Hedgerow Appraisal System

*Best Practise Guidance on
Hedgerow Surveying, Data Collation and Appraisal*

*By
Neil Foulkes
Janice Fuller
Declan Little
Shawn McCourt
Paul Murphy*

Contents

List of Tables

List of Figures

Notes on the Authors

Neil Foulkes has been involved in practical hedgerow management since the mid-1980s, having trained with the British Trust for Conservation Volunteers. He has worked in hedgerow management as a consultant, management contractor and trainer since 1997, and has a thorough understanding of hedgerow management and conservation. He was a founder member of the Crann Hedgerow project (1997) and was involved in establishing the Networks for Nature hedgerow conservation initiative (2001), which developed the Hedgerow Survey methodology. He was also involved in conducting eleven local/ County hedgerow surveys during the last nine years. Neil is a founder member of the Hedge Laying Association of Ireland and is an Assessor in Hedge Laying for City and Guilds.

Dr Janice Fuller is a Consultant Ecologist with considerable experience of botanical survey and ecological assessment. She has worked on a wide range of woodland and hedgerow projects such as preparing habitat maps and management plans for native woodlands, identifying ancient woodland, and conducting hedgerow surveys, the latter most notably in Counties Galway and Clare. Her PhD and postdoctoral research examined long-term forest dynamics in North America using palaeoecological and ecological data. Recent projects have included preparing habitat maps and management plans for urban woodlands in Galway City and County, developing a management plan for Dromore Wood Nature Reserve in Co. Clare, as well as surveying woodlands in Co. Clare as part of the National Native Woodland Survey.

Dr Declan Little has worked in the native woodland sector since 1988, initially as a researcher of woodland development, soil processes and land use history and latterly, in native woodland project and policy development. His PhD study was on soil acidification in native oak woodlands in Ireland and subsequently, he undertook post-doctoral studies on climate change impacts on woodland soil processes, and on long-term ecological monitoring in Irish ecosystems. Currently his brief in Woodlands of Ireland is to provide technical support and training toward the sustainable management and expansion of native woodlands. He is particularly interested in the cultural, historical and biodiversity values of hedgerows derived from old or ancient woodland, i.e. Heritage Hedgerows. His primary role in this project was to co-ordinate all activities that lead to the development of the Hedgerow Appraisal System and the National Hedgerow Database.

Dr Shawn McCourt has spent more than a decade of primary research in woodland and hedgerow ecology, spanning two continents. He recently completed a PhD in Botany at Trinity College, Dublin and his final dissertation investigated links between Irish woodland and hedgerow plant communities, with particular emphasis on north County Dublin (Fingal). The objective of the study was to examine species richness, structure and composition of each community type, and the suitability of hedgerows as habitat for known woodland specialists, particularly herbaceous ground flora species. Shawn's current work includes ascertaining the factors that influence woodland and hedgerow diversity and improving habitat and biodiversity through sensitive restoration and conservation efforts. As well as being a freelance consultant for local authorities in Ireland, he also volunteers some of his time and knowledge to non-profit groups such as Conservation Volunteers and Woodlands of Ireland.

Paul Murphy developed an interest in hedgerows whilst studying at the National Botanic Gardens where he undertook a study on the association between plant diversity and hedgerow age. In subsequent years as an environmental consultant, he has been involved in hedgerow condition assessment in Environmental Impact Assessments throughout the country. He was one of the co-authors of the National Roads Authority 'A Guide to Landscape Treatments on National Road Schemes' (National Roads Authority, 2006) which provides guidance on how to reconnect the severed complex of habitats arising from road construction, in particular the fragmentation of the hedgerow network.

Citation: This publication should be referenced as follows: Foulkes, N., Fuller, J., Little, D., McCourt, S. and Murphy, P. (2013). Hedgerow Appraisal System - Best Practise Guidance on Hedgerow Survey, Data Collation and Appraisal. Woodlands of Ireland, Dublin. Unpublished Report [pdf].

Since its establishment in 1998, Woodlands of Ireland has addressed particular issues that require a broad range of specific woodland expertise through the formation of 'Technical Sub-Groups' (Appendix A).

In 2009 at the request of the Hedge Laying Association of Ireland, a 'Hedgerow Sub-Group' was established by Woodlands of Ireland to address the requirements of this fundamental aspect of our landscape heritage. Ireland is unique in that it has a characteristic, dense network of hedgerows, most of them planted in recent centuries and others derived from the original native woodland cover and comprising predominantly of native species. They are a multi-functional resource with a biodiversity value that has yet to be fully elucidated and recognised. In addition, they are generally not afforded any legal protection or conservation designation and are vulnerable to destruction, especially from clearance as farming practices continue to change.

Over the past two decades or so, numerous County and local hedgerow surveys have been carried out, many with support and funding from the Heritage Council. Yet, until the publication of this guide, there has been no standard methodology for combining the recording and appraisal of hedgerows nor is there a central database where the increasing amount of hedgerow data can be stored and accessed. The Hedgerow Sub-Group developed this guide as part of a 'decision-support' assessment tool for those involved in the assessment and management of hedgerows. It consists of two elements, i.e. a **Standard Recording Methodology** to allow for consistency of recording of all hedgerow survey data, and **A Method for Data Appraisal** in order to maximise the value of the data collected. This is particularly useful in identifying and assessing the condition of hedgerows of ecological, historical and landscape significance, known as *Heritage Hedgerows*. In addition, the work carried out on the Methodology has brought the original Hedgerow Methodology developed in 2006 (Murray and Foulkes, 2006) in line with the Appraisal system. Finally, these two elements will complement a '**Standard and Accessible National Hedgerow Database'** that has been developed in this project in order to store current and future hedgerow data in a standard format. By allowing open access to the database, this will enable users to interrogate the dataset. The hedgerow records and database will be held by the National Biodiversity Data Centre (NBDC).

The Heritage Council and all the partners within Woodlands of Ireland fully endorse this project and recommend that future hedgerow surveys use the methodology system outlined. It also advocates submitting all future hedgerow data into the National Hedgerow Database in order to maximise its interpretative value and enable survey data to be compared with future surveys in the same locality. This project is a further example of the unique partnership approach adopted by Woodlands of Ireland toward the sustainable management of this integral part of Ireland's native woodland heritage. I thank, in particular, all members of the Sub-Group that contributed so freely with their time and expertise.

Michael Starrett

Chairman
Woodlands of Ireland – Coillearnacha Dúchasacha

Hedgerows cover approximately 1.5% of the land area of Ireland (Smal, 1995) and represent a very significant aspect of Ireland's heritage, especially as they possess features of archaeological, geological, social and natural heritage. They have a utility value, primarily in agricultural management as stock-proof barriers and boundaries, as a tool in the management of grazing rotation and for the provision of shelter for livestock (and adjacent dwellings) during inclement weather. Yet they also serve as indicators of land-use history by possessing aspects of the past. Their values are multi-functional in both practical and spiritual terms, and enrich our understanding of history, ecology, rural society and farming practices. For example, hedgerows were used to demarcate townland boundaries, many of which date to the 8th century (Joyce, 1898). Also, the small fields and paddocks characteristic of marginal agricultural holdings in the West of Ireland reflect the extensive nature of agricultural practise in this region compared to the larger field sizes in the more productive South and East where agriculture is more intensive.

Hedgerow networks are perhaps the most characteristic feature of the Irish landscape and give character to an area, providing aesthetic appeal and creating a sense of place. They define agricultural and other lands and knit the landscape into a patchwork quilt. They also provide valuable refuges for biodiversity in a landscape dominated by large tracts intensive agriculture and function as an alternative habitat for numerous woodland plant species. In addition, hedgerows have the potential to act as corridors for regular movements and dispersal of birds, mammals (especially bats) and invertebrates through the landscape.

While older hedges certainly exist, the majority of the hedgerow network in Ireland was initially established in the middle of the 18th century to provide agricultural services, primarily land delineation, stock control, shade and shelter. In addition to their agricultural functions, hedgerows are one of the most widespread semi-natural habitats in the country, due to their extent, connectivity, structure and composition, and require further research to quantify their biodiversity values. Additionally, the hedgerow network is acknowledged to provide a range of Ecosystem Services, including Provisioning Services (i.e. food and fuel), Regulation Services (i.e. air quality, climate moderation, water quality, soil erosion control, disease management, pest control and pollination), Cultural Services (i.e. aesthetic value, educational and recreational), and Support Services (i.e. soil formation, photosynthesis and nutrient cycling) (Land Use Consultants, 2009).

Fig. 1: Typical woodland flora species found in hedgerows, i.e. primroses (*Primula vulgaris*) and violets (*Viola riviniana*), Co. Longford.

1

Ireland has made commitments to conserve biodiversity and to manage trees in a sustainable manner under a number of international agreements and policy frameworks, such as the Convention on Biological Diversity and the Ministerial Council on the Protection of Forests in Europe. Measures to conserve biodiversity need to be applied at a number of levels from the international scale through to the local scale in order to be effective. In recognition of this, Ireland has prepared a National Biodiversity Plan and the County hedgerow surveys carried out to-date – 14 in total, plus two partial County surveys - address the requirements of a number of the actions in this plan. The central aim of these surveys is to compile baseline information on the extent, type, location and conservation status of hedgerows, and to use this information to develop recommendations for their conservation and management.

