

Longwood Community Biodiversity Action Plan 2016-2020



An Chomhairle Oidhreachta
The Heritage Council



comhairle chontae na mí
meath county council

An action of the County Meath Heritage Plan 2015-2020 and County Meath Biodiversity Plan 2015-2020

Funded by the Heritage Council in collaboration with Meath County Council

**Longwood
Community Biodiversity Action Plan 2016-2020**

By

**Deborah D'Arcy MSc
Consultant Ecologist**

In collaboration with Longwood Community

February 2016

Acknowledgements

Firstly, a big thank you to the community of Longwood for all their work, enthusiasm and commitment to the development of this Community Biodiversity Action Plan. I am sincerely grateful to Eileen Healy, Meath County Council for all her work on this project. Sincere thanks are extended to Loreto Guinan Heritage Officer, Meath County Council, and Annette Lynch, NPWS Conservation Officer for sharing their expertise and providing support during the course of this project.

Cover photo: The Fair Green at the centre of Longwood village.

Contents

Acknowledgements.....	3
Contents.....	4
Introduction	6
How was this plan drawn up?.....	6
Implementation of the plan.....	7
What is biodiversity?.....	8
The importance of biodiversity.....	8
Protection of biodiversity	8
Threats to biodiversity.....	10
Case Study.....	11
Pollinators	11
What is happening to our pollinators?	12
What can we do to help pollinators?.....	13
More Actions for Biodiversity	14
Native planting.....	14
Road verges.....	14
Ten Tips to Help Conserve Biodiversity	15
Local Setting.....	16
The environment.....	16
The community	17
Proposed Biodiversity Projects	18
Details of Selected Projects	21
The pipe project.....	21
The soccer field.....	22
Ribbontail Way walk	23
Project Guidelines.....	25
Appendix A: Planting for Pollinators.....	26
A.1: Pollinator friendly plants	26
A.2: Gardening tips for butterflies	28
Appendix B Habitat Management Methods.....	29

B.1 Managing meadow grassland	29
B.2: Creating a clover or wildflower lawn	30
B.3: Managing roadside verges.....	30
Appendix C: Habitat creation	32
C.1: Planting a woodland	32
C.2 Planting a native hedgerow	33
C.3 Planting an orchard.....	35
C.4 Creating a wildlife garden	37
C.5 Planting a wildflower meadow	38
C.6: Create a bumble bee nest site	39
Appendix D: Bird Nest Boxes	40
Standard bird nest box.....	40
Where to put up your nest box.....	41
Care of your nest box.....	41
Appendix F: Bat Boxes.....	42
F.1: Making a bat box.....	42
F.2: Where to put your bat box.....	43
F.3: Monitoring the bat boxes	43
Appendix F: Citizen Science Projects	44
F.1: Biodiversity recording	44
F.2: Small mammal footprint tunnel.....	45
Appendix G: Conservation Organisations and Special Interest Groups.....	46
References	48

Introduction

Ireland is a land of contrasting landscapes - peat bogs and limestone pavement, steep cliffs and rolling coastal dunes, rugged mountains and damp lowland pastures defined by a patchwork of hedgerows and stone walls. Our landscape, celebrated in arts, music, literature and folklore, is intrinsic to our identity and sense of place.

Appreciation for our natural heritage and love of nature has, for centuries, been engrained in many of us. Recent scientific studies have linked exposure to nature with increased energy, a heightened sense of well-being and numerous health benefits (Maller *et al.* 2008, Townsend *et al.* 2015). These studies confirm what we instinctively know and feel already.

People are spending more time outdoors; walking, running, cycling, gardening and reconnecting with nature to recharge their batteries. Communities are coming together to look after their local environment, preserving their patch and learning more about their natural environment.

While there are both global and national efforts to conserve the natural environment through legislation and policy, the role of local communities in the guardianship and conservation of our natural heritage is crucial in order to effect conservation on the ground.

The aim of this biodiversity plan is to raise awareness of biodiversity and to empower the local community to undertake actions for the conservation and enhancement of biodiversity in their local area.

“Everybody needs beauty as well as bread, places to play in and pray in, where nature may heal and give strength to body and soul alike.”

John Muir

How was this plan drawn up?

This biodiversity plan is the result of collaboration between members of Longwood community and Meath County Council. Community groups were invited to participate including Tidy Towns groups, Pride of Place, residents associations, members of the Public Participation Network (PPN) and schools. Workshops were advertised locally and the public were invited to attend.

Deborah D'Arcy Consultant Ecologist, worked with the community groups and interested individuals on behalf of Meath County Council to facilitate the development of this plan. Desktop research was carried out including a review of rare and protected species from the National Parks and Wildlife Service, records from the National Biodiversity Data Centre, site synopses of designated sites, habitat surveys and habitat mapping from the National Survey of Native Woodlands and the Irish Semi-natural Grassland Survey. In addition, *The County Meath Development Plan 2013-2019* and the *Meath Heritage Plan 2015-2020*, together with Local Area Plans and Tidy Town reports, were reviewed.

A series of four training workshops were held in Longwood. The first of these involved a walkover survey of the village with the community groups to review the natural resources and areas within the locality. This was then followed by a series of three workshops addressing key concepts in biodiversity, local biodiversity in Meath and actions that can be taken to help conserve, enhance and raise awareness of biodiversity in the local area.

These workshops were participative and facilitated the generation of project ideas, discussion and consultation with the community regarding their interests and aspirations for their local area. A range of biodiversity projects were identified that reflect the natural resources in the local area as well as the capacity, interests and expertise of the community groups. The result is a community biodiversity plan with a range of biodiversity projects to be carried out by the community over the next five years.

Implementation of the plan

It is proposed to establish a local (community) implementation group in Longwood, facilitated by Meath County Council. Each year, a work programme will be agreed along with project partners and funding sought. The progress of projects will be reviewed annually.

What is biodiversity?

Biodiversity or biological diversity describes the variety of life on earth. It includes all living things, people, plants, animals, fungi and microorganisms and the places (habitats) where they live.

Biodiversity is just another term for nature, flora and fauna, natural heritage, wildlife and the living environment.

Biodiversity is all around us, from gardens to hedgerows, woodlands to wetlands, rivers to coastlines. We all interact with biodiversity and the living environment every day as we go about our daily lives.

Habitat

A habitat is the natural home of an animal, plant or other organism. It can be an area such as woodland or grassland or a feature such as a tree or a stone wall.

The importance of biodiversity

Biodiversity sustains life on earth. It provides us with fertile soils, the air we breathe, our food and fuel and is important in regulating our climate, nutrient cycling and crop pollination. Lots of medicines are first discovered from plant and animal species. A healthy environment is important for human health, well-being and in delivering economic benefits (e.g. agriculture and tourism). Nature provides us with natural amenities to enjoy, parks and green spaces, wildlife and landscapes to admire and thus improves our quality of life. All these free services are called ecosystem services or ecoservices and are crucial to sustaining life on earth.

Protection of biodiversity

European Directives have helped shape national legislation and policies towards the protection and conservation of biodiversity. The EU Habitats Directive and Birds Directive have directed the establishment of Special Areas of Conservation (SACs) for habitats and certain species and Special Protection

Areas (SPAs) for birds. These conservation areas provide protection for important areas that contain the best examples of Irish habitats and important populations of certain species. However, these areas only contain a small fraction of Ireland's biodiversity and it is important that biodiversity is afforded protection outside of protected areas. The EU Water Framework Directive and the EU Nitrates Directive are important for the protection of our waters both marine and freshwater. At a national level, the most important legislation for the protection of wildlife is the Wildlife Act 1976 (as amended).

Conservation policy has also been driven by Ireland becoming a signatory to the Convention on Biological Diversity 1992. On signing, Ireland undertook to promote the conservation and sustainable use of biological diversity. This led to the development of a National Biodiversity Plan promoting the need for the integration of the conservation and sustainable use of biological diversity into all relevant sectors and into the development and implementation of other policies, legislation, and programmes. Local Authorities have adopted Local (County) Biodiversity Action Plans and this Community Biodiversity Action Plan complements the Meath Local Biodiversity Action Plan 2015-2020.

Despite these efforts, biodiversity is under serious threat both in Ireland and globally.

Any project or work that is carried out within a SAC, SPA or NHA may be "An Activity Requiring Consent". Check with your local NPWS Conservation Ranger to see if this is the case before commencing any project.

