Overarching Topic

Project Planning & Implementation

Kat Stanhope, Nic Coppin & Mike Gibbs

Rebuilding nature
Good practice guidance for ecological restoration

CIEEM

This document is part of a series written by experts in ecological restoration from the UK and Ireland, led by members of CIEEM's Ecological Restoration Special Interest Group. The series is prefaced by ten good practice principles for ecological restoration, set out in *Rebuilding nature: Good practice guidance for ecological restoration*, and includes five Overarching Topics that apply to any ecological restoration project in the terrestrial, freshwater and marine environments of the UK and Ireland:

- **Integrating Ecosystem Services into Ecological Restoration**
- **Project Planning and Implementation**
- **Physical Environment**
- **Large Scale Nature Recovery and Restoration**
- **Monitoring**

Accompanying the five Overarching Topics are the habitat specific documents applicable to ecological restoration projects in terrestrial, freshwater and marine environments.

Introduction

The simplest definition of a project is a set of tasks that must be completed within a defined timeline to accomplish a specific set of goals. Every project, regardless of budget and scale, needs some level of project planning and design to ensure that the work being carried out is aligned to the project objectives.

Project planning is an essential part of ecological restoration. A project plan defines the project strategy and objectives and explains how they will be achieved and verified. A good project plan can mean the difference between the project achieving success or failure and will reduce the risk of costly delays.

This topic provides an overview of what ecologists and land managers may need to consider when developing a project plan for use in ecological restoration and habitat creation projects in the UK and Ireland. It provides two key resources:

- **Table 1 Project Stages** - a summary of the stages of a well delivered project, with high-level prompts on the inputs, considerations and decisions that might be needed at each stage.
- **Table 2 Project Planning Checklist** - a checklist with more detailed notes on what to consider in the project planning stages relating to some of the project stages and considerations included in Table 1. It is likely that several of the project stages will overlap, and the project plan should be revisited and updated throughout the project. The objectives may also need revision throughout the project.

These Tables can be used for projects of all sizes and budgets, although not all the prompts will be applicable to all projects. Charity and volunteer groups which have limited resources will likely need to implement a minimum in terms of project planning. In this case the information here should be reviewed to prepare a project plan which includes the minimum necessary to deliver the project using the resources available. It is critical to discuss with the project client or sponsor what is possible with the resources and time available from the project's inception.

Completion of the project plan is likely to need input from specialists other than ecology or land managers, such as hydrologists, landscape designers and geotechnical engineers, who may have experience of design feasibility, preparation of contracts and direct construction experience. The ecological restoration project may be an integral part of a larger scheme, in which case the plan will need to consider a host of other interests, some of which may have conflicting objectives that need to be resolved early on (i.e. the ecologist will need to work with the client or project sponsor to find a balanced solution).

This topic should be read in conjunction with the other Overarching Topics:

- Physical environment
- Large-scale nature recovery and restoration
- Ecosystem services & opportunities
- Monitoring

This topic is not a guide to Project Management, which is *"…the application of processes, methods, skills, knowledge, and experience to achieve specific project objectives according to the project acceptance criteria within agreed parameters"* (Association for Project Management, 2025). There are numerous online resources and training courses available on project management, systems, and processes.

Useful guidance

The following references are useful guides to project management and implementation of habitat creation, restoration and translocation.

- *Habitat translocation – a best practice guide.* (P. Anderson, 2003)
- *Habitat Creation and Repair* (Gilbert & Anderson, 1998)
- *Habitat Creation – a critical guide; Section 2 Habitat Creation Planning* (Parker, 1995)
- *Project Planning and Management for Ecological Restoration* (Rieger *et al*., 2014)
- *Project Management for Wildlife Conservation v4* (WildTeam, 2021)
- *Standards of practice to guide ecosystem restoration – A contribution to the United Nations Decade on Ecosystem Restoration 2021-2030* (Nelson *et al*., 2024)

Objective setting

Setting clear objectives is key to project planning and should inform the design, management, and monitoring of habitat in ecological restoration projects. There are many goal-setting frameworks that could be used to define the objectives, with the most well-known and widely used being SMART:

- **Specific** – the objectives of the ecological restoration should be specific and clear and related to the impacts of the project (or delivery of enhancement).
- **Measurable** – the objectives should be measurable so that monitoring can be used to check progress against the objectives. It is easier to produce a habitat management and monitoring plan if design objectives are specific and targets are measurable. The habitat management and monitoring plan should include feedback loops, e.g. the process by which remedial measures will be carried out if the habitat creation, restoration or translocation is not meeting its objectives.
- **Achievable** – the proposals should be realistically achievable given available resources, time, and the constraints or opportunities of the site. Larger or more complex projects sometimes need breaking down into distinct phases, each with its own set of objectives.
- **Responsible** – it should be clear from the outset who is responsible for implementing the ecological restoration project. This includes who will be responsible for post-construction aftercare and monitoring, as well as the process for hand-over between different parties, legal agreements may be required to ensure long-term management is implemented. The project ecologists should be aware of their role and its likely limitations.
- **Time-related** (or time-bound) – the timescales in which the ecological restoration project needs to be completed should be specified, including maturation periods if the site is to be used for translocation of species, and for how long management and monitoring need to be carried out. Many of the objectives may take a significant time to achieve. If the objectives are to be used to assess the success of the project and to be measurable within a certain time frame, for example on completion of the project, then only short-term objectives can be used. It may not be possible to measure some objectives for several years.

It may be helpful to set stretch goals, which are ambitious long-term goals used to inspire creativity and innovation to achieve difficult outcomes, particularly for large scale restoration projects (Manning *et al.,* 2006) (see also Overarching Topic - Large Scale Nature Recovery and Restoration).

