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Guidelines on the Implementation of Landscape Treatments on National Road Schemes in Ireland



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Disclaimer

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Health and Safety

Those involved in the implementation of landscape treatments are obliged to comply with all relevant health and safety requirements and nothing in this document should be read as overriding or detracting from these obligations. Attention is drawn to the relevant sections in the *2010 Project Management Guidelines* (National Roads Authority, 2010) dealing with health and safety and, in particular, those sections dealing with Health and Safety Risk Assessments.

Chapter 1 Introduction

In 2006, the National Roads Authority ('NRA') published *A Guide to Landscape Treatments for National Road Schemes in Ireland* (National Roads Authority, 2006) (hereinafter called the '*Guide*') (see Figure 1). This policy document outlines the philosophy adopted by the NRA in relation to the design of Irish roadside landscapes; in particular, it espouses the use of an 'ecological landscape design' approach to landscape design and the establishment of landscape treatments on national road schemes.

Whilst the *Guide* illustrates in detail the NRA's philosophy with regard to landscape treatments, the NRA considers it appropriate to supplement the *Guide* with a document outlining some of the practical steps required to implement the NRA's philosophy on landscape design and landscaping works in the various phases of national road project management (see Figure 2).

The relevant project management phases, as per the *2010 Project Management Guidelines* (National Roads Authority, 2010) are: Phase 3 Design; Phase 4 EIA/EAR & The Statutory Processes; Phase 5 Advance Works & Construction Documents Preparation, Tender & Award; Phase 6 Construction & Implementation; and, Phase 7 Handover, Review & Closeout.

The purpose of the *Guidelines on the Implementation of Landscape Treatments on National Road Schemes in Ireland* is not to summarise the *Guide*. These guidelines, instead, focus on the roles and responsibilities of the various relevant parties

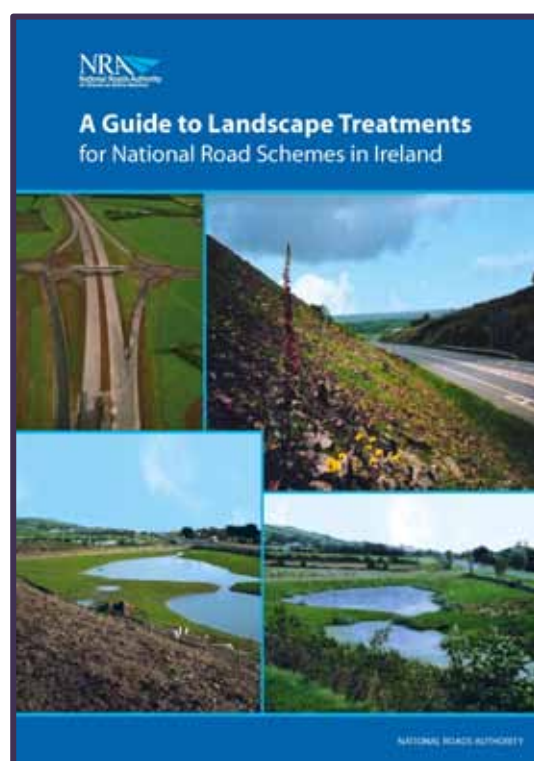


Figure 1: *A Guide to Landscape Treatments for National Road Schemes in Ireland*

involved during the project management phases, including the: Environmental Impact Assessment ('EIA') landscape and visual expert; EIA ecological expert; Employers' or Authority's Representative; Contractor or PPP Company; Designer; and, those involved in the execution of the landscape treatments, e.g. landscape sub-contractor and nursery/supplier.

As landscape treatments interact with mitigation measures for the natural environment, noise, cultural heritage, hydrology, geology and soils, drainage, lighting and head light glare, this document also highlights the need to liaise with other experts or specialists involved in the impact assessment and design process in the preparation of the EIS Landscape Mitigation Masterplan for national road schemes.

As indicated above, this document complements and should be read in conjunction with the *Guide*.

Habitat classification in this document follows *A Guide to Habitats in Ireland* (Fossitt, 2000). Botanical names follow *New Flora of the British Isles* (Stace, 1997) for vascular plants.

It is worth noting at this point that the terminology used in this document is in the context of a design and build (D&B) contract type. However, much of the guidance can also be applied, *mutatis mutandis*, to Public Private Partnership (PPP) contract types.