Threats to biodiversity

Biodiversity is under threat globally and Ireland is no exception. The Millennium Ecosystem Assessment, the most authoritative statement on the health of the earth's ecosystems has demonstrated the negative impact of human activities on the natural functioning of the planet. As a result, the ability of the planet to provide the goods and services that we, and future generations, need for our well-being is seriously jeopardized.

- **Habitat destruction and fragmentation** - changes in land use to provide for human shelter, food, fuel and material goods has resulted in loss of land that previously provided habitats for wildlife
- **Invasive alien species** - non-native plant and animal species accidentally or deliberately introduced into Ireland by human activities that displace our native wildlife
- **Pollution**- deterioration in air and water quality mainly as a result of industrial and transport activities
- **Unsustainable and excessive consumption** - increases the effects of all of the above
- **Climate change** - rapid climate change chiefly a result of burning fossil fuels to produce energy and deforestation has caused changes in climate that has an effect on the survival of other species

Case Study

Pollinators

Pollination is the transfer of pollen between flowers of plants of the same species and is necessary for the production of seeds and fruit. We rely on bees and other insects to pollinate many of our crops. The result for us is that we have a range of fruit and vegetables to eat. The result for wildlife is that it provides fruit and seeds for animals to eat and the persistence of wildflowers in the landscape.

Unfortunately, the number of bees in Ireland has declined substantially, with 30% of species considered threatened with extinction. This is due to a lack of flower-rich habitats for the bees to feed on, the use of pesticides and herbicides, climate change and pests and diseases such as the *Varroa* mite which weakens honey bee colonies.



Did you know?

100 crops provide 90% of the world's food.

71 of these crops are pollinated by bees.

What is happening to our pollinators?

Hunger and homelessness: Intensive agriculture particularly the move from hay making to silage production (and other land use change e.g. forestry and urban development), has led to a decrease in the numbers of wildflowers in the landscape.

Pests and disease: *Varroa destructor*, a parasitic mite introduced to Ireland with imported honeybees attacks and weakens honey bees and spreads viruses to them. It can even lead to death of the honey bee colony. Other diseases may spread to wild bees from bumble bees imported for pollination in glasshouses and polytunnels.

Pesticides: Insecticides particularly systemic pesticides, such as the neonicotinoids, applied to crops reach pollinators through pollen and nectar and through the air, water and soil. Herbicides decrease the amount of wildflowers available as food in the landscape.

Climate change: Climate change is likely to bring about changes to the timing of flowering and lifecycle events of pollinators. This could lead to mismatches between the timing of flowering and the pollinators searching for food.



Pollinator planting, beautiful and plentiful for pollinators

What can we do to help pollinators?

Plant pollinator-friendly plants: Incorporate pollinator-friendly plants into gardens and village streetscapes. Not all flowers are useful to pollinators. Double or multi-petaled cultivars may lack pollen and/or nectar, or it may be difficult for bees to reach the pollen or nectar in these types of flowers. Plant a range of plants that will provide a source of nectar and pollen throughout the year. Clumps of bee-friendly plants in sunny places will be more attractive than plants that are scattered or in shade (Appendix A for guidance)

Mow less- create a wildflower lawn: Common wildflowers in lawns include white clover, red clover, dandelion and self-heal which never get a chance to flower because we tend keep our lawns so short. All these wildflowers will flower in your lawn if you raise the blades on your lawn mower and cut the lawn less often allowing the flowers to bloom. Dandelion is a very important early nectar source in spring.

Make hay: Manage an area of grassland or road verge/bank as a wildflower meadow.

Avoid the use of herbicides: Herbicide use kills our native wildflowers which are an important food source for our pollinators and are an integral part of the natural Irish landscape.

Provide nest sites for bees Areas of long grass will provide nesting sites for bumble bees. Compacted bare earth (soil, sand, clay) will suit solitary mining bees; south facing stone walls, masonry, wooden structures or purposefully made nest boxes will suit cavity nesting solitary bees.

National Pollinator Plan

In 2015, *The All Ireland Pollinator Plan 2015-2020* was launched by the National Biodiversity Data Centre. The main objective of the plan is to make Ireland pollinator friendly by taking action on farmland, public land and private land.

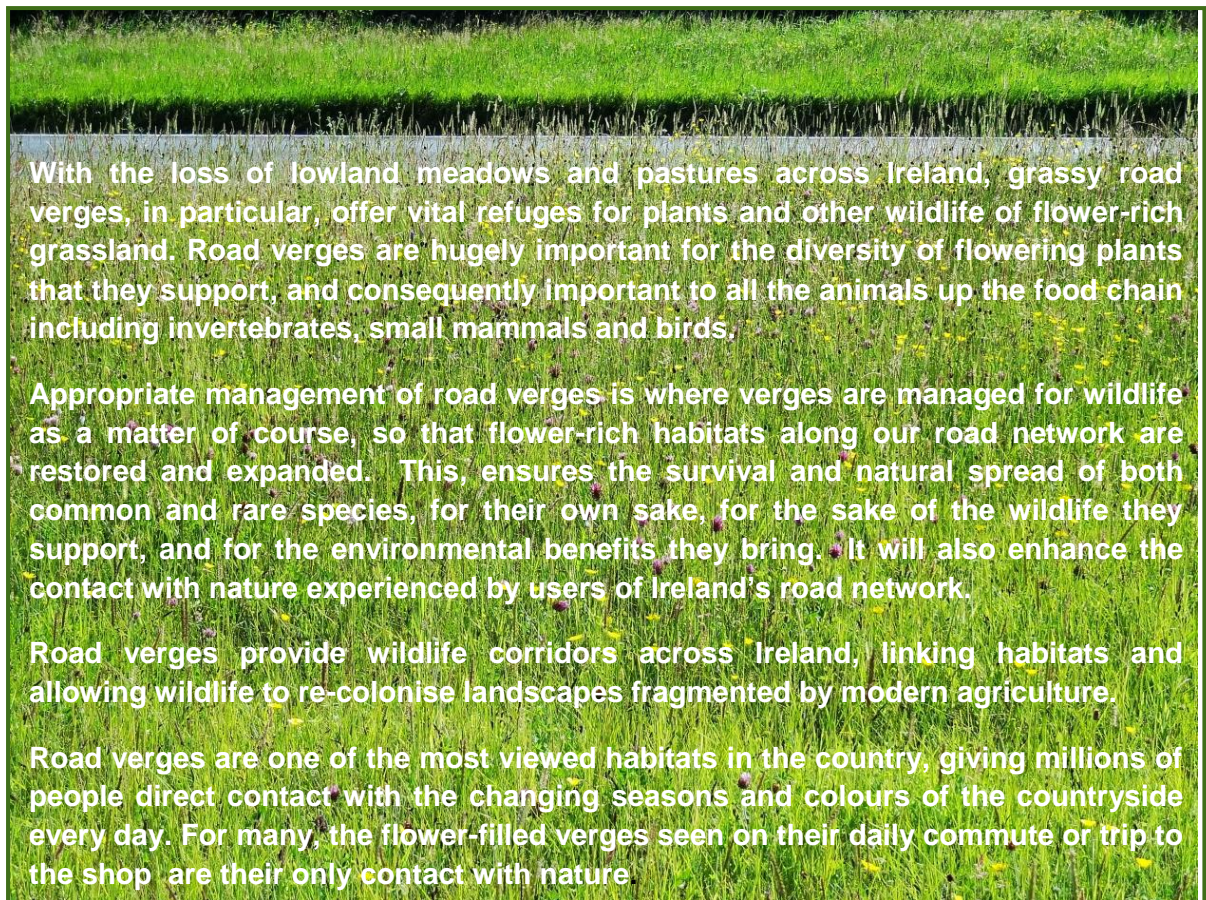
More Actions for Biodiversity

Native planting

Native planting is best for wildlife. Native plants are those species of plants that colonised the landscape of Ireland naturally. These species found their way to Ireland by themselves without being brought here by humans. They are adapted to the environmental conditions here in Ireland and provide food and shelter for lots of other native wildlife in Ireland.

There are many plants that were introduced into Ireland by humans as garden plants and trees. These plants do not provide as many resources for our native animals and can also look very “out of place” when planted in the countryside or in semi-natural areas. Our natural heritage is unique to Ireland so avoid planting non-native species in semi-natural areas as this contributes to the erosion of our distinctive Irish landscape.