For complex, large-scale or unusual projects it may be helpful to use techniques within the developing Theory of Change. Theory of Change is a comprehensive description or illustration of how and why a desired change is expected to happen in a particular context. It can be used to map out the steps to achieve objectives, by working backwards from an objective and identifying all the conditions that must be in place (and how these relate to one another) for the objectives to occur. The theory of change has been implemented in areas of international development, sustainability, education, human rights and social change. These techniques are also called backcasting (Manning *et al.,* 2006). More information can be found on the Centre for Theory of Change website. A toolkit for The Theory of Change Process – Guidance for Outcome Delivery Plans can also be found on the Government Analysis Function website.

Collaboration, Engagement and Partnership

Community and stakeholder engagement have a critical role for long-term sustainable outcomes in habitat creation and restoration across the UK and Ireland.

Particularly at large scales (see Overarching Topic - Large-Scale Nature Recovery and Restoration), collaborative ways of working are essential for restoration outcomes and require suitable partnership or engagement structures and adaptability over time (Adams *et al*., 2016; Eigenbrod *et al.*, 2016; Macgregor *et al*., 2012). Good practice principles have been suggested for engagement (Best *et al.,* 2022):

1. Define a clear purpose for engaging with communities.
2. Engage appropriately to build local ownership.
3. Understand 'the community' and the power relationships within it.
4. Use participatory co-design approaches.
5. Develop trust and manage conflict effectively.
6. Foster two-way dialogue and transparency.

A recent review by NatureScot (Underwood *et al*., 2022) presents useful learning points for collaboration, engagement and partnerships.

Figure 1

Ecological habitat creation site near Cubbington in Warwickshire, May 2022.

Photo credit: HS2 Ltd.

Figure 2

Reptile bank being constructed on a habitat creation site.

Photo credit: Stuart Lowe.

Table 1: Project Stages

PROJECT STAGE	Inputs, data	Decisions, considerations & stakeholders (see Table 2 for more detail)
Project scoping and definition; setting objectives	☐ Needs, constraints and opportunities ☐ Baseline data (including information on the physical environment) and relevant research ☐ Environmental education.	☐ Ecosystem Services and reference ecosystems ☐ Local, regional and national targets ☐ Resources available / allocated ☐ Reporting requirements ☐ Land issues ☐ Identifying key stakeholders, including local communities ☐ Sustainability principles ☐ Climate change resilience
Planning, consents and permitting	☐ Plans ☐ Design & Access Statement ☐ Project description ☐ Environmental Impact Assessment (EIA) ☐ Appropriate Assessment ☐ Requirement to quantify biodiversity gain e.g. Biodiversity Net Gain (BNG) in England	☐ Local Planning Authorities (LPAs) ☐ Regulators ☐ Health, Safety and Environment team ☐ Statutory undertakers Note: some permissions (such as outline planning consent) may be obtained before detailed design and site investigations (may vary depending on the permission and jurisdiction).

PROJECT STAGE		Inputs, data	Decisions, considerations & stakeholders (see Table 2 for more detail)
Concept Design	Initial data collation	▢ Desk Studies ▢ Reconnaissance	▢ Main constraints and opportunities ▢ Biodiversity gain and protected / priority species / habitats ▢ Nature and function of the physical environment
	Site context analysis	▢ Stakeholders ▢ Public access & other pressures ▢ Landscape ecology; buffers ▢ Fragmentation / isolation	▢ Availability of site access ▢ Effect on adjacent habitats (e.g. invasions) ▢ Opportunity to increase habitat continuity & ecological corridors
	Integration into local strategies & initiatives	▢ Nature conservation strategies (e.g. Local Nature Recovery Strategies) ▢ Planning policies and natural area initiatives ▢ Social and cultural initiatives ▢ Stakeholder consultations including local community and relevant Non-Governmental Organisations (NGOs) ▢ Pre-planning discussions with LPA, key consultees including regulators	▢ Areas of deficiency ▢ Green corridors and links. ▢ Green / blue space for people ▢ Biodiversity gain ▢ Off-setting ▢ Community engagement
	Initial design and feasibility, costing	Resources and funding available.	▢ Mitigation of impacts ▢ Nutrient mitigation (e.g. nutrient neutrality in England)

<table>
<tr><th colspan="2">PROJECT STAGE</th><th>Inputs, data</th><th>Decisions, considerations & stakeholders (see Table 2 for more detail)</th></tr>
<tr><td rowspan="3">Detailed Design</td><td>Review and refine objectives</td><td>Measurable criteria and targets</td><td>Identify resources, special skills and expertise required for implementation and management</td></tr>
<tr><td>Detailed site surveys and site investigations</td><td>☐ Phase 2 flora, fauna, fungi (if relevant)
☐ Soil resources and properties
☐ Hydrology, drainage
☐ Topography, mapping
☐ Microclimate
☐ Archaeology
☐ Future management requirements (e.g. water resources, access and compounds)</td><td>Level of detail required to meet objectives</td></tr>
<tr><td>Design and specifications</td><td>☐ Multidisciplinary inputs
☐ Long term monitoring and management plan</td><td>☐ Health and safety - Design risk assessments, awareness of responsibilities under the Construction (Design and Management) Regulations 2015
☐ Planning and permit conditions
☐ Delivery plan
☐ Preparation of proposed plans, maps, drawings, details of implementation methods, mitigation measures proposed, environmental management plan (plans, specifications, quantities)
☐ In-house direct labour, contractor and / or volunteers
☐ Project risks and contingencies
☐ Form of contract
☐ Habitat aftercare, management and monitoring plan
☐ Monitoring – parameters and frequency</td></tr>
</table>