Key objectives of the County hedgerow surveys are:

- to carry out an audit of existing datasets that include information on hedgerows;
- identify gaps in existing datasets and complete field surveys of hedgerows;
- collate both existing and new data and develop a geographic information system (GIS) dataset to contribute to baseline information on the location, species composition, type, extent, distribution and condition of hedgerows;
- provide ecological information on valuable hedgerow habitat types to guide spatial and development planning;
- produce guidelines on the management of hedgerows;
- inform future conservation policies in relation to hedgerows by making recommendations on conservation priorities and any future work that should be carried out;
- raise awareness of the importance of biodiversity and habitats among landowners and residents in those areas surveyed by liaising with the public and landowners to ensure public awareness of the survey being undertaken;
- collate and make the information gathered available for future research, through a detailed survey report and a set of raw data as appendices;
- contribute to baseline information required for the development and implementation of local heritage, biodiversity and County Development Plans;
- offer guidance on whether hedgerow areas are sufficiently represented on protected areas lists at County level;
- ensure a hedgerow legacy for future generations.

The outputs of most County hedgerow surveys to-date include:

- the preparation of a GIS dataset on hedgerows based on existing datasets and field survey data to be used for strategic planning;
- the provision of target notes, representative photographs and other data;
- the production of a survey report outlining survey results, data analyses, and
- the interpretation, and recommendations on conservation and management measures.

Hedgerows are living structures which change over time and in response to management activities and changing land-use objectives. Given the financial costs and the limited number of skilled operators available to appropriately manage hedgerows, it is unrealistic to expect that the entire hedgerow network in the country can be maintained at optimum condition. In order to achieve optimum condition, periodic renewal of hedges through coppicing or laying should occur which extends their lifespan and maximises their multi-functional attributes. Therefore, conservation strategies need to prioritise individual hedgerows and hedgerow networks on the basis of their significance in terms of agricultural, ecological, environmental, heritage and landscape value. Hedgerow conservation initiatives should focus on measurable results, not only in terms of quantity, but also in terms of the hedgerow qualities and attributes that impact on their value to agriculture, biodiversity, heritage and the wider landscape functions.

Hedgerow conservation policy in Ireland is embraced primarily through national legislation and incentive, especially agriculturally-related schemes. A number of County Councils also espouse hedgerow policy in County Development Plans. Nonetheless, hedgerow policy and legislation does not necessarily equate with protection and many hedgerows have been removed in recent years as a result of agricultural intensification, new road schemes and building developments. In addition, management is generally poor due to a lack of skills-based knowledge and resources. For convenience and cost-effectiveness, management often entails flailing which, if done without skill and due care, has a tendency to weaken the shrubs in the hedgerow. Therefore, any attempt to promote hedgerow conservation through management needs to be based on a systematic assessment of the current resource, a meaningful interpretation of the data collected and appropriate management.

Fig. 2: A typical hedgerow with an open base indicative of abandoned management, Co. Monaghan.

To help achieve this objective, a Hedgerow Appraisal System (HAS) has been developed which has three core elements:

1. Standard Recording Methodology
2. Standard and Accessible National Database
3. A Method for Data Appraisal

2.1 Standard Recording Methodology

Hedgerow surveys carried out consistently with the methodology outlined will permit a countrywide assessment of the quantity, quality, structure, and condition of the hedgerow resource. It will allow trends to be identified and threats to be deduced; it should improve understanding of the variation in floristic hedge types; allow for comparisons of hedges in different geographical areas and under different management regimes; and enable environmental change to be monitored with repeat surveys. This will allow for consistency in the recording of hedgerow data from different areas and landscape types. The methodology has been tried and tested in several counties as outlined below (Section 4), and is considered to be reliable and robust. In addition, it does not require highly specialised knowledge to use it; a good, general knowledge of hedgerow flora is all that is required, which will equally facilitate very local and regional or County hedgerow surveys (e.g., Foulkes & Murray, 2005, 2005a, 2005b & 2005c).

2.2 Standard and Accessible National Hedgerow Database

In order to provide a more comprehensive system, the data collected during hedgerow surveys needs to be stored in a standardised national hedgerow database. Allowing open access to the database will facilitate a wide variety of users to interrogate the dataset. Future surveys can be added to the database using a standardised format.

Incorporating the database into the records held by the National Biodiversity Data Centre (NBDC) will allow ease of access, as well as the investigation of hedgerow data in conjunction with other datasets, e.g. the Badger and Habitats Survey of Ireland (Smal, 1995) and the Countryside Bird Survey (Crowe *et al,* 2011).

2.3 A Method for Data Appraisal

To get the maximum value from the data collected and stored, a method for appraising the data is required. This is particularly useful in terms of identifying hedgerows of high ecological, historical and landscape significance (which are defined as *Heritage Hedgerows* in this context) and in assessing the condition status of individual hedgerows.

A standard hedgerow recording methodology was developed in 2002 as part of the 'Networks for Nature' hedgerow conservation initiative. Networks for Nature brought together representatives of the Heritage Council, the Department of Agriculture and Food and the Marine, the National Parks and Wildlife Service (NPWS), the Forest Service, the Irish Wildlife Trust, Crann and other Environmental non-governmental organisations, the Irish Farmers Association, the Professional Agricultural Contractors of Ireland and University College Dublin into one forum to discuss issues relating to hedgerows.

As there are a wide range of potential end-users for the recording methodology, there was extensive consultation on its development. This methodology was piloted for County-wide hedgerow surveys in Roscommon and Westmeath in 2004 and, following a number of refinements, was published in 2006 as *A Methodology for the recording of hedgerow extent, species composition, structure, and condition in Ireland* (Murray and Foulkes, 2006). This methodology has been used as the basis for approximately 14 County or regional hedgerow surveys, e.g. for those in Fingal, Donegal, Cavan, Monaghan, Meath, Westmeath, Mayo, Kildare, Laois, Leitrim, Longford, Sligo, East and West Galway. The methodology was treated as a 'work in progress' and surveyors using it were requested to critically assess it.

A number of issues were identified, including:

a)   Certain definitions and recording categories needed to be modified to ensure greater accuracy and consistency of recording between surveyors.
b)   Data needed to be stored in a consistent format between surveys so that larger datasets could be interrogated.
c)   Some guidance was needed on the interpretation of the data recorded so that appropriate decision-making on conservation and management issues could follow.

In 2009, a hedgerow Sub-Group of the Woodlands of Ireland (WoI) project was set up to address these issues. This Sub-Group met on a number of occasions to progress the development of the Hedgerow Appraisal System (HAS). The HAS was piloted as part of the County Monaghan Hedgerow Survey in 2010 (Foulkes, 2010).

In 2012, WoI secured funding from the Heritage Council to finalise the project, develop the database and publish the HAS. The Sub-Group further refined the methodology, reviewing the interpretation criteria to ensure consistency and compatibility between the various elements of the HAS. Compass Informatics were engaged to develop a database for the HAS.

3.1 Target Groups

In order to maximise the use of the HAS, it was developed to cater for most situations that are encountered by surveyors who have a good, basic understanding of flora and assessment criteria. The HAS is suitable for use by non-specialist surveyors. It will require a basic level of training to operate, but will not require specialised knowledge. It is envisaged that it will be suitable for general ecologists, local authority staff, agricultural consultants, foresters, land managers and local communities.

Where unusual or rare circumstances occur, i.e. the presence of lichens and bryophytes in, for example, 'ancient' *Heritage Hedgerows*, that require specialised ecological/expertise, this should be addressed through an additional, more detailed physical survey by a relevant expert.

4.1 Methodology

The objective of the methodology is to record the extent (i.e. quantitative survey), and floristic composition, context, physical structure, condition, and management of hedgerows (i.e. qualitative survey) in any given locality, County or region of Ireland using a semi-random sample selection. The methodology is largely based on the methodology devised by Murray and Foulkes (2006) with a number of additions, modifications and refinements to ensure compatibility with other elements of the HAS.

4.1.1 Hedgerow Definition

Murray and Foulkes (2006) define hedges or hedgerows as:

> "*Linear strips (4m wide or less) of woody plants with a shrubby growth form that cover more than 25% of the length of a field or property boundary that have been deliberately established or managed. They often have associated banks, walls, ditches (drains), or trees*".

Hedges that have developed into lines of trees which no longer display a shrubby growth form (remnant hedgerows) are also considered for recording purposes.

In order to maintain consistency with other habitat surveys in the Republic of Ireland, it is proposed that hedgerows meeting the following definition of Fossitt (2000) are also recorded (abbreviated):

> ***Hedgerows WL1:*** *Linear strips of shrubs, often with occasional trees, that typically form field or property boundaries. Dimensions of hedgerows are taken here as being mainly less than 5m high and 4m wide. When wider or taller than this, or dominated by trees, the habitat should be considered as a narrow strip of scrub or woodland, or as a **treeline - WL2**. Some hedgerows may be overgrown or fragmented if management has been neglected, but they should still be considered in this category unless they have changed beyond recognition. Linear strips of low scrub are included in this category if they occur as field boundaries.*

4.1.2 Sampling Method

This method involves sampling approximately 1% of the total area of a given region or County. The samples selected are derived from the south-west corner of the one kilometre grid square in each of the Ordnance Survey (OS) 10 kilometre grid squares of the country. This is the same as the sampling procedure used for the Badger and Habitats Survey of Ireland (Smal, 1995) and the Countryside Bird Survey (Crowe *et al,* 2011). Discovery Series OS maps (scale 1: 50,000), vector maps, aerial photographs, and both first edition OS (mid 1800s) and second edition OS (early 1900s) maps, all at an approximate scale of 1:10,560 (i.e. six inch to one mile) are used for each survey sample square.

