management. Plans for the maintenance of this equipment, or the ecological value of this management are unclear.

Assessment of strength of evidence: traffic light categories: No link

17.8.1.2 Q2 Are there potential environmental benefits at landscape scale within or beyond the Natura 2000 site itself?

Identified in the application: Improving visitor education may influence behaviour in a positive way to reduce individual environmental footprints, but any effect is likely to be small and difficult to assess.

Clearing of site paths is unlikely to affect habitat connectivity in a positive manner or impact the wider environment. There is no evidence of a causative link that would have a positive impact on site habitat connectivity or the site's capacity to adapt to climate change, based on the information provided.

Identified by this review:

17.8.1.3 Q3 Are there simple metrics for monitoring/evaluating the impacts of this action?

Identified in the application: No metrics are proposed for this action.

Identified additionally by this review: Recording visitor access and experience feedback.

17.8.1.4 Q4 Are there potential benefits for the local economy?

Improved visitor access and information may facilitate greater public engagement and higher visitation, which may lead to a further economic benefit in the area in an indirect way.

17.8.1.5 Q5 Are there potential benefits for increasing engagement of the local community in the Natura 2000 site(s)?

Identified in the application: Improved visitor access may facilitate greater public engagement with the site in a passive sense.

Identified additionally by this review:

17.9 ASSESSMENT OF ACTION 9

Action description and relationship with Natura 2000 features and priorities

Action 9 Gwent WT	Investigation of deer browsing and invertebrate biodiversity
Natura 2000 site(s) relevant to this action	Wye Valley Woodland SAC
Habitat/species/feature of the Natura 2000 site targeted by this action	Mixed woodland on base rich soils associated with rocky slopes Beech forests on neutral rich soils Yew dominated woodland
Brief description of action	• 2 contractors to deliver deer impact surveys • Sampling and identification of bast bark beetles in small-leaved lime deadwood • Invertebrate trapping (Sept-Nov) and identification
Scale of implementation	Deer impact surveys covering Prisk (6ha) and Piercefield wood (unknown)
Potential direct/indirect impacts of the action on restoration of this habitat/species/feature, as identified in the application	Piercefield wood has previously been identified as the third best site in Wales for deadwood beetles. Further study will enable a greater understanding of the biological value of this site and others. Browsing has been identified as a risk to woodland at the site and an investigation into the scale of the impact will help the identification of future management option.
Other wider benefits, as identified in the application	Contractors will be hired to conduct the survey Improve awareness of species value in the national context Improved targeting of browsing control measures Improved knowledge for deadwood management and provision
Condition assessment of the target habitat/species in this/these Natura 2000 site(s)	Mixed woodland on base-rich soils associated with rocky slopes: Unfavourable (high confidence) Beech forests on neutral rich soils: Unfavourable (high) Yew dominated woodland: Unknown
'Issue' or 'risk' for *this* habitat type/species/feature in *this* Natura 2000 site, which the action addresses	Deer grazing/ browsing: Mixed woodland on base rich soils associated with rocky slopes: H Beech forests on neutral rich soils: H Yew dominated woodland: M

17.9.1 EVALUATION QUESTIONS FOR ACTION 9

17.9.1.1 Q1 Is there good evidence for the potential impact of this action on the condition of targeted Natura 2000 habitat(s) and /or species

Weight of evidence that links potential direct impacts of this action on the condition of targeted Natura 2000 habitat(s) and /or species in the location where it will be applied.

Deadwood is known to have significant value for forest invertebrate biodiversity and UK woodlands have particularly low levels of standing and lying deadwood, relative to European forests. Research that facilitates better management of deadwood resources could therefore benefit local species communities and the stability of populations dependent on deadwood

as a resource. Establishing the national importance of this site and incorporating that information into future management could also safe guard this resource.

There is good evidence that browsing can suppress the regeneration of woodland and undergrowth, and that restricting levels of wild grazing can benefit local biodiversity when unmanaged browsing levels are high. Monitoring browsing levels and the extent of local biodiversity has great value for shaping ongoing management. However, the inferences that can be made by these investigations will be dependent on study design, and the ability to respond to new information, which are not described in the application. As the deadwood survey is conducted over 3 months, it is unlikely to represent the total diversity using the resource at an annual timescale.

ERAMMP SFS Evidence Review (4) and expert opinion

Assessment of strength of evidence: traffic light categories: Blue

17.9.1.2 Q2 Are there potential environmental benefits at landscape scale within or beyond the Natura 2000 site itself?

Identified in the application: As the extent of the investigation is local, any wider benefits will come from understanding the biodiversity value of Piecefield woodland for invertebrate biodiversity in a national context, which will depend on the study methodology and results.

Identified by this review:

17.9.1.3 Q3 Are there simple metrics for monitoring/evaluating the impacts of this action?

Identified in the application: This action itself is a monitoring activity that could support other actions associated with this project.

Identified additionally by this review:

17.9.1.4 Q4 Are there potential benefits for the local economy?

Improved visitor access and information may facilitate greater public engagement and higher visitation, which may lead to a further economic benefit in the area in an indirect way.

17.9.1.5 Q5 Are there potential benefits for increasing engagement of the local community in the Natura 2000 site(s)?

Identified in the application:

Identified additionally by this review: Investigations into site diversity offer an opportunity to engage with the public in an educational manner, but the application has not discussed this possibility.

17.10 ADDITIONAL COMMENTS

Actions are generally robust, traditional woodland management options for promoting biodiversity, flood management and visitor access, but do not address the most significant risks to the SAC features identified in the PIP. The application uses ‘improved climate change adaptability’ as an expected outcome for most actions, which is not elaborated on

and has sparse supporting evidence in the literature. There was no mention of the species expected to benefit from increased heterogeneity in woodland structure, and links between management initiatives and ecosystem resilience were not clearly identified.

Most actions are likely to be implemented on a small scale, although collectively they may affect a more significant area of the SAC. Most of the fbudget is allocated to the purchase of a single piece of equipment (as part of action 8) to maintain visitor accessibility, although it will be helpful in future woodland management.

For multiple actions repeat management will be required to maintain any benefits to woodland species composition and status beyond the scope of this capital grant. The applicant has a history of long-term management in the region, although one of the key sites (Piercefield Woods) is associated with a 10 year management lease only.

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