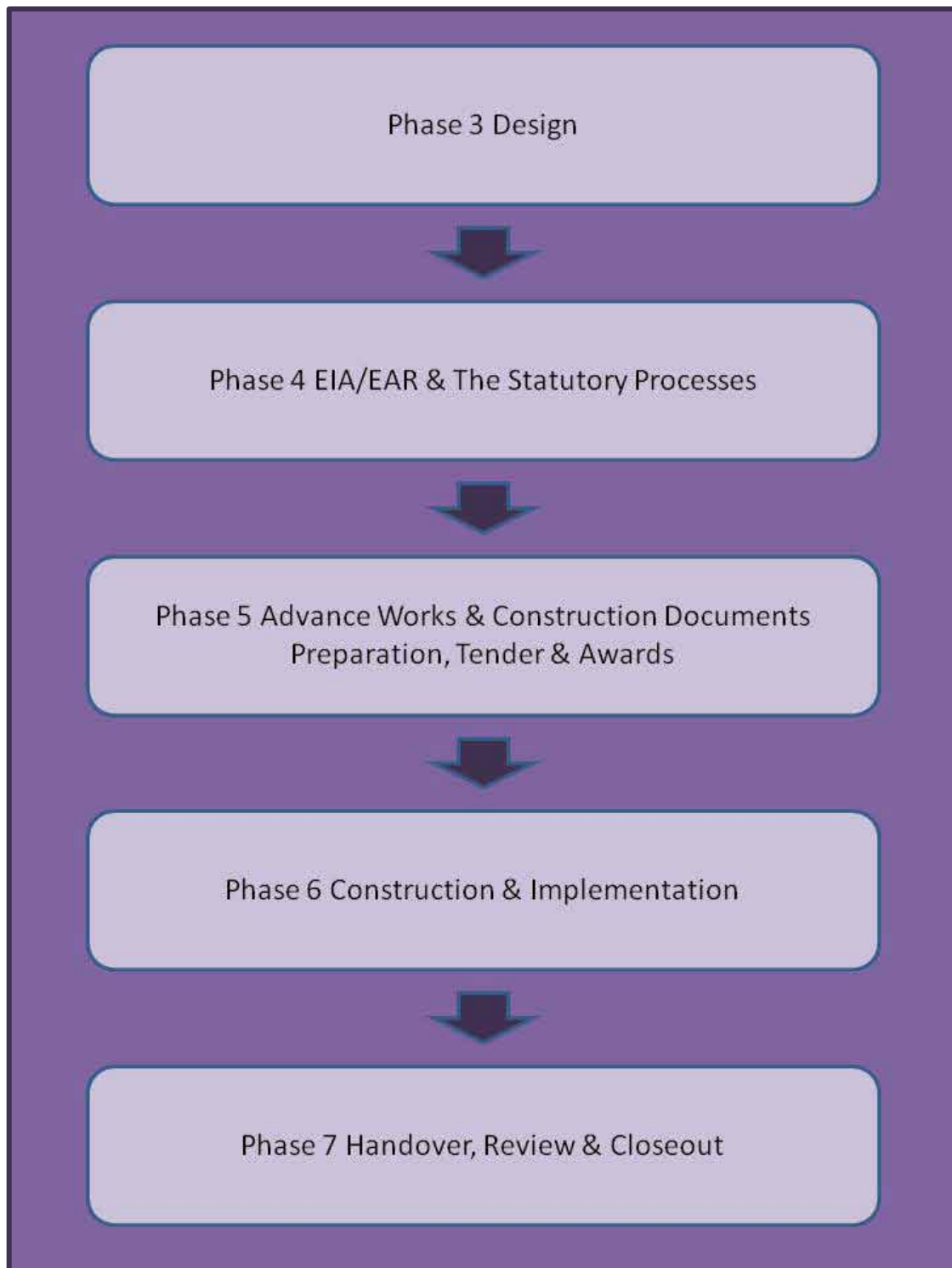


Figure 2: Relevant Project Management Phases

Chapter 2 Design (Phase 3)

Having regard to the *2010 Project Management Guidelines* (National Roads Authority, 2010) (see pages 150-1), the design phase should begin with a review of the landscape and visual impact of the Preferred Route Corridor. In addition, it is anticipated that for many schemes the input of a landscape and visual and an ecological expert will be required at this stage.

Chapter 3 EIA/EAR & The Statutory Processes (Phase 4)

3.1 Landscape and visual impact assessment

Phase 4 EIA/EAR & The Statutory Process requires the preparation of a landscape & visual impact assessment of the Design by the EIA landscape and visual expert. Following the assessment of the impacts, the focus is on the identification and recommendation of mitigations measures, *i.e.* landscape treatments for those impacts on the landscape and visual amenities which are considered to be significant. These studies inform the preparation of the landscape section of the Environmental Impact Statement (EIS).

In addition to the *Guide*, the EIA landscape and visual expert should refer to, *inter alia*: *Guidelines of Landscape and Visual Impact Assessment* (The Landscape Institute/Institute of Environmental Management & Assessment, 2002); *Guidelines on the Information to be contained in Environmental Impact Statements* (Environmental Protection Agency, 2002); and, *Environmental Impact Assessment of National Road Schemes – A Practical Guide* (National Roads Authority, 2008).

3.2 Mitigation of impacts on the landscape & visual amenities

In accordance with the *Guide*, details of the baseline ecology data of the various habitats and supporting soils within the zone of influence of the road scheme should be examined by the EIA landscape & visual expert in conjunction with the EIA ecological, soils & geology and agronomy experts. Having regard to the *Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes* (National Roads Authority, 2008) and *Guidelines for Assessment of Ecological Impacts of National Road Schemes* (National Roads Authority, 2009), the habitat types found within the zone of influence of the proposed national road development project should be categorised in accordance with *A Guide to Habitats in Ireland* (Fossitt, 2000) down to Level 3.

This baseline data in conjunction with Chapter 6 of the *Guide* will provide the EIA landscape and visual expert with the necessary information to facilitate the identification of landscape treatments and appropriate native species¹ and species mixes for use along the proposed national road development.

In line with the principles of sustainable development, and as detailed in the *Guide*, the EIA landscape and visual expert should ensure that the selection of landscape treatments is compatible with the existing soil geographic factors (including soil type, soil pH and nutrient content) available within the scheme, or the soil should be reasonably capable of being altered or managed so as to be compatible. In relation to woodland treatments further additional information can be found in the *Native Woodland Scheme Manual* (Forest Service, 2008) and *Advice Notes 4, 5 & 6* (Woodlands of Ireland, 2008a, 2008b, 2010). Scrub/transitional woodland (WS1) treatments are further categorised into, for example, Willow and Blackthorn scrub in the *Native Woodland Scheme Manual* (Forest Service, 2008). The selection of appropriate soils and treatments is necessary to ensure the establishment of sustainable treatments which require minimal natural and physical resource inputs in their implementation and maintenance in accordance with the ecological landscape design approach (see the *Guide*).

For the selection of suitable landscape treatments for the various roadside components refer to Sections 3.1.2-3.1.4 of the *Guide*.

For the most part hedgerow and woodland landscape treatments established through natural recolonisation or the direct planting of certified Irish indigenous nursery grown planting stock as 'whips or transplants'² will be the primary means of mitigating significant impacts on the landscape and visual amenities (see the *Guide*) which may arise as a result of national road scheme development.

¹ It should be noted that Section 2.4.2 of the *Guide* states that '[i]n particular situations, treatments that make limited use of non-native or introduced species such as Beech (*Fagus sylvatica*), Chestnut (*Aesculus hippocastanum*) and Lime (*Tilia* spp.) may be acceptable so as to retain local landscape character.'

² These terms are utilised to refer to unbranched young tree or shrub seedlings of approximately 300 to 1200mm in height and 2-3 years old and which are suitable for planting out.

These landscape treatments can be utilised to 'fit' the road into the landscape and/or to provide 'environmental barriers' which aim to mitigate significant impacts relating to loss of visual amenities or to complement barriers which aim to reduce the impact of noise on sensitive receptors (*e.g.* residential properties) within the roadside landscape. For example, environmental barriers and landscape treatments can be utilised to screen visually intrusive roadside components or structures, thus reducing the potential for loss of 'naturalness' (see Figure 3) or scenic landscape aesthetics which may be associated with the construction of a new road scheme.

In order to mitigate significant impacts on landscape character and structure, the EIA landscape and visual expert should focus on the landscape scale and select landscape treatments which can retain or restore regional identity, *i.e.* a 'sense of place'. Treatments can also be selected which will retain views, *i.e.* vistas or panoramas to areas of outstanding scenic beauty or locally distinctive features as identified in the architectural or archaeological sections of the EIS. In contrast, landscape treatments can also be utilised to screen off views to such elements where it has been identified that a proposed national road development may have a significant impact on landscape quality through the opening up of views to such elements, *e.g.* in areas of fill and/or as a result of the removal of vegetation.

Once all mitigation measures for significant landscape and visual impacts have been identified, the EIA landscape and visual expert can commence with the preparation of the EIS Landscape Mitigation Masterplan (see Figure 7).

However, as landscape treatments interact with or may be required to provide mitigation or compensation for significant impacts relating to the natural environment, noise, cultural heritage, hydrology, drainage and lighting, including headlight glare, the EIA landscape and visual expert should liaise with other specialists involved in the preparation of the EIS including the EIA ecological, noise, cultural heritage, hydrology (& drainage), soils and geology, hydrogeology and lighting experts/specialists in order to incorporate any additional landscape treatments into the EIS Landscape Mitigation Masterplan.