However, in urban areas where often there are no hedgerows in the south-west corner of the one-kilometre grid squares, smaller squares on a smaller grid should be used, e.g. a 0.5km square on a 5 x 5km grid or indeed a 0.25km square on 2.5 x 2.5km grid, where necessary. This provides the same 1% coverage of land area but results in a greater number of random survey points.

Fig. 3: Hedgerow connectivity with scrub woodland, Co. Leitrim.

For the purpose of recording qualitative data, a maximum of 10 hedges are surveyed in each square. Hedges for sampling are identified prior to the fieldwork in the following way. A transparent overlay of the square is divided into equal square quarters. Using a random number generator and a grid pattern, two random points are identified in each quarter. A further two random points are generated for the square as a whole. By placing the overlay over the aerial photograph of the square, the nearest hedge of at least 60m in length to each random point is identified and numbered (1-10). If it is unclear from the photograph whether a particular linear feature is a hedge or not, a second (and occasionally third) potential sample hedge can also be noted using the same principle (e.g. 1a, 1b, etc.). Where there is no hedge within a fixed radius *(r)* cm of the random point, no hedge is recorded and the total number of hedge recordings for the square is reduced by one. This is to prevent skewing the sampling density in favour of certain landscape types.

The value for the radius *(r)* cm is given by the formula $r = \sqrt{A/(10\pi)}$, where *A* is the area of the square on the aerial photograph in cm². This equates to an actual distance on the ground of approximately 175m.

Hedges bordering curtilage (as defined in Fossitt (2000) – BL3) are only recorded if they also border agricultural land. This is to avoid skewing the sample with garden hedges that do not border a field or property boundary and are not agricultural hedges. Hedges that are within afforested land are not recorded for the purposes of this survey, as they fall into different habitat categories (i.e. WN, WD and WS – Fossitt (2000)).

4.1.3 End Points

For each hedge selected, two end points are marked on the map. End points are generally identified as field corners and by nodal intersections with other hedges or boundary features (i.e. one side of a field) or gaps greater than 20m. In landscapes where the average field size is very small, the frequency of hedge intersections may result in many stretches of hedge between nodal points being less than 60m in length, though there may well be continuity in the feature extending beyond the nodes. An alternative scenario applies where a hedge can suddenly change significantly in type, with no obvious evidence of nodal intersections (possibly due to boundary removal). In practice, a certain amount of latitude must be given to the surveyors to determine the end points of the sample. The key factors are continuity in structure, composition and management. Any changes from the original end points marked on the maps are noted and target notes are made to explain why the decision to amend was taken.

4.1.4 Data Recording

The majority of the recording for the survey is carried out in the field but a certain amount of desk study will be necessary to ascertain specific details relating to Historical Significance and Landscape Designation. Where a category can be recorded as a result of desk study, this will be indicated in the Manual Section (Section 4.2 and Appendix B). Field recording can be made in the period April to September (inclusive), but less experienced surveyors may find recording of ground flora easier during the period June to August.

After recording in the field, data should be transferred via data entry forms into standardised Excel spreadsheets, which are available at www.heritagecouncil.ie/landscape/resources-links/. These can be uploaded to the NBDC National Hedgerow database. It is recommended that the data recording template and explanatory notes (Appendix B) are used by surveyors in the field as it is a vital support in ensuring the highest standards in hedgerow surveying. The recording template has been designed to facilitate both manual and electronic entry of data in the field.

4.1.5 Quantitative Survey

It is important to adhere to the quantitative criteria outlined (Section 4.2.1) in order to collate reliable, quantitative data. It also allows repeat surveys to be undertaken against similar, clearly defined criteria.

4.1.5.1 Recording of Hedgerow Extent

In order to evaluate the extent of hedges in each one kilometre square or target area, the length of each hedgerow is recorded. In practice, this is most easily achieved in the field by recording the existence of hedgerows on a copy of a recent aerial photograph or vector map of the sample square. Where gaps >20m occur in a hedge this is excluded from the extent data, thereby minimising the overestimation of hedgerow length due to the inclusion of significant gaps. The recorded information can subsequently be digitised into a GIS system.

Alternatively, the information can be obtained using a digital map-measuring wheel. Each length of hedge is measured and recorded twice, and the average value taken. The total length of hedgerow and remnant hedgerow in each sample square is calculated and an estimate for larger areas (e.g. at a County scale) can be extrapolated.

For additional and relevant guidance on the formatting of data for inclusion in a GIS database, the Heritage Council's *Best Practice Guidance for Habitat Survey and Mapping* should be consulted (Heritage Council, 2011).

4.1.6 Qualitative Survey

The attributes covered by the methodology are grouped into five sections on the recording sheets. These are:

1. CONTEXT

Each hedge is placed in the context of the location; aspect; type of farm in which it is located; and the wider environment, in terms of adjacent land classification and links with other habitats. Also recorded are any potential indicators of antiquity. The elevation of each hedge is also recorded using

GPS (or by reference to the OSI Discovery Series maps). The purpose of recording these factors is to enable assessment of the potential significance of the surrounding landscape on hedgerow ecology and the structure of the hedge, as distinct from other influences such as management. It also allows the hedgerow survey to be integrated with other specific ecological surveys.

2. CONSTRUCTION

The basic construction of the hedge relates to the linearity of the woody shrubs, the presence or absence of features such as drains, banks, walls or 'shelves' (where the hedge delineates differences in height between fields on each side). These characteristics can be indicative of the period of hedgerow origin and are largely of a fixed nature and unlikely to change over time.

3. STRUCTURE AND CONDITION

The structure relates to the physical dimensions of the hedge (height, width, cross sectional profile, quantity and age profile of trees). Condition is gauged by an assessment of the percentage of gaps, density of basal growth (i.e. in the bottom metre of the hedge), bank erosion and overall vigour. These attributes can vary significantly over time and, where repeat surveys are undertaken, can be the main indicators of quality and condition. Furthermore, by assessing trends, the long-term sustainability of the hedgerow can be determined.

4. MANAGEMENT

This covers the type and method of hedgerow management, including flailing, laying, coppice management, short- and long-term absence of management, and evidence of past management of the hedge.

5. FLORISTIC DATA

Recordings of the woody species that make up the hedge/shrub layer are taken from two, non-concurrent, randomly placed 30 metre strips. Identification and nomenclature should follow Stace (2010).

Hedgerows can be considered to be composed of three floristic layers;

a) Tree layer

Hedgerow trees are any trees within the hedge that have been deliberately or incidentally allowed to grow, as distinct from the shrub layer of the hedge.

b) Shrub layer

The shrub (hedge) layer includes shrubs such as thorns, woody climbers and tree species that have a shrubby growth form, normally due to management such as cutting or laying.

c) Ground flora

This includes all herbaceous broadleaved plants, grasses, rushes and ferns found in the hedge bottom, some of which may be indicators of hedgerow age or origin (e.g. derived from scrub, old or ancient woodland). Comprehensive assessment of all ground flora is too time consuming for most hedgerow surveys. A list of ground flora species to be recorded is included in Appendix E.

Note: If rare or EU Habitats Directive Annex listed species are present, i.e. in a Heritage Hedgerow, a further survey requiring specialist expertise should be undertaken.

Fig. 4: An example of a double row hedge and potentially a Heritage Hedgerow, Co. Mayo.

4.1.7 Access and Permissions

It is imperative that before any survey work is undertaken permission to access land is sought and granted by the landowner. This can often prove difficult for numerous reasons, including difficulties in identifying the owners of all land parcels within the sample area and the absence of landowners during the survey period. All reasonable efforts should be made to identify landowners, with particular emphasis where access to land is through a farmyard or close to a dwelling. For further guidance on preparations for field survey, refer to *Best Practice Guidance for Habitat Survey and Mapping* (Heritage Council, 2011). In any case, a protocol should be established by surveyors, which is both courteous and respectful since access to hedgerows normally involves access to private property.

The process of gaining permission is not only a legal requirement but is also desirable for other reasons, especially as it may also lead to the provision of useful, additional information by landowners. Since the sample squares are often the same as those used by Birdwatch Ireland for the Countryside Bird Survey, these landowners may well be familiar with surveyors at work on their lands. (Crowe *et al,* 2011) This can often result in cordial exchanges, prompt access and indeed, an interest in the survey work to be undertaken.

The length of time spent recording each square should be recorded. On average it has been found that one square takes two surveyors between five and ten hours; this varies according to the number of hedges and the terrain in the sample square, which affects the time required for recording extent and access throughout the square. Time taken to record each hedge may vary from 10 to 45 minutes, depending on the structural and floristic complexity of the hedge.

4.2   Data Recording Manual

Note: Where a data category recording can be made as the result of desk study, this is indicated by an asterix, i.e. *D (Appendix B).

4.2.1 Recording of Quantitative Data

The extent of hedges in each 1 kilometre square is recorded by marking a copy of the aerial photograph, or vector map with a solid red line for hedgerow and a broken red line for remnant hedgerows. Any linear feature that is apparent on the aerial photograph or vector map should be investigated and non-hedgerows noted with a solid green line to prevent duplication of investigation. These might include vegetated banks, vegetated drains, and stone-walls with or without shrubs, fence lines, and small woodland strips. Where gaps >20m occur in a hedgerow, a green line should be used to mark the gap section.

It should be specifically indicated on the extent map where a boundary feature that is present on the aerial photograph is no longer present.

