

Connecting the Commons

Beynon, S. A.¹, Underhill, M.², Walton, N.³ & Cooke, A.⁴

¹Dr Beynon's Bug Farm Ltd; ²The National Trust; ³The Wildlife Trust of South and West Wales; ⁴The Pembrokeshire Nature Partnership

Correspondence address: sarah@thebugfarm.co.uk

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Introduction & overview

The Northwest Pembrokeshire Commons (NWPC) Special Area of Conservation (SAC) is largely in poor ecological condition due to the decline of traditional grazing that previously created and managed the important wildlife habitat of heath, marshy grassland, bog and standing water. The SAC commons are also fragmented by agricultural land which limits the dispersal of many species. SAC-quality habitat on private farmland has been lost due to changing agricultural practices (intensification of productive land and abandonment of so called 'rough land'), with a corresponding decline in biodiversity and places for nature. This type of habitat largely now remains only on public or not-for-profit land managed for conservation. As over 80% of the land in Wales is farmed, and most of that land is privately-owned, it is vital to work with private landowners to re-connect fragmented habitat.

This project pioneered a collaborative approach by working with a private landowner who owns a strip of land that connects two areas of the SAC –Dowrog Common Site of Special Scientific Interest (SSSI) and the St Davids Airfield Heaths SSSI. This strip is currently very narrow but provides a critically important wildlife corridor. The aim of the project was to help re-connect SAC habitat and protect that land for wildlife in the long term while also working with the National Trust to bring a non-SAC parcel of common land back into better condition to further strengthen the robustness of marshy grassland habitat in the locality.

The project delivered a scheme of heath creation, wildflower plug planting, wildflower meadow seeding, hedgerow creation, hedgerow planting and conservation grazing to create 26.43 hectares of 'bigger, better, more joined up' habitat. The project was delivered on time and within budget.

Methods

The project was delivered on the following sites:

- Lower Harglodd Farm
- Waun Fachelich
- Dowrog Common
- Waun Gwla

This project included significant ecological survey effort across all project sites to ensure that capital works benefited present and potential species that would utilise the sites. These baseline habitat surveys enabled us to inform management and quantify the capital asset created whilst making management action suggestions to protect the assets in the long-term.

We expanded the habitat on the SAC through fencing agricultural land to create green lanes along the public right of way (PROW), enabling public to traverse the land without impacting the conservation-grazing livestock and vice versa. The fencing facilitated appropriate conservation grazing while heather and gorse brash, thatched purple moorgrass (*Molinia caerulea*) and bramble were removed with a flail collector. All land included in the project is publicly accessible via open access land under the Countryside and Rights of Way (CRoW) Act or is accessible or adjacent to Public Rights of Way (PROWs). The main block of private land is close to the well-used St Davids Airfield, popular with local residents for activities such as dog-walking, cycling and birdwatching. A further site (Waun Gwla) backs onto a residential street in the city of St Davids.

Project activities and outputs by site are identified in the tables below. Project site problems and solutions identified in the initial application are synthesised in Appendix 1, application details are synthesised in Appendix 2 and output measures are synthesised in Appendix 3. Before, during and after project photographs are included in Appendix 4.

Project outputs

Lower Harglodd Farm (The Bug Farm) habitat corridor

Where:

- SM7725 7783 (Caerwen) – 2.52 hectares
- SM7725 6498 (the Roft) – 2.27 hectares of the field
- SM7726 0228 (Parc Sara) – 0.34 hectares
- SM7726 3861 (Dowrog Field) – 1.21 hectares

Area: 6.34 hectares

Access: PRow through Caerwen and the Roft. Parc Sara and Dowrog Field are immediately adjacent to Open Access land

Owned by: Private ownership

Planned action	Output	Changes/notes
To create 2.27 hectares of wildlife habitat on improved farmland, traversed by a PRow, creating a new habitat corridor	We created 2.27 hectares of wildlife habitat on improved farmland, traversed by a PRow, creating a new habitat corridor	Following from a Rapid Ecological Assessment of project sites at Lower Harglodd Farm (Sutton, 2022a) an area of approximately 0.8 hectares in the south-eastern corner of an improved grass field (the Roft) was identified for heath creation. A full report of the heath creation sub-project is available (Sutton, 2022g). The project involved topsoil relocation, pond and scrape creation, bee bank creation, collection of brash from the adjacent Waun Fachelich SSSI (under licence) and spreading of brash on the site. Topsoil from heath creation was used to create earth banks: ~576m in the Roft and ~150m in the adjacent field and it was also used to increase soil depth by ~30cm in a 0.39ha section of the Roft which will be planted with native broadleaf trees in 2022-2023 as part of Glastir Woodland Creation scheme.
To install 910.48 m of fencing and 1 gate on land traversed by a PRow to create 1.2 hectares of enhanced hedgerow habitat to connect 2 SSSI's with a new habitat corridor	A total of 1,791m of fencing and 10 gates were erected to create enhanced hedgerow habitat of 1.2 hectares to connect 2 SSSI's with a new habitat corridor	Initially, 1,461m of fencing and 7 gates were erected across project land in 2 fields. An underspend enabled an additional 330m of fencing and 3 gates to fence another earth bank in the Roft at the end of the project. As a result of the Rapid assessment indicating potential reptile refugia habitat in Parc Sara (Sutton, 2002a), it was decided that Parc Sara would not be grazed and therefore did not require fencing. The purchase of the Ryetec flail collector mower as part of this project enabled this field to instead have rides cut through regularly to maintain edge habitat. Therefore, Parc Sara was not fenced. Instead, the same length of an earth bank was fenced in the Roft to create additional habitat. 1,296.84m of fencing protected hedgerow habitat with an average width of 6m (creating 7,781.04m ² of enhanced hedgerow habitat), 426.16m protected hedgerow habitat with an average width of 9m (creating