PROJECT STAGE		Inputs, data	Decisions, considerations & stakeholders (see Table 2 for more detail)
Implementation	Procurement	Commercial / contracts	▢ Tendering, estimating costs, committing resources ▢ Contracts, agreements, payment terms, welfare, temporary works
	Site works	▢ Clerk of Works ▢ Contractor or other resources	▢ Supervision, quality control, health and safety management, conformance. Variations. ▢ Clerk of Works role is to monitor for, and advise on, compliance with pre-approved environmental safeguards. ▢ Discharge of consent conditions (some may need discharging before commencing site works). ▢ Sign off on satisfactory completion of the works. ▢ Compilation of as-built information / safety file.
Post implementation	Initial aftercare	Immediate maintenance requirements to achieve short-term objectives and interim Key Performance Indicators (KPIs), 3 to 5 years usually.	▢ Monitoring – parameters and frequency ▢ Reporting ▢ Remedial works if variance from KPIs
	Long-term management and monitoring	▢ Reference ecosystem and specific KPIs relating to final objectives ▢ Monitoring results	▢ Responsibilities and long-term funding. Interventions and remedial actions if needed ▢ Adaption to emerging best practice ▢ Stakeholder involvement, including the community ▢ Promotion of education and skills ▢ Sharing of lessons learnt

Table 2: Project Planning Checklist

Planning for project scope, objectives and permitting

Considerations	Guidance Notes
Objective setting	☐ The objectives will steer the project, so it is important to make them clear. If there are many objectives, it can be useful to assign priorities. ☐ Set KPIs (Key Performance Indicators) and success criteria to track performance in meeting objectives, how these will be measured, and at what points in the project. This could include defining a 'Reference Ecosystem' (Gann *et al*., 2019) against which future outcomes can be compared. This could be what was there before (if documented), a nearby example, or a 'typical' example (note that an ecosystem comprises both biotic and abiotic aspects). There may be novel ecosystems and assemblages without a reference which need bespoke criteria. ☐ Include KPIs set by the client or funder of the project, if applicable. ☐ Objectives and KPIs should be based on one or a combination of different aspects of the ecosystem: ○ The plant, animal or fungal components, including soil biota. ○ The site conditions, such as soil type and fertility, hydrology, slope stability. ○ The ecosystem functions and services provided, including biodiversity services, recreation and regulating services, health and wellbeing. ☐ Make sure that the objectives and KPIs are not just for the short-term implementation stages but also cover the long-term development, succession, and management of the habitat. ☐ Consider how the project can deliver against local, regional and national biodiversity objectives and whether enhancements are provided over and above any mitigation / compensation required, which will help to deliver local, regional or national biodiversity targets.
Reporting requirements	☐ Make sure the project plan includes what the deliverables or outputs will be and who is responsible for delivering them. ☐ Include the level of detail for reporting which may be needed for different stakeholders. ☐ Provide information on the frequency and timescale of reporting required throughout the project stages, including post-implementation.
Land ownership / easement issues	☐ Ensure land ownership and rights of access are determined (L. Anderson, 2023) and that the budget includes land purchase if necessary. Consider who will be owning and managing the land in the long term, and that they have the commitment and resources to achieve the objectives. ☐ Check land registry documents for any burdens, such as turbary rights1, fishing rights, rights of way.

1 Turbary is the ancient right to cut turf, or peat, for fuel on a particular area of bog in Ireland. The turbary right would be registered on the title of land when it was registered in the Land Registry.

Considerations	Guidance Notes
Stakeholder engagement	**Partnerships**: There may be opportunities to work in collaboration with local groups and partnerships such as local wildlife trusts. Try to identify these and engage early in the process. There may be local projects which could offer a partnership approach to deliver bigger, better, more and joined-up habitats. **Community engagement:** Consider if the design can integrate community benefits, whether community engagement can be carried out to inform the design, and whether the community can be involved in habitat creation, management and monitoring. Particularly in urban settings, this can reduce vandalism and anti-social behaviour in the space. The site could be used for education as part of a local schools programme or STEM engagement, for example getting local schools involved to build bug hotels on the site or designing a pond on site specifically for school pond dipping visits. **Regulators:** Consider whether any consents or licences are required for the work, including protected species licences. The habitat site should integrate with any designated sites but may need the correct consents in place to carry out habitat creation, restoration or translocation works (such as a Section 28 Consent for works likely to damage a SSSI) even if ultimately the habitat would improve the designated sites and its connectivity. **Consultees:** Consider whether any input / review of the design or management plans is required by interested parties including the public, statutory bodies, non-governmental organisations and charities. If the project is complicated or contentious, consider producing a stakeholder communication plan (L. Anderson, 2023). As a minimum, keep the local community informed of the proposals. Consider direct early engagement with adjoining landowners, as this can avoid or reduce conflicts. When thinking about local stakeholders, consider whether the works are likely to impact the local economy, for example through changes to traffic flow, longer duration of works, and different hours of operation. If there are private properties overlooking the site it is good to engage the landowner and / or tenant as they may benefit from the site and could help to 'keep an eye out' in case of vandalism. **Public access:** Integrate Public Rights of Way rather than requiring a permanent diversion. People will use 'desire lines' rather than a long diversion; don't design something that people are likely to trample whilst walking their dogs if the habitat would be sensitive to this. Public information boards can help engage the public and make them aware of site sensitivities. Include disability access where possible.
Sustainability principles	☐ Where possible, the design of the project plan should re-use any waste generated. For example, use the material excavated from ponds to create reptile banks so that no material needs to be transported off-site, or if top-soil strip is required in one area for low nutrient status wildflower grassland, consider using that soil in another area for tree and shrub planting. ☐ Consider sourcing materials sustainably and using those with low or zero carbon impact. Check whether there is material on site for natural pond liner (clay) rather than bringing in artificial liner. ☐ The design should reduce construction transport to and from the site as much as possible and make use of local sources of materials and labour. ☐ If the site can act as a carbon sink and can generate carbon credits or biodiversity units, this may be a source of funding although you must be cognisant of stacking rules. Use of biodiversity units would need to be identified at an early stage if linked to statutory Biodiversity Net Gain in England.
Permissions and consents	☐ The requirement for formal permissions and consents will depend on the design, scale and location of the project. Consider whether permissions may be required such as planning permission, discharge consents, abstraction licences, or traffic consents and whether these are for temporary / construction works or permanent / long-term work. ☐ In some locations even simple fencing may need permissions if it is expected to be permanent and over a certain height (such as deer fencing). The definition of temporary and permanent may have a specific timescale in planning terms.