Road verges



With the loss of lowland meadows and pastures across Ireland, grassy road verges, in particular, offer vital refuges for plants and other wildlife of flower-rich grassland. Road verges are hugely important for the diversity of flowering plants that they support, and consequently important to all the animals up the food chain including invertebrates, small mammals and birds.

Appropriate management of road verges is where verges are managed for wildlife as a matter of course, so that flower-rich habitats along our road network are restored and expanded. This ensures the survival and natural spread of both common and rare species, for their own sake, for the sake of the wildlife they support, and for the environmental benefits they bring. It will also enhance the contact with nature experienced by users of Ireland's road network.

Road verges provide wildlife corridors across Ireland, linking habitats and allowing wildlife to re-colonise landscapes fragmented by modern agriculture.

Road verges are one of the most viewed habitats in the country, giving millions of people direct contact with the changing seasons and colours of the countryside every day. For many, the flower-filled verges seen on their daily commute or trip to the shop are their only contact with nature.

Ten Tips to Help Conserve Biodiversity

Everyone in Longwood is encouraged to get involved in the implementation of this community biodiversity plan and to assist with the projects, however, it is equally important and effective to take action as individuals in our homes and gardens. The following are some simple ways that we all, as individuals, can help to conserve biodiversity. The actions below can be carried out by incorporating some simple features in our gardens or by taking some simple actions.

1. Plant native trees (Appendix C) and pollinator friendly plants (Appendix A)
2. Change the grass-mowing regime to create a wildflower lawn (Appendix B)
3. Leave some areas of grass to grow long as habitat for insects
4. Let a clump of nettles grow for butterflies to lay their eggs on
5. Leave piles of leaves in quiet corners for hedgehogs
6. Create a pond/water feature in your garden
7. Avoid the use of herbicides, pesticides and rodenticides
8. Erect bird boxes and feeders (Appendix D)
9. Compost your garden waste and vegetable peelings
10. Record your sightings of wildlife and send them to the National Biodiversity Data Centre or use their Biodiversity App (Appendix F)

You could also make a bug hotel!



Building a bug hotel can provide a variety of nest sites for invertebrates

Local Setting

The environment

Longwood is a medium-sized rural village located in southeast County Meath. The River Boyne runs 2 km to the west while the River Blackwater runs 1 km to the east of the village and the Royal Canal is 1.5 km due south. The River Boyne is designated as a Special Area of Conservation (SAC) and a Special Protection Area (SPA) for birds at this point. However, the River Blackwater is not designated at this location. The Royal Canal runs approximately 1.5 km south of the village and is designated as a National Heritage Area (pNHA). The Fair Green in the centre of the village is a considerable amenity for the residents of Longwood. Trees define the north and west sides of the green and contribute greatly to its attractiveness. In May 2008 a tree survey was carried out in the village, identifying trees, of biodiversity value. A deep drainage channel runs just north of the primary school and has become vegetated with a variety of wetland plants.



Aerial image of Longwood in 2011 showing sites protected for nature conservation
SAC: Special Area of Conservation; SPA: Special Protection Area; pNHA Natural Heritage Area

The community

Longwood have an active Tidy Towns group whose members are dedicated to the development and enhancement of the village for the community and the environment supported by Tús, the community work programme initiative and local volunteers. The graveyard committee tends the graveyard and local residents associations see to the upkeep of the green areas in their estates. The primary and post primary school actively contribute to activities in the village and local scouts and youth groups are also involved in village life. These organisations work in partnership with a number of organisations, for example Meath County Council, the Heritage Council and local businesses. The GAA club and soccer club provide sporting facilities in Longwood, and the community gather for fair days on the fair green with an annual tractor run and circus among other events.



A section of the Royal Canal

Proposed Biodiversity Projects

This Biodiversity Action Plan proposes a number of ambitious projects and actions to be carried out by the community of Longwood. The following list of projects was drawn up in consultation with the community and includes actions to conserve, facilitate and to raise awareness of and celebrate biodiversity in Longwood. Detailed practical information for carrying out the projects are provided in the appendices.



Map showing locations of proposed projects as numbered in the following table

Longwood Community Biodiversity Plan 2016-2020

Project No.	Location	Project	When	Partner	Appendix
1	Fair Green	Cut below trees less often and allow wildflowers to grow. Plant bluebells beneath the trees. Erect bat boxes in trees. Consider organising a bat survey/walk as community event.	1	Tidy Towns	E
2	Old Garda station	Add pollinator planting to bed alongside the house.	1	Tidy towns	A
3	Approach roads	Sensitive road verge management. Avoid use of herbicides. Allow wildflowers to grow by cutting 1-2 times a year and remove the cuttings.	1-5	Tidy Towns TUS	B.2
4	Vacant site	Set up the large upturned sewer pipe with gravel and soil and plant up to discourage dumping. Consider using panels/graffiti on wall to illustrate the wildlife value of the vacant site.	1	Tidy towns Schools	A
5	Village	Increase number of planters in village and plant with pollinator friendly plants. Identify area for composting.	1-5	Credit union Antiques and curios Tidy Towns Church	A
6	Soccer field	Manage marginal areas as a hay meadow. Conduct plant, bee and butterfly recording/surveying project in the meadow with school students.	1-5	Tidy Towns Soccer club Schools	B.1
7	Soccer field	Continue with native tree planting on verge near road to create a mini-woodland area.	1-5	Tidy Towns	C.1
8	Graveyard	Plant up the gap in hedgerow with hawthorn and maintain as low hedgerow to keep back from power lines above.	1	Tidy Towns Graveyard committee	C.2

9	Ribbontail Way	Erect bird nest boxes and bat boxes in hedgerows along the trail. Organise a guided community walk along Ribbontail Way to the canal with a focus on the biodiversity of the walk and the canal. Investigate the possibility of improving access by upgrading the trail path and erecting waymarking signage.		Tidy Towns	D E
10	St Fintina's Post Primary School	When the building is complete, create a biodiversity area with native hedgerow, tree planting and long grass verge with a view to using this area as a resource for ecology studies by the students.	1-5	Principal	C.1 C.2 B.1
11	St Nicholas Primary school	Develop a school garden including a wildlife garden. Promote school biodiversity projects.	1-5	Local school Meath County Council	C.4
12	Longwood	Run an awareness programme on bird life in the locality.	2-5	Birdwatch Ireland	
13	Longwood local community	Develop an annual biodiversity awareness programme and interpretation activities.	1-5	Meath County Council Local community	
14	Longwood	Survey and habitat map for the local area.	1-5	Meath County Council	

Details of Selected Projects

The pipe project

As is often the case, the vacant site to the north of Brackinrainey Wood is a wildlife haven in the village, with wild flowers, grasses and some young willow and birch. Unfortunately the area suffers from dumping and littering and can become an eye sore. The Tidy Towns group plan to raise awareness of the wildlife value of the area and discourage littering and dumping by means of an innovative use of a large drainage pipe at the entrance. The pipe is currently used as a bin with rubbish bags and bottles regularly being dumped there. The Tidy Towns group intends to plant it up with a feature planting scheme including pollinator-friendly plants. With the help of the local primary school, the pipe itself will be painted and illustrated with information about pollinators or the wildlife of the area. It is hope that this planting scheme will change people's perceptions that the area is an eyesore to one where wildlife flourishes.



The drainage pipe at the entrance to the vacant site in Longwood

The soccer field

The Longwood community plan to manage the area of grassland, adjacent to the GAA football grounds, as a hay meadow in an effort to increase biodiversity. A range of wildflowers are currently growing on the margins of the football field including red clover, meadow vetchling, ribwort plantain. The presence of silverweed and hard rush indicates a degree of wetness in some parts of the area. This is probably due to its location in a depression. The area is adjacent to a drain which runs along the southern boundary and has potential as a wildlife corridor. The fact that the primary and post primary schools are nearby means that this area could provide additional natural resources for students as part of their ecology studies.

The management will involve:

- Management of the semi-natural grassland as a hay meadow involving the local community in a volunteer hay-making day or possibly being baled by a local farmer,
- Cutting the area in September or earlier if hay is to be used as fodder. A second cut in spring may be required,
- Promotion of the area (by way of some simple signage) as an important biodiversity area for native plants, pollinators and other wildlife.