		<p>3,835.44m² of enhanced hedgerow habitat) and 68m of fencing (in Caerwen) protected hedgerow habitat, with an average width of 3m (creating 204m² of enhanced hedgerow habitat). The narrower section of enhanced hedgerow habitat in Caerwen was created because of the findings of the Rapid assessment (Sutton, 2002a): the 68m of south- and west-facing Pembrokeshire hedgebank in Caerwen was fenced on the top of the bank to create additional habitat for solitary bees. This created an enhanced hedge of ~3m, as the fence in the adjacent field was approximately 3m into the field away from this new fence. Therefore, the total area of enhanced hedgerow habitat was 1.2 hectares. Of this area, 500m was identified on the farm's Single Application Form as WS1 and therefore, removed from eligibility for claiming entitlements (a loss of £3.51 per year).</p> <p>To improve grazing management by reducing biosecurity risks, we also installed high-sided badger-proof water troughs and trialled badger-proof mineral lick stands. The mineral lick stands however did not stand up to rubbing by cattle and were difficult to screw into hard ground, meaning that moving them to different sites with the cattle as they rotated around the farm was impractical. In addition, the areas surrounding the lick stands became very poached in wet weather. We reverted back to mineral blousing cattle as a result. Gates and barriers were erected to improve cattle handling facilities to facilitate conservation grazing of project sites.</p>
<p>To plant 5,000 native trees and shrubs on land traversed by a PRoW</p>	<p>5,530 native trees and shrubs were planted on land traversed by a PRoW</p>	<p>Tree/hedging whips were planted during winter months. Hedging plants were planted on and adjacent to new hedge banks while larger trees were planted adjacent to banks only. We trialled two methods of weed suppression: (1) sowing the new, bare hedge bank with yellow trefoil immediately after planting and (2) putting down a biodegradable weed matting. As the new banks were formed from fertile topsoil, the yellow trefoil seedlings were quickly smothered by grass, which had covered the bank by spring, meaning a repeat sowing of yellow trefoil was not possible. Sowing yellow trefoil in the winter may also have hindered survival. However, the timing of sowing was limited by the date of the creation of the new banks. Retrospectively placing weed matting around the trees was extremely time consuming and, at the date of writing the report, there is no qualitative difference in survival or growth between those trees protecting with weed matting and those left unprotected. Due to the site's policy on single-use plastic, tree guards were not used. A trial of biodegradable tree guards will take place as part of a separate project.</p> <p>While we would usually wait at least a year for the bank to settle before planting whips on a new bank, the duration of the project meant that we had to plant in new banks. We will monitor the survival of trees on and adjacent to the banks over the years.</p>

<p>To plant 800 native hedgerow climbing plants (e.g. honeysuckle) on land traversed by a PRow</p>	<p>We planted 900 native hedgerow climbing plants (honeysuckle) on land traversed by a PRow</p>	<p>All climbers were planted adjacent to banks to prevent climbers competing with newly-planted hedging whips on the top of the new hedge banks.</p>
<p>To plant 10,000 native wildflower plants, including the foodplant of the marsh fritillary butterfly on land traversed by a PRow or adjacent to Open Access land</p>	<p>Over 10,000 native wildflower plants, including the foodplant of the marsh fritillary butterfly, were planted on land traversed by a PRow or adjacent to Open Access land</p>	<p>Plug plants were supplied by The Wildflower Nursery and Celtic Wildflowers for planting at The Bug Farm and Waun Gwla. A total of 8,333 cells containing >13,333 plants* from The Wildflower Nursery and 4,275 from Celtic Wildflowers were planted by Bug Farm staff and volunteers.</p> <p>Of these plants, approximately 10,300 were Devil's-bit scabious, the foodplant of the marsh fritillary. Approximately 1,000 of these were planted on Waun Gwla, while the remainder were planted at Lower Harglodd.</p> <p><i>*The Wildflower Nursery Devil's-bit scabious plants are grown in plugs containing, on average, 2 plants per cell and were planted as cells rather than split into individual plants.</i></p>
<p>To propagate and plant 10,000 native wildflower plants from locally-collected seedstocks on land traversed by a PRow or adjacent to Open Access land</p>	<p>Over 10,000 Devil's-bit scabious seeds were collected from seedstocks on land traversed by a PRow or adjacent to Open Access land and propagated</p>	<p>Seeds were collected in October 2021 by Bug Farm staff and were propagated by The Wildflower Nursery.</p>
<p>To spread >5 kg of locally-sourced wildflower seed to create the capital asset of a wildflower meadow on land traversed by a PRow</p>	<p>37kg of locally-sourced wildflower seed (from Wyndrush Wild) was purchased to create the capital asset of a wildflower</p>	<p>We increased the quantity of wildflower seed purchased and sown as part of the project. Seed was collected from some of the best meadows in Pembrokeshire by Wyndrush Wild and kept separate by collection site.</p> <p>In September 2021, an area of ~2 hectares of improved pasture (rich in creeping thistle) in the Roft was cut and baled to remove thistle seeds and reduce above-ground biomass. Bales were composted onsite to provide reptile habitat. The field was then rotovated, using a rotovator purchased as part of this project, before it was split into 4 similar-sized sections. Seed from one of the 4 collection sites across Pembrokeshire</p>