Planning for Concept Design (Potential Constraints and Possible Opportunities)

Depending on the size and nature of the project, constraints may need to be assessed, for example within an Environmental Impact Assessment.

Consideration	Guidance Notes
Baseline data	☐ The project plan should identify what information is needed and the sources of information including site history, biological context, size, site stability, water regime, current and forecast climate, shelter, levels of likely disturbance, geology, soils, and any constraints and opportunities. There may be opportunities to consider wider biodiversity benefits for the design of well-planned and managed habitats such as for migrant species (including birds and invertebrates) which are not normally found on the site but which could benefit from the interventions. ☐ Talk to landowners who may have a wealth of information on the site that cannot be gathered by looking at plans and aerial photos, for example areas liable to periodic flooding, the location of underground field drains and buried services, current management regimes, and accesses. Take this checklist to the site as a prompt of what to look out for or ask about. ☐ Further engage with stakeholders and communities (see above).
Interaction with third party works or infrastructure such as utilities	☐ Obtain service plans for the project area. ☐ On larger projects, do not assume scheme plans show all utilities. Speak with a utilities engineer as in some cases proposed diversions of utilities are 'indicative' (subject to change) and there may be on-going discussions with utility service providers about the final route of any future service plans or diversions. ☐ There are restrictions for planting trees and shrubs above or below certain services such as power lines and obstacle limitation surfaces for runways; these should be checked with the relevant utility or relevant company. ☐ Check services along access routes outside the site if hauling heavy material or heavy equipment.
Cultural heritage designated assets (listed buildings, scheduled monuments, burial grounds) and non-listed built heritage and Conservation Areas	☐ Search for any archaeological or cultural heritage value for any site. If ecological restoration is proposed on a heritage asset, investigations for archaeology will need careful programme management with any ecology requirements and may restrict certain activities (such as pond digging, tree planting or deep soil inversions, due to the potential effect on surface or subsurface archaeological features). If the project site requires excavation for archaeological investigations before ecological restoration, protected species, important habitats and soils may need to be translocated and a suitable receptor site identified or even created, which can affect the programme significantly. ☐ If the proposals include structures such as roosting spaces for bats in an important historic setting, this may severely restrict the type and design of the structure and may cause issues getting planning approval. ☐ Although there may be some constraints, consider any opportunities for combining local cultural heritage aspects into the habitat design or enhancing the setting of any feature through appropriate design that helps illustrate the landscape or land use of the period when the feature was at its peak (consult with heritage specialists).

Consideration	Guidance Notes
Land quality and ground conditions	☐ If the work will require breaking ground on potentially contaminated land, this could introduce a new source-pathway-receptor linkage. ☐ Soil handling should be undertaken with regard to the Defra Construction Code of Practice for the Sustainable Use of Soils on Construction Sites (Defra, 2009) which requires the development of a Soil Management Plan. ☐ If land required for ecological restoration affects Local Geological Sites (or Regionally Important Geological Sites), these should be integrated into the design. ☐ If land designated for ecological restoration is identified as containing mineral resources or at risk of mineral sterilisation (when mineral resources become inaccessible or unusable), it may be necessary to either extract the mineral beforehand, retain it for future use, or demonstrate that the restoration works will not impact the mineral resource. ☐ The geology of the site should be considered in the baseline survey as this will affect soils, drainage, and topography. The design may also need to consider the permeability of the geology or surface sediments, for example to know if ponds will hold water naturally or require lining. ☐ Check for any planned construction adjacent to the site which may affect groundwater, leading to reduced water levels in groundwater-fed ponds. ☐ Check for any pumped wells or water abstraction points on adjoining land as their zone of influence may extend into the site. This may involve seeking advice from a water resources specialist.
Landscape and visual considerations	The design should integrate with and enhance the existing landscape, but the project should consider if there are limitations due to location within a protected landscape, such as a National Landscape or National Park, and potential visual impacts to receptors such as: ☐ changes to the external appearance of buildings and / or structures. ☐ significant earthworks. ☐ planting which could act as screening vegetation.
Water resources and flood risk	☐ If any proposed works directly affect surface watercourses (e.g. dams, weirs, watercourse diversions, culverts) or are in a flood zone, they may require a flood risk assessment or Water Framework Directive assessment. Climate change resilience is important here. ☐ Other questions to consider for potential water resources constraints include: ○ Are there any works within areas susceptible to groundwater flooding? ○ Are ponds likely to fill from groundwater (in which case a groundwater abstraction licence may be required)? ○ Are there any changes in subsurface works within aquifers which may affect ground-water? ○ Are there any new pollution sources that may affect groundwater or surface water? ○ Are there any new abstractions or discharges? ○ Does the habitat need drainage, and will this affect the existing surface water regime (such as increased flow, change in chemistry)? ○ If the habitats being designed rely on a water source, is a hydrological model available to identify sources / amount of water, e.g. natural run-off, groundwater fed, outlets from watercourses? Input from a geomorphologist may be required. ○ Is there a risk of silt discharges to watercourses during, or on completion, of the works? ○ Will the project affect surface water regime that is draining adjacent land? ○ Will the works result in reduced / increased flow to lands downstream? ☐ There may be opportunities to combine ecological restoration with flood management, for example see Woodlands for Water project (Nisbet et al., 2011). ☐ Proposed wetlands dug through land drains may quickly empty of water through the drainage system and may also cause interruption of the normal land drainage (especially if the pond is lined) which could lead to flooding of the land. Land drains are not often shown on plans so it is necessary to discuss with landowners whether land drains are present.

