Proposed Framework for the Restoration and Management of Grassland Habitat

at

Moneystone Quarry Solar Farm

February 2015

Summary

This document lays out the approach by which the land within the Moneystone Solar farm will be restored to species-rich grassland of a target NVC habitat type. Moneystone Quarry is a former silica sand quarry characterised by reclaimed areas and disturbed habitats. A restoration plan for the wider quarry has been approved but contains few details. This framework lays out the approach to creating and managing valuable grassland habitat at the solar farm for the life of the project.

There are several key considerations for the site. First, the soil conditions are unknown but are likely to vary between and within each of the 2 solar areas. Soil conditions will dictate the habitat type, so soil testing early in the process is important. Second, if the development is approved, the site will have a solar farm constructed upon it and activities to create and manage habitat will need to be designed with this in mind.

Once the soil conditions are known a target habitat will be agreed between the project proponents, Staffordshire Wildlife trust (SWT) and the County Ecologist. Green hay will be the primary approach for habitat creation. Several donor sites neighbour the quarry and would be suitable donors for neutral and acidic grassland types, with alkaline donor sites being found slightly further afield. SWT manages the donor sites and has expertise in green hay harvesting and use.

Prior to construction the 2 solar sites will be prepared, with scrub being removed through herbicide and ripping in the southern portion of Area D. Post-construction ruts will be levelled and the entire site scarified with a harrow before the green hay is applied. Green hay will be brought from the donor site the same day it is cut and baled. Bales would be distributed throughout the site and hand spread.

The site will be ideally managed through sheep grazing through the autumn, winter and spring, with the land being rested through the late spring and summer to allow herbs to flower and set seed. No herbicide shall be used except to spot treat pernicious weeds. No fertilizer shall be used on site.

Monitoring will be intensive in the early years given the uncertainties associated with habitat creation. The site will be visited twice per year for the first 2-3 years to ensure the target habitat is establishing. Monitoring will be undertaken according to a structured scoring system whereby the species of the target habitat are afforded scores (weighted for rarity) and a certain number of points must be reached within certain time periods, e.g. 15 points by year 2 and 25 points by year 5. This programme of monitoring will be essential to assessing the success of the solar site in reaching the target habitat.

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Context

In the past three years there has been increasing interest in the potential for solar farms to provide benefits to UK biodiversity, evidenced by numerous press reports[i] and the release of industry good practice guidance[ii] to this effect. On paper, solar farms offer a good opportunity for creating species-rich grassland habitat, as the infrastructure only directly disturbs 5% of the land area, the panels overshadow 40-65% of the land (but a fraction of this area is in permanent shadow) and crucially, once construction is complete, there is little or no disturbance from vehicles and human activity. These characteristics all lend themselves to the management of solar farms for wildlife management.

The limited available evidence (unpublished) suggests that solar farms can return a measurable increase in botanical and invertebrate diversity where a significant investment in habitat creation and management is made[iii]. The benefit can be especially great where solar farms have been established upon arable land.

Indeed, it is logical that solar farms, like any other land, have the potential to deliver benefits to biodiversity, so long as the necessary habitat creation and management activities can be adapted to the presence of the solar array. At Westmill Solar Cooperative and Hawton Solar Farm (sites 1 and 2 in the study)[iii], species-rich grassland has been successfully established beneath and surrounding the arrays. From a management perspective, grassland within solar farms is commonly managed by grass cutting using a small tractor mower. Solar farms are also well suited to grazing by sheep[iv] and can be sub-divided for variable grazing effects.

These observations from operating solar farms indicate that establishing and managing species-rich grassland among solar panels is indeed possible. What sets apart the Moneystone site from many solar farms is the plan to create a specific habitat type, as opposed to a general species-rich meadow from a commercial seed mix. To achieve this outcome, the approach to habitat creation, management and monitoring must be clearly defined.

The purpose of this document

This management framework aims to identify a credible approach to the creation and management of species-rich grassland beneath and surrounding the solar farm proposed for Moneystone Quarry at Oakamoor, Staffordshire. There is already an approved scheme of restoration for this former quarry site but the target habitat type and methods for creating and managing the habitat have not been specified.