	<p>meadow on land traversed by a PRow. An additional 1 day of yellow rattle seed harvesting generated an additional ~30kg of seed which was also spread on project land</p>	<p>was sown separately in each section. Seed was mixed with sand and hand-broadcast in October 2021 before the area was rolled. Each of the 4 sections was then split in half and half was planted with plug plants, while the other half was not planted. This will enable comparison on the benefits of plug planting in addition to just seeding when creating a wildflower meadow in an agriculturally improved, 'weedy' field.</p> <p>The seed has germinated well, with a proliferation of yellow rattle across the field in 2022. While there is still creeping thistle in the sward, its density has reduced compared to 2021. Preliminary results from a botanical survey in June 2022 indicates that the diversity of desirable meadow species has increased from 2021 and that the diversity of desirable meadow species is greater in plug-planted areas compared to areas without plug plants.</p> <p>Yellow rattle-rich wildflower meadow seed collected onsite was spread on bare ground across all project land. Yellow rattle has germinated in all areas where it was sown.</p>
<p>To carry out a baseline biodiversity survey and Phase 2 vegetation survey to inform the management of the capital asset (i.e. planting plants and sowing seeds in appropriate microhabitats to ensure survival)</p>	<p>A baseline biodiversity survey and Phase 2 vegetation survey was carried out by Matt Sutton.</p> <p>The survey informed the management of the capital asset.</p>	<p>A Rapid assessment (Sutton, 2022a) and full ecological survey (including a Phase 2 habitat classification) (Sutton, 2022d) were produced.</p> <p>The survey recorded:</p> <ul style="list-style-type: none"> ● 109 species of invertebrates <ul style="list-style-type: none"> ○ 6 invertebrate species of conservation concern ○ The potential for another 5 invertebrate species of conservation concern ● 10 species of breeding birds <ul style="list-style-type: none"> ○ 4 bird species of conservation concern probably breeding ○ 4 bird species of conservation concern foraging or on passage ○ 4 amber listed birds (5 on Wales list) seen ○ 7 species of red listed birds (8 on Wales list) seen ● 22 bird species seen (summer) ● 18 bird species seen (wintering) ● 15 bird species seen during October and November (anecdotally recorded) ● 5 species of bat ● 2 species of mammal and nests of 2-3 others ● 3 reptile species ● 2 amphibian species ● 134 species of plant including nationally rare sausage beard moss, an uncommon liverwort: purple crystalwort and wavy St. John's-wort ● 3 species of fungi

		<p>The assessment suggested the following management actions:</p> <p>Rhos Pasture</p> <ul style="list-style-type: none"> • Reduce winter cattle grazing and poaching. Some light pony grazing in drier winter periods is suggested to reduce scrub. However, mowing may be preferable. Mowing should create meandering paths rather than large blocks of cleared ground. Cuttings should be collected and tipped in areas dominated by bramble and bracken. To avoid disturbing reptiles, cutting should only be carried out in late summer (>16°C) or during the winter • Specific creation of bare clay areas is desirable and cuttings could be spread in the adjacent heath creation site • Target grazing at spring, May-July and late summer/early autumn where conditions allow <p>Parc Sara and Dowrog Field</p> <ul style="list-style-type: none"> • Mowing should create meandering paths rather than large blocks of cleared ground. Cuttings should be collected and tipped in areas dominated by bramble and bracken. To avoid disturbing reptiles, cutting should only be carried out in late summer (>16°C) or during the winter <p>The Roft</p> <ul style="list-style-type: none"> • There should be no prescriptive management approach and management should be reactive • Weedy species will proliferate initially and this is expected as part of the successional process <p>Caerwen</p> <ul style="list-style-type: none"> • There is no prescriptive management plan for this agriculturally-improved field, but the application of fertiliser or muck should be avoided to avoid nutrient-rich run-off into adjacent habitats
<p>To create a trust to protect the capital asset for the long term</p>	<p>A trust structure was developed to protect the capital asset for the long term</p>	<p>Most land is protected as SAC or SSSI and the asset cannot therefore be destroyed in future. 4.79 hectares of the private land is currently improved pasture which could be ploughed, drained or seeded at any time. However, after the project, this land will be classified as Habitat under Welsh Government (WG) EIA (Agriculture) regulations, meaning that it cannot be 'improved' for agriculture (destroyed for nature) without permission from Welsh Government. The asset is therefore protected. We also created a Trust structure to further protect the capital asset (Agri Advisor, 2002a,b). This will be made available on the websites of the Pembrokeshire Nature Partnership and The Bug Farm. We have already distributed the report to 4 other Pembrokeshire landowners who wish to use it as a framework to protect their own land. Machinery and equipment will be held on the asset register of the National Trust for use on project sites</p>

		and wider areas as opportunity allows for conservation purposes. It will be maintained for a minimum of 5 years.
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Waun Gwla

Where: 51.88511, -5.26375

Area: 1.69 hectares

Access: Open Access land

Owned by: National Trust

Planned action	Output	Changes/notes
To create 1.69 hectares of better managed common land habitat adjacent to St Davids, that is currently being used for fly tipping, by fencing the un-fenced boundary (650 m).	We created 1.69 hectares of better managed common land habitat adjacent to St Davids, that is currently being used for fly tipping, by fencing the un-fenced boundary (650 m).	The boundary was fenced despite the extremely wet ground conditions of the site. We also created a hardstanding area at Penweathers Farm to facilitate foot trimming of cattle grazing Waun Gwla.
To deploy 6 NoFence collars to separate cattle from public (there have been negative public-livestock interactions on PRowS near this site in the past) to allow conservation grazing immediately adjacent to the city of St Davids. The collars will also allow targeted		It was decided early on in the project that, due to the Welsh Government stance on the use of NoFence electric collars for cattle, they would be omitted from this project. Instead, a flail mower collector was purchased for use on the project land. Additional electric fencing was purchased to temporarily separate cattle and humans/dogs when the site is being grazed. The boundary fencing was not completed in time to facilitate cattle grazing during the summer of 2021 so instead paths were cut through the site with a flail collector mower. Welsh Black cattle will graze the site from mid-summer 2022 under an open gate licence.