Consideration	Guidance Notes
Other construction work	☐ Is the project part of a wider construction project, or is it stand-alone? The ecological restoration works may be constrained by the construction and having to fit in with a contractor's programme of works, particularly with respect to seasons and delays due to weather, so make sure the construction and site supervisors are aware of critical constraints and timing for the ecological restoration work. ☐ Clarify the situation in relation to overall responsibility for the area regarding health and safety management, security, and insurance.

Planning for Detailed Design and Implementation

Consideration	Guidance Notes
Habitat strategy	The project plan should consider the options for ecological restoration methods and interventions that will be used (individually or in combination) and adhere to CIEEM's good practice principles for ecological restoration: ☐ **Natural colonisation and succession:** As an alternative to planting or seeding, this may give more natural and biodiverse outcomes and can be cheaper to deliver, although habitat may take longer to achieve objectives. ☐ **Seeding**: Commercially available seeds may have limited range of species and provenance can be uncertain. They may also be expensive and their supply cannot be relied upon. Locally collected seed, or techniques such as brush seed harvesting and brash cutting can be time-consuming but give better results. Hay spreading is a good technique in some instances (e.g. for grassland habitats). For inaccessible areas, hydroseeding (hydraulic seeding) may be a good technique but requires specialist expertise and equipment. ☐ **Planting**: Propagating species in a nursery for planting is particularly used for tree and shrub species, though increasingly used for herbaceous species, where seed introduction can have variable results. As for seeding, provenance of commercially available plants can be problematic. ☐ **Harvesting seed bank**: Some habitats, such as lowland heathland, respond well to the introduction of soil containing the seed bank as well as plant material from a donor site. There are also advantages to the preservation of genetic material from the donor location. However, this method can have a major effect on the donor site. ☐ **Translocation:** This involves wholesale removal of the soil, seedbank, plant community and other features and transfer to another location. It needs special equipment and expertise and is not appropriate for all habitat types. Consider whether to match the habitat objectives to the existing site conditions, or to modify the site (soils, hydrology, etc.) to suit the desired habitat objectives. Usually, a project will need a combination of the two. If you are restoring a habitat, consider the extent of degradation and whether: ☐ management interventions or adjustments will be sufficient; ☐ physical interventions are necessary, such as changing soil fertility or hydrology; ☐ biological interventions are needed, such as introducing plant and / or animal species.
Site preparation	☐ Consider methods and timing. ☐ Timing will depend on strategies such as allowing natural colonisation (any time), seeding (usually spring or autumn), or planting (November to March inclusive, weather dependent). ☐ Consider soil fertility or characteristics and whether there is a need to adjust. For example, if the land is ex-arable then creating habitats requiring lower fertility may need additional preparations such as topsoil strip, inversion, additives or nutrient reduction through cropping. ☐ May also need the removal of 'non-target' species such as invasives / non-natives. The spread of any invasive species throughout the site or off the site needs to be considered and a biosecurity plan may be required.
Site infrastructure	☐ If grazing is going to be a management method, the design should include infrastructure for livestock (such as gates, grids, troughs, and penning areas). If the site will be publicly accessible, consider any designs for accessibility and health and safety. ☐ If the site is likely to be browsed by deer or rabbits, appropriate protective fencing may be required.

Consideration	Guidance Notes
Resources	Budget: Budget should cover detailed and specialist design, planning / permitting, consultations and implementation (planting, maintenance, aftercare, management, supervision) and any required monitoring, together with the long-term management. The amount of financial and human resources available may well affect the design. Consider any risks and contingencies needed within the funding, such as planting failures that may need replacing. A project risk is anything that could affect the cost and programme, the reputation of the project or participants, or invalidate insurance. Skills and practical knowledge: Someone must take ownership of the project and be responsible for briefing other project participants. Identify technical specialists at the earliest stage of the project so that they can help guide the scope of the work (and can confirm availability). Confirm what competencies, such as CIEEM competencies, will be needed for different project roles. Workforce: Think about what human resource the project will need and how this will be delivered e.g. though direct labour, contractor, or volunteers. Using sub-consultants will need procurement and supplier set-up which may include checking their competencies, insurances, and references. A sub-contract may be needed. There is guidance available for involving volunteers on a project: ☐ Involving volunteers in your organisation (UK Government, 2022) ☐ Involving Volunteers - practical and step by step guidance (NCVO, 2024) ☐ A complete guide to volunteer management (Jones, 2025) Ensure all statutory competencies are met, such as health and safety appointments to manage construction health and safety. Ensure all those using machinery and equipment have the required training and qualifications. Tools and machinery: Think about what specialist equipment is needed for the job and whether the budget allows for this and consider access needed, e.g. if translocation of mature trees is recommended this may require very large and wide machinery, which can lead to high costs. Consider how this equipment will be transported to site and the access routes available, and whether specialist training or permitting is needed to operate the machinery. Time: Have a programme including, as a minimum, start dates, end date and milestones. Make sure the programme includes all work stages, including management, establishment, and seasonal constraints. Note that it can take many years for habitats to establish and meet their objectives.
Technical specifications	☐ Regardless of who is carrying out the work, instructions to staff need to be clear and unambiguous. Most larger landscaping schemes will need a specification created for ground preparation, planting and seeding, and aftercare. Specifications give site teams a detailed overview of the project work, required performance, and product selections (Swaddle, 2021). An example of a contract specification document for Landscape and Ecology can be found within the Manual of Contract Documents for Highway Works (Standards for Highways, 2008). ☐ Effective communication of what the project needs to achieve may require three elements: ○ Drawings and plans – these can be site plans, detailed CAD drawings or sketches, with notes and dimensions which illustrate where things should happen or the final shape of the works. ○ Specification – description of what the project needs implementing on the ground, which can be either performance based (what the outcome should be) or method based, describing the methods, techniques, and materials to be used. The specification should specify where temporary works, such as compounds, need to be removed at the end of the project. ○ Schedule of quantities – listing deliverables with either fixed or estimated quantities; a contractor may use this to price the work and the payments may be related to final measurements. ☐ Whilst these probably apply mainly to contracted work, they may also be useful for direct labour and volunteers so there is no ambiguity of what they need to implement. Use of volunteers needs careful consideration in terms of experience, training and health and safety. Note: if the work involves design, and meets certain thresholds, it will need to adhere to The Construction (Design and Management) Regulations 2015 (UK) or the Safety, Health and Welfare at Work (Construction) Regulations 2013 (S.I. No. 291 of 2013) (Ireland).