The approach will be to identify appropriate target habitat(s), determine a suitable seed source, develop a step by step plan to create the target habitat(s) and develop a management plan for the life of the project, including a detailed plan for monitoring the site.

There are several key issues which must be considered in the development of this approach. First, the Moneystone Quarry site is a complex of silica sand pits, spoil and sites of former industrial buildings, so the terrain is physically varied and is likely to host a range of soil conditions. The soil structure and condition will have strong influence over the grassland species that can grow there and will ultimately dictate the target habitat(s) that will be suitable for the site. Soil testing will therefore be essential.

Second, establishing species-rich grassland beneath a solar array requires special consideration of the construction process and the resulting solar infrastructure which present challenges to the sequencing of events and the logistics of habitat creation and management.

This document presents a framework for grassland habitat creation and management for two specific areas within the Moneystone Quarry (see Figure 1). This framework will support the planning application for the solar farm and will form part of the submission. If planning consent is granted, this framework will be developed into a full management plan, once agreement on the approach has been reached with the LPA, and key unknowns such as soil condition have been verified.

This management framework has been prepared specifically to demonstrate that a species rich grassland can be achieved within the proposed solar deployment areas (areas D and E). It is also the applicant's intention to create a similar grassland habitat in area B. Area B will not be subject to solar deployment and as such has not been considered in this framework. Following on from this management framework a detailed management and monitoring plan for areas B, D and E will be submitted to the authority for approval prior to works on site.

The approach outlined here draws upon good practice guidance for the solar industry[ii] ,Wychwood Biodiversity's 6 years of experience planning, establishing and managing species-rich grasslands within solar farms, and most crucially, the Staffordshire Wildlife Trust's expertise in habitat creation using green hay from local grassland sites.

Site description

Moneystone Quarry has been the site of silica sand extraction since 1948, with operations ceasing in 2012. The quarry site extends to 168 hectares and is owned by Laver Leisure. The quarry comprises a series of large quarry voids which have been partially filled in and restored in places, and an associated, now demolished, processing plant. A range of habitats are present although most are relatively recently established and generally dominated by early successional and pioneer habitats typical of disturbed sites, with large areas of scrub, grassland and moss.

A solar farm is being proposed on part of the site. The application site for the solar farm is split over two distinct areas, D and E, separated by Eaves Lane and located approximately 1.3km to the south east of Whiston village (Figure 1). Collectively the area of development is approximately 11.7ha. The centre of the application site lies approximately at National Grid Reference SK 04688 46030.

Area D

Area D to the north eastern side of the quarry is 5.67 hectares in size and dominated by dense scrub to the central and southern portion, mainly willow but with some birch. The scrub has recently been cut to 20cm above ground level. The central area appears damper and contains rush and fescue grasses and areas of moss, with sparse grassland and bare ground to the northern end of the site (see Photo 1).

Area E

Area E covers an area of 5.98 hectares on the south eastern side of the quarry and was the site of a former processing plant. The concrete structure was broken up and covered with a thick layer of sandy material from within the quarry site. The area was reportedly hydroseeded with grass seed in October 2014 which in late January 2015 displayed a light growth of new grass (see Photo 2). It has not been specified what species of grass were contained in the mix, but agricultural grasses are suspected, e.g. *Lolium* spp. This species information has been requested.

Table 1. Area of land beneath the panels and outside the fence for Areas D and E

	Beneath solar panels	**Outside the fence**	**Total**
Area D	4.31	1.46	5.77
Area E	4.59	1.38	5.97
Total	**8.65**	**3.00**	**11.74**

Target habitat type

The target habitat for the solar farm has not yet been specified and this must be agreed among the relevant stakeholder organisations. Currently the submitted planning application identifies the target habitat for the solar deployment areas as 'unimproved neutral grassland', but this umbrella term covers a number of different possibilities. A grassland habitat type relating to the National Vegetation Classification (NVC) should be identified, taking consideration of the specific conditions of soil type, pH, aspect and drainage within the 2 areas. If soil conditions differ significantly between the areas, or even within areas, then multiple target habitats may be identified. The target habitat(s) must be agreed in consultation with Staffordshire Wildlife Trust (SWT) and the Local Planning Authority (LPA), and consistent with what is feasible for the site.