<p>conservation-grazing of specific areas to support existing wildlife (following survey results)</p>		
<p>To plant 5,000 native wildflower plants, including the foodplant of the marsh fritillary butterfly</p>	<p>1,000 Devil's-bit scabious plug plants were planted at Waun Gwla</p>	<p>It was initially planned to plant 5,000 plug plants at Waun Gwla. However, the Rapid assessment (Sutton, 2022b) indicated that the site was under-grazed and that, across much of the site, plug plants would be out-competed by grass and bracken. The landowner was also keen to monitor the impact of management change facilitated by fencing and grazing and only plant Devil's-bit scabious at this stage. Therefore, following flail mowing of established paths across the site, 1,000 Devil's-bit scabious plug plants were planted on pathways and clearings by Bug Farm staff and volunteers</p>
<p>To remove non-native garden plants and fly-tipped rubbish from the site to enable the site to be safely grazed by cattle</p>		<p>The site was surveyed for non-native plant species. Four species of non-native plants, of which two are invasive species, were recorded. Neighbouring residents along Nun Street were informed of the project via letter and discussion was encouraged. The non-native plants immediately behind residents' gardens were removed during fence erection. However, non-native plants have spread significantly across the site and significant volunteer and mechanical effort, beyond the scope of this project, is required to remove them. This work has been identified as a priority for ongoing collaborative work between the National Trust and The Bug Farm.</p>
<p>To carry out a baseline biodiversity survey to inform the management of the capital asset by informing programming of the NoFence collars (i.e. keeping cattle out of harvest mouse nesting areas (recorded in 2021 in an adjacent garden) during the breeding season)</p>	<p>A baseline biodiversity survey was carried out to inform the management of the capital asset. This survey informed the location and timing of cutting rides through the vegetation as well as the planting of plug plants</p>	<p>A Rapid assessment (Sutton, 2022b) and full ecological survey (including a Phase 1 habitat classification) (Sutton, 2022e) were produced.</p> <p>The survey recorded:</p> <ul style="list-style-type: none"> ● 23 species of invertebrates <ul style="list-style-type: none"> ○ 1 invertebrate species of conservation concern – possibly the first record of this species for Pembrokeshire ● 7 species of breeding bird <ul style="list-style-type: none"> ○ 2 bird species of conservation concern breeding or probably breeding ○ 2 bird species of conservation concern possibly breeding ○ 3 bird species of conservation concern foraging or on passage ○ 1 species of amber listed (4 on Wales list) seen ○ 4 species of red listed birds (3 on Wales list) seen ● 21 bird species seen (summer) ● 20 bird species seen (wintering)

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| | | <ul style="list-style-type: none">• 6 species of bat• 2 species of mammal and nests of 1 other species• 2 species of reptile• 77 species of plant including 4 species of non-native plants, of which 2 are invasive species |
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The assessment suggested the following management actions:

- Sustained grazing coupled with some scrub management, rather than one-off grazing trials, is required, with grazing targeted at early spring and late summer where conditions allow
- Mowing should create meandering paths rather than large blocks of cleared ground. Cuttings should be collected and tipped in areas dominated by bramble and bracken. To avoid disturbing reptiles, cutting should only be carried out in late summer (>16°C) or during the winter
- The complete removal of invasive non-native plants is considered impractical. However, mowing should target areas of non-native plants to help reduce their spread
- Bushy hedgerows should be retained
- Given the tendency of the site to attract non-native plants, it is not advised to dig a pond. However, a location has been suggested for a small pond if it is required to provide water for grazing livestock

Waun Fachelich & Dowrog

Where: 51.8882, -5.22772 – this is part of the St Davids Airfield Heaths SSSI with is part of the Northwest Pembrokeshire Commons SAC.

Area: 16.19 hectares

Access: Open access

Owned by: National Trust (Dowrog is managed by the Wildlife Trust of South and West Wales)

Planned action	Output	Changes/notes
To acquire and fit 20 NoFence collars on cattle (see main application for more information) to remove a barrier to conservation-grazing, allowing us to create 16.19 hectares of better managed SAC habitat	We purchased a flail collector mower to improve management of the site through regular cutting and collecting of woody heath	It was decided early on in the project that, due to the Welsh Government stance on the use of NoFence electric collars for cattle, they would be omitted from this project. Instead, a flail mower collector was purchased for use on the project land. Rides were cut through the heath and marshy grassland during 2021 and the cut material was used to create a new area of heath on the adjacent private land at Lower Harglodd Farm (see Sutton, 2022g). Additional electric fencing was purchased to keep cattle away from the area of bog.
To carry out baseline biodiversity surveys to inform the creation and management of the capital asset by informing programming of the NoFence collars (e.g. keeping cattle out of skylark nesting areas to avoid disturbing skylark nests during the breeding season, focussing grazing on	A baseline biodiversity survey was carried out to inform the management of the capital asset. This survey informed the location and timing of cutting rides through the vegetation and future grazing management	A Rapid assessment (Sutton, 2022c) and full ecological survey (Sutton, 2022f) were produced. Both the Rapid assessment and the survey combined Waun Fachelich and Dowrog Common and the results below are therefore combined across sites. The survey recorded: <ul style="list-style-type: none"> • 21 species of invertebrates <ul style="list-style-type: none"> ○ 1 invertebrate species of conservation concern ○ The potential for another 3 invertebrate species of conservation concern • 14 species of breeding bird (4 of these confirmed as breeding) <ul style="list-style-type: none"> ○ 9 bird species of conservation concern breeding or probably breeding ○ 2 <i>species possibly breeding</i> ○ 2 bird species of conservation concern foraging or on passage ○ 4 species of amber listed (4 on Wales list) seen