The hay will then be harvested after the wildflowers have set seed in August or September. Over time, it is expected that the number and diversity of wildflowers will increase. Traditional hay meadows are a rare sight in Ireland, and this project will have many benefits both for biodiversity in the area. The project presents an ideal opportunity to raise awareness about this biodiversity project through simple signage and perhaps discussion at the soccer field!



Location of Hay Meadow Project adjacent to the soccer field

Ribbontail Way walk

Ribbontail Way is a lovely 1.5 km trail bordered by a hedgerow which leads from the Fair Green in Longwood to the Royal Canal. The trail or path is already in place but is apparently little used by the residents of Longwood. While a little muddy in places the trail is easily passable in appropriate footwear. The community plan to enhance the existing habitat for wildlife by erecting bird and bat boxes in the taller trees along the hedgerow. To raise awareness of the local wildlife, and that of Royal Canal, they plan to run a guided community walk at least once a year.



A section of the Ribbontail Way walk



Entrance onto the Royal Canal from Ribbontail Way

Project Guidelines

The following appendices contain detailed guidance for carrying out biodiversity projects including detailed specifications for bird and bat boxes and guidance on managing a meadow. The guidance on woodland planting should be useful when planting the mini-woodland or planting up the new school grounds.

Some additional guidance has been included on hedgerow planting, orchard planting and roadside verge management as these actions may be appropriate following the findings of the habitat survey or may be useful guidance for other groups who get involved in the implementation of the plan e.g. residential associations or businesses in Longwood.

Some extra activities have been included. "Building a bee nest site" is a fun activity to do with children and "tracking mammals" is a very good science project that is suitable for both primary and secondary students.

Appendix A: Planting for Pollinators

Not all flowers are useful to pollinators. Double or multi-petaled cultivars may lack pollen and/or nectar or it may be difficult for bees to reach the pollen or nectar in these types of flowers. Also F1 hybrids are sterile and so do not produce pollen.

Plant a range of plants that will flower at different times of the year to provide a source of nectar and pollen throughout the year. Clumps of bee-friendly plants in sunny places will be more attractive than plants that are scattered or in shade.

A.1: Pollinator friendly plants

Here is a list of some pollinator friendly plants to get you started but there are plenty more to choose from. Many garden centres now have sections selling pollinator-friendly plants. The Royal Horticultural Society provides a free list of pollinator plants at: www.rhs.org.uk/perfectforpollinators and in 2016 the National Biodiversity Data Centre will provide a full list of plants suitable for pollinators www.biodiversityireland.ie



A range of pollinator-friendly plants are blooming in this flower border

Some Pollinator-friendly Plants

Winter	Spring	Summer	Autumn
Snowdrop (<i>Galanthus</i>)	Apple (<i>Malus</i>)	Columbine (<i>Aquilegia</i>)	Borage (<i>Borago</i>)
Hellebores (<i>Helleborus</i>)	Horse chestnut (<i>Aesculus</i>)	Yarrow (<i>Achillea</i>)	Majoram (<i>Origanum</i>)
Barberry (<i>Mahonia</i>)	Field maple (<i>Acer campestre</i>)	Bistort (<i>Persicaria bistorta</i>)	Knapweed (<i>Centaurea</i>)
Winter aconite (<i>Aconitum</i>)	Cherry (<i>Prunus</i>)	Angelica (<i>Angelica</i>)	Larkspur (<i>Delphinium</i>)
Ivy (<i>Hedera helix</i>)	Lime (<i>Tilia</i>)	Bell flowers (<i>Campanula</i>)	Heathers
Willow (<i>Salix</i>)	Hawthorn (<i>Crataegus monogyna</i>)	Chives (<i>Allium</i>)	Lavender (<i>Lavandula</i>)
Japanese aralea (<i>Fatsia japonica</i>)	Willow (<i>Salix</i>)	Comfrey (<i>Symphytum</i>)	Nasturtium
	Rosemary (<i>Rosmarinus officinalis</i>)	Foxglove (<i>Digitalis</i>)	Catmint (<i>Nepeta</i>)
	Barberry (<i>Mahonia</i>)	Hebe	Raspberry (<i>Rubus</i>)
	Hebe	Lupin (<i>Lupinus</i>)	Runner beans (<i>Phaeolus coccineus</i>)
	Broom (<i>Cystisus</i>)	Monkshood (<i>Aconitum</i>)	Scabious (<i>Knautia, Scabiosa</i>)
	Bluebell (<i>Hyacinthoides non-scripta</i>)	Sage (<i>Salvia</i>)	Snapdragon (<i>Antihirrhums</i>)
	Bugle (<i>Ajuga reptans</i>)	Thyme (<i>Thymes</i>)	Sunflowers (<i>Helianthus</i>)
	Aubrieta	Coneflower (<i>Echinacea purpurea</i>)	Ivy (<i>Hedera helix</i>)
	Barberry (<i>Berberis</i>)	Bell Heather (<i>Erica cinerea</i>)	Chrysanthemum
	Wallflower (<i>Erysimum</i>)	Red Turtlehead (<i>Chelone obliqua</i>)	Ice plant (<i>Sedum</i>)
	Cranesbills (<i>Geranium</i>)	Bugbane (<i>Actaea simplex</i>)	Honeysuckle (<i>Lonicera</i>)
	Blueberry (<i>Vaccinium</i>)	Bee Balm (<i>Monarda</i>)	
	Cowslip (<i>Primula veris</i>)	<i>Heliopsis</i>	
	Primrose (<i>Primula vulgaris</i>)	Black-eyed Susan (<i>Rudbeckia</i>)	
	Spurges (<i>Euphorbia</i>)	Wallich milk parsley (<i>Selinum wallichranum</i>)	
	Pasque flower (<i>Pulsatilla vulgaris</i>)	Burnet (<i>Sanguisorba</i>)	
		Sneezeweed (<i>Helenium</i>)	
		Bramble (<i>Rubus fruticosus</i>)	

A.2: Gardening tips for butterflies

Butterflies need both a nectar source for the adults and food plants for the caterpillars. Some caterpillars are very specific about the food plants they will eat. Don't forget to provide some hibernation sites for butterflies during the winter.

Nectar source	Food plant	Hibernation
Hebe	Nettles for small tortoiseshell, peacock, red admiral, painted lady, comma	Do not trim back dense ivy. Brimstone butterflies will use it for hibernation and the late summer/autumn generation of the holly blue will use it for breeding if it is allowed to flower
Ice plant (<i>Sedum spectabile</i>)	Thistles for painted lady	A log pile in a shaded, wooded part of the garden could be used as a hibernaculum by peacock butterflies
Lavender (<i>Lavandula angustifolia</i>)	Alder buckthorn for brimstone larvae	A wooden garden shed with the door or window left open in September/October will attract small tortoiseshell butterflies prospecting for a hibernation spot. Make sure that they can leave in March
Verbena (<i>Verbena bonariensis</i>)	Blackthorn for brown hairstreak/moth larvae	A gap in stonework or in a wall vent allows access for hibernating small tortoiseshells, so don't be in a hurry to make unnecessary repairs
Majoram (<i>Origanum vulgare</i>)	Hazel for moth larvae/shelter	
Chives (<i>Allium schoenoprasum</i>)	Holly for Holly Blue larvae	
Wild thyme (<i>Thymus praecox</i>)	Oak for Purple hairstreak/moth larvae	
Michelmas daisy (<i>Aster novae-belgii</i>)	Bird's foot trefoil for cryptic wood white, wood white, common blue, dingy skipper, green hairstreak	
Grape hyacinth (<i>Muscari neglectum</i>)	Cuckoo flower for green-veined white, orange-tip	

Appendix B Habitat Management Methods

B.1 Managing meadow grassland

[Adapted from A Crofts & Jefferson RG (Eds) The Lowland Grassland Handbook English Nature/The Wildlife Trusts 1999 and Teagasc Managing Meadow Grass]

In general the change from late mown meadow to early cut silage has reduced the wildlife value of grasslands in Ireland. Traditional hay meadows are now rare in Ireland. To improve or recover the wildlife value of grasslands, the best management is to revert to traditional management practices, particularly with respect to the use of fertilisers and timing of mowing.