Soil testing

When considering re-creation or restoration of grassland habitats, detailed information on soils is necessary to help determine whether a site is suitable, and, if it is, the most appropriate target community to aim for. Soil analysis provides information on the nutrient status and pH of a soil. However, the reliability of the results depends on the accuracy of the sampling[v].

To obtain a good representation of an area of land at least 25 individual cores should be taken for each of areas D and E. Soil samples taken from a similar area can be bulked together to give a single soil sample for analysis. It is recommended that for area D the northern and southern areas be sampled separately, as soil conditions appear to differ considerably. Likewise, the northwestern area of D (close to the entrance) appears to have a different soil type to the rest of the area and should be sampled separately.

Area E looks to be more uniform and could be sampled as a single area.

Soil cores should be collected using a soil corer. The cores should be taken by walking each area in a 'W' or other representative pattern and taking cores from equally spaced sampling points, the distance

apart depending on the size of the area to be sampled. It is important to spread the sampling points evenly over the area to be sampled. Samples should be taken to a depth of 0-20 cm. Samples should always be put in clean polythene bags to avoid contamination and labelled as soon as taken.

Soil samples should be despatched for analysis as soon as possible after sampling. If there is a delay of a few days the samples should be stored in a cool dark environment until they can be sent to the laboratory. The laboratory analysis should include the following tests[v]:

- pH (water)
- available phosphorus (P) using the Olsen method
- available potassium (K)
- available magnesium (Mg)
- total nitrogen (N) using the Dumas method
- a hand soil texture
- the P, K and Mg results should be quoted in milligrams/litre.

Where neutral soil conditions exist, a target for a National Vegetation Classification MG5 neutral grassland community is likely to be appropriate. Where more acidic soil conditions are encountered, e.g. on sandy areas, a target community suitable for acidic conditions and locally represented will be identified. If alkaline soils occur, a suitable target community will be identified, probably not within the immediate vicinity of the quarry, but likely within 10km in the limestone area of Staffordshire. The specifications for target habitats for each area cannot be decided until soil testing has been conducted using a regular sampling strategy across areas D and E.