Figure 3: Natural recolonisation of pond (Photograph courtesy of Lisa M.J. Dolan)

The following sections outline landscape treatments, which may be identified during the preparation of the EIS, to mitigate or compensate for significant impacts arising from the environmental impact assessment of the natural environment (see Section 3.3) and other impacts (see Section 3.4).

3.3 Mitigation of impacts on the natural environment

The EIA landscape and visual expert should liaise with the EIA ecological expert in relation to any measures required to mitigate or compensate for significant impacts on the natural environment including any “vegetation to be retained” (see Section 3.3.1), specialised works (see Section 3.3.2) and the restoration of connectivity (see Section 3.3.3) identified by the EIA ecological expert in the preparation of the natural environment section of the EIS.

3.3.1 Vegetation to be retained

A tabulated list of vegetation which can be retained during construction will be prepared by the EIA ecological expert and detailed in the natural environment section of the EIS. Typically such vegetation consists of mature trees, Hedgerows

(WL1) or Tree-lines (WL2) which are in close proximity and/or run parallel to the Lands Made Available (LMA) boundary/permanent fence line, or fall within larger habitat areas such as severance cut-offs and/or grade-separated junctions and whose presence will not impinge on construction works. There may also be a requirement to retain, where practically feasible, mature trees in the roadside landscape which are of cultural importance and hold symbolic value to local residents. For details on the assessment and selection of vegetation to be retained refer to the *Guidelines for the Protection and Preservation of Trees, Hedgerows and Scrub Prior to, During and Post-Construction of National Road Schemes* (National Roads Authority, 2006).

Recommendations should be made in the EIS, as appropriate, to retain this vegetation for incorporation into the EIS Landscape Mitigation Masterplan and for protective measures to be installed around the root protection area (RPA) of this vegetation prior to commencement of site clearance (see Figure 4).



Figure 4: Temporary protective fencing to protect crowns of trees (Photograph courtesy of Lisa M.J. Dolan)

3.3.2 Specialised works

'Specialised works' are works that are non-standard or extraordinary in nature and require special skills and methods in order to implement. 'Specialised works' may include: the stripping and reuse of soils containing the soil seed bank of a habitat, the translocation of native vegetation such as sods, turves or plugs; the use of live-twig cuttings; seed harvesting; and, hay-strewing (see Sections 3.2, 3.4, 5.5.3, 6.1.3-6.1.7. of the *Guide*).

The Authority envisages that 'specialised works' may be warranted in order to mitigate likely significant impacts on an ecological resource valued at a high geographical frame of reference (see Section 3.3 of *Guidelines for Assessment of Ecological Impacts of National Road Schemes* (National Roads Authority, 2009)). 'Specialised works' may also be required in order to provide 'compensatory'

measures (see Section 3.8 of *Guidelines for Assessment of Ecological Impacts of National Road Schemes* (National Roads Authority, 2009)).

Where 'specialised works' are deemed necessary, the appropriate statutory authorities (e.g. National Parks and Wildlife Service and Inland Fisheries Ireland) should be consulted at an early stage.

Due to their nature, 'specialised works' may carry the potential for additional construction costs and delays to the construction programme. As a result, their proposal should be carefully justified. In justifying the proposed 'specialised works,' the costs of carrying out the 'specialised works' and the potential for delays to the construction programme should be estimated.

Whilst it is not anticipated that a detailed plan of how the 'specialised works' will be performed should be produced at EIA stage, it is appropriate that the methodology be considered to the degree necessary to determine the extent of landtake required and the availability of appropriate soils (or other substrates) to efficiently carry out the 'specialised works' and to ensure that the works may be carried out in a timely and cost effective manner with a high degree of success. Where specific conditions such as hydrological factors are required, for example, where the establishment of compensatory wetlands are under consideration, available lands should be examined to ensure that they display suitable hydrological factors or are reasonably capable of being altered or managed so as to be compatible.

In addition, where translocation³ of native vegetation is proposed, the experts should consider whether landtake is required for a suitable storage area in the vicinity of the donor site, which can temporarily accommodate the material until it can be transferred to the intended recipient site. Consideration might also be given to how the required soil types, sods/turves, plugs, live-twigs cuttings, seeds or hay

³ The 'lifting' of particular sods/turves or plugs from a habitat (donor site) for storage or direct transfer to a recipient site for habitat compensation purposes.

will be sourced and appropriately stored (if the requirement arises) in order to keep them viable during construction stage.

Areas requiring 'specialised works' should be highlighted in the EIS Landscape Mitigation Masterplan (see Figure 7).



Figure 5: Stripping of wet grassland (GS4) soils (Photograph courtesy of Lisa M.J Dolan)

3.3.3 Retention and restoration of connectivity

As part of the design process the EIA ecological expert, in consultation with the EIA landscape and visual expert, should prepare a Map of the Ecological Network (MEN). This Map is required to identify the requirement for landscape treatments to retain or restore connectivity within the landscape (see the *Guide*, Figure 2) where significant impacts on the dispersal of a species are envisaged through loss of hedgerows and other linear vegetative elements which connect habitat patches and core habitat areas.