4.2.2 Recording of Qualitative Data

A considerable amount of the data collected during hedgerow surveys is qualitative in nature. The following sections outline the main topics involved

4.2.3 Floristic Recording

Floristic data is recorded from two randomly selected non-concurrent 30m strips along the length of the sample hedge. Where a hedge is 60m in length, start one 30m strip from each end. A method for identifying two randomly selected non-concurrent 30m strips for a given length of hedge is explained in Appendix C. Where a gateway occurs in a 30m sample strip, the gateway should be ignored and the width of the gateway added to the far end of the strip.

Note: The species lists (Appendices D and E) were agreed by the Woodlands of Ireland Hedgerow Sub-Group and are primarily based on woodland indicator species; these lists were refined by removing species that are confined to woodlands <u>only</u>.

4.2.3.1 Tree layer

Record all tree species present in the entire length of the hedgerow. If the structure contains species in both tree and shrub form, for example holly, this can be recorded in the tree and shrub layer simultaneously. The trees should be no more than 1m from the edge of the hedge. All tree species (not individuals) in each hedge should be recorded simply as 'present'. The most numerically dominant tree species should also be noted (Appendix D).

4.2.3.2 Shrub layer

All shrub species present within the length of each 30m strip are to be allocated an appropriate Domin value. Where a species is present in tree form in the 30m sample strips it should be given a Domin value of 1. Gaps in the hedge layer are also to be given a Domin value. Ivy (*Hedera helix*)[1] (see below) also should be given a Domin value.

Woody climbers; e.g. brambles *(Rubus fruticosa agg.,* wild rose *(Rosa spp.*), honeysuckle *(Lonicera periclymenum)* are recorded separately using the DAFOR scale (X for absent).

---

1   For nomenclature see Section 4.1.6 Floristic data.

Ivy – recordings for Ivy should predominantly relate to its presence at the canopy level of the hedge. No ivy –"X" (absent). If Ivy is present but not in the canopy record as "P".
All species recording should be to the most detailed level possible given the level of knowledge/ experience of the surveyor (Appendix D).

Where any species is seen in a sample hedge but not included in the 30m strips, record as "P", present.

Record the species present without Domin values for *Remnant* and recently *Coppiced* hedges.

4.2.3.3 Ground Flora

Record the presence of any of the ground flora species listed in Appendix E within one metre of each side of the hedge in each of the 30m strips.

Fig. 5: A potential Heritage Hedgerow derived from Old or Ancient woodland containing Wych elm (*Ulmus glabra*) and spindle (*Euonymus europaeus*), Co. Leitrim.

4.2.4 Context, Construction, Structure and Condition, and Management Recording

The majority of category recordings are self-evident and notes are only included for those aspects of the recording that require elaboration or additional explanation. Assess both sides of the hedge in order to record all characteristics. Multiple recordings are possible in a number of categories. The numbers in brackets after the category heading indicate the minimum and maximum number of alpha-numeric digits that can be recorded in that category.

Since the sampling squares for this survey are the same as those used by both the Badgers and Habitats Survey (Smal, 1995) and the Countryside Bird Survey (Crowe *et al,* 2011), the information from this survey will also enable more detailed analysis of the results from those two datasets.

Repeating surveys at approximately ten year intervals is recommended in order to assess trends in hedgerow condition.

4.3 Data Storage

Data recorded in the field should be transferred to a standardised Excel spreadsheet available from www.heritagecouncil.ie/landscape/resources-links/ . The data can then be submitted to the NBDC for inclusion in the National Hedgerow Database.

4.4 Hedgerow Appraisal

The appraisal system is intended to identify hedgerows of historical, ecological and/or landscape significance and to provide a means of condition assessment for hedgerows based on the data recorded using the methodology outlined (Table 1).

4.4.1 Hedgerow Significance

The system is based on ranking the significance of hedges on a scale of 0-4 (0 being lowest) in five categories: Historical Significance, Species Diversity Significance, Structure, Construction and Associated Features, Habitat Connectivity Significance and Landscape Significance. A score of 4 in any category indicates a hedge of high significance (*Heritage Hedgerow*). Hedges can also be considered of high significance (*Heritage Hedgerows*) if they record a cumulative score of 6 or greater in the Historical, Species Diversity or Structural Categories, or a cumulative score of 16 or greater over the five categories. These hedges should be considered as high priority in terms of retention, management action, etc. Hedges recording lower scores may still be of value depending on the context.

Letters in brackets indicate the relevant categories from the recording methodology (Table 1 and Appendix B).

Table 1: Criteria for assessing Hedgerow Significance (historical, ecological and landscape)

Historical Significance	0 Low Significance	1 Slightly Significant	2 Moderately Significant	3 Significant	4 Highly Significant
Period of Establishment (B,B1,B2,B3,B4,F,W)	Recently Established (0-25 years)	Internal Field Boundary	Roadside / Rail / Canal Boundary: Farm Boundary, March ditch*, Mearing* *old terms for farm boundaries	Boundary appears on 1st Edition O.S.	Townland Parish / County Boundary: Area shown as, or connected to, woodland on 1st Edition O.S. map: Connects to feature recorded on Sites and Monuments Record
				Non-linear (excluding roadside)	
		Past evidence of laying or coppicing			

Species Diversity Significance	0 Low Significance	1 Slightly Significant	2 Moderately Significant	3 Significant	4 Highly Significant
Tree / Shrub / Climber Species Count (Floristic) (All species)	(1-3 species / 30m strip)	(4/5 species / 30m strip)	(6/7 species / 30m strip)	(8/9 species / 30m strip)	(10+ species / 30m strip)

Table 1 [continued]

Ground Flora Significance	0 Low Significance	1 Slightly Significant	2 Moderately Significant	3 Significant	4 Highly Significant
Species type (Y)	Dominated by ruderal species* - nettles / docks / thistles / cleavers				
Species Count (from list) (Floristic)	(<2 species / 30m strip)	(2-3 species / 30m strip)	(4-5 species / 30m strip)	(6-7 species / 30m strip)	(>7 species / 30m strip)
Pteridophytes (Ferns) (from list) (Floristic)				3-5 species	>5 species

Ruderal species - Weedy vegetation that shows a preference for growing on compacted, ploughed, or otherwise disturbed ground.

Structure, Construction & Associated Features	0 Low Significance	1 Slightly Significant	2 Moderately Significant	3 Significant	4 Highly Significant
Wall / Bank (G1,G2,G3,H)	None	Wall / Bank < 0.5m (height / depth)	Wall / Bank 0.5 - 1m	Wall / Bank > 1m	Double Ditch
Drain / Ditch (B,I,I1)			Dry Ditch	Wet Ditch / Drain	Stream / River
Other (Target Notes)			Badger Set		
Other (G3)			Green Lane		

Table 1 [continued]

	0	1	2	3	4
Habitat Connectivity Significance	**Low Significance**	**Slightly Significant**	**Moderately Significant**	**Significant**	**Highly Significant**
(C1,C2,D1,D2,D3)	No connection with other semi-natural habitat	Single link with semi-natural habitat including hedgerow	Multiple links with semi-natural habitats, including other hedgerows	Link with woodland / forest habitat	Link with designated area, particularly woodland

	0	1	2	3	4
Landscape Significance	**Low Significance**	**Slightly Significant**	**Moderately Significant**	**Significant**	**Highly Significant**
(J, P,Q, Desk study)		Wind shaped	Mature Hedgerow Trees		Area covered by Landscape designation (Landscape Conservation Order, TPO, Amenity Area Order)

Other Factor/s of Significance	Record any other factors of significance which are not included above, e.g. upland hedgerow with landscape significance.

4.4.2 Condition Assessment

For a qualitative assessment of hedgerow condition criteria have been set for desirable and undesirable attributes. These criteria are open to amendment based on further research.

Hedgerows are ranked from 0-3 (0- unfavourable to 3- highly favourable) in 3 categories representing the Structural Variables, Continuity and other Negative Indicators. The higher the recorded score, the more favourable the condition. A score of 0 in any category represents a hedgerow in Unfavourable Condition.

Table 2: Criteria for assessing condition assessment of hedgerows.