Grassland creation

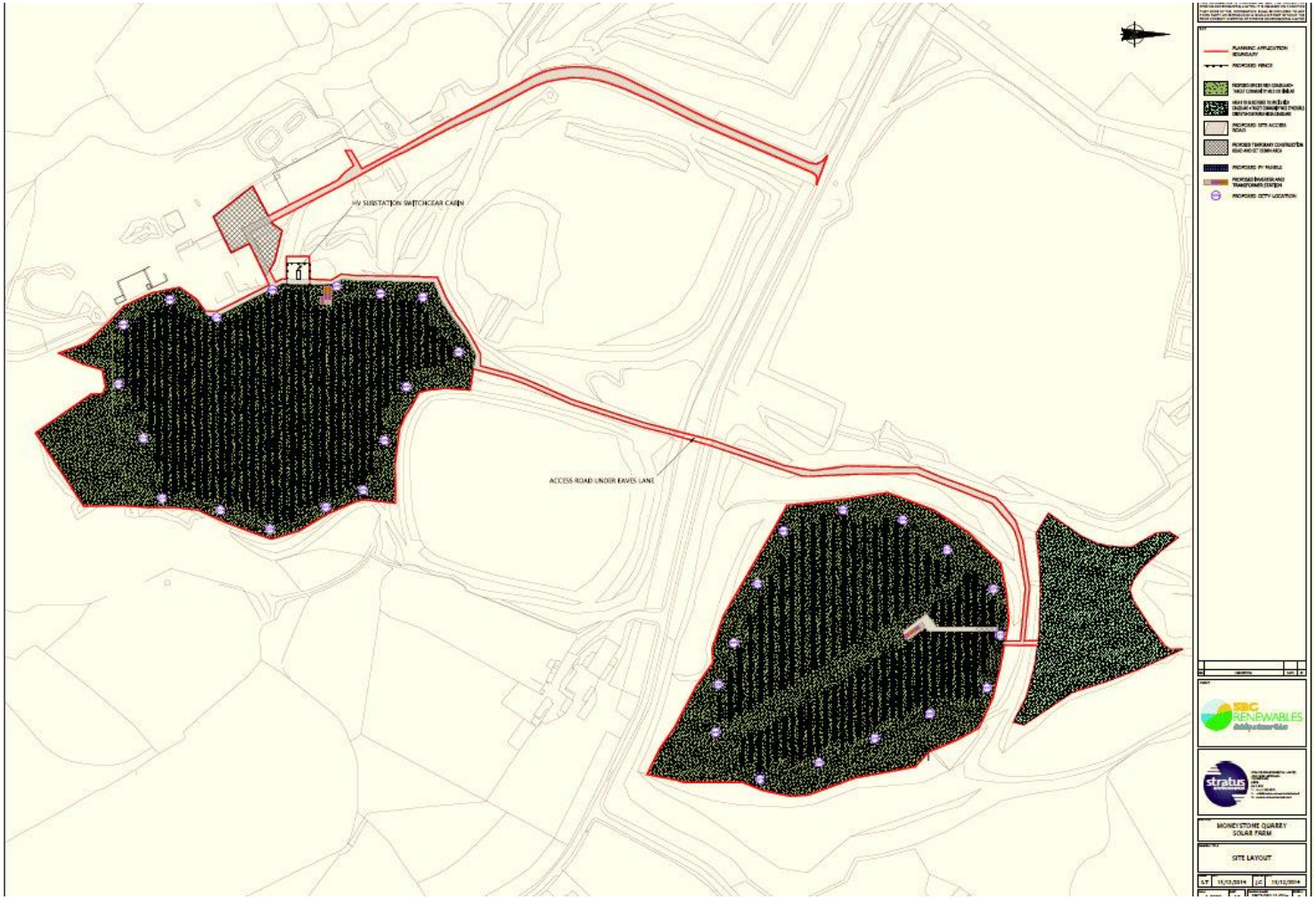
Green hay should be the primary means of creating species rich grassland in both areas D and E. Green hay is herbage cut from a meadow at or just before the hay cutting stage. The hay is then collected fresh without drying or turning and transported to the recipient site and spread immediately[vi]. The seeds then drop from the hay onto the receptor site and the herbage stalks create a protective mulch.

The main advantage of green hay is that it provides a means of ensuring fresh seed from a local source, and the seed will be reflective of a known habitat type and quality. In general a, wider range of species can be found in green hay than in a traditional seed mix, and the costs tend to be lower than commercially available seed. Finally, for green hay a much higher proportion of seeds remain in the flower heads as compared to dry hay.

Staffordshire Wildlife Trust is experienced in grassland establishment from green hay and has several donor sites local to Moneystone Quarry (see below). A suitable donor site must be within reasonable distance, as green hay does not transport well and needs to be spread shortly after cutting. If contained within a trailer for more than a few hours it will start to compost and the heat generated can reduce the viability of the seed. In SWT operations the green hay is bailed and there is a maximum of 8-12 hours from cutting to spreading.

It may be necessary in certain areas to supplement the green hay application with seed sowing using either dry seed collected from the donor sites or by purchasing suitable commercial seed mixes. Seeding may be required in areas where there are unusual soil conditions, e.g. alkaline soils for which a donor green hay site cannot be found, or where the green hay does not take and the substrate remains bare. Options for sourcing suitable seed in the event of this being required are described in 'Seeding and sources of seed stock', below.