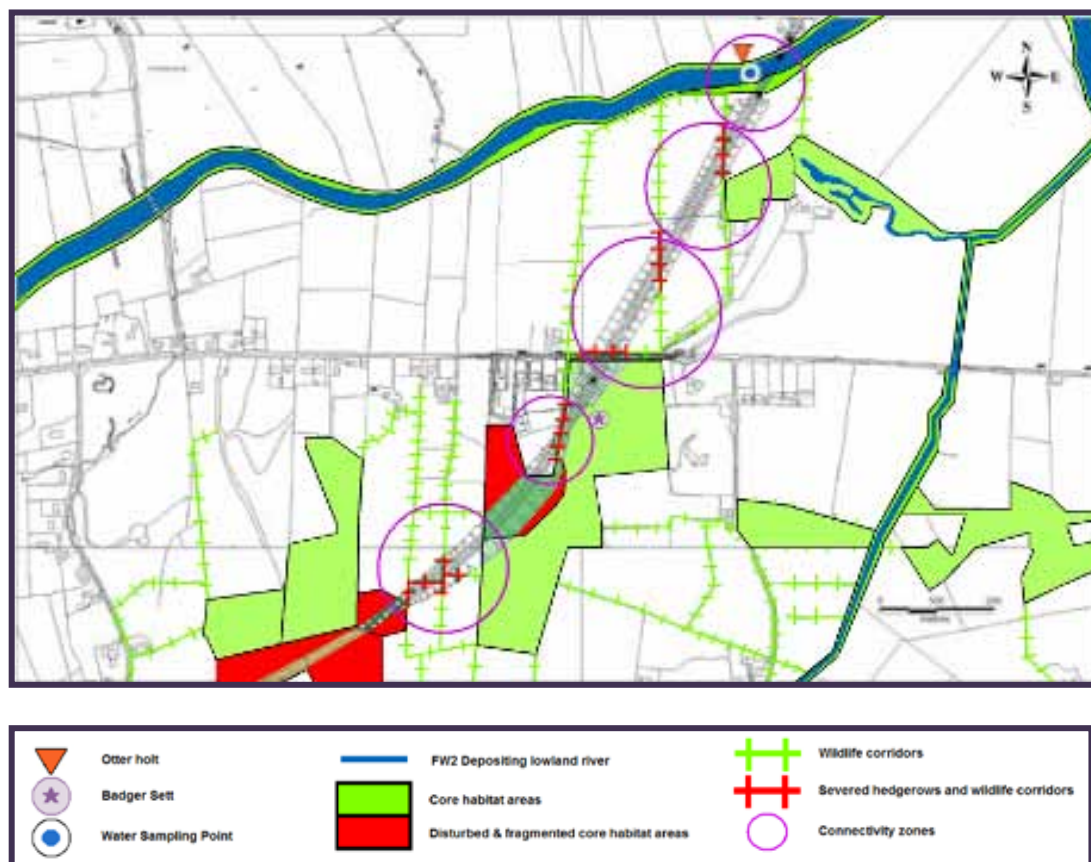


Figure 6: Map of the Ecological Network (MEN) (Source: *A Guide to Landscape Treatments for National Road Schemes in Ireland* (National Roads Authority, 2006)).

The EIA ecological expert should provide details of mitigation measures required to fill 'gaps' in linear corridors, or to reconnect the former wildlife corridors, in the landscape, in order to restore connectivity for species. Specifically in relation to mitigation measures for bat species, regard should be had to *Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes* (National Roads Authority, 2006) and *Guidelines for the Treatment of Bats during the Construction of National Road Schemes* (National Roads Authority, 2006).

Similarly, where active badger (*Meles meles*) setts or other significant mammal observations/signs are present within or adjacent to the LMA, the provision of wildlife crossing structures (such as mammal underpasses) and mammal-resistant fencing should be considered in association with hedgerows, tree-lines, linear strips of riparian woodland (or other woodland) treatments in order to provide corridors

for the safe passage of badger, red deer (*Cervus elaphus*), pine marten (*Martes martes*) and otter (*Lutra lutra*) (among other species) across a road scheme; see the *Guidelines for the Treatment of Badgers prior to the Construction of National Road Schemes* (National Roads Authority, 2006) and *Guidelines for the Treatment of Otters prior to the Construction of National Road Schemes* (National Roads Authority, 2006). Plant species utilised in these treatments can be selected to target particular wildlife species e.g. Alder (*Alnus glutinosa*) and Scots Pine (*Pinus sylvestris*) can be selected for pine marten, as they provide a food resource for this species.

Where impacts from road mortalities are envisaged for species such as barn owls (*Tyto alba*), landscape treatments can be utilised to force species to fly up and over a road scheme and thus to avoid traffic in areas of fill.

Significant areas within the road scheme which require treatments for retention or restoration of connectivity should be highlighted in the EIS Landscape Mitigation Masterplan (see Section 3.5) as 'connectivity zones' for wildlife.

Again, it is important to ensure that sufficient landtake is acquired in order to ensure that such mitigation is capable of being provided in a timely and cost effective manner with a high degree of success.

3.4 Other impacts

As lighting is also known to impact on certain species through ecological light pollution, the EIA ecological expert may also recommend the use of sensitive light standards and the strategic placement of landscape treatments and light standards in order to avoid or reduce the potential for significant impacts of lighting on species of bats or birds.

Landscape treatments, in possible combination with soil bunds, can also be utilised to provide a visual screen or to provide a barrier to disturbance or pollutants in circumstances where significant impacts on species or habitats are expected, e.g. where visual or noise disturbance, air borne pollutants (from vehicle exhaust

emissions or vehicle and pavement wear and tear) or wheel splash onto adjacent vegetation are predicted.

Landscape treatments may also be used to provide an anti-dazzle screen to reduce headlight glare.

3.5 EIS Landscape Mitigation Masterplan

Once the full range of significant impacts and landscape treatments for mitigation and compensation have been identified, the EIA landscape and visual expert should complete the landscape section of the EIS and finalise the EIS Landscape Mitigation Masterplan (see Figure 7).

The plan should highlight connectivity zones, visual screening areas, habitat compensation areas and any vegetation to be retained.

While the selection of treatments for a particular location along a road scheme is focused on recreating or restoring the former habitat types as *per* Fossitt (2000) to that site, the spatial arrangement and sequence of landscape treatments within the roadside landscape should also focus on the treatment objectives, *e.g.* in circumstances where semi-natural grasslands are present within the landscape an open habitat mosaic approach (a combination of semi-natural grassland and woodland or scrub/transitional woodland treatments) or a combination of hedgerows and grasslands treatments should be utilised along the route corridor where the treatment objective is to provide screening of the road and associated structural elements from any sensitive receptors.

The EIA landscape and visual expert may also need to consider circumstances where it may be necessary to avoid providing certain landscape treatments which may impact on a protected species, *e.g.* the provision of semi-natural grasslands can encourage barn owls through the provision of prey species. In such circumstances Scrub (WS1) should be planted and/or encouraged through natural recolonisation through the absence of mowing within the wider verge area.