Structural Variables	0	1	2	3
Dimensions	**Unfavourable**	**Adequate**	**Favourable**	**Highly favourable**
Height (K)	<1.5m	1.5 – 2.5m	2.5 – 4m	>4m
Width (L)	<1m	1 – 2m	2- 3m	>3m
Profile (J,J1)	Remnant; Derelict;	Wind shaped; Losing Base Structure	Boxed / A-shaped; Straight sided	Overgrown; Top heavy/ undercut; Outgrowths at base
Basal density / porosity to light of woody shrubs? (N)	Open	Semi-translucent	Semi-opaque	Opaque / Dense

Continuity	0	1	2	3
	Unfavourable	**Adequate**	**Favourable**	**Highly favourable**
% gaps (M)	>10%	5-10%	<5%	Continuous
Specific gaps (M1)	Individual Gap > 5m	Individual gap <5m	No gaps	No gaps

Table 2 [continued]

Negative Indicators/ Degradation / Issues affecting long-term viability	0	1	2	3
	Unfavourable	Adequate	Favourable	Highly favourable
Bank / Wall (O,O1)	>20% of the length of the hedge degraded	<20% of the length of the hedge degraded	Minor degradation	No degradation
% of canopy dominated by Ivy (Floristic)	>25%			
Unfavourable species composition (from list) (Floristic)	>10% of woody growth volume comprised of unfavourable species			
Ground Flora / Hedge Base (Y)	> 20% of ground layer showing evidence of Herbicide Use			
Ground Flora / Hedge Base (Y)	Contain Noxious weeds •/ > 20% Dominated by Nutrient Rich Species			
Ground Flora / Hedge Base (Y)	Presence of alien invasive species^ß			
Degraded Margin (R2,R4)	Ploughing up to base of hedge shrubs or Poaching/erosion		(grassy) margin (2 m or greater on one side of the hedge)	(grassy) margins (2 m or greater on both sides of the hedge)

• *Noxious Weeds - Native plants of disturbed ground that impact adversely on agriculture. They may compete for space with tillage or forage crops, harbour pests or diseases, or be injurious to livestock or human beings. These are: Common ragwort (Senecio jacobea), Spear thistle (Cirsium vulgare), Creeping or field thistle (C. arvense) and two species of dock, i.e. the curled dock (Rumex crispus) and the broad-leaved dock (Rumex obtusifolius).*

ß*Alien invasive species – see Table 1: 'Problematic Plant Species: Top 39' at http://invasives.biodiversityireland.ie/ Those listed as occurring in woodland, hedgerows, demenses and on roadsides often occur in hedgerows. Cherry laurel (Prunus laurocerasus) can be added to this list.*

Fig. 6: Hedgerows often contain a rich array of ground flora species such as tutsan (*Hypericum androsaemum*), Co. Kildare.

4.4.3 Issues requiring further assessment

The factors outlined in Table 3 are not considered to be sufficiently significant to classify a hedgerow as being in unfavourable condition without more detailed assessment, but should be flagged as 'Warning Status'.

Table 3: Warning status hedgerow condition criteria

	Indicate Warning Status
Obvious signs of poor condition (S)	Includes weak growth, basal decay, effects of spray drift
Risk of infection; Management Safety Issues (U,X3)	Wire fixed to stems; managed using excavator type machinery
Impact on biodiversity (U1)	Managed out of season
Hedgerow Tree Sustainability (Q)	Only Mature Trees present

Note: Refer to Appendix B for explanation of categories and codes.

4.4.4 Current status and potential for improvement

The above system gives an assessment based on the current condition, but does not indicate the potential for improvement, e.g. an exposed upland hedgerow and a managed lowland hedgerow may both record a score of 1 (Adequate) in the Height Category of the Condition Score. The upland hedge may be at the limit of its height growth whereas the lowland hedge may have the potential to grow to >4m (Highly Favourable).

4.5 Repeat Surveys

Where a repeat survey (approximately 10 year cycle) is being conducted the Hedgerow Appraisal System will need to be developed to monitor trends in hedgerow condition to determine whether the conservation status is stable, improving or declining.

4.6 Additional Research

An appropriate method of assessing the representative species composition for hedgerows in Ireland needs to be determined. This would allow for the development of a classification system for hedgerows based on flora which would assist future management, especially the conservation of existing- and establishment of new hedgerows. It would also assist in policy development, particularly the development of a strategic approach to conserving and expanding the hedgerow network. This would also allow for financial resources channelled through agri-environmental schemes to be targeted in a strategic manner.

The current methodology uses two random, non-concurrent 30m strips. This is based on the 30m figure used in the UK but has not been validated for Irish conditions. Preliminary results from surveys conducted to date are showing significant variation between the two 30m strips which suggests that 30m may not be the optimum sampling distance in Ireland. Further sampling is required to determine the optimum sampling distance.

A number of criteria require further research or assessment to enhance the scientific robustness of the category thresholds. The main areas where this would be of value are:

Species Diversity Significance - Tree / Shrub Species Count and Ground Flora Count.

Aulino Wann & Associates (2009). *Hedgerow Survey of County Donegal.* Donegal County Council.

Bickmore, C.J. (2002). *Hedgerow Survey Handbook: A standard procedure for local surveys in the UK*. Department of Environment, Food and Rural Affairs, UK.

Clements, D.K. and Tofts, R.J. (1992). *A Methodology for the Ecological Survey, Evaluation, and Grading of Hedgerows.* Countryside Planning and Management, UK.

Cooper, A., Murray, R. and McCann, T. (1997). *The Northern Ireland Countryside Survey.* The Environment and Heritage Service, Northern Ireland.

Council for the Protection of Rural England (2000). *CPRE Hedgerow Survey Pack.* Council for the Protection of Rural England, London.

Crowe, O., Coombes, R. H., Lauder, A., Lysaght, L., O'Brien, C., O'Halloran, J., O'Sullivan, O., Tierney, T. D. and Walsh, A. (2011). *Countryside Bird Survey 1998-2010*. BirdWatch Ireland. Unpublished Report. [pdf]

Department of Agriculture Food and the Marine (2007). *Specification for REPS Planners in the Preparation of REPS4 Plans.* Department of Agriculture, Food and the Marine. Dublin. www.agriculture. gov.ie

Department of Agriculture Food and the Marine (2010). *Specifications for the Agri-Environment Options Scheme and Natura 2000 Scheme.* Department of Agriculture, Food and the Marine. Dublin. www.agriculture.gov.ie

Department of the Environment (2001). *Urban and Rural Roles.* Government Publications Office.

European Union (2000). *Water Framework Directive.* Council Directive 2000/60/EC.

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

Foulkes, N. and Murray, A. (2005). *County Roscommon Hedgerow Survey Report.* Roscommon County Council. Unpublished.

Foulkes, N. and Murray, A. (2005a). *County Westmeath Hedgerow Survey Report.* Westmeath County Council.

Foulkes, N. and Murray, A. (2005b). *County Offaly Hedgerow Survey Report.* Offaly County Council. Unpublished.

Foulkes, N. and Murray, A. (2005c). *County Laois Hedgerow Survey Report*. Laois County Council. Unpublished.

Foulkes, N. (2006). *County Kildare Hedgerow Survey Report.* Kildare County Council. Unpublished.

Foulkes, N. (2006a). *County Longford Hedgerow Survey Report*. Longford County Council. Unpublished.

Foulkes, N. (2006b). *County Leitrim Hedgerow Survey Report*. The Heritage Council. Unpublished.

Foulkes, N. (2007). *County Mayo Hedgerow Survey Report.* Mayo County Council. Unpublished.

Foulkes, N. (2008). *County Sligo Hedgerow Survey Report*. Sligo County Council. Unpublished.

Foulkes, N. (2008a). *West Kerry / Dingle Peninsula Pilot Hedgerow Survey Report*. Kerry County Council. Unpublished.

Foulkes, N. (2008b). *Hedgerow Translocation*. Heritage Office, Roscommon County Council.

Foulkes, N. (2009). *North Kerry Hedgerow Survey Report.* Kerry County Council. Unpublished.

Foulkes, N. (2010). *County Monaghan Hedgerow Survey Report.* Monaghan County Council. Unpublished.

Fuller, J. (2006). *East Galway Hedgerow Survey 2006*. Galway County Council. Unpublished report.

Giorria Environmental Services (2006). *County Cavan Hedgerow Survey*. Cavan County Council. Unpublished report.

Government of Ireland (2010). *Draft European Communities (Birds and Natural Habitats) Regulations 2010.* Department of the Environment & Local Government, Dublin.

Government of Ireland (1976). *Wildlife Act. No. 39/1976*. Department of Lands, Dublin.

Government of Ireland (2000). *Wildlife (Amendment) Act. No. 38/2000*. Department of Arts, Heritage Gaeltacht & the Islands, Dublin.

Government of Ireland (2000a). *Planning & Development Act. No. 30/2000*. Department of the Environment & Local Government, Dublin.

Government of Ireland (2002a). *National Biodiversity Plan.* Department of Arts, Heritage, Gaeltacht & the Islands, Dublin.

Government of Ireland (2002b). *National Heritage Plan.* Department of Arts, Heritage, Gaeltacht & the Islands, Dublin.

Government of Ireland (2005). *Rural Environment Protection Scheme Specifications.* Department of Agriculture & Food, Dublin.

Heritage Council (2011). *Best Practice Guidance for Habitat Survey and Mapping.* The Heritage Council, Kilkenny. http://www.heritagecouncil.ie/fileadmin/user_upload/Publications/Wildlife/Habitat_Survey_Guidance/Habitat_Survey_Guidance_Heritage_Council_2011_2.pdf

Joyce, P.W. (1898). *Irish Local Names Explained*. Gill, Dublin.

Land Use Consultants (2009). *Provision of Ecosystem Services through the Environmental Stewardship Scheme*. DEFRA (Research Contract NR0121).

Lyons, M. and Tubridy, M. (2006). *A Survey of Ancient and Species Rich Hedgerows in Dublin City.* http://www.hedgelaying.ie/images/1254465141.pdf The Heritage Council, Kilkenny.

Murray, A. and Foulkes, N. (2006). *A Methodology for the Recording of Hedgerow Extent, Species Composition, Structure, and Condition in Ireland.* Tearmann, Vol. **5,** 79-94.

National Roads Authority (2006). *A Guide to Landscape Treatments on National Road Schemes.* http://www.nra.ie/Publications/Environment/#d.en.3463

Smal, C. (1995). *The Badger and Habitats Survey of Ireland.* Department of Agriculture, Food and the Marine. Dublin.

Stace, C. (2010). *New Flora of the British Isles*. Cambridge University Press

Woodlands of Ireland (2007a). *Cartographic and Historical Sources for Native Woodlands.* Native Woodland Information Note No. 1. Woodlands of Ireland, Dublin.