Consideration	Guidance Notes
Checks, reviews, and audits	☐ Consider how and who will check and review designs and specifications and how works will be audited to make sure they are delivered correctly. Smaller projects with dedicated staff may be able to have a full-time site presence. Others may need periodic visits from a suitable Clerk of Works. ☐ Depending on the terms of contract, the plan should consider how to deal with non-performance issues such as a defect, e.g. a contractor does not install the specified tree guards leading to exposure and failure of a high percentage of planted trees. A defect is a part of the works which is not as stated in the scope or not in accordance with applicable law or the accepted design. Most construction contracts provide for a 'defects liability period', which may run from 12 to 24 months after completion. Typically, the contractor will be responsible for any defects which arise during this period. In New Engineering Contracts (NECs) the term 'Defects Liability Period' is not used. Instead, the contract defines a 'Defects Date' which is typically 12 months after the completion of the whole works (based on the NEC4 Engineering and Construction Contract (ECC) (NEC, 2017)). NEC contracts originate from the UK, but are increasingly used in international contexts. In Ireland, when the NEC4 ECC is adopted, the concept of a 'Defects Date' applies in place of the traditional 'Defects Liability Period', provided it is appropriately incorporated into the contract and aligned with Irish legal requirements. ☐ Note that any defects liability period is not the same as an aftercare period, which may well be longer. ☐ On larger schemes or more complicated projects, consider the use of an inspection test plan (ITP). The ITP sets out the program of inspections, tests, and surveys needed for each specified work or materials of the project. Having an ITP protects the business from costly mistakes and ensures the consistency and quality of the project output. It also satisfies the requirements stated in the ISO 9001 standard in relation to control of production and service provision (Inglesis, 2024).
Contractual arrangements	☐ Professional ecologists working within multidisciplinary companies or bigger consultancies will be covered by the standard service agreements of those firms. For professional ecologists working alone or in small companies, CIEEM has produced a Model Service Agreement (CIEEM, 2020d). ☐ Contract Advice Notes (Part 1) Professional Guidance Series PGS10 (CIEEM, 2020b) sets out the broad legal obligations and duties that derive from a contract agreement. ☐ Contract Advice Notes (Part 2) Administration of Works Contracts Professional Guidance Series PGS11 (CIEEM, 2020c) sets out the elements of managing a contract that a professional ecologist should be aware of and makes recommendations for ensuring that the quality of work is maintained until contract completion.

Planning for Aftercare, Management and Monitoring

Considerations	Guidance Notes
Habitat management and monitoring plan	☐ Aftercare should be captured within a maintenance, management, and monitoring plan. The Conservation Management System Consortiums Management Planning Guide (Alexander, 2005) is a useful reference. ☐ Projects linked to planning may have separate reporting and monitoring requirements linked to planning conditions. ☐ Guidance on what to include in a habitat management and monitoring plan for BNG in England, including a template, is available from Natural England on the Gov.UK website (UK Government, 2023). Natural England's Habitat Management and Monitoring Plan Template (HMMPT) can be used outside of formal BNG requirements as long as it is adapted appropriately to the context of the project and relevant planning or regulatory frameworks. ☐ The initial maintenance period for most habitats is 3-5 years, during which time more intensive input such as watering, mulching and replacement of plant failures may be required. The long-term management period will depend on the habitat, its objectives and the responsibilities, but may include on-going weed control. ☐ Consider efficient ways of habitat management. For example, it may be more efficient to enter conservation grazing agreements with a local tenant farmer or landowner for grassland management, than to use machines. ☐ The plan should consider the logistics of long-term management and monitoring such as future access, parking, and locations where monitoring equipment may be installed. ☐ The management and monitoring plan should be cognisant of adaptive management and on-going engagement with stakeholders.
Safeguarding	☐ If you are not the landowner or the land will be passed to a third-party, you may require legal agreements, environmental covenants, long-term lease agreements, restrictions on deed of property, or easements for access to future management and monitoring to ensure the habitat meets its objectives. ☐ It is important to be clear about long-term responsibilities and who should be doing what throughout the project's life.
Monitoring and reporting	☐ The monitoring plan should be tailored to the objectives and identify specific parameters and criteria, both biotic and abiotic, that are critical to success. It should also be linked to pre-defined trigger levels which, if breached, will lead to some form of action or intervention. ☐ Be mindful of who the results will be reported to, and their needs and resources. ☐ Any feedback from maintenance inspections and monitoring needs to be fed into updates of maintenance, management, and monitoring plan at regular intervals. ☐ Monitoring Report Templates (MRTs) for BNG in England are available from Natural England on the Gov.UK website and can be adapted for use outside of BNG. ☐ See Overarching Topic - Monitoring.