<p>areas of scrub encroachment which cattle preferentially avoid and keeping cattle away from unsafe areas of quaking bog where they may sink)</p>		<ul style="list-style-type: none"> ○ 5 species of red listed birds (6 on Wales list) seen ● 19 bird species seen (summer) ● 23 bird species seen (wintering) ● 2 species of bat ● 2 species of mammal and nests/signs ● 3 species of reptile ● 2 species of amphibian ● A general plant survey was not carried out ● 10 species of rare plant including 4 species that had not been recorded previously at this site <ul style="list-style-type: none"> ○ 3 additional noteworthy plant species and 1 noteworthy bryophyte species were recorded ● 2 non-native invasive plant species was found on Dowrog South ● 5 species of fungi and lichens <p>The assessment suggested the following management actions:</p> <p>Dowrog South</p> <ul style="list-style-type: none"> ● Invasive non-native plants on Dowrog South should be controlled, with repeat cutting (<i>Rosa rugosa</i>) and removal (<i>Crocasmia x Crocosmiiflora</i>) suggested. Complete removal of <i>Rosa rugosa</i> would require co-operation of the adjoining property ● Dowrog South will revert to scrub if grazing/cutting is not introduced, but this may be desirable. A decision needs to be made as to whether this is appropriate* ● If grazing is reintroduced, a new pond could be dug on Dowrog South (avoiding the area of swampy vegetation) <p>*If grazing is to be reintroduced, a permanent boundary fence is required, as this small area is adjacent to a busy main road</p> <p>Waun Fachelich</p> <ul style="list-style-type: none"> ● The area of nutrient-rich bog on Waun Fachelich could be dug out, with the nutrient-rich material spread onto adjacent agriculturally improved land. This would create a new pond* ● Continue grazing Waun Fachelich with cattle – current grazing is appropriate and continue to use the flail collector to create rides and fire breaks <p>*This action would also remove the risk of sinking for cattle in an area where a cow has previously got stuck</p>

Dowrog Common

Where: 51.89003, -5.24019 and 51.89065, -5.23866

Area: 2.12 hectares

Access: Open Access land

Managed by: The Wildlife Trust of South and West Wales

Capital asset objective:

Planned action	Output	Changes/notes
To create 2.12 hectares of better managed habitat of this SSSI that is currently un-grazed and turning to scrub by fencing the boundary (716 m)	We created 2.12 hectares of better managed habitat of this SSSI that is currently un-grazed and turning to scrub by flail collector mowing the site	We were unable to get permission to fence the site due to the fence line not being considered a boundary fence. Therefore, we purchased a flail collector mower to manage this site until grazing becomes feasible. Rides were cut through the site and volunteers hand cut and removed blackthorn scrub.
To enable the site to be grazed safely by cattle	We were unable to make the site safe to be grazed by cattle	We will continue to work with project partners to investigate a way to erect fencing to make the site safe to be grazed by cattle in the future.
To carry out a baseline biodiversity survey to inform the management of the capital asset by informing programming of the NoFence collars (i.e. keeping cattle out of harvest mouse nesting	A baseline biodiversity survey was carried out to inform the management of the capital asset	The results from this site were combined with Waun Fachelich. Please see outputs in the table above.

areas (recorded in 2021 in an adjacent garden) during the breeding season)		
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Learning outcomes

The Pembrokeshire Nature Partnership successfully facilitated a collaborative project, bringing together private and public landowners to create and manage local places for nature across the St Davids Peninsula. While the project delivered over and above its planned aims (see above and Appendix 3), some key learning outcomes of the project are summarised below:

- **Problem**: Delivering a large-scale, area-wide, collaborative conservation project within 1 financial year is extremely challenging. For many activities (e.g. scrub clearance, hay making, fencing wet habitat), there is an extremely narrow window for completion. Therefore, external factors (such as poor weather) can impact severely on project delivery when there is only one window within a project in which to complete the action. This challenge was further exacerbated by the fact that there was a delay between the agreed start-date to the actual go-ahead date, which lost the project a few months at a crucial late-spring/early-summer period. Many project works had to be completed outside of the bird nesting season and therefore had to be delayed from spring to autumn when ground conditions were wet, making groundworks more challenging and causing additional damage to wildlife habitat
- **Proposed solution**: Increase the duration of future projects to a minimum of 2 years and give the go-ahead to start capital works immediately

- **Problem**: Large-scale habitat creation, such as the heath creation element of this project, is costly and looks conventionally untidy for a number of years. Early-successional agricultural 'weeds' (in this case creeping thistle) proliferate on disturbed ground. Therefore, getting farmers on-board with such work and showcasing a net biodiversity benefit within a year is difficult
- **Proposed solution**: The importance of outreach and education to the farming community is key. Therefore, working with willing private landowners who can spread the message is vital and we would suggest a larger proportion of the fund is allocated to this outreach and education. The private landowner in this project is an education and conservation professional and put their own private resources into this element of the project

- **Problem**: There was initial reticence to work with private landowners and the resulting project, and thus project outputs, was streamlined to reduce the amount of work carried out on private land as a result, reducing the potential delivery of the project
- **Proposed solution**: We have now developed a framework as part of the project to protect private land for nature in the long-term and we suggest using this as a framework to facilitate future work on private land. Being able to work with willing private landowners opens up 80% of Wales's land to such projects and allows nature recovery not just on the fringes of Wales's farmland, but also within it. The interest from other landowners in using the framework agreement on their own land suggests that there is significant potential for nature recovery projects on private land where the land is protected for nature in the long term