Woodlands of Ireland (2007b). *A History of Woodland Management in Ireland: An Overview.* Native Woodland Information Note No. 2. Woodlands of Ireland. Dublin.

Woodlands of Ireland (2007c). *The Control of Rhododendron in Native Woodlands.* Native Woodland Information Note No. 3. Woodlands of Ireland, Dublin.

Woodlands of Ireland (2008). *Native Riparian Woodlands – A Guide to Identification, Design, Establishment and Management.* Native Woodland Information Note No. 4. Woodlands of Ireland. Dublin.

Woodlands of Ireland (2009). *Establishment, Design and Stocking Densities of New Native Woodlands.* Native Woodland Information Note No. 5. Woodlands of Ireland. Dublin.

Woodlands of Ireland (2010). *The Classification of Native Woodlands in Ireland and its Application to Native Woodland Management.* Native Woodland Information Note No. 6. Woodlands of Ireland. Dublin.

Appendix A: Woodlands of Ireland

Since the establishment of Woodlands of Ireland in 1998, a wealth of practice, expertise and knowledge has been generated with respect to native woodland ecology and management in Ireland. Much of this has arisen through specific projects such as the People's Millennium Forests Project and the Forest Service Native Woodland Scheme, launched in 2000 and 2001 respectively. This has resulted in the development of a solid foundation for the rejuvenation and expansion of native woodlands, a long-neglected cornerstone of our heritage, through planning and management, with appreciable financial investment from the taxpayer.

Woodlands of Ireland provide technical guidance, training and information, stage national events, and publish supporting literature. Technical support is provided by Woodlands of Ireland in partnership and consultation with a wide range of stakeholders involved with native woodlands. These include foresters, ecologists, woodland contractors, academic institutes, tree nurseries, landowners, environmental NGOs, and relevant State agencies, especially the sponsors of Woodlands of Ireland, i.e. the Heritage Council, the Forest Service (Department of Agriculture, Food and the Marine), and the National Parks and Wildlife Service (Department of Arts, Heritage and the Gaeltacht).

As a further step in developing the knowledge base, Woodlands of Ireland addresses specific issues that require a broad range of particular expertise through the formation of 'Technical Sub-Groups'. Issues as diverse as riparian woodland management, quality native hardwood production and invasive species management have been addressed over the past decade. The outputs from these technical Sub-Groups are stand-alone publications or technical guidance bulletins as part of the series of Native Woodland Information Notes designed to complement the Native Woodland Scheme.

In 2009, at the request of the Hedge Laying Association of Ireland, a 'Hedgerow Sub-Group' was established by Woodlands of Ireland to address the requirements of this fundamental aspect of our landscape heritage. The output from this Sub-Group includes a standard hedgerow survey methodology, a standard appraisal system for interrogating hedgerow data and a centralised national hedgerow database where all hedgerow records will be stored. The project demonstrates the hard work and commitment of the Hedgerow Sub-Group over a three-year period and adds considerable added value to the hedgerow datasets that have accumulated in the past two decades or so. It is hoped that future hedgerow surveys will use the standard methodology developed here, as this will allow other and future hedgerow data sets to be compared with one another.

Declan Little
Project Manager
Woodlands of Ireland – Coillearnacha Dúchasacha

Appendix B: Hedgerow Manual data recording field sheets – explanatory notes

These notes are for field use to assist in finalising the survey field sheets available at www.heritagecouncil.ie/landscape/resources-links/ prior to submission to the National Hedgerow Database located in the NBDC.

Note: * denotes a data category derived from desk study, i.e. maps, documents, databases, etc.

	Surveyor(s)	Name(s), address & contact details
	Date of Recording	Date of field survey (day: month: year)
*D	**ID**	Unique identifier: 3 character OS hectad reference; 2 digit hedge number identifier; 1 alpha character *a* or *b* to indicate 30m strip, e.g. H13.01a
*D	**OS_Square**	3 character OS hectad reference
*D	**Length**	Total length (m) of polyline
*D	**Start_node_to_start_of_1st_30m_strip_**	Distance in metres
*D	**End_of_1st_30m_to_start_of_2nd_30m__**	Distance in metres
*D	**End_of_2nd_30m_to_End_Node_**	Distance in metres
	Context	
*D	**Corine**	CORINE Land Cover Classification
*D	**Soil Type**	This can be assessed using the appropriate layer on the NBDC website www.biodiversityireland.ie
	GPS_Start_Point	
	GPS_End_Point	
*D	**a1. Elevation_max.(m)**	Record maximum elevation of the hedge using GPS or Discovery Series contours.
*D	**a2. Elevation_min.(m)**	Record minimum elevation of the hedge using GPS or Discovery Series contours.
*D	**b1. Aspect_Side_1**	Using 16 major compass points deduce the aspect of each side based on a straight line drawn from one end of the hedge to the other.
*D	**b2. Aspect_Side_2**	See above.
	A._Adjacent Land Use (1)	Record the type of farming carried out on lands adjacent to the hedge – record both sides of the hedge.
	a tillage	
	b dairy	
	c cattle	
	d sheep	
	e mixed stock	
	g equine	
	h other	
	I fodder	Meadow cut or left for making silage or hay

	j curtilage	Fossitt BL3 and BC4
	k amenity / golf course / playing field	
	l parkland / demesne	
		27
*D	**B. History (1)**	With reference to the 6 inch to one-mile OS Maps note if the hedge is a Townland, County or other boundary of historical significance.
	1 internal farm boundary	
*D	2 townland / parish, etc. boundary	
*D	3 canal side boundary	
*D	4 railway line boundary	
	5 farm boundary	Townland boundaries, etc. should be assumed to be property boundaries.
	B1._History_Road_/_Stream (0,3)	
*D	1 road	
	2 stream	Only record if it meets Fossitt watercourse definitions
	3 recently established	Hedgerow up to c.25 years old
*D	**B1a. Road Class (0,1)**	For roadside hedges only
	NP – National Primary	
	NS – National Secondary	
	R – Regional	
	L – Local	
	U – Unclassified	
	F – Farm Road or Track	
	B2. History Ordnance Survey (0,2)	
*D	1. Boundary present on 1st Edition OS Map	6 inch to one-mile
*D	2. Boundary present on 2nd Edition OS Map	6 inch to one-mile
	B3. Sites and Monuments Record (0,1)	
*D	3. Boundary connects to feature on SMR	Sites and Monuments Record can be found at www.archaeology.ie
	B4. Old Woodland Link (0,2)	

*D	a Boundary connects to woodland on 1st edition OS	
	b Boundary shown as treeline on 1st edition OS	
	C._Adjacent Land Classification (1+) &	Record the Fossitt (2000) habitat (to the greatest level of detail possible) for land on both sides of the hedge
	D._Habitat Link Classification (1+)	This category is primarily applicable to the ends of the hedge. If the hedgerow links at any other point with any other listed habitat that is not recorded in C this should also be recorded. A 'link' is applicable only where the hedge physically borders or runs in to another habitat type. Where a break of 5 metres or less, such as a gateway, occurs between the hedge and the other habitat, treat this as being linked. Where the canopies of trees in the hedge and the other habitat meet (often over distances of 10m +), include as a link. Likewise, if a ditch continues past the hedge to link up with, for example, a watercourse, record as a link.
	a arable (BC)	
	b improved grassland (GA)	
	b1 neglected pasture (GA)	
	c semi-natural grassland (GS)	
	d non-native woodland (WD)	
	e semi-natural woodland / scrub (WN)	
	f scrub/transitional woodland (WS)	
	g curtilage/built land (BL)	
	g3 curtilage/built land (BL3)	BL3 Buildings and artificial surfaces
	h peatlands (P)	
	i lake/pond (FL)	
	j watercourse (FW)	
	k other (target note)	
	m hedgerow (WL1 or WL2)	
	n earthbank (BL2)	
	o re-colonising bare ground (ED3)	
*D	**D3._Designated Site (0,1)**	Record if hedgerow is within or immediately adjacent to any designated site.
	1 Annex 1 habitat	
	2 designated site	NHA, SAC, SPA layers can be found at http://www.npws.ie/protectedsites/ and at http://maps.biodiversityireland.ie/Maps.aspx

3 designated woodland		
E._Boundary Function (1)	This refers specifically to the functionality of the hedge line as a farm / field boundary. Does the same stock have simultaneous access to land on both sides of the hedge? An active boundary must be stockproof, irrespective of the condition of the hedge. A redundant boundary may not necessarily be redundant for shelter or other functions.	
1 hedge redundant		
2 active boundary		

Construction

*D	**F._Outline (1)**	Assess whether the hedge runs in a straight line or has a more curved or irregular plan. This may best be noted from the map.
	a linear	
	b non-linear	
	G1._Linearity_of_Shrubs_ (1)	
	1 Single Line Hedge	where the linearity of the hedgerow stems is principally defined by a single line
	2 Double Line Hedge	where the linearity of the hedgerow stems is principally defined by a two separate and distinct lines
	3 Random Line	Where the hedgerow stems do not appear to follow any distinct linear pattern record
	G2._Bank,_Wall,_Shelf (1)	
	1 Bank	
	2 Wall	
	3 Shelf	
	0 none of the above features	
	G3._Drain (1,2)	
	a External Drain	Double Ditch should be recorded as a_a
	b Internal Drain	
	c Internal Path, Track-way, etc.	Where this category is recorded structural, management and floristic recording should be made on the hedge on the side of the lane nearest to the randomly selected point that identified the hedge
	0 none of the above features	