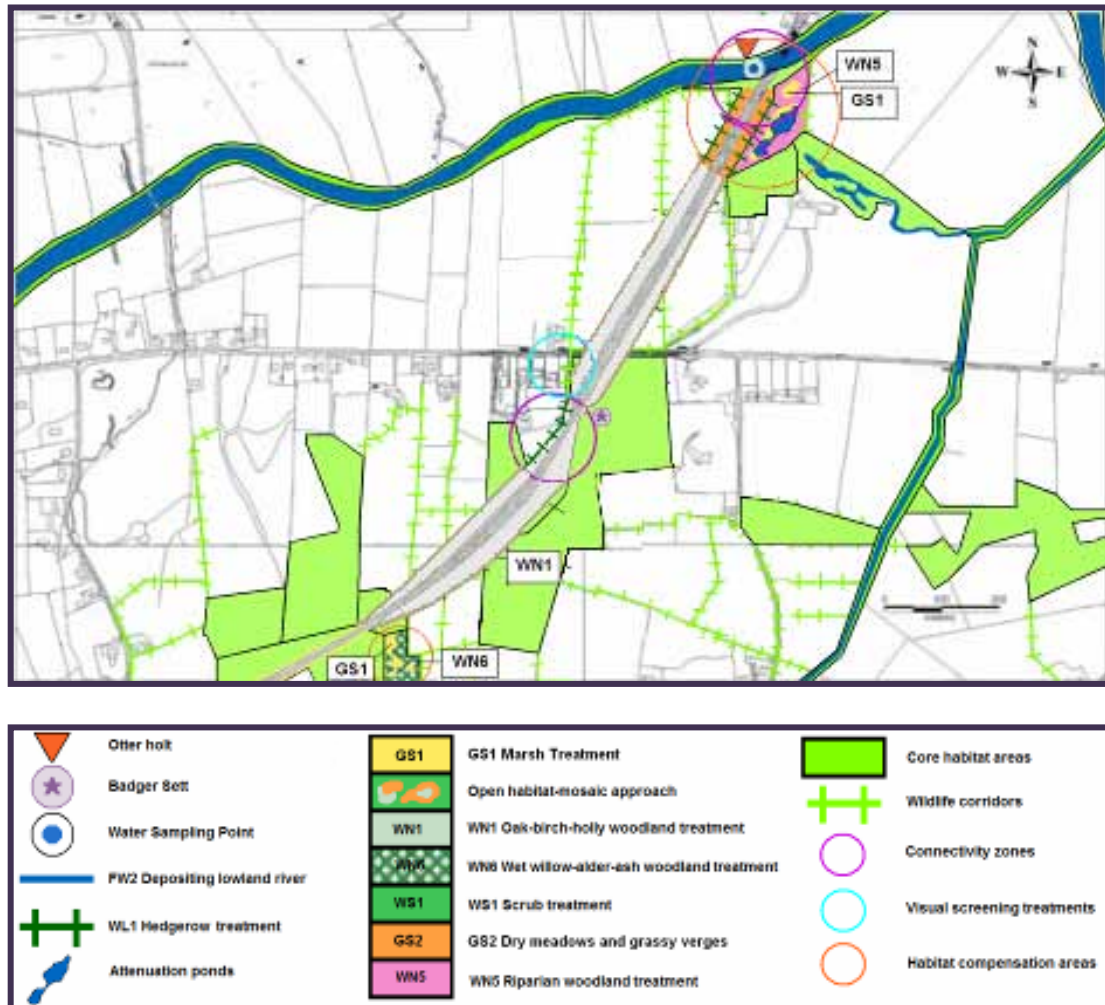


Figure 7: EIS Landscape Mitigation Masterplan (Source: Modified after *A Guide to Landscape Treatments for National Road Schemes* (National Roads Authority, 2006)).

Chapter 4 Advance Works & Construction Documents Preparation, Tender & Award (Phase 5)

4.1 Advance Works Contracts

According to the NRA's *2010 Project Management Guidelines* (National Roads Authority, 2010), it may be necessary to undertake advance works contracts to ensure that the site for the main roadworks contract is unencumbered. Advance works contracts include, but are not limited to, fencing, hedge clearances, environmental, archaeological and ground investigation contracts.

In determining the need for advance works contracts, regard should be had to the EIS, together with any conditions of approval imposed by An Bord Pleanála. For example, the EIS and conditions may require that certain landscape measures required for the restoration of connectivity be planted in advance of the main roadworks contract. Advance works contracts may also present opportunities to strip sods, turves or plugs for storage or put in place compensatory measures at an early stage.

Equally, regard should also be had to the EIS and any imposed conditions in planning advance works contracts. For example, hedge clearance contracts should be managed to ensure that the vegetation listed to be retained is not removed in the implementation of these contracts or, indeed, vegetation adjacent to particular watercourses is retained for as long as is practicable to provide a buffer to the watercourse during site clearance and construction stage.

4.2 Construction Documents Preparation

The NRA's *2010 Project Management Guidelines* (National Roads Authority, 2010) outlines the preparation of construction documents as being a key element of Phase 5. With regard to landscape treatment, the proper preparation of the construction documents is vital to ensuring that appropriate landscape treatments are established.

4.2.1 NRA's Consolidated D&B PPP Document Templates

In 2010, the NRA compiled Consolidated D&B PPP Document Templates. Guidance in relation to these templates is provided in *Consolidated D&B PPP Document Templates – Project Consultant Notes for Guidance* (National Roads Authority, 2011). In compiling the Consolidated D&B PPP Document Templates, regard was had to the philosophy outlined in the *Guide*.

4.2.1.1 Schedule 4: Construction Requirements

In the context of landscape treatments, *Volume A: Works Requirements* is a particularly important constituent part of the template documents *vis-a-vis* a D&B contract type. Schedule 4 of *Volume A: Works Requirements* deals with 'Construction Requirements.' Part 1 of *Schedule 4: Construction Requirements* outlines 'General Requirements' and Annex 1 to Part 1 outlines 'Project Specific Requirements.' Within Annex I there is a section (Section 22) devoted to Landscape Works. The section is composed of 'generic text' and of 'project specific' text.

'Generic text' is to be used for all projects, whereas 'project specific' text, as the name suggests, is specific to the individual project. The 'generic' text may, where appropriate, be enhanced by more onerous requirements in the 'project specific' text. Whilst the 'project specific' text must be inputted by the Project Consultant on a project-by-project basis, changes to the 'generic' text may only be made by the NRA of its own volition or at the request of the Project Manager.

The 'generic text' sections of Annex I of the template documents have been devised having regard to the philosophy outlined in the *Guide*. Whilst it is only the NRA that can change elements of the 'generic text,' it is recommended that the Project Consultant informs the Project Manager of any changes it considers necessary to the 'generic text' in order to improve it and further the philosophy outlined in the *Guide*. The Project Manager should then contact the NRA to examine whether changes to the 'generic text' are required.

The Project Consultant must also input the 'project specific' text. So, for example, the Project Consultant may have to populate 'Table 22.16 (Part A): Particular

Landscape Treatment Requirements – Section A’ within Section 22 and provide drawings in order to indicate the landscaping and other specific requirements within specified chainage ranges. In doing so, the Project Consultant should ensure that it has access to landscape and ecological experts who have sufficient training, experience and knowledge appropriate to the nature of the task. In inputting the ‘project specific’ text, and in recommending changes to the ‘generic text,’ the Project Consultant should review, *inter alia*: site conditions (which will include a walkover survey and a review of available soil or substrate types); safety, maintenance and management issues; the Environmental Impact Statement, including the EIS Map of the Ecological Network and EIS Landscape Mitigation Masterplan; the reasoned decision of An Bord Pleanála; the *Guide*; and, this document.

It must be stressed again that thorough construction document preparation is essential to ensuring that appropriate landscape treatments become established post-construction.

4.2.2 Information Pack

The Information Pack is a collection of information provided to tenderers associated, but not included, in the Contract.

Generally, the Information Pack contains a part entitled ‘Miscellaneous Background Information.’ This part will generally include the Environmental Impact Statement, and, consequently, will include the associated EIS Map of the Ecological Network, the EIS Landscape Mitigation Masterplan and the EIS Habitat Mapping.

Additionally, the Information Pack generally contains a part entitled ‘Design Information.’ This part should contain a Specimen Landscape Design, which has been developed by the Project Consultant preparing the Construction Documents, and which builds upon the EIS Landscape Mitigation Masterplan. Again, in preparing the Specimen Landscape Design, the Project Consultant should review, *inter alia*: site conditions (which will include a walkover survey and a review of available soil or substrate types); safety, maintenance and management issues; the EIS, including the EIS Map of the Ecological Network, the EIS Landscape Mitigation Masterplan, EIS

Habitat Mapping; the reasoned decision of An Bord Pleanála; and, the *Guide*. As the Tendering Timetable is brief, it is important that the Specimen Landscape Design is prepared to a high quality in order to sufficiently assist tenderers during the tender process.