Figure 1. Layout of Areas D and E, proposed solar farm at Moneystone Quarry



Identifying a suitable donor site

Donor sites for green hay should be species-rich and of a habitat type that is required for the recipient site. Importantly, the soil conditions (type, pH) must be similar. The donor site should be in close proximity to the recipient site as green hay needs to be transported quickly. There should be few or no pernicious weeds such as Spear Thistle, Common Nettles or Broad-Leaved Docks present. The donor site should be large enough to supply the whole receptor site. Typically, 1 acre of green hay from the donor site will cover 2 - 3 acres on the receptor site[v].

Potential donor sites

The donor sites for green hay will be decided once the results of soil testing are available. Several candidate donor sites exist within close proximity of the Moneystone Quarry:

> The Ashbourne Hey Site of Biological Importance (SBI) is situated in Whiston village, Staffordshire Moorlands District. Ashbourne Hey supports a selection of semi-natural habitats that are of ecological significance, including broadleaved woodland, wet woodland, unimproved pasture and traditionally managed hay meadows.
>
> At the heart of the Ashbourne Hey SBI lies the Whiston Eaves Site of Special Scientific Interest (SSSI). Whiston Eaves SSSI is situated approximately 500m of the quarry's western boundary. *"The semi-natural grassland at Whiston Eaves is situated to the south of the village of Whiston in north Staffordshire. The site encompasses a series of species-rich meadows, all of which have been traditionally managed as either hay-meadow or grazing pasture. As elsewhere in lowland England, such areas are now rare in Staffordshire, having largely been lost as a result of changes in agricultural practices. Although consisting predominantly of semi-natural grassland, the site does include areas of rush pasture, scrub and running water."* Green hay from Whiston Eaves SSSI has been used in the past at the quarry, but was an unmanaged and therefore failed restoration attempt.

Soil conditions of the recipient sites (Areas D and E) will be matched with suitable donor sites. Soil pH is a major consideration and donor and recipient sites must have similar conditions. If soil testing reveals neutral soils at the recipient sites (pH5.5 – 7.5), then Ashbourne Hey SBI (especially the western side) could deliver a fair quantity of green hay, consistent with NVC grassland community MG5C. If acidic conditions are found within the recipient site (pH <5.5) then a donor site fairly close or bordering the quarry can be found. If alkaline soil conditions are found then it will be necessary to look beyond the immediate Moneystone area, possibly closer to Stanton.

Prior to collecting green hay, consultation will be required with Natural England on whether the condition of an SSSI is conducive for green hay production. A re-survey of Ashbourne Hey SBI would be required (fields 4-6) if that site was proposed as a donor site. Collection of green hay would also require landowner consent to remove material and an agreement to remove any grazing stock from the site in spring.

Ground preparation

The preferred receiving surface for green hay at the recipient site is bare ground, scarified. Where weeds or unsuitable grasses occur, the sites should be sprayed off with glyphosate first and then scarified. The spraying off will reduce competition from grasses and weeds. In a post-industrial site the seed bank is likely to contain a high proportion of weed species.

The scrub encroachment to the south of area D must be treated and removed prior to any grassland creation. A brushwood herbicide such as Timbrel must be applied to the scrub – either foliar or cut stem application – dependent upon the state of the scrub when removal operations occur. Once the scrub is dead, the root stock must be removed by ripping using heavy tines mounted on a tractor toolbar that work the soil to a depth of 60cm. This operation can be undertaken at any time of year.

Once weeds have been controlled, construction of the solar farm can be undertaken. Once the site is completed, ruts and holes should be levelled with a mini digger followed by light harrowing of the entire area of D and E will provide a level yet lightly scarified surface ideal for the application of green hay. NB these operations must be undertaken using small equipment and with contractors familiar with working in a solar farm.

Seeding and sources of seed stock

Green hay

Green hay will be cut and baled from the selected donor site(s) and transported by road trailer to the recipient sites. The bales will be delivered from the road trailer to regular points within the solar array by ATV and mini trailer. Bales will be split immediately and hand spread to an even depth across the entire recipient area. In areas outside the security fence it will be possible to turn the hay to help seeds to separate from seed heads.