If the hay is to be used as fodder then cut and bale the hay after the 1st August which will still produce palatable hay but allow the seeding of late flowering meadow plants and avoid disturbance to ground nesting bird species.

Occasionally 1 year in 5 delay the cut till late August/September to allow some very late flowering species to set seed (e.g. Common Knapweed). If the hay is not to be used as fodder you can delay the cutting till later if this suits as the palatability of the crop will not be important.

Watch the weather forecast and try to cut the hay when there is a good spell of dry days forecast. Baling of the hay should be done when the hay is dry if it is to be stored as winter fodder.

If possible follow the mowing with grazing by cattle (or horses or sheep) at an appropriate stocking rate as this can increase the structural diversity of the sward. Remove the livestock during winter to prevent poaching of the soil.

If grazing isn't possible, then an early cut before the end of February should be carried out. Again the clippings/hay should be removed if possible.

It may take a few years before you see the number and diversity of wildflowers increasing. Monitor your meadow to see if it is becoming more species rich. Even if you can't name them, count the number of different grasses and wildflowers growing each year and see if it increases.

If necessary, further increasing the range of wildflowers and grasses in the sward can be attempted by:

- Direct sowing/spreading or native seed from another local source (e.g.) from existing species-rich hay meadow.
- Scarifying the soil and seeding with Yellow Rattle, a native wildflower, typical of hay meadows that is semi-parasitic on grasses and can help to reduce the vigour of grasses and allow more wildflowers to proliferate. Yellow rattle may be collected

from a local grassland or if not available bought from a wildflower seed supplier (see resources for more information).

If weedy species such as docks, thistles or ragwort are a problem then remove them by pulling or spot treating with small amounts herbicide. Note careful spot treating is needed as treating the area with herbicide will kill the wildflowers you are trying to encourage.

B.2: Creating a clover or wildflower lawn

Identify some green areas or lawns that have clover growing in them. Clover is easily identified at any time of year by the characteristic three leaflet structure of the leaves. If there are other species of wildflower such as dandelions, bird's foot trefoil or even self-heal growing in the lawns then that is even better.

Raise the blades on your lawn mower to the highest setting and cut the lawn less often. How often you cut will depend on the time of year and how fast the lawn is growing. The aim is to allow the dandelions, clovers and other wildflowers to grow and bloom but you can maintain a neat appearance by topping the grass when it grows taller than the flowers.

If you only have clover in your lawn and would like to try introducing more wildflowers then you could try scarifying the lawn and adding seeds of dandelion, selfheal or bird's foot trefoil to increase the diversity of wildflowers in your lawn. Only buy native Irish wildflower seeds or better still collect some from your local area.

B.3: Managing roadside verges

[Adapted from Plantlife 2015 www.plantlife.org.uk]

Where health and safety considerations for road safety and traffic management allow, roadside verges in the countryside should be managed as semi-natural grasslands to allow native wildflowers to bloom.

As it is not normally possible to graze roadside verges, two cuts per year are usually required one in early spring and one in autumn. The cuttings should be removed and composted. This is important to prevent the buildup of nutrients in the soil.

Under the Wildlife Act, it is an offence to cut, grub, burn or destroy vegetation on land not then cultivated between the **1st March and 31st August**. This legislation applies to all roadside verges in the countryside (except where road safety considerations apply).

A. Management of unshaded grassy road verges

The following should be undertaken on all grassy road verges (apart from those where safety is a priority):

If only one cut is possible:

- Cut the full width of the verge once a year, during September. This allows plants to flower and, importantly, gives time for seed to be set. Remove the cuttings.

If more cuts are required

- Then cut once more before March. This is the ideal option to conserve and enhance wild flowers, as it mimics the pattern of traditional meadow management. Remove the cuttings.

If it is not practical to cut the whole width of the verge:

- On large verges, cut a 1 m strip at the edge of the verge during February and remove the cuttings. Grass at the back of the verge can be allowed to grow longer, providing a diversity of habitat that is especially important for invertebrates. Cut the full width of the verge during September.

B. Management of roadside verges shaded by hedgerows and treelines

Roadside verges that are shaded by treelines or hedgerows will have a more woodland type ground flora such as bluebells, dog's violets and wood sorrel. They may only need one cut a year if vegetation growth is impeded by shading. Cut these verges in September. No cutting should be carried out from the end of January. This will allow early woodland flowers to grow and set seed.

Collection of clippings: It is essential to gather and remove grass cuttings, either by hand or by use of suitable cut-and-collect machinery. Try to collect the cuttings after they have had a few days to dry out as this will promote seed dispersal. Removing the cuttings will reduce the build up of organic material (i.e. a thatch of cut grass), keep nutrient levels low, and ensure that there is plenty of bare ground for plants to regenerate from seed. The cuttings, rich in wildflower seed, can be used as green hay to benefit other local verges or grasslands or they can be composted locally.

Don't use commercial seed on roadside verges: Sowing of artificial seed mixes is unnecessary and costly, and is often unsuccessful in the long term: The resulting verge vegetation bears little resemblance to naturally-occurring plant communities, has a uniform structure that results from the even distribution of species within sown mixes, and ultimately does not reflect the local character of vegetation that develops naturally. It may also introduce species that are not characteristic of the area.

BEE FRIENDLY!

Appendix C: Habitat creation

C.1: Planting a woodland

[Source: Department of Agriculture Native Woodland Scheme Manual 2011]

Plant native trees of Irish or local stock during the tree planting season from November to February. A good way to ensure that the tree you are buying is native is to always check the scientific name (the Latin name) and make sure it is the same as the Latin name of the native species you are looking for.

Check with your tree nursery or supplier whether the trees are grown from seed collected in Ireland. Imported trees may not grow as well in Ireland as they are not adapted to our climate or soil conditions and also risk introducing diseases from other parts of Europe. This is what caused ash dieback disease in Ireland

Even better still, collect native seed such as acorns, ash keys, rosehips etc. from local woodlands and hedgerows and grow your own. Start them off in pots to give them the best chance and plant them out when they are big enough.

Suitable tree species for planting as groves, woodlands and hedgerows in Meath include:

- Ash (*Fraxinus excelsior*)
- Hazel (*Corylus avellana*)
- Pedunculate Oak (*Quercus robur*)
- Downy Birch (*Betula pubescens*)
- Elm (*Ulmus glabra*)
- Rowan (*Sorbus aucuparia*)
- Hawthorn (*Crataegus monogyna*)
- Holly (*Ilex aquifolium*)
- Spindle (*Euonymus europaeus*)
- Blackthorn (*Prunus spinosa*)

Choose species from the above list that are already growing in the hedgerows and /or woodlands in your local area.

Woodland planting mixtures

On dry soils

Ash (*Fraxinus excelsior*). (50%), pedunculate oak (*Quercus robur*) (25%) in pure groups. hazel (*Corylus avellana*) and hawthorn (*Crataegus monogyna*) (5%) scattered throughout. Other species (5%) positioned along edges and glades; downy birch (*Betula pubescens*), holly (*Ilex aquifolium*), spindle (*Euonymus europaeus*), rowan (*Sorbus aucuparia*), wild cherry (*Prunus avium*) and crab apple (*Malus sylvestris*).

Wet or waterlogged soils

Alder (*Alnus glutinosa*), Grey Willow (*Salix cinerea*) and Ash (*Fraxinus excelsior*).

Planting mixture: Alder (*Alnus glutinosa*) (50%), Ash (*Fraxinus excelsior*) (10%), Grey Willow (*Salix cinerea*) (10%) and Downy Birch (*Betula pubescens*) (10%). Hawthorn (*Crataegus monogyna*) (5%) scattered throughout. Minor species (15%) pedunculate oak (*Quercus robur*), holly (*Ilex aquifolium*), hazel (*Corylus avellana*), guelder rose (*Viburnum opulus*) positioned between the above pure groups.

C.2 Planting a native hedgerow

[Adapted from Teagasc 2009 Countryside Management Series 4 New Farm Hedgerows]

Hedgerow planting should be done during the tree planting season between November and February. To make planting easier, cover the ground with black polythene at least 6 months before hand to suppress existing vegetation.