4.3 Tender Process

The NRA's *2010 Project Management Guidelines* (National Roads Authority, 2010) outlines (at page 251) the standard tender process for a D&B contract. The standard tender process comprises of two stages: Stage 1 comprises the Invitation to Tender (Expressions of Interest) stage, which includes a pre-qualification process; and, Stage 2 comprises the Tender Process for Pre-qualified Candidates, based on the approved Tender Documents.

4.3.1 Stage 1 – Invitations to Tender - Pre-Qualification of Tenderers

The NRA's *2010 Project Management Guidelines* (National Roads Authority, 2010) states (at page 252) '*[s]tage 1 of the Tender Process requires candidates to submit a pre-qualification questionnaire based on Suitability Assessment for Works Contractor Restricted Procedure (QW1) prepared by CWWF.*' The document states further that '*[s]ome elements of the Suitability Assessment will have pass or fail criteria while other elements will be subject to a qualitative assessment.*'

In relation to landscaping, pass/fail criteria should be laid down in relation to the educational and professional qualifications, etc., of the Designer's landscape and ecological experts. These experts should have sufficient training, experience and knowledge appropriate to the nature of the task.

4.3.2 Stage 2 – Tender Process for Pre-Qualified Candidates

4.3.2.1 Consultation Meetings

The NRA's *2010 Project Management Guidelines* (National Roads Authority, 2010) states (at page 253) that a number of Consultation meetings will be held during the Tender Process between the Tenderers and the Employer. These guidelines state:

These meetings will deal with queries relating to issues such as the Works Requirements, elements of the specimen and conceptual designs, environmental undertakings, etc. and may also include a review of the Tenderer's ongoing works proposals.

The Project Consultant's landscape expert/s should review the Tenderer's ongoing works proposals relating to landscaping.

4.3.2.2 Review of Consolidated Outline Proposals

The NRA's *2010 Project Management Guidelines* (National Roads Authority, 2010) states (at page 254):

Each Tenderer will be required to develop outline proposals of their conceptual design for the Scheme, culminating in the preparation of Consolidated Outline Proposals. These proposals will be submitted within a defined period in advance of the Tender Closing Date.

The Tenderer's Consolidated Outline Proposals should include outline proposals relating to landscape. The Employer, assisted by the Project Consultant's landscape expert/s, should review these proposals and should refer any comments to the Tenderers who may in turn incorporate them into their respective tender submissions.

4.4 Tender Assessment and Award

The tenders should be assessed as *per* the award criterion laid down in the Instructions to Tenderers and the contract awarded as appropriate.

4.5 Appointment of the Employer's Representative and a Site Supervisory Team

The NRA's *2010 Project Management Guidelines* (National Roads Authority, 2010) states (at page 260):

The Project Manager shall, in conjunction with the NRA Inspector, appoint an Employer's Representative together with a Site Supervisory Team to monitor the Works on behalf of the Employer.

The *Project Management Guidelines* state further that the staff structure for the Site Supervisory Team shall be approved in advance by the NRA. When considering the staff structure for the Site Supervisory Team, care should be taken to ensure that the team has access, at the appropriate times during the construction period, to both landscape and ecological experts who have sufficient training, experience and knowledge appropriate to the nature of the task.

Chapter 5 Construction & Implementation (Phase 6)

The NRA's *2010 Project Management Guidelines* (National Roads Authority, 2010) indicates (at page 290) that Phase 6 includes the administration of the Main Construction Contract and the management of the entire Scheme.

5.1 Functions and Duties of the Employer's Representative

5.1.1 Duties of the Employer's Representative and Site Supervisory Team

The NRA's *2010 Project Management Guidelines* (National Roads Authority, 2010) states (at page 260) that the duties of the Employer's Representative will be as stated in the contract.

Whilst a detailed analysis of the scope of the Employer's Representative's duties under the contract is beyond the scope of this guidance document, attention is drawn in Sections 5.1.1.1 and 5.1.1.2 to some of the key duties in the context of landscape treatments.

The NRA's *2010 Project Management Guidelines* (National Roads Authority, 2010) states (at page 284) that the duties of the Site Supervisory Staff should include, but not be limited to:

- Providing for the monitoring of the Works to ensure that they are constructed in accordance with the Works Requirements and the Contract; and,
- Maintaining adequate site records including the preparation of Non-Conformance Reports (NCRs) as required and ensure that NCRs are properly closed off to the satisfaction of the Employer's Representative.

The presence of an appropriately qualified and accredited landscape expert at appropriate times within the Site Supervisory Team will assist the team in performing these roles with regard to elements of the Works relating to landscape.

5.1.1.1 Quality and Environmental System and the Quality Plan

The appropriateness of the Contractor's Quality and Environmental System and the Quality Plan is key to ensuring that appropriate landscape treatments result post-construction and it is essential that the Employer's Representative vets the Quality and Environmental System and the Quality Plan with a view to ensuring that the landscape treatments implemented are those anticipated in the contract documentation.

It is important that the Employer's Representative ensures that the System and the Plan contain appropriate Employer's Representative Witness Points to allow the proper implementation of the Works Requirements, related to landscape treatments, to be appropriately monitored. For example, when native plant material is being delivered to site, it is important that an Employer's Representative Witness Point is present to allow the Employer's Representative to ensure that the material meets the requirements of the Works Requirements in relation to Irish indigenous planting stock. (Guidance on how an Employer's Representative may ensure the material is derived from native provenance is provided in Appendix I).

5.1.1.2 Professional input into the Design and Construction

The Employer's Representative should, in accordance with the Works Requirements, ensure that the Contractor employs environmental professionals with knowledge and experience in the fields of landscape and ecology to provide all relevant input and that the Contractor involves these professionals sufficiently throughout the duration of the Design and Construction Period. The Employer's Representative should ensure that the Design and Construction of the Works comply with the Works Requirements pertaining to landscaping works and landscape treatments for the scheme.

5.1.1.3 Sourcing of Native Plant Material

The Works Requirements may require that, as soon as practicable following the Commencement Date, the Contractor, in conjunction with the Designer's landscape

expert, consults with a nursery to ensure that an adequate supply of certified native plant material of Irish (or local provenance in the vicinity of designated conservation areas and known ancient woodlands) is available when required. The Works Requirements may also require that the Employer's Representative **Acknowledge receipt of a consultation certificate in this regard**. The need for early engagement between the Contractor and an appropriate nursery is vital in ensuring that sufficient plant material of Irish (or local) provenance is in stock and available for use when required.

5.1.1.4 Landscape maintenance and habitat management manual

The Works Requirements may require that the Contractor shall produce a 'landscape maintenance and habitat management manual.' This manual should detail all maintenance and management operations (including the repair of Defects) that will be undertaken during the Defects Period. The Employer's Representative should vet the 'landscape maintenance and habitat management manual' to determine its appropriateness.