G4._Boundary Classification (1)	Fossitt classification of recorded feature
1 WL1	Hedgerow
2 WL2	Treeline
H._Bank,Wall,Shelf_size__ (1)	The height of these features should be estimated as the average along the length of the hedge. Record the height above the general ground level of the top of the earth or stone bank (also called ditch!). Take care not to record the bank height from the level of bottom of shallow drains. A stone-breasted bank, containing earth / clay, should not be confused with a stone wall. A shelf is where the ground level is different between the two sides of the hedge (often in roadside situations). The height of a shelf is the difference between the two levels.
a < 0.5m	
b 0.5 – 1 m	
c > 1m	
d not applicable	
I Drain Size (1)	Drains tend to be approximately square in cross section. The measurements denote width and depth of the drain. An assessment based on volume should be made for very wide, shallow drains or very deep, narrow drains.
1 not present	
2 small (<0.5m)	
3 medium (0.5 – 1m)	
4 large (>1m)	
I1._Drain_Wet/Dry (0,1)	
a dry ditch / drain	
b wet ditch / drain	
Structure/Condition	For structural attributes the recording should be taken as an average for the hedge length as a whole. With the exception of Category *M* this average should not include the gaps in the hedge.
J Profile (1)	The cross-sectional profile of the hedge

a remnant	The remains of what used to be a hedge, has no consistent profile. A remnant hedge is generally indicated by a (broken) line of mature or senescent plants in tree, rather than shrub form. Almost invariably has a high percentage of gaps, although may have bits of shrubby growth (including brambles) along its length. Once the remains of a hedge covers <25% of a boundary, it is no longer classed as remnant and is not recorded (including for extent). *For a remnant hedge only record categories A-J, M,O, R, and U-Y.*
b relict (derelict)	Where shrubs and thorns of the hedge component have mostly grown up into trees, no longer displaying shrubby, dense growth form in the bottom 1-2 metres of the hedge. Plants have potential for rejuvenation.
c boxed / A shape	Has been cut into some form of a box- or A -shape, even if the last one or two years growth since cutting does not give the impression of a straight, neat, clipped hedge. 'Boxed' does not necessarily mean cut down low, hedges can be cut quite high (up to around 2 metres or more).
d overgrown/irregular	This type will have more of a base structure than type b.
e. top heavy / undercut	Hedges that have been managed in the lower section and allowed to grow up and out on top.
f straight sided	A hedge that has been completely breasted (side cut) but not topped
g wind-shaped	Shaped by the effects of strong prevailing winds.
J1._Profile_base_suffix (0,2)	
a losing basal structure	Where many of the shrubs of the hedge component do not display a horizontal mesh of branches in the lowest 1m; most of the lower portion of stems are visible (unless obscured by herbage/ground flora).
b outgrowths at base	Where shrubs / scrub are spreading laterally in to the verge alongside the base over the majority of the length. This is most commonly seen where blackthorn, gorse or damson plants are suckering out from the base of the hedge.
K Height (1)	This is estimated as an average over the whole length of the hedge to best fit classes. Where there is a distinct tree layer the measurement is taken as the height of the woody shrub layer. For managed hedges – 'height' should be the height at the last trimming/cutting point; otherwise the recorded height category could vary dependent on the time of year the hedge is surveyed.
1 <1.5m	
2 1.5 – 2.5m	
3 2.5 – 4m	
4 4 - 5m	
5 5m+	
K1._Height_overhead_cables (0,1)	
a overhead wires/cables	

L Width (1)	This is estimated as an average over the whole length of the hedge to best fit classes.
a < 1m	
b 1– 2m	
c 2 – 3m	
d 3 m+	
M.__%_of_Gaps_ (1)	This is an assessment of the percentage of the length of the hedge that no longer has a cover of hedgerow shrubs. Gaps that are filled with brambles and /or non woody vegetation are still recorded as gaps
1 complete	
2 < 5 % gaps	
3 5 – 10 % gaps	
4 10 – 25 %	
5 25 – 50 %	
6 > 50 %	
M1._Gaps_Specific_or_general (0,1)	
a general	Individual gaps < 5m
b specific	Any individual gap >5m
N Base Structure (1)	Rampant growth of brambles and cleavers or other climbers in the base of the hedge can be deceptive regarding the density at the base of the hedge. Picture the density in winter when foliage is absent for a more accurate assessment of base structure.
a open / translucent	Little or no horizontal mesh of branches of woody shrubs in the bottom metre.
b scrawny, semi-translucent	More light/ vegetation than hedge growth. The horizontal mesh of branches or bushy growth of hedging shrubs at base of the hedge is unlikely to prevent movement of stock through the hedgerow.
c semi-opaque	More hedge growth than light/ vegetation.
d dense / opaque	Shrub growth and horizontal meshing of branches in the bottom metre, sufficiently dense to contain livestock.
N1._Base_-_Vegetation (0,1)	
a vegetation	Record where the space in the lower 1m of the hedge is filled with growth of brambles or other herbage/ vegetation, etc.

O._Bank_Degradation_Degree_ (1,2)	
1 not applicable	No bank, wall or shelf.
2 none	
3 severe	Degree of erosion or degradation - bare soil may be showing, root systems may be exposed.
4 minor	
5 drain blocked/waterlogged	
O1._Bank_Degradation__Extent (1)	
a general >10%	Damage occurs over >10% of the length of the hedge
b isolated	Damage occurs at up to 10% of the length of the hedge.
P._Trees_Quantity (1)	Should reflect where species have reached tree proportions (particularly for hawthorn) diameter at breast height (DBH >8cm).
a none	
b few up to 15%	
c scattered 15 – 30%	
d abundant 31-75%	
e line >75%	
Q._Tree_Age_Composition (1)	For the purpose of this survey, immature trees are defined as having a diameter at breast height (DBH) of no more than 8 cm. Planted saplings, whips, etc. that are clearly intended to be trees should be recorded as such. Some discretion is required on the part of the surveyor as long as the basis of discretion is explained for the benefit of those using the data.
1 all mature	
2 predominantly mature	
3 predominantly immature	
4 mixed age range	
5 none	
Q1. Tree Height (max) (1) &	Record the maximum and minimum height for trees within the hedge.
Q2. Tree Height (min) (1)	

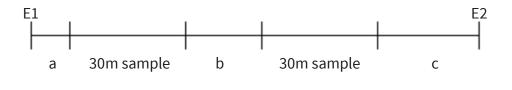|	
a <3m	
b 3-5m	
c 5-10m	
d 10-20m	
e >20m	
R._Verge_/_Margin__Width (1)	This refers to an uncultivated strip or undisturbed grassy margin alongside the hedge. In the case of tillage or arable land, this will be an unploughed/ unplanted strip (a sterile strip is not counted as a verge). In grassland situations a verge is where the edge of the field is clearly not seeded, managed, or utilised as the rest of the field, such as where grazers are excluded by a fence. A fenced off area in from a hedge should be counted, but a strip left after mowing for hay/silage should not. This should be clearly indicated by the surveyor. Record for both sides of the hedge.
a < 1m	
b 1 – 2m	
c 2 – 4m	
d 4m +	
e none	
R2._Verge_/_Margin_Degradation (0,2)	Record for both sides of the hedge.
0 none	
1 poached within 2m	
2 ploughed within 2m	
3 herbicide use >20%	Herbicide use over >20% of the length of the side of the hedge.
S._Vigour_(1,2)	An assessment of the average amount of new growth (annual increment), in terms of protruding shoots, along the length of the hedge.
a poor	This recording is appropriate where there are few new shoots, little annual increment, and /or shoots are weak or unhealthy looking.
b average	
c good	
d poor in part	
e basal decay	Evidence of dead wood in the base of hedgerow trees and shrubs.
f. evidence of disease	This includes fungal disease, mildew, etc.

Management

U._Management_ (1+)	35
a cut box profile	
b cut 'A' shape	
c cut on one side	
d cut on both sides	
e topped	
f excavator	This applies where land excavator type machinery has been used for hedge management purposes. Usually this involves knocking over mature stems along the hedge line and compressing them. Occasionally just the side growth is 'folded' or 'tucked' back into the hedge. Both cases are identified by partially broken rather than cut wounds.
g fully laid	
h laid in part	This category applies where gaps have been dealt with by laying
i coppiced	Cut no higher than 10cm from the ground
j short term unmanaged	Applies where options a-i and m have not been implemented in the last 3-5 years.
k long term unmanaged	Where there is no evidence of management activity in the last 5+ years.
l infill planting	Evidence that young plants have been introduced into the hedge to fill gaps.
m pruned	Selective cutting of individual hedgerow plants.
n other (target note)	
o cropped	Cut between 10cm and 1m from ground (high coppicing.)
U1._Management_-_out_of_season (0,1)	
a. out of season	Cut between 1st March and 31st August.
U2._Management_Stage	This is based on work done by Hedgelink in the UK, detailed in www.ptes.org/files/1353_hedgemanagementcycle.pdf
1	Heavily over-trimmed with many gaps and sparse stems, their bases gnarled or rotting.
2	Over-trimmed, infrequent stems too far apart to be 'let up' for laying. Hard knuckle at trim line, shrubs developing mushroom shaped growth form.
3	Over-trimmed, frequent stems. Stems still healthy but require more height. Hard knuckle may be starting to form at trim line.
4	Recently layed, coppiced, or planted hedgerow.