Acknowledgements

The authors wish to thank Dr. Timothy Graham for input to the Collaboration, Engagement and Partnership section, and to Neil Beamsley for comments on a draft of this document.

Biographies

Kat Stanhope

Kat Stanhope CEnv FCIEEM has over 25 years of experience of environmental consultancy in relation to biodiversity issues and environmental management. This has involved the project management, design, implementation and management of habitat enhancement, creation, and translocation on large and nationally significant infrastructure projects including in the water, road and rail industries. Kat is currently Strategic Biodiversity Net Gain Manager at National Grid, leading the development of its strategic vision and approach to BNG to enable transformational change as part of the Great Grid Upgrade. Kat was previously seconded to HS2 for eight years including as the Ecology Lead for Phase One (London to West Midlands). Kat is a member of the CIEEM Ecological Restoration Special Interest Group.

Nick Coppin

Nick Coppin MCIEEM(rtd) is an ecologist and environmental scientist with 40 years of international experience. He has worked in ecological restoration, impact assessment, and environmental management across mining, waste, and civil engineering sectors. With a special interest in bioengineering, Nick began his career in mine reclamation in Cornwall and later worked with Tony Bradshaw at Liverpool University. He joined Wardell Armstrong in 1987, becoming Managing Director of its international mining consultancy in 2004. Since retiring in 2013, Nick has worked as a freelance consultant, focusing on ecological restoration and environmental growth. Nick is a founder member and the first convenor of the CIEEM Ecological Restoration Special Interest Group.

Mike Gibbs

Mike Gibbs CEcol MCIEEM is a botanist and ecological consultant with over 20 years experience in vegetation survey and habitat creation, enhancement and restoration. His expertise includes providing assessments and design input for construction and development projects in order to maximise the benefits to biodiversity and ecosystem services. He is an Associate Director at AtkinsRéalis, having formerly worked at Thomson Ecology, Surrey Wildlife Trust, and as a self-employed consultant. Early in his career, he worked with a habitat management contractor, particularly on lowland heathlands. He is a committee member for the CIEEM Ecological Restoration Special Interest Group.

Publication of this guidance is kindly supported by National Grid

The publication of this guidance, which is kindly supported by National Grid, provides an important source of information to those professions who will lead the legacy of nature restoration.

National Grid Group's operations in the UK include National Grid Electricity Transmission (NGET), which owns the high voltage transmission system in England and Wales; National Grid Electricity Distribution (NGED), which owns and operated electricity distribution networks in the Midlands, the South West and Wales; and National Grid Ventures (NGV), which owns and operates energy businesses in competitive markets, including sub-sea electricity interconnectors.

National Grid are embarking on the largest overhaul of the electricity grid in generations, playing a key role in supporting the transformation of the energy system to achieve a cleaner and more affordable energy future.

As part of this transformation, National Grid's proposed approach to Biodiversity Net Gain also presents an opportunity to deliver a positive change for nature, the environment, and communities - maximising the benefits and value from habitat creation, restoration, and enhancement.

nationalgrid

References

Adams, W. M., Hodge, I. D., Macgregor, N. A., & Sandbrook, L. C. (2016). Creating restoration landscapes: Partnerships in large-scale conservation in the UK. *Ecology and Society*, 21(3), art1. https://doi.org/10.5751/ES-08498-210301

Alexander, M. (2005). *The CMS guide to management planning.* CMS Consortium. https://core.ac.uk/download/pdf/48025692.pdf

Anderson, L. (2023, October 27). *How To Create An Effective Stakeholder Communication Plan*. Forbes. https://www.forbes.com/sites/forbesagencycouncil/2023/10/27/how-to-create-an-effective-stakeholder-communication-plan/?sh=29b-0597c47ed

Anderson, P. (Ed.). (2003). *Habitat translocation: A best practice guide. Buch.* CIRIA.

Association for Project Management. (2025). *APM Body of Knowledge.* Association for Project Management. https://www.apm.org.uk/resources/what-is-project-management/

Best, M., Irvine, R., Bako, L., Citegetse, G., Field, A., Roe, D., Rose, D. R., & Spencer, J. (2022). Identifying Stakeholders and Collaborating with Communities. In W. J. Sutherland (Ed.), *Transforming Conservation* (1st ed., pp. 179–196). Open Book Publishers. https://doi.org/10.11647/OBP.0321.06

CIEEM. (2020a). *Access to Land. Professional Guidance Series PGS24.* Chartered Institute of Ecology and Environmental Management. https://cieem.net/wp-content/uploads/2021/10/Access_to_Land__2020.pdf

CIEEM. (2020b). *Contract Advice Notes (Part 1) Professional Guidance Series PGS10*. Chartered Institute of Ecology and Environmental Management. https://cieem.net/resource/professional-guidance-series-contract-advice-notes-part-1/

CIEEM. (2020c). *Contract Advice Notes (Part 2) Administration of Works Contracts Professional Guidance Series PGS11*. Chartered Institute of Ecology and Environmental Management. https://cieem.net/resource/professional-guidance-series-contract-advice-notes-part-2/

CIEEM. (2020d). *Model Service Agreements. Professional Guidance Series PGS6*. Chartered Institute of Ecology and Environmental Management. https://cieem.net/wp-content/uploads/2021/10/Model_Service_Agreements_2020.pdf