- **Problem**: The project team were determined to deliver this project working with knowledgeable local contractors to keep the funding within Pembrokeshire and support local people. However, there was no weighting within the procurement structure of Pembrokeshire County Council to favour local contractors and so some work had to be contracted outside of Pembrokeshire and even outside of Wales where there were the skills within the county to carry out the work

- **Proposed solution**: During the next procurement review, Pembrokeshire County Council should include favourable weighting for tenders from in-county contractors to ensure that funds are kept within the county, supporting local people to deliver local projects
- **Problem**: Contractors do not routinely disinfect their machinery when moving between farms, which is a significant biosecurity risk for livestock diseases such as TB, Leptospirosis, BVD and IBR as well as for the movement of non-native plants between sites
- **Proposed solution**: We specifically chose to work with contractors that could guarantee that they would disinfect machinery between sites with a Defra-approved disinfectant and all contractors were issued with a statement explaining the importance of biosecurity and the reasons why it is important. Where contractors were not prepared to include machinery disinfection as normal practice, we paid them for the additional time and materials required to disinfect their machinery. We were unable to source a muck spreader that had been disinfected to use to disperse heath brash across the heath creation site and therefore it was done instead by hand. Provision for the purchase of this type of machinery should be made for future projects, as this work required significant additional volunteer hours. Machinery disinfection between sites should be common practice and further education of conservation professionals, project managers, farmers and agricultural contractors is required
- **Problem**: There was insufficient budget allocated to project revenue and management costs. Even though we knew that the project would require additional voluntary input of time, we still significantly underestimated the revenue time spent on habitat creation and on the ground project management
- **Proposed solution**: Funding should include a more realistic allocation of spend towards project management and revenue costs. We were only able to deliver this project as the private landowner put in all her time voluntarily outside of normal working hours due to a passion for the project. The Bug Farm also provided staff voluntarily to complete the majority of the plug planting, seeding, land management and tree planting. This level of voluntary involvement should not be expected in such projects and will stop organisations and individuals applying for funding

Conclusion

This Local Places for Nature 'Connecting the Commons' project has enabled us to bring together public and private landowners to deliver a collaborative nature recover project, across 26.43 hectares of land, significantly enhancing 21.79 hectares of green space and creating the equivalent of 61 tennis courts of new woodland that is accessible to people with the least access to nature. We have created new areas of heath, wildflower meadow, hedgerows and green lanes on previously intensively-farmed, private agricultural land that, under a Trust structure created as part of the project, is now protected for nature, forever. As over 80% of Wales is farmland, working with farmers like this is vital in delivering environmental benefits that connect our remaining fragments of protected wildlife habitat. This project will enable wildlife to utilise new habitat corridors to move across the St Davids Peninsula and increase the robustness of the Northwest Pembrokeshire Commons Special Area of Conservation in and around places where people live, work and access public services.

Reports produced as part of the project

Agri Advisor (2022a) Example Trust Clause

Agri Advisor (2002b) Example Trust Clause - Guidelines for Use

Sutton, M. (2022a) Rapid assessment – Lower Harglodd Farm

Sutton, M. (2022b) Rapid assessment – Waun Gwla

Sutton, M. (2022c) Rapid assessment – Dowrog Common and Waun Fachelich

Sutton, M. (2022d) Ecological assessment – Lower Harglodd Farm

Sutton, M. (2022e) Ecological assessment – Waun Gwla

Sutton, M. (2022f) Ecological assessment – Dowrog Common and Waun Fachelich

Sutton, M. (2022g) Heath creation – Lower Harglodd

Acknowledgements

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Appendix 1: Project application problems and solutions taken from initial project application*

**Any changes in how the solutions were delivered are highlighted in the tables in the main project report.*

Problem: There is old, inadequate fencing on the National Trust (NT)-owned SAC common Waun Fachelich and on adjacent private land, with boundary fences not adequate to keep the required 3m biosecurity gap between cattle on adjacent holdings. Waun Fachelich is grazed, under licence, by the Tyddewi Herd of Welsh Black cattle from The Bug Farm (TBF). The cattle have Premium Herd Health status, whereas cattle on adjacent holdings do not, leading to significant biosecurity concerns. Specific concerns include bovine tuberculosis (TB) – adjacent holdings have tested positive –, Johnes Disease, IBR, BVD and Leptospirosis. Such biosecurity concerns mean that cattle must be taken off the area when the surrounding land is grazed by other cattle – this occurs at least 10 times each year, often with no or little notice from adjacent farmers, usually at a time that is inconvenient, often leading to cattle being kept off the areas when it is likely that adjacent land may be grazed, significantly reducing conservation grazing efficacy. In addition, an area of quaking bog on Waun Fachelich poses a significant animal welfare concern: one cow, Tyddewi Alice, became stuck in this bog and subsequently had to be put down after many months of care. It is not possible to erect a fence around the quaking bog due to public access and so cattle must be removed from Waun Fachelich in wet conditions. An additional TB biosecurity concern is badger-cattle interactions at mineral lick locations and low water troughs. Mineral supplementation of cattle is required due to low copper and selenium status in the area. TBF has trialled slow-release mineral boluses in their cattle over the past 3 years but are concerned by the welfare implications of such intrusive administration every 6-months.

Solution: Waun Fachelich is a perfect site to trial NoFence collars on a largely free-grazing herd of extremely placid cattle. Whilst the boundary fence of Waun Fachelich is poor, it is still largely intact, meaning that it would provide a security back-up when trialling a new technology safely and appropriately. The grant will fund 19 NoFence collars to facilitate appropriate grazing of Waun Fachelich common, through which there is a well-used PRow. The grant will also fund 10 animal-attached multi-sensor (tri-axial acceleration, tri-axial magnetometry, temperature sensor, GPS) tags to be fitted to cattle at TBF. To alleviate badger-cattle interaction, raised mineral lick holders and raised water troughs will be erected.