5	Healthy, dense, hedgerow with frequent stems and more than 2m in height.
6	Either a) Hedgerow more than 3m high and trimmed on rotation, or b) May also be non-intervention hedge, having intentionally been left un-trimmed for several years.
7	Hedgerow with frequent healthy stems more than 4m high.
8	Mature tall hedgerow with spreading tops. Stems still healthy (although they may be infrequent) but too large (more than 18cm in diameter) for laying.
9	Over-mature hedgerow with tops dying back, collapse possible. Perhaps becoming dominated by tree species.
10	Hedge developed into line of trees.
V._Management_Method_ (1+)	This must be determined by examining the cuts at the hedge front over which machinery has passed. If a hedge clearly has been managed but the surveyor is unsure as to the means employed, record as 7, 'unsure'.
1 flail	
2 circular saw	
3 bar cutter	
4 hand tools	
5 excavator	
6 other	
7 unsure	
8 not applicable	
W._Evidence_of_Rejuvenation_-_Past (1,2)	Laying is detected by looking in at the hedge stems to see if any are growing horizontally, or at an upward angle with lesser shoots / stems growing vertically from these. Often it can be seen where the hedge was laid as long as several decades ago. Sometimes branches can have a horizontal growth form as a result of a reaction to trimming, this should not be confused with laid stems. Closer inspection should reveal the source of the action. The scar tissue around the clean wounds from hedge laying is significantly different from those caused by the action of machinery. Past coppicing is generally detected by multiple stems originating from the same point at or close to ground level of species where this would not be the typical habit.
a no evidence	
b past evidence of laying	
d past evidence of coppicing	
W1._Evidence_of_Rejuvenation_-_Recent	

c recent evidence of laying	Within the last 5 years.
d recent evidence of coppicing	
X Fencing (1)	Record for both sides of the hedge.
1 none	
3 electric	
4 post & wire	
5 sheep wire	
6 timber fence	
7 concrete post and rail	
X3._Fencing__wire_to_stems	
2 fixed to stems	Record if wire is fixed to hedgerow stems irrespective of other fencing.
Y Ground Flora (1,5)	
d noxious weeds	Record the following on the DAFOR scale ▪ Common ragwort (*Senecio jacobea*) ▪ Spear thistle (*Cirsium vulgare*) ▪ Creeping or field thistle (*C. arvense*) Two species of dock: the curled dock (*Rumex crispus*) and the broad-leaved dock (*Rumex obtusifolius*).
e nutrient rich >20%	>20% of ground layer dominated by nutrient rich species – nettles, docks, cleavers (*Galium aparine*).
f use of herbicide	>10% of ground layer affected.
h. alien invasive species	Record presence of alien invasive species, primarily Japanese Knotweed, Giant Rhubarb, Spanish Bluebell and Himalayan Balsam. See also; http://invasivespeciesireland.com/most-unwanted-species/established/terrestrial/?pg=1

Appendix C: Method for selecting 2 random, non-concurrent, 30m strips in a given length of hedgerow

The selected hedge of length (L) between the two end points E1 and E2 is subdivided as outlined below. E1 is the most northerly and westerly of the two points and is the datum.

```
E1                                                              E2
 |---|---------------|-----------------|-------------------|-----|
 a      30m sample        b       30m sample          c
```

$$L = a + 30 + b + 30 + c$$
$$L - 60 = a + b + c$$

If the respective percentage of the total length of each of a, b and c is generated at random, then two, non-concurrent sample lengths of 30m can be randomly selected.

This can be achieved by using the RANDBETWEEN random number function in a Microsoft Excel Spreadsheet.

e.g.   Random 1 =RANDBETWEEN(0,(L-60))
        Random 2 =RANDBETWEEN(0,((L-60)-Random1))
        Random 3 =((L-60)-(Random1+Random2))

Total Length	L-60	Random 1	Random 2	Random 3
350	290	213	15	62

Each of the random numbers 1, 2, and 3 are randomly assigned to give values to a, b, and c.

Appendix D: The current hedgerow survey list of native trees, shrubs and climbers.

Note: This list is current at the time of writing and will need to be monitored and updated by the NPWS.

<u>**Native Tree, Shrub and Climber Species**</u>

Favourable tree, shrub and woody climber species		Unfavourable tree, shrub and woody climber species	
Scientific Name	**Common Name**	**Scientific Name**	**Common Name**
* Native ^ Naturalised # Non-native		* Native ^ Naturalised # Non-native	
Alnus glutinosa	Alder		All coniferous species (except Scots pine)
Betula pendula	Silver birch	#*Acer campestre*	Field Maple
Betula pubescens	Downy birch	^*Acer pseduplatanus*	Sycamore
#*Castanea sativa*	Spanish Chestnut	^*Aesculus hippocastanum*	Horse Chestnut
Cornus sanguinea	Dogwood	^*Carpinus betulus*	Hornbeam
Corylus avellana	Hazel	^*Clematis alba*	Clematis
Crataegus monogyna	Hawthorn	^*Fagus sylvatica*	Beech
Cytisus scoparius	Broom	#*Fuchsia magellanica*	Fuchsia
Euonymus europaeus	Spindle-tree	#*Laburnum anagyroides*	Laburnum
Fraxinus excelsior	Ash	#*Ligustrum ovalifolium*	Japanese Privet
Hedera helix	Ivy	^*Lonicera nitida*	Dwarf Box
Ilex aquifolium	Holly	#*Populus alba*	White Poplar
#*Juglans regia*	English Walnut	^*Prunus laurocerasus*	Cherry laurel
^*Ligustrum vulgare*	Wild Privet	^*Rhododendron ponticum*	Rhododendron
Lonicera periclymenum	Honeysuckle	^*Salix alba*	White willow
^*Malus domestica*	Wild Apple	^*Salix fragilis*	Crack willow
Malus sylvestris	Crab Apple	^*Symphoricarpos albus*	Snowberry
Myrica gale	Bog Myrtle	#*Syringa vulgaris*	Lilac
Pinus sylvestris	Scots pine	#*Tilia spp.*	Lime
Populus nigra	Black poplar	^*Viburnum lantana*	Wayfaring tree
Populus tremula	Aspen		
Prunus avium	Wild cherry		

^*Prunus cerasus*	Sour Cherry
^*Prunus domestica*	Wild Plum
Prunus padus	Bird Cherry
Prunus spinosa	Blackthorn, sloe
#*Pyrus communis*	Wild Pear
Quercus petraea	Sessile oak
Quercus robur	Pedunculate oak
Rhamnus cathartica	Purging Buckthorn
Rosa spp.	Wild Rose
Rubus idaeus	Raspberry
Salix aurita	Eared willow
Salix caprea	Goat willow
Salix cinerea subspp. oleifolia	Rusty willow
Salix pentandra	Bay Willow
^*Salix triandra*	Osier
Sambucus nigra	Elder
Solanum dulcamara	Bittersweet
Sorbus aria, S. hibernica	Whitebeam
Sorbus aucuparia	Rowan
Taxus baccata	Yew
Ulex europaeus	Gorse
Ulmus glabra	Wych Elm
^*Ulmus procera*	English Elm
Viburnum opulus	Guelder rose

Appendix E: The current hedgerow survey list of ground flora species.

Note: The following list will need to be monitored and updated by the NPWS.

<u>**Herbaceous Ground Flora Species**</u>

Scientific Name	Common Name
Ajuga reptans	Bugle
Alliaria petiolata	Garlic Mustard
Allium ursinum	Ramsons
Anemone nemorosa	Wood Anemone
Anthriscus sylvestris	Cow Parsley
Arum maculatum	Lords-and-Ladies
Chrysoplenium oppositifolium	Opposite Leaved Golden Saxifrage
Conopodium majus	Pignut
Digitalis purpurea	Foxglove
Epipactus helleborine	Broad-leaved Helleborine
Fragaria vesca	Wild Strawberry
Galium odoratum	Sweet Woodruff
Geranium robertianum	Herb Robert
Geum urbanum	Wood Avens
Glechoma hederacea	Ground Ivy
Hyacinthoides non-scripta	Bluebell
Hypericum androsaemum	Tutsan
Lapsana communis	Nipplewort
Lathraea squamaria	Toothwort
Luzula sylvatica	Great Woodrush
Lysimachia nemorum	Yellow Pimpernel
Neottia nidus-avis	Birds-nest Orchid
Oxalis acetosella	Wood Sorrel
Potentilla sterilis	Barren Strawberry
Primula vulgaris	Primrose
Ranunculus ficaria	Lesser Celandine
Sanicula europaea	Wood Sanicle
Stachy sylvatica	Hedge Woundwort
Stellaria holostea	Greater Stitchwort
Veronica Montana	Wood Speedwell
Viola spp. (V. riviniana, V. reichenbachiana)	Dog Violets

Ferns and Allies

Scientific Name	Common Name
Athyrium filix-femina	Lady Fern
Blechnum spicant	Hard Fern
<u>*Dryopteris*</u> *filix-mas*	Male Fern
D. dilitata	Broad Buckler Fern
D. affinis	Scaly Male Fern
D. aemula	Hay-scented Buckler Fern
D. carthusiana	Narrow Buckler Fern
Phyllitis scolopendrium	Hart's Tongue Fern
Polystichum setiferum	Soft Shield Fern
Polypodium spp.	Polypody Fern
Equisetum telmateia	Great Horsetail
Equisetum sylvaticum	Wood horsetail