Defra. (2009). *Construction code of practice for the sustainable use of soils on construction sites PB13298*. Department for Environment, Food and Rural Affairs. https://www.gov.uk/government/publications/code-of-practice-for-the-sustainable-use-of-soils-on-construction-sites

Eigenbrod, F., Adams, W., Hill, C., Macgregor, N., Osborne, P., Clarke, D., Sandbrook, L., Hodge, I., Steyl, I., Thompson, A., Dijk, N. V., & Watmough, G. (2016). *A review of large-scale conservation in England, Scotland and Wales (JP019).* Natural England. https://publications.naturalengland.org.uk/publication/5762035722223616

Gann, G. D., McDonald, T., Walder, B., Aronson, J., Nelson, C. R., Jonson, J., Hallett, J. G., Eisenberg, C., Guariguata, M. R., Liu, J., Hua, F., Echeverría, C., Gonzales, E., Shaw, N., Decleer, K., & Dixon, K. W. (2019). International principles and standards for the practice of ecological restoration. Second edition. *Restoration Ecology, 27*(S1). https://doi.org/10.1111/rec.13035

Gilbert, O. L., & Anderson, P. (1998). *Habitat creation and repair (*Reprinted). Oxford Univ. Press.

Inglesis, P. (2024, December 18). *How to Write an ITP (Inspection and Test Plan) in Construction*. Quality In Construction. https://www.qualityinconstruction.com/how-to-writehow-to-write-an-itp

Jones, I. M. (2025). *A complete guide to volunteer management.* Charity Digital. https://charitydigital.org.uk/topics/topics/a-complete-guide-to-volunteer-management-systems-9021

Macgregor, N., Adams, W., Hill, C., Eigenbrod, F., & Osborne, P. (2012). Large-scale conservation in Great Britain: Taking stock. *ECOS, 33*(3/4), 13–23.

Manning, A. D., Lindenmayer, D. B., & Fischer, J. (2006). Stretch Goals and Backcasting: Approaches for Overcoming Barriers to Large-Scale Ecological Restoration. *Restoration Ecology, 14*(4), 487–492. https://doi.org/10.1111/j.1526-100X.2006.00159.x

NCVO. (2024). *Involving Volunteers—Practical and step by step guidance.* The National Council for Voluntary Organisations. https://www.ncvo.org.uk/help-and-guidance/involving-volunteers/

NEC. (2017). *NEC4 Engineering and Construction Contract (ECC)* (Fourth edition June). NEC. https://www.neccontract.com/products/contracts/nec4/engineering-and-construction-contract/ecc?srsltid=AfmBOorrSh7khh_TS7jrx_IdZhSjVcKuY4jIOHx-qvDKQEBAqMl_pP6hb

Nelson, C. R., Hallett, J. G., Romero Montoya, A. E., Andrade, E., Besacier, C., Boerger, V., Bouazza, K., Bouazza, K., Chazdon, R., Cohen Shachma, E., Danano, E., Diederichsen, A., Fernandez, Y., Gann, G. D., Gonzales, E. K., Gruca, M., Gutierrez, V., Hancock, B., Innecken, P., … Wang, Z. (2024). *Standards of practice to guide ecosystem restoration*. FAO; SER; IUCN; https://doi.org/10.4060/cc9106en

Nisbet, T., Silgram, M., Shah, N., Morrow, K., & Broadmeadow, S. (2011). *Woodland for Water: Woodland measures for meeting Water Framework Directive objectives. Summary of final report from Forest Research to the Environment Agency and Forestry Commission (England)* [Summary report]. Environment Agency. https://www.gov.uk/government/publications/woodland-for-water

Parker, D. M. (1995). *Habitat creation: A critical guide*. English Nature.

Rieger, J., Stanley, J., & Traynor, R. (2014). *Project Planning and Management for Ecological Restoration.* Island Press/Center for Resource Economics. https://doi.org/10.5822/978-1-61091-566-3

Standards for Highways. (2008). *Manual of Contract Documents for Highway Works (MCHW). Series 3000—Landscape and Ecology.* Standards for Highways. https://www.standardsforhighways.co.uk/search/50e8c0e2-638d-493f-b929-7dd4733df88a

Swaddle, P. (2021, October 5). *Construction specifications: Everything you need to know.* NBS. https://www.thenbs.com/knowledge/construction-specifications-everything-you-need-to-know

UK Government. (2022). *Involving volunteers in your organisation. Gov.UK*. https://www.gov.uk/guidance/involving-volunteers-in-your-organisation

UK Government. (2023). *Creating a habitat management and monitoring plan for BNG*. Gov.UK. https://www.gov.uk/guidance/creating-a-habitat-management-and-monitoring-plan-for-biodiversity-net-gain

Underwood, N., Kaczor, K., Roberts, V., Tooze, G., Rayment, M., Smith, M., Fry, C., Swindlehurst, S., Armstrong, S., & James, N. (2022). *Mainstreaming Large Scale Nature Restoration*. (Nature Scot Research Report No. 1271). Nature Scot. https://www.nature.scot/doc/naturescot-research-report-1271-case-studies-large-scale-nature-restoration-and-rewilding

WildTeam. (2021). *Project Management for Wildlife Conservation v4.* WildTeam. https://www.wildteam.org.uk/conservation-best-practice-project-management

Raising the profile of professional ecological and environmental management and promoting the highest standards of practice for the benefit of nature and society.

CIEEM
Grosvenor Court
Ampfield Hill, Ampfield
Romsey, SO51 9BD

© 2025 Chartered Institute of Ecology and Environmental Management | Company Number: RC000861 | Registered Charity (England and Wales): 1189915.

Design by Buckley Creative