Choosing Species

- Native species, adapted to Irish conditions benefit wildlife more.
- Locally grown plants, tolerant of local conditions, are likely to thrive.
- Plants grown from locally collected seed conserves local provenance (origin), but this takes time, effort and patience.
- Thorny species such as whitethorn or blackthorn are essential for a stockproof hedgerow.
- A variety of species provides a varied food supply throughout the year for more wildlife. Include another hedgerow species or climber approximately every metre
- Include a tree species at irregular intervals, provided it will be allowed to grow up and is NOT topped when routinely trimming the hedgerow.
- Avoid trees that cast dense shade, such as sycamore, beech and chestnut.

Hedgerow Species

These species survive routine trimming as a hedgerow while individual stems can be allowed to grow up and mature into trees.

- Whitethorn (hawthorn): Predominant hedgerow species. Hardy, fast-growing and tolerates most soils except very wet.
- Blackthorn: suits most soils except very wet. Suits exposed and coastal sites. Spreads by suckers, good for gapping up, but is invasive.
- Holly: slow growing evergreen. Tolerates exposed sites and shade. Suitable under trees. Male and female plants required for berries.
- Spindle: prefers alkaline, but tolerates a wide range of soils. Open, infertile site better for fruit production.
- Guelder rose: prefers alkaline, fertile, clay soils and neutral wet soils. Acid soils unsuitable. Competitive in new hedgerows.
- Hazel: prefers heavier, fertile soils. Tolerates some shade. Understory species.

Hedgerow Planting

It is recommended to plant 7 plants/metre in a double staggered row. This means a spacing of 300mm (1') between plants in each row and at least 300mm (1') between the two rows. Of the 7 plants in every metre, at least 6 should be whitethorn for a stockproof hedgerow. The other plant in every metre should come from the list above which tolerate routine trimming: **The best guide is to look at hedgerows growing locally and plant the same native species. If native varieties are not available, do not use ornamental garden varieties as they crowd out the desired plants and are not so good for biodiversity.**

Prepare the ground and ensure that plant roots do not dry out. This can be done by keeping them in their bag in a cool place until planting or dig them into a temporary trench. During planting, avoid exposing the plants to air.

Dig a trench and plant to the same depth as previously planted in the nursery.

Whitethorn, blackthorn and dog-rose should be cut back to 100mm (4") from ground level to promote shoots at this level. Leave a few whitethorns un-pruned, placing tree shelters on them to identify and protect as single stemmed mature trees. Identify a few other species for retention as single stemmed trees. Trees such as Pedunculate Oak and Ash are also suitable. Retain approximately ten single stemmed small trees per 300 m; too many make hedge cutting difficult and cast shade on the hedgerow.

Ongoing Management

- Water in dry weather
- Control competing vegetation to prevent smothering and allow lower branches develop, giving a dense base.
- Manual weeding
- Mulching immediately after planting helps weed control. Mulch such as wood chippings, paper or cardboard must extend 150mm outside the plants.
- Fence off livestock using temporary fencing. Consider livestock reach and future access for machine trimming, when positioning the fence. Rabbit proof fencing may be needed to protect from rabbits or hares.
- Replace plants which fail to grow.
- For the first few years after planting, cut whitethorn back to 75mm above previous level of cut, gradually shaping into a triangular profile.

C.3 Planting an orchard

An orchard is a wonderful resource to have in a community. It will provide fresh, flavoursome fruit and flowers for bees and encourage a community spirit of sharing and celebration of the earth's bounty.

Consider buying your fruit trees from the Irish Seed Savers who specialise in heritage varieties of apples and other fruit trees.

Creating an orchard

[adapted from Irish Seed Savers Association guide to Creating an Orchard]

Site: The perfect site for an orchard is one which has:

- a south facing slope, that receives light from early morning to late evening and has
- free draining soil with a soil pH of approximately 6.5
- avoid planting in a frost pocket as this may lead to damage of the blossoms in the spring.

Wind: Too much wind at pollination time will discourage insect movement. Poor pollination will result in poor yield. Apple trees are tolerant of moderate wind. For very exposed sites a shelter belt of trees or a hedge should be planted though the shelter belt should not shade the orchard.

Pollination: Apple trees are insect pollinated, because trees of the same variety cannot pollinate each other, another variety of apple tree needs to be grown close by. Furthermore since different varieties blossom at different times, for successful pollination to take place trees must be of the same flowering group *i.e.* they flower at approximately the same time, allowing bees to transport pollen from the flower of one variety to that of another. Apple varieties are classified as early, mid and late season flowering groups. The best fruit set is assured by having at least three varieties of apple (of the same flowering group) planted in close proximity.

Choosing varieties: When considering a variety it is best to do some research. Find out from local fruit growers and gardeners which varieties have done well in your local area. Taste is influenced by soil type, climate, and local growing conditions, and can vary from year to year depending on factors such as summer sunlight, in particular. Catalogue descriptions of taste may be unreliable.

Long-term maintenance and harvest: Choose rootstock and layout based on future work. Harvesting from large trees must be done either by ladder or by waiting for windfall but this bruises the fruit which reduces storage time. Sheep or geese can be useful for grass maintenance in an orchard but a suitable rootstock must be chosen such that the lowest branches are kept out of reach.

Think about lawnmower access when planning the layout of the orchard.

Fruit trees feed almost exclusively in the top soil as they do not have deep tap roots. They compete for nutrients with grass and other vigorous herbaceous plants. In the first few years of growth, keep a radius of 1 m completely weed free around the young tree. Regular mulching around the tree will help. Mulching can be achieved with many materials including cardboard, straw, leaf mould or commercially available fabrics. Biodegradable mulches such as cardboard or straw breakdown to improve the soil and so need to be replaced but this also allows an opportunity for feed, such as farmyard manure, to be added to the soil.

Fabric mulches do not breakdown with the result that eventually weeds, such as scotch grass and creeping buttercup take root and can be a lot of work to remove.

Mulching and maintenance weeding is an annual task. It is most efficient to do some weeding three to four times a year to catch weeds when they are small.



Orchard at Airfield Estate Dublin under planted with meadow flowers

C.4 Creating a wildlife garden

A wildlife garden is one where habitats are provided or “let be” for a variety of wildlife including mammals, birds, amphibians, lizards and invertebrates. To create a wildlife garden incorporate into your space as many of the following features as possible:

- Native trees, mini-woodlands and hedgerows
- Leave the grass grow long in strips or patches
- Leave piles of leaves in a quiet corner for hedgehogs
- A log pile will provide a home for many invertebrates
- Add a pond, even a small one by sinking a large basin into the ground. This will attract aquatic life or frogs to your garden.
- A bird feeder and bird bath is luxury for birds and entertaining to watch.
- Add a bug hotel or bee nest site (See C.5 below)
- Leave a clump of nettles for butterflies to lay eggs on.
- Try sowing a small wildflower meadow (see C.4 below)
- Erect bird boxes and bat boxes if you have a suitable place to locate them. (see E and F below)

C.5 Planting a wildflower meadow

Wildflowers thrive in areas of low fertility where they can compete successfully with neighbouring grass species.

The easiest way to create a wildflower meadow is to change the management of the grassland i.e. cut twice yearly once in Spring and a late cut in August or September and remove the cuttings. The cut is timed to allow all the wildflowers to set seed but not the grasses. This management regime will prevent the grassland becoming rank, reduce soil fertility over time and promote the growth of wildflowers. Over a few years, the number and diversity of wildflowers should increase to form a wildflower meadow but it may take some time. In cases where the area has been seeded, for example, with lawn grass and the potential for wildflowers occurring is very low or if a more instant wildflower meadow is needed then a wildflower meadow can be sown.

Use a native Irish wildflower seed mix otherwise there is a risk of non-native species spreading out into our countryside. Native Irish seed can be bought from Sandro Cafolla Design by Nature at www.wildflowers.ie who supplies wildflower seed mix for a variety of soil types and different settings. A wildflower meadow can be sown with just wildflowers or a grass/wildflower mix.

- Clear the area to be sown removing all vegetation and rake to a tilth. Be diligent as any resprouting grass will compete with your meadow grass and flowers.
- Sow the seed in autumn or early spring.
- After flowering, cut the meadow in August or when all the flowers have set seed.
- Cut the meadow low to about 10 cm. Preferably leave the cuttings in place for a few days to dry out so that seed can fall and then remove all the cuttings by raking.
- Rake the soil too as this helps the germination of new seedlings.
- Removing the cuttings is very important as otherwise they will rot down into the soil and make the soil more fertile which will not favour the wildflowers.
- Remove the dead thatch of grass that develops in Autumn as this can suppress seedlings and cause mould.
- This management should be repeated every year.