Problem: There is no boundary fencing on two compartments of Dowrog Common that could otherwise be grazed by TBF's cattle. Both areas are adjacent to a busy main road. This important marshy grassland and heath habitat is converting to scrub. The habitat is categorised as 'potential rank' for the marsh fritillary butterfly (MF) and requires grazing for it to be brought back into suitable condition. Only one plant of Devil's-bit scabious (DBS) (the MF foodplant) was recorded here during a 2020 survey. However, even with a secure boundary fence, small areas of bog habitats will prevent grazing these areas when the ground is wet.

Solution: Following an application for permanent fencing of common land being submitted by WTSWW, the project will fund the boundary fencing of two compartments of Dowrog Common to facilitate grazing. NoFence collars and GPS tags will allow grazing during wet conditions and grazing areas will be determined virtually to deliver the best conservation outputs in terms of habitat restoration. For example, areas of tussocky grasses and scrub that are not being grazed, due to cattle preferring the richer habitat will be virtually fenced to increase grazing intensity. Grazing management will lead to increased floral diversity and therefore

greater numbers of insects, birds, mammals, amphibians and reptiles, benefiting the wellbeing of people driving past the site on this commuter road.

Problem: There is no boundary fencing of field 3918 and 0228, owned by Dr Sarah Beynon (SB), which are adjacent to Dowrog common SAC. As such, both fields are un-grazed and covered largely in dense bramble scrub, which is encroaching annually.

Solution: Under this project, the boundaries will be fenced, scrub will be controlled, and these dry fields will be grazed with ponies alongside the adjacent common land. Locally sourced seed will be spread and plug plants planted in these areas. This work will increase the extent of floristically diverse grassland habitat adjacent to marshy grassland and dry heath which has a nectar gap in early summer. This new habitat will help to fill the nectar gap on this extremely important site.

Problem: The only habitat corridor linking two parts of the SAC (Dowrog Common and the St Davids Airfield Heaths – including Waun Fachelich) is less than 50m wide and consists of a single 2.24 hectare field with areas of marshy grassland, Rhos pasture, scattered scrub and dry heath owned by TBF (field 7799). Due to its small size, this extremely important habitat corridor is not robust and needs to be extended. The adjacent field 3.3-hectare field (field 6498), despite having been managed as a permanent pasture with no inputs under the farm's Glastir Advanced contract, is still an improved grass field, consisting of agricultural grasses, some white clover and creeping thistle. When the farm was walked by the project team in September 2020, the consensus was that: *"it couldn't be much worse for wildlife than it is now – anything you do will be an improvement"*. This field could form a key connectivity route between two protected sites.

Solution: The 3.3-hectare improved grass field will be restored as a vital 'missing link' of wildlife habitat, making the corridor between the SAC robust for the long-term. <1 hectare will be planted with native trees (outside of this project), while the remaining ~2.5 hectares will be restored under this project as a mosaic of heath, marshy grassland and dry wildflower meadow. This section of the project will be managed and implemented by Matt Sutton, who has extensive expertise in heathland recreation in Pembrokeshire. Capital works will include re-wetting, by breaking up drainage ditches, topsoil relocation, power-harrowing and the creation of standing water. Heathland seed will be harvested from Waun Fachelich and spread on the existing habitat corridor at the TBF in autumn 2021 using a muck spreader following existing best practice. The rest of the field will be rotovated and seeded with dry meadow species and the un-fenced boundaries fenced, with hedgerow width >5m (as above), to facilitate appropriate grazing management with TBF's Welsh Black cattle, ponies and goats. This field has been removed from TBF's Glastir Advanced (extended) contract to facilitate this work, with a letter of support for the work received from NRW.

Problem: Whilst there is no hedgerow cutting carried out at TBF, single lines of fencing on top of hedge banks have meant that many hedgerows are gappy, with very little scrubby vegetation extending into the surrounding fields, as it is eaten or trampled by grazing livestock. Nesting in hedgerows by birds such as turtle doves and nightingales occurred on the Knepp Estate when hedgerows were allowed to outgrow 5-10m wide and these enhanced hedgerow corridors would also benefit other farmland bird species such as the yellowhammer and tree sparrow at TBF. Additionally, TBF site is lacking in deep flowers (e.g. dead nettles and

hemp nettles) found at the base of hedgerows, required for many long-tongued bumblebee species (Dr Richard Comont (BBCT), *pers. comm*, 2018).

Solution: Sections of Pembrokeshire hedge bank will be double-fenced to create a habitat corridor of >5m in width across TBF – creating new habitat. Gaps will be planted-up with native hedging, nectar-rich native climbers (e.g. hawthorn, blackthorn, willow, crab apple, honeysuckle, dog rose, willow and gorse) and shade-loving species for long-tongued bumblebees (e.g. dead nettles and hemp nettles) to provide additional floral resources to benefit key species onsite including *Andrena rosae*, the shrill carder bee and other pollinator species. In addition, a small section of degraded Pembrokeshire hedge bank will be restored to benefit species such as slow-worms and adders.

Problem: After the lifetimes of the current owners, TBF could be sold to an intensive farmer and the habitat could be lost in the long-term.

Solution: Under the project, project land at TBF will be managed as a wildlife reserve. The land will be protected for all of SB's days and put into a trust after SB's days. This is a key project output and can be used as an example of working with a private landowner to deliver long-term conservation benefits.