Dry seed

In addition to green hay, it may be necessary to collect and dry seed from the donor sites. Dry seed can be used to seed particular areas where germination has been poor, or to augment the entire recipient site with certain species, e.g. early flowering species, which were poorly represented in the green hay. Additionally, dry seed would be a good means of introducing late-flowering species to the site which may have been missed by green hay collection. Seed will be harvested from the donor site using a brush harvester and ATV, then seeds would be sieved and dried. Ideally there would be 2-3 harvests at each donor site to ensure a wide range of species (including early and late flowering species) are represented.

Commercial seed

As a back-up, commercial seed may be considered for use if no suitable donor sites for green hay can be identified. This may be due to unusual soil conditions which require a specific species mix not locally available. Alternatively, this may be required for areas where the green hay does not take, due to timing, weed issues or some other factor. In these circumstances it is recommended a suitable fine grass mix (matched to the target habitat type) is sown to stabilise the site and reduce the risk of weed infestation and scrub encroachment. This area can then be oversown with green hay or dry seed from

a suitable donor site at a later date. Finally, commercially sourced seed may be a good source of yellow rattle, a useful plant for restoration of where vigorous agricultural grasses exist.

If either dry seed from a donor site or commercial seed is to be used, the following method should be followed. Seed is best sown in the autumn or spring but can be sown at other times of the year provided there is sufficient warmth and moisture. Vegetation, especially weeds, should be cleared from the site before sowing, followed by harrowing to produce a medium tilth. The seed must be surface broadcast but not drilled. To get an even distribution and ensure the entire area is covered, the seed should be divided into two or more parts and sown in overlapping sections. Seed should be firmed in with a roller once sown.

Construction plan

Plans for habitat creation need to be carefully coordinated with the construction of the solar farm. The scrub should be treated and removed prior to construction commencing. All other ground preparation and habitat creation activities should be undertaken post-construction.

For the construction process, construction equipment should ideally be tracked to reduce ground disturbance. Normal precautionary measures will be taken during construction to protect existing habitats of value and protected wildlife species (see Appendix 1).

NB ground preparation post-construction will require the use of small equipment for ground preparation, to ensure no damage to the solar arrays. A wide range of ATVs and mini tractors are suitable for undertaking this work.

Grassland management

Maintaining a low nutrient soil is essential for the development of the species-rich grassland. The grassland within the solar farm should be cut or grazed several times during the first spring following sowing to 50mm length. If the grassland is cut rather than grazed then all arisings should be removed from site.

As soon as the sward is established, a grazing regime can be instated. Sheep are the usual choice for solar farms, being generally small enough to pass beneath the rows of panels. Sheep have been successfully used at multiple solar farms for several years[ii]. Hardy breeds are usually best suited to autumn and winter grazing where the grazing is less nutritious.

The grazing regime should be established in consultation with SWT. Sheep grazing at low stocking density will encourage floral diversity and help control weeds and scrub. To encourage floral diversity sheep grazing is recommended from October to March. Sheep should be removed by the beginning of April to allow herbs to flower and set seed. At the end of the summer in late August / early September a hay cut should be taken using a mechanical cutter and baler and all hay removed from site prior to grazing commencing. No fertilizers should be used on site.

Monitoring for weed species will be essential, especially during the early stages of grassland establishment. Assuming an autumn sowing, the site should be monitored for weeds regularly during the following spring as the sward develops.

No herbicides should be applied to the site after the initial vegetation clearance. If any pernicious weed is considered to become a problem, then hand pulling or spot treatment with a selective herbicide should be undertaken prior to the weeds setting seed.

Monitoring

Monitoring is essential to track the development of the target grassland habitat(s) and troubleshoot any problems. A detailed botanical monitoring plan will be developed, using specific indicators and key time intervals to track the progress of establishment. This monitoring plan will be developed in conjunction with the LPA, and specifically with the input of the County ecologist, as well as the SWT.

There is always uncertainty where new habitat is being established. This relates to weather conditions, the quality of seed stock or green hay, variations in the conditions of the recipient sites, and problems with pernicious weeds. It is therefore recommended the monitoring of the target habitats be intensive during the first 5 years to ensure any problems are identified early and resolved as quickly as possible.