Chapter 6 References and Relevant Literature

Dolan, L. M. J. (2003). Roads as Ecosystems: a more sustainable approach to the design of Irish rural roadside verges. In: J. Davenport and J.L. Davenport (2003) *Boats and Planes, Cars and Trains: The Effect of Human Transport on Ecosystems*. Dublin: Royal Irish Academy.

Dolan, L. M. J., Whelan, P. and Emmerson, M. (2009). Road Infrastructure and the Landscape. In: *2009 Irish Landscape Conference*. Tullamore, County Offaly, Ireland 13-16 October 2009. Kilkenny: The Heritage Council.

Dolan, L. M. J. (in draft). The Road to Improvement: The Ecological Highways of the Future. A strategic review of national road project planning, construction, implementation and decommissioning. (Wexford: Environmental Protection Agency).

Environmental Protection Agency. (2002). *Guidelines on the Information to be contained in Environmental Impact Statements*. Dublin: Environmental Protection Agency.

Forest Service. (2008). *Native Woodland Scheme Manual*. Wexford: Forest Service, Department of Agriculture, Fisheries and Food.

Fossitt, J. A. (2000). *A Guide to Habitats in Ireland*. Dublin: The Heritage Council.

National Roads Authority. (2010). *2010 NRA Project Management Guidelines*. Dublin: National Roads Authority.

National Roads Authority. (2006). *A Guide to Landscape Treatments for National Road Schemes in Ireland*. Dublin: National Roads Authority.

National Roads Authority. (2006). *Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes*. Dublin: National Roads Authority.

National Roads Authority. (2011). *Consolidated D&B PPP Documents Templates - Project Consultant Notes for Guidance* (B ed.). Dublin: National Roads Authority.

National Roads Authority. (2010). *The Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads* (1st ed.). Dublin: National Roads Authority.

National Roads Authority. (2008). *Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes*. Dublin: National Roads Authority.

National Roads Authority. (2008). *Environmental Impact Assessment of National Road Schemes - A Practical Guide*. Dublin: National Roads Authority.

National Roads Authority. (2009). *Guidelines for Assessment of Ecological Impacts of National Road Schemes* (2nd ed.). Dublin: National Roads Authority.

National Roads Authority. (2005). *Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes*. Dublin: National Roads Authority.

National Roads Authority. (2006). *Guidelines for the Protection and Preservation of Trees, Hedgerows and Scrub Prior to, During and Post-Construction of National Road Schemes*. Dublin: National Roads Authority.

National Roads Authority. (2006). *Guidelines for the Treatment of Badgers prior to the Construction of National Road Schemes* (1st ed.). Dublin: National Roads Authority.

National Roads Authority. (2006). *Guidelines for the Treatment of Bats during the Construction of National Road Schemes*. Dublin: National Roads Authority.

National Roads Authority. (2004). *Guidelines for the Treatment of Noise and Vibration in National Road Schemes* (1st ed.). Dublin: National Roads Authority.

National Roads Authority. (2006). *Guidelines for the Treatment of Otters prior to the Construction of National Road Schemes*. Dublin: National Roads Authority.

Stace, C. A. (1997). *New Flora of the British Isles*. Cambridge: Cambridge University Press.

The Landscape Institute/Institute of Environmental Management & Assessment. (2002). *Guidelines for Landscape and Visual Impact Assessment*. London: Spon Press.

Woodlands of Ireland. (2008a). *Native Riparian Woodlands – A Guide to Identification, Design, Establishment and Management*. Native Woodland Scheme Information Note 4. Authors: Little, D. , Collins, K., Cross, J., Cooke, D., McGinnity, P. Dublin: Woodlands of Ireland.

Woodlands of Ireland. (2008b). *Establishment, Design and Stocking Densities of New Native Woodlands*. Native Woodland Scheme Information Note 5. Authors: Little, D. , Curran, E. Horgan, T., Cross, J., Doyle, M. and Hawe, J. Dublin: Woodlands of Ireland.

Woodlands of Ireland. (2010). *The Classification of Native Woodlands in Ireland and Its Application*. Native Woodland Scheme Information Note 6. Authors: Cross, J. R. Perrin and Little, D. Dublin: Woodlands of Ireland.

Appendix I Determining the appropriateness of Native Material

App.I.i Suitable Indigenous Plant Material for General Landscape Treatments

Native plant material utilised on national road schemes should meet the following specifications:

- a. All native plant material utilised in landscape treatments should meet the criteria of the Native Woodland Scheme (NWS).⁴ As set out in Table 1, planting stock for the different native tree and shrub species must come from specific sources. The tick mark (ü) indicates which source is acceptable for each species. All sources must be within the island of Ireland.
- b. Furthermore, in accordance with the *Guide*, particular emphasis should be placed on the use of plant material from seed sources (which meet the criteria of the Native Woodland Scheme, and) which are ecologically similar to the native vegetation within/or adjacent (or formerly present see pages 19 and 20 of the *Guide*) to the recipient site in the roadside landscape.
- c. It should be noted that there are more stringent requirements relating to the establishment of landscape treatments within or adjacent to designated conservation areas and known ancient woodlands under the Native Woodland Scheme.
- d. Where the use of 'live-twig' cuttings of native Willow (*Salix* sp.), root cuttings of Aspen (*Populus tremula*) or translocation of Alder (*Alnus glutinosa*) or Ash

⁴ The Native Woodland Scheme (NWS) provides grant aid for the establishment, conservation and restoration of native Irish woodland. The procedures outlined by the Native Woodland Scheme ensure traceability and assurance that all planting material originates from a suitable source within Ireland and is fully traceable from seed collection to the planting site. All planting material used under the NWS is subject to the requirements of the EU Council Directive 1999/105/EC on the marketing of forestry reproductive material, and to specific Forest Service requirements. The NRA promotes the planting of native trees and shrubs from (Irish) indigenous seed sources, on national road schemes, that meet the criteria of the Native Woodland Scheme. In ensuring that all plant material originates from suitable sources, the Forest Service requires the registration of the Seed Collector, Nursery/Supplier, registration of individual seed collections and the use of Supplier's Document/Provenance Declaration Form in the movement of indigenous plant material from the nursery to the planting site within the roadside landscape of a national road scheme.

(Fraxinus excelsior) seedlings is envisaged, suitable sources (see Table 1) should be identified for this material within the LMA. Mature woodlands and hedgerows and other vegetation elements which are likely to contain indigenous plant material may also be utilised with permission from the relevant landowner/s. Written consent should be acquired from the NPWS with regards to the removal of live-twig, root cuttings, hay (for hay strewing), sods, turves or plugs from a designated conservation area.