Problem: Waun Gwla is a fragmented, under-grazed piece common land owned by the NT. This parcel of land is immediately adjacent to the city of St Davids and backs onto Nun Street. The site is also adjacent to land at Penweathers owned by SB's family, managed by SB and grazed with the second small Tyddewi Herd of Welsh Black cattle – separated from the main herd at TBF in 2020 to act as a separate, long-term conservation-grazing herd at Penweathers. Waun Gwla is traversed by a well-used PRoW –the Pilgrim's Way to St Davids Cathedral and, more recently, to the community allotments. The boundary fence of Waun Gwla requires replacement. The site was grazed by ponies until recently, when the licence lapsed due to the lack of suitable boundary fencing. Negative public-cattle interaction on land at Penweathers (with incidences of humans terrifying cattle and dogs killing sheep during 2019-2020) necessitated the abandonment of grazing on private land traversed by the PRoW. If Waun Gwla were to be grazed by cattle, an open-gate licence would be required in addition to implementing 6-monthly TB testing instead of annual testing.

Solution: The erection of a boundary fence at Waun Gwla will enable the site to be grazed by ponies and/or cattle immediately, restoring 1.67 hectares of important wildlife habitat that is used regularly by the residents of St Davids. Temporary electric fencing will be used to separate humans and dogs from cattle/ponies to reduce the risk of negative human-livestock interaction while enabling the capital asset to be restored and managed appropriately. Use of NoFence collars will provide an additional boundary to keep cattle away from humans and dogs and will enable grazing to be targeted at areas of scrub. SB will apply for an open gate licence and implement 6-monthly TB testing under the project.

Problem: There have been incidences of TB on adjacent holdings. The spread of TB to cattle at Penweathers would cease conservation grazing management by cattle and have a significant negative impact on the habitat.

Solution: To improve biosecurity and reduce cattle-badger interactions, 2 raised mineral lick holders and 4 raised water troughs will be sited across the land.

Problem: A significant constraint with having a herd of cattle at Penweathers is the lack of electricity – primarily required for annual foot trimming (more frequent when problems occur). As it is a separate holding to TBF, when one cow became lame in the winter of 2021, she had to be pre-movement TB-tested and taken back to TBF in a trailer. She was then not able to be moved back to Penweathers, as she required further treatment. This constraint alone could make it impossible to graze cattle at Penweathers and Waun Gwla.

Solution: We will purchase a small generator and re-surface the handling areas with hardcore to enable foot trimming and other livestock management activities at Penweathers.

Appendix 2: Project application details

Confidential

Appendix 3: Proposed LPfN Output Measures 2021-22

	Number of projects	Hectares
Projects to be delivered	1	26.43ha
Capital assets created (number)	1	26.43ha
Output measure (not all will apply to each project)		
New green spaces created	0	0
Of which new green public space created on previously man - made surfaces	0	0
Green spaces significantly enhanced.	1	21.79ha
Number of projects that reduced use of pesticides/ fertilizers	1	0
No of pollinator sites created or significantly enhanced (target 2,000)	1	26.43ha
Improve public access to drinking water (new fountains and refill stations).	0	0
Increase wildflower planting.	1	6.06ha
Number sites with changed mowing practices to encourage wildflowers and improve biodiversity.	1	26.43ha
Of which meadows on sloping land	1	6.06ha
No of local tree planting sites including street trees, orchards and small woodlands	1	1.2ha
Of which number of dense and diverse woodlands the size of a tennis court (target 100)	1	61 tennis courts
Number of community food growing opportunities; community food growing sites including the provision of allotments ((target 1,000)	0	0
Number of community orchards, cultivating native fruit (target 200)	0	0
Habitat creation scheme at rail stations and transport interchanges (target 50).	0	0
Number of sensory gardens for therapeutic purposes, delivered in partnership with health charities and the Welsh NHS.	0	0

Volunteers who report an improvement in wellbeing as a result of project involvement	1	17
Volunteers involved (number)	1	17
Volunteer hours contributed	1	776
Community assets created (number)	0	0

Appendix 4. Project photographs

The Roft



Aerial photographs before, during and after the project



The Roft – before



The Roft – cutting, collecting and removing thistles



Thistles in adjacent field (Parc Newi) – cut, baled and removed to prevent seed dispersal onto new wildflower meadow site in the Roft



Ragwort removal from adjacent field to prevent seed spread onto new habitat



An example of new fencing to assist habitat management



Topsoil relocation and creation of bare ground for invertebrates and arable playns in adjacent field







The Roft – during





The Rofet - after

Rhos Pasture



New fencing facilitating better grazing management

Dowrog Field



Aerial photographs before and after the project



Dowrog Field – creating rides through the bracken and bramble prior to fencing the boundary

Parc Sara



Aerial photographs before and after the project showing a reduction in bracken and bramble as a result of cutting rides through the field

Waun Facelich and Dowrog Common



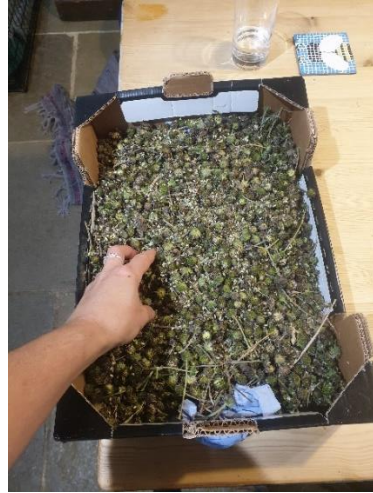
Aerial and ground photographs before, during and after the project showing the creation of new rides cut with the flail collector (cut material spread on the heath creation site in the Roft)

Waun Gwla



Aerial photographs before and after the project

General project photographs



Devil's-bit scabious, yellow rattle and marshy grassland seed harvesting and drying



Wildflower meadow seed from Wyndrush Wild



Plug plants



Badger proof mineral lick stand, badger proof water trough, contractor disinfecting machinery before coming onsite