Grassland habitat indicators would typically include the presence and abundance of key herb species (usually those rarer species within the seed mix) as well as the number of flowering species present. The monitoring should be based upon the species list and thresholds identified by Hopkins for Staffordshire grasslands[vii]. Once the target habitat(s) have been identified, a comprehensive species list of grassland species present will be compiled and used as the basis for monitoring. A scoring system will be used to determine the progression of the site towards the target habitat. Rarer plants will be scored more highly, and higher abundance will also be scored more highly. Target scores will be set for different time intervals, e.g. a score of 15 will be required in year 2, 20 in year 4 and 25 in year 5.

It's important that botanical monitoring be undertaken at regular intervals (twice per year) in the first 2 years to ensure the sward is developing as intended, and once per year for years 3, 4 and 5. Once the target habitat has been established to the satisfaction of the stakeholders, site monitoring can be reduced to once every 3 to 5 years as appropriate.

Monitoring must be undertaken by competent botanists who are familiar with the target habitat types and associated species and should be undertaken twice per year in the early years to ensure both early and late flowering species are recorded. Monitoring should be designed to survey each habitat type individually, assuming there will be multiple habitat types. The survey design for monitoring should consider the area beneath the solar array and the area at the edge of the solar array in Areas D and E as separate entities and sampling should be effected accordingly. This will allow the assessment of each individual area towards its target habitat, independent of other areas.

Where significant weed problems occur, or where seed has not taken successfully, further action will be required. Weed control will be undertaken as outlined above and re-seeding will be effected as soon as suitable weather conditions occur.

Protected species

The following legally protected species have been confirmed or are believed to be present on site. The construction, habitat creation and management plans for the site must ensure the protection of these species, and where possible, should benefit them.

- Badgers are considered to use the site for foraging and commuting but no setts have been observed. The planned development is considered to have limited impact upon the local badger population.
- Of birds, the grasshopper warbler was identified within Area D. This BAP priority species breeds on the ground in grass tussocks and suitable habitat must be searched prior to any construction on site.
- The Great Crested Newt has been observed on site and breeds in ponds within the Moneystone Quarry site. No suitable hibernating or breeding habitat occurs within Areas D and E but both areas could be used for foraging during spring and summer, though it should be noted the short sward and patchy nature of the vegetation renders the areas sub-optimal.
- Slow worms, common lizards and grass snakes have been observed within the wider quarry area. As for amphibians, Areas D and E are considered sub-optimal habitat for foraging snakes in their current state.
- As a general recommendation to protect ground-nesting birds as well as amphibians and reptiles, it is recommended that the vegetation in Areas D and E be cut short (<50mm) in the lead-up to construction. If cutting occurs after March the areas must be carefully searched for ground nesting birds and amphibians and reptiles prior to cutting occurring.
- A number of bat species including Pipistrelle, Brown Long-eared and Daubentons were identified in the surrounding area, however the closest records are approximately 800m from the site within Whiston Hall Site of Biological Importance. The proposed development is not expected to negatively impact bats.

Habitat creation and protected species

The successful establishment of species-rich grassland beneath and surrounding the Moneystone solar farm will provide valuable habitat for a wide variety of species, including a wide range of invertebrates, small mammals, birds, reptiles and amphibians. Specifically, the creation of structured grassland with some tussocks and a varied sward height will favour ground nesting birds and provide suitable foraging for the great crested newt and reptiles. The flower and grass rich sward will benefit invertebrates which in turn should provide a rich food source for breeding and wintering birds and bats.

It is recommended that nesting, roosting and hibernating habitat be created for a wide range of species, including hibernacula, nesting boxes and invertebrate nesting areas to enhance the value of this site for biodiversity in general. The type and number of habitats will be specified in the full management plan.