Table 1: Acceptable sources for planting material under NWS (Source: *Native Woodland Scheme Manual* (Forest Service, 2008))

	Pedunculate & sessile oak	Scots pine	All other species
A registered seed stand included in the National List of Basic Material in the category 'Selected', and <i>regarded</i> as being indigenous.	Ü		Ü
A registered seed stand included in the National List of Basic Material for gene conservation.	Ü	Ü	Ü
A registered seed stand included in the National List of Basic Material in the category 'Selected', and of Scottish origin.		Ü	
A seed orchard included in the National List of Basic Material in the category 'Qualified', and of Scottish origin.		Ü	
A seed source or stand included in the National List of Basic Material in the category 'Selected' or 'Source Identified' (including forests, hedgerow trees and individual trees), and regarded as being indigenous and heterogeneous.			Ü
<p>Related notes</p> <p>q The following relevant 'categories' of seed or planting material are listed in Council Directive 1999/105/EC:</p> <ul style="list-style-type: none"> o Source Identified This category is the basic standard. In relation to the seed collected, the geographic location of the seed source or stand is known. o Selected This category is seed or planting material derived from a stand that has been specifically phenotypically selected and delineated. o Qualified This is seed or planting material derived from seed orchards. <p>q National Register of Basic Material / National List of Basic Material These official documents, as specified in Council Directive 1999/105/EC, are essentially the same. The National Register of Basic Material (commonly referred to as the National Register of Seed Stands) incorporates all approved seed sources, seed stands, seed orchards, seed categories, ownership details, current status and maps. The National List of Basic Material, publicly available at www.agriculture.gov.ie/forests-service, is a summary of the National Register presented in a common standardised EU-wide format.</p> <p>q The National Register of Basic Material is maintained by COFORD⁵ on behalf of the Forest Service.</p>			

⁵ COFORD, The National Council for Forest Research & Development, Arena House, Arena Road, Sandyford, Dublin 18 (tel. 01-2130725 / fax 01-2130611 / e-mail info@coford.ie).

Hawthorn (Crataegus monogyna)	
Batch No. Assigned:	Age of Plants:
Plants/Bag:	Pack Date:
Purpose: Landscape treatments for a National Road Scheme	
Provenance Details (Name of Irish County):	
Name of Nursery/Supplier	
EEC PLant Passport No. IRL DAF _____	
Contact No. Nursery/Supplier	
It is hereby declared that this plant material meets the criteria of the Native Woodland Scheme	

Figure 8: Example of a label which should accompany each bag of plant material.

PART A Supplier's Document (to be completed by the Nursery/Supplier-Issued in accordance with Council Directive 1990/269/EEC)

Supplier's Official Registration Number: _____ Supplier's Document Number: _____

Species: Common Name: _____ Botanical Name: _____

Master Certificate of Provenance Number: _____ Country of Issue: _____

Note: The Master Certificate of Provenance Number refers to the number of the original Master Certificate of Provenance issued by designated National Regulatory Authority.

Provenance Details: Country: _____ Provenance: _____

Origin: Indigenous _____ Unknown _____ If Non-Indigenous: Country: _____ Region: _____

Category: Source Identified _____ Selected _____ Qualified/Unrated Seed Orchard _____ Inbred _____ Less stringent requirements/Description _____

Type of Basic Material: Seed source _____ Seed _____ Seed Orchard _____ Provenance of families _____ Clonal _____ Clonal mixture _____

National Register Reference or identity code for origin of provenance: _____

Purpose: Multifunctional forestry _____ Other specific purposes (please indicate) _____

Length of time in commercial production type: _____

Unique identity/label no. assigned by the Supplier: _____ Quantity dispatched: _____ Date of Dispatch: _____

Name and Address of Purchaser: _____

Delivery Address (if different): _____

Plant Passport Details (where applicable): EU Plant Passport IML/CMF Registration Number: _____ PE Code: _____
Replacement Passport Details: Country: _____ Reg No: _____ Batch No: _____

It is hereby declared that all of the above details are correct, that the origin/provenance complies with the accepted origin/provenance list in the Forest Service *Forestry Schemes Manual* and/or the *Native Woodland Scheme Manual* , and that where applicable the original Supplier's document is available for inspection.

Name and address of Nursery/Supplier: _____

Authorised Person: _____

Authorised Person's signature: _____

Date: _____

PART B To be completed by the Contractor/Applicant

Applicant's Name: _____

PART A is an Original: _____ PART A is a Photocopy: _____

This Provenance Declaration Form accounts for: _____ Part of the quantity planted of the above species on this contract: _____

All of the trees planted of the above species on this contract: _____ Part of the quantity planted of the above species on this contract: _____

If Part, indicate the number planted and complete a separate Provenance Declaration Form for the remainder:

If Part, state the Plot Number(s) applicable to this Provenance Declaration Form:

It is hereby declared that all of the above provenance details for the above contract are correct and that, where the Nursery/Supplier Declaration (Part A) is a copy the original is available for inspection.

Applicant's signature: _____

or

Name of Contractor: _____

Contractor's Authorised Person: _____

Authorised Person's signature: _____

Date: _____

Version: 11.001

Figure 9: Example of a Provenance Declaration Form which should accompany the plant material from the nursery to the road scheme (Source: Forest Service)

Table 2: Indigenous plant material certified under the Native Woodland Scheme

Tall Trees (High-Canopy or Dominant species)

Ash, *Fraxinus excelsior*

Aspen, *Populus tremula*¹

Pedunculate Oak, *Quercus robur*

Scots Pine, *Pinus sylvestris*²

Sessile Oak, *Quercus petraea*

Medium Trees (Low-Canopy or Sub-dominant species)

Common Alder, *Alnus glutinosa*

Downy Birch, *Betula pubescens*

Silver Birch, *Betula pendula*

Wild Cherry, *Prunus avium*

Small Trees / Tall Shrubs (Tall Fringe and Understorey species)

* Bird Cherry, *Prunus padus*¹⁺²

Crab Apple, *Malus sylvestris*¹

Elder, *Sambucus nigra*

Hawthorn (Whitethorn), *Crataegus monogyna*

Hazel, *Corylus avellana*

Holly, *Ilex aquifolium*

Goat Willow, *Salix caprea*

* Purple Willow, *Salix purpurea*

Rowan (Mountain Ash), *Sorbus aucuparia*

Rusty Willow, *Salix cinerea ssp. oleifolia*

Yew, *Taxus baccata*¹⁺³

Medium or Small Shrubs (Edge and Understorey species)

Blackthorn (Sloe), *Prunus spinosa*

* Broom, *Cytisus scoparius*

* Dog-rose, *Rosa canina*

Eared Willow, *Salix aurita*

* Gorse, *Ulex europaeus*⁴

Guelder Rose, *Viburnum opulus*

Spindle, *Euonymus europaeus*

Climbing / Trailing Plants (Ground Layer species)

* Bramble, *Rubus fruticosus*


* Honeysuckle, *Lonicera periclymenum*

* Ivy, *Hedera helix*

* Native species currently not available under the Native Woodland Scheme. These species can be allowed to naturally recolonise within the respective landscape treatments.

- 1 A Native species but is less common or of restricted range.
- 2 Indicates that there is some debate as to its native status.
- 3 Yew (*Taxus baccata*) should be planted with care as cut foliage is poisonous to animals and the attractive red berries are poisonous to humans.
- 4 While Gorse (*Ulex europaeus*) is common and widespread in the Irish landscape, the use of this species should be restricted, particularly where fire may pose a hazard or potential risk to adjoining sensitive areas, such as peatlands



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