C.6: Create a bumble bee nest site

This is a fun activity to do with children and an interesting feature to add to your garden!

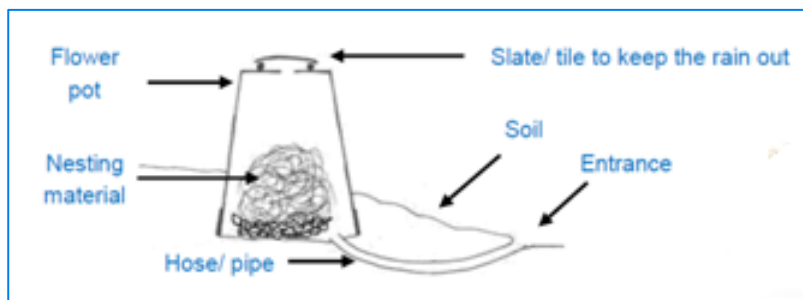
[Source: www.bumblebeeconservation.org]

What you need:

- A flowerpot (> 20cm in diameter)
- A piece of slate/ tile
- A bit of tube or pipe

Instructions:

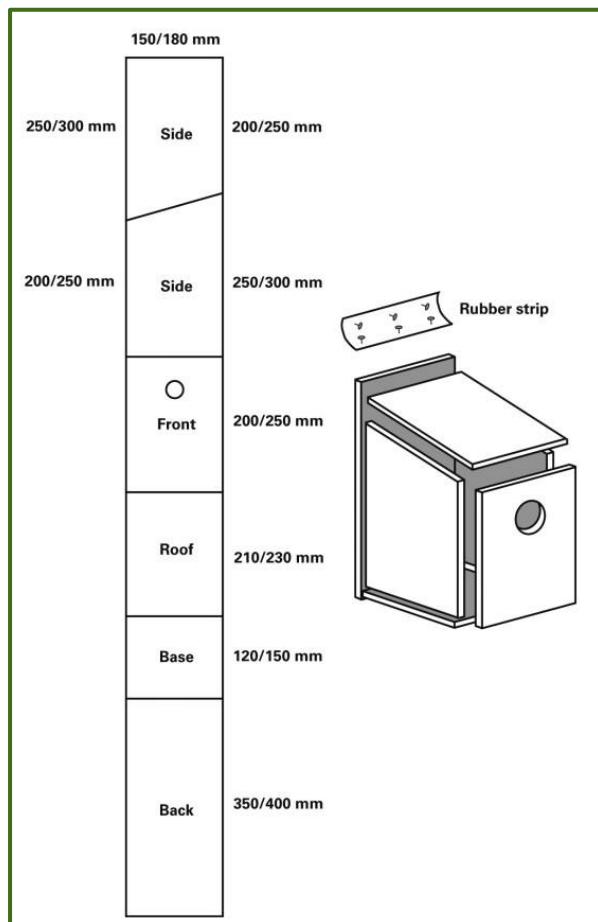
1. Sink the upturned flower pot into the ground and use the slate/ tile to cover any drainage holes to keep the rain out.
2. Run a hose or pipe underground to the pot, leaving a prominent entrance. Be sure to make drainage holes in the pipe.
3. Finally, fill with a generous handful of nesting material, such as old bedding from a pet mouse, guinea pig, etc.



Appendix D: Bird Nest Boxes

Standard bird nest box

[Adapted from www.rspb.org.uk and www.birdwatchireland.ie]



Make the same box with the upper half taken away altogether for robin, pied wagtail and wren.

1. Use a plank of wood about 150 mm wide and 15 mm thick. Cut out pieces according to the dimensions in the diagram opposite.

The bottom of the entrance hole must be 125 mm from the floor

The inside wall below the entrance hole should be rough to help the young birds to clamber up when it's time for them to leave.

2. When assembling the box, use screws or galvanised nails.

3 Attach the lid with a brass or a plastic hinge that will not rust, or hinge it with a strip of leather or rubber (an old piece of bicycle inner tube will do). Fasten it down with a good catch. Do not nail down the lid, since you will need to clean out the box in the autumn

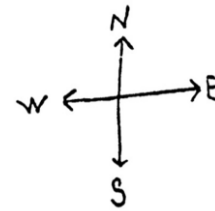
4. By altering the size of the hole you can make a box to suit different species.

- Blue tit and coal tits 25 mm
- Tree sparrow 28 mm
- House sparrow 32 mm

5. It is best to use hardwood and leave the wood untreated. Softwood boxes can be treated with selected water-based preservatives, which are known to be safe for animals, such as Sadolin.

Where to put up your nest box

Put your nest box up well before the start of the breeding season in February. If you put the box up in winter with a small handful of wood shavings, birds may even roost in it for warmth. Don't use straw as this will become damp and mouldy over the winter.



The box should be located at least 2 m from the ground (preferably 3-5 m), so that cats or other predators or curious people don't disturb the nesting birds.

Choose a site that is away from the bird table or bird feeders as nesting birds are territorial and may feel threatened by other birds feeding nearby. Unless there are trees or buildings which shade the box during the day, face the box between north and south-east, thus avoiding strong sunlight and the wettest winds.

Make sure that the birds have a clear flight path to the nest without any clutter directly in front of the entrance. Tilt the box forward slightly so that any driving rain will hit the roof and bounce clear.

Attach the box to a wall, fence or tree trunk. Use a wire strap to attach the box to a tree to avoid damage to the tree and check every year to make sure the wire is not cutting into the tree trunk.

Open-fronted boxes for robins and wrens need to be low down, below 2 m, well hidden in vegetation.

Care of your nest box

If birds take up residence in your nest box, be careful not to go near the box or to disturb the nest, as this may result in parents abandoning their young. Observe from afar, preferably from inside, looking through a window.

The box can be opened from the end of October and cleaned out of nesting material and any unhatched eggs and clean the inside of the box of any parasites that may be still in it.

Appendix F: Bat Boxes

Bats are social animals and often congregate in large numbers. Providing bat boxes offer bats additional roosting areas, and can often help to replace lost or degraded roosting sites.

F.1: Making a bat box

[Source: Bat Conservation Trust www.bats.org.uk and Kent Bat Trust www.kentbatgroup.co.uk]

There are many designs for bat boxes. Check the resources page for alternatives. Bat boxes should be draught free and preferably painted black with a non-toxic paint to allow for maximum absorption of heat during the day to keep the bats warm.

The bat box described below is for summer occupancy, since it lacks the required insulating properties to make it suitable as a hibernation site.

Materials and construction

The only critical measurement is the width of the crevices: between 15-20 mm.

This kit requires approximately 1.6 m of rough wood and 25 screws (8 x 1 ½ inches) to assemble.

Pre-drill the holes to prevent the wood splitting.