Next steps

Assuming planning consent is granted for the solar farm, it is recommended the following steps be taken in sequential order:

1. Undertake a comprehensive survey of soil condition across Areas D and E.
2. Use soil conditions to identify suitable target habitat types for each of Areas D and E, in consultation with the County Ecologist and SWT.
3. Identify suitable sites donor sites for green hay for each of the target habitats identified. If a suitable donor site cannot be recommended, identify a suitable seed source.
4. Develop a detailed management plan, expanding upon all the sections presented in this framework, and specifying target species, donor sites, site preparation, timing and specific activities for habitat creation, management of the grassland through the establishment phase, long term management including a specific grazing strategy and a contingency plan for what to do in case of seeding failure, weed infestation or some other major issue.
5. Ensure scrub is completely removed and land is properly prepared ahead of any grass seeding operations.
6. During scrub clearance, construction of the solar farm and land preparation ensure reasonable avoidance measures are implemented to safeguard protected species and other wildlife which may be present.
7. Develop a detailed monitoring plan for the life of the site, paying particular attention to the establishment phase and first 5 years of habitat development. The monitoring plan will include a schedule of activity, survey design and method for monitoring and interpreting results. Indicator species will be selected from the species list of the target habitat and will include a scoring system for species based upon their rarity and conservation status within Staffordshire. Specific quantitative targets will be set, increasing over time, to ensure the target habitat is developing as planned. The monitoring plan will be developed in collaboration with the County Ecologist and SWT. An annual site visit involving members of the LPA, SWT and the owners of the solar farm is recommended as part of this monitoring strategy in at least the first 3 years of habitat establishment.

Photographs

Photo 1. Area D looking northwards from scrub encroachment towards grassland

Photo 2. Area E, looking east across hydroseeded grassland

Appendices

Appendix 1. Reasonable Avoidance Measures to avoid impact to legally protected species during construction of the solar farm

This method statement should be followed for the construction period of the Moneystone solar farm. Minor or short term destructive or disturbance works (e.g. trenching, pipe laying) will also follow this method statement to ensure legal compliance and to ensure the favourable conservation status of the species is not compromised.

The following measures will be adopted throughout the construction period of the proposed development:

- Grassland vegetation within working areas is to be strimmed and cut back to approximately 15cm above ground level prior to the start of works to reduce the attractiveness of the site to amphibians and reptiles.
- A tool box talk will be undertaken prior to any works commencing on site. A licensed ecologist will oversee all construction works involving habitat removal.
- All working areas will be hand-searched by a licensed ecologist prior to any form of digging, excavation or final vegetation clearance (below 15cm) being started.
- If any amphibians or reptiles are found they should be taken to a designated safe place outside the area to be developed. Before re-commencing work during construction after an overnight or other significant pause, temporary refuge sites (e.g. excavation holes) should be checked for amphibians - e.g. in the morning after an overnight break. Temporary moveable refuges such as carpet tiles can be laid down in work areas to provide good easy to use and check and refuges. In areas sealed off from amphibians and already checked this approach would not be necessary, but would be useful in marginal parts of the work areas. If a great crested newt is found, work must stop immediately and contact should be made with a licensed, qualified ecologist, who will liaise with Natural England.
- Should any trenches and excavations be required, an escape route for animals that enter the trench must be provided, especially if left open overnight. Ramps should be no greater than 45 degrees in angle. Ideally, any holes should be covered.
- All excavations left open overnight or longer should be checked for animals prior to the continuation of works or infilling.
- The proposed timing of the works should coincide with the majority of great crested newt being within ponds (March – June) or during the hibernation period (with the exception of the feature that may offer shelter for overwinter amphibians). This will reduce the likelihood of great crested newts occurring within the main site.
- Any excavated material stored overnight should be searched prior to being used as infill.
- Back filling should be completed immediately after any excavations, ideally back filling as an on-going process to the work in hand.

References

[i] www.solarpowerportal.co.uk/guest_blog/solar_farms_and_biodiversity_2356;
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[vi] www.grasslands-trust.org/restoring-grassland-using-green-hay
[vii] Hopkins, I.J. (1985) *Staffordshire flowering plants and ferns*. City Museum and Art Gallery, Stoke-on-Trent