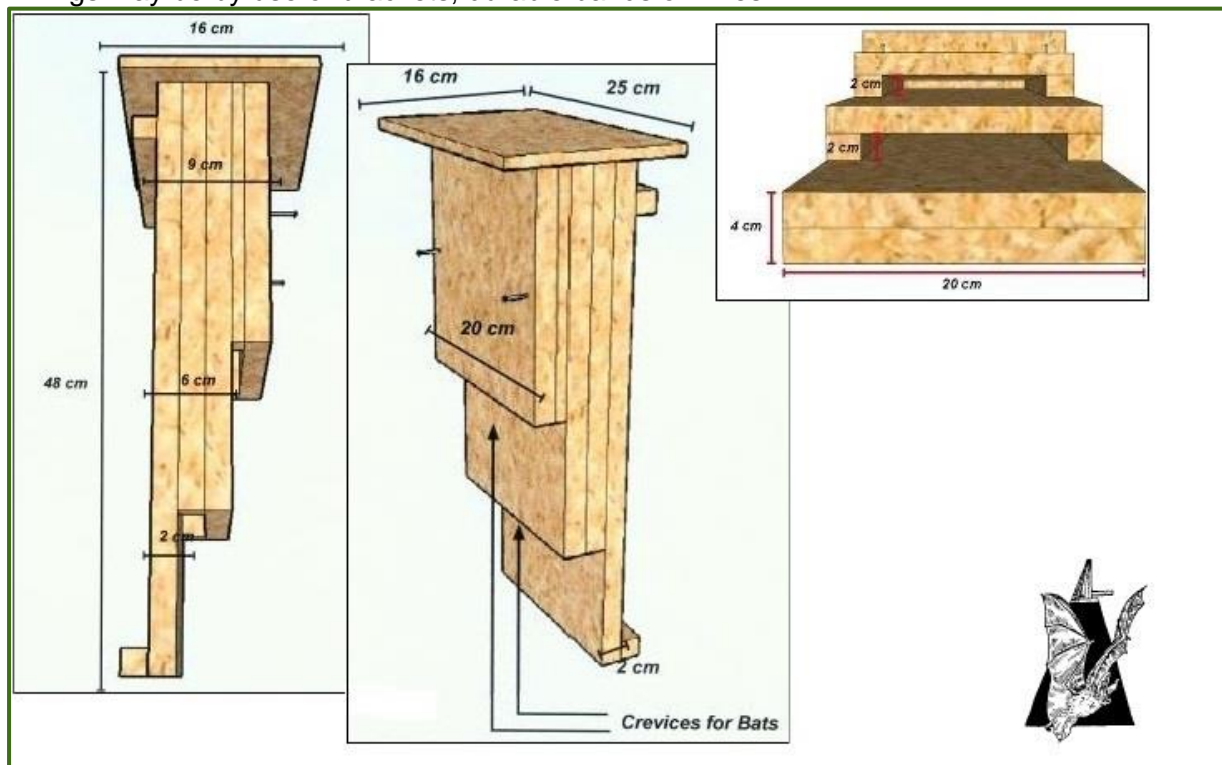
The box should be made from untreated, rough, sawn timbers.

The timber should be about 20 mm thick.

The box should be rainproof and draught-free.

Crevices can be between 15-20 mm wide.

Fixings may be by use of brackets, durable bands or wires.



F.2: Where to put your bat box

Bat boxes are best positioned as high as possible, but at least 4 or 5 m from the ground in a sheltered wind free position exposed to the sun for part of the day (6-8 hours). They can be fitted to walls, other flat surfaces or trees. A clear flight line to the entrance is important. Ideally put up 2-3 boxes in a group with varying aspects ranging from south east to south west, e.g. around a tree trunk, as bats may move roosts to keep comfortable.

Bats are nocturnal and adapted to low light conditions. Artificial light sources should not be directed onto bat boxes or flight paths, as most bat species find artificial lighting very disturbing.

Bat boxes are more likely to succeed in areas where bats are frequently found in buildings and where there is a good mixture of habitat including trees nearby. Bat boxes may be more successful if located close to a linear feature such as a line of trees or hedgerow. Some bat species use these features for navigation between their roosting sites and feeding grounds and to avoid flying in open and exposed areas. Ensure that the bat's approach to the box is not impeded, for example by branches – clear away underneath the box so the bats can land easily before crawling up into the box.

If fixing the box to a tree, use headless or domed nails not fully hammered home, to allow the tree to push the box off without splitting, or strap the box to the tree.

On buildings, place the boxes high up, which will reduce the likelihood of the bats falling prey to cats or humans. As with trees, the aspect of the box should capture sun for part of the day.

F.3: Monitoring the bat boxes

Making and putting up bat boxes is a great conservation action but what is even more useful is to know whether they are being used, when and by which species. You will need a bat detector to find out what species is using your box or contact Bat Conservation Ireland, a local member may be able to help.

How long before bats will use the box?

Sometimes it may take several years for the bats to find the box. Be patient!

It is highly unlikely bats will shift their roost from a well-used site to a newly positioned box and there may be plenty of other suitable roosting sites in the area. However, at other times, bats will use the box within a few months, and if you are extremely lucky, maybe even within a few weeks!

How will I know if the box has been successful?

To check if the box is being used, look out for droppings, urine staining, listen for “chattering” and watch the box for an hour either side of sunset, to observe any bats leaving to feed.

Remember, disturbance of a bat roost is an offence under the Wildlife Act. Therefore you should not open or interfere with a bat box unless you are licensed to do so.

Appendix F: Citizen Science Projects

Keeping records of wildlife species that you have seen and submitting these records to the National Biodiversity Data Centre (NBDC) or other dedicated recording scheme, is a great way to get involved in biodiversity conservation, improve your skill in wildlife identification and get back in touch with nature. Such data is very important and is not only used in research and policy formation but also contributes greatly to our knowledge of biodiversity and its conservation.

The National Biodiversity Data Centre collates records of all species recorded in addition to running a number of targeted recording schemes such as those for butterflies and bumblebees. Anyone can get involved and the Centre is keen to recruit new recorders.

F.1: Biodiversity recording

How to keep and submit records

The information recorded needs to be as accurate as possible. To take an accurate record you need to:

- Correctly identify the species (or get help in doing so)
- Record when (the date) and where you saw it. For the location you need a grid reference. You can submit records to the NBDC centre through their online records submission form. This has a “find a grid reference feature” to easily find an accurate location for your record.
- You can also submit records of any wildlife species using their Biodiversity Smartphone App.

The number of conservation organisations running citizen science recording projects is growing all the time:

Birdwatch Ireland run the Garden Bird Survey and other more specialised recording schemes such as the Countryside Bird Survey, Irish Wetlands Bird Surveys (iWeBS), as well as species action projects such as the Swift Nest Box Project and Barn Owl Project which you may be able to get involved with www.birdwatchireland.ie

The Irish Wildlife Trust also run targeted recording schemes. www.iwt.ie

For botanical recording, contact the Botanical Society of Britain and Ireland (BSBI). The BSBI vice county recorder for Meath is Miss MP Norton. The BSBI runs several outings a year and is very encouraging to new and emerging botanists and members.

- Contact Maria Long BSBI Irish Officer.
- Facebook: BSBI Botanical Society of Britain and Ireland
- BSBI: <http://www.bsbi.org.uk/ireland.html>

Bryophytes of Ireland specialise in recording mosses and liverworts.

- Facebook: Irish Bryophytes

Submit wildlife sightings and sightings of road kill to www.biology.ie

There are a number of other conservation organisations that you can get involved with, or from which you can seek advice. Please refer to the list in Appendix H.

F.2: Small mammal footprint tunnel

[Adapted from: Denise O'Meara *et al.* 2015 Small Mammals in School Yards – A Report for Schools]

This is a great science project to do with children and teachers resources and lesson plans can be found at www.miseproject.ie/publications/education.

The tunnels are baited with food and as the mammal enters it leaves a footprint of paint on the paper. The footprints can then be identified to find out what type of mammal visited the tunnel

- The tunnels can be made from a folded large sheet of poster board (corrugated plastic) formed into a tunnel with a triangular cross-section.
- Two blank sheets of white paper are fixed onto the floor of the tunnel with sellotape, one at either entrance inside the tunnel.
- A small pad of absorbent material (e.g. a j-cloth) is painted with non-toxic poster paint or ink on either side of the tunnel (below).
- The innermost section of the tunnel is baited with hot dogs and peanut butter to attract hedgehogs and other small mammals.
- The tunnel is secured with cable ties and then left overnight, next to or close to a hedgerow.

When a hedgehog or other animal enters the tunnel to get the bait, the feet are covered in paint and footprints are left behind on the sheet of paper, which are examined the following morning. Compare the prints to a mammal footprint identification sheet such as that found at www.scouts.org.uk/news/2015/01/wildlife-tracking



Small mammal footprint tunnel

Image from www.mammal.org.uk

Appendix G: Conservation Organisations and Special Interest Groups

General

An Taisce	www.antaisce.ie
Coillte Raised Bog Restoration Project	www.raisedbogrestoration.ie
Conservation Volunteers Ireland	www.cvi.ie
Environmental Protection Agency	www.epa.ie
Friends of the Earth	www.foe.ie
Friends of the Irish Environment	www.friendsoftheirishenvironment.net
Golden Eagle Trust`	www.goldeneagle.ie
Heritage Council	www.heritagecouncil.ie
Inland Fisheries of Ireland	www.fisheriesireland.ie
Irish Peatland Conservation Council	www.ipcc.ie
Irish Wildlife Trust	www.iwt.ie
Louth Nature Trust	www.louthnaturetrust.org
Meath County Council Heritage Officer Loreto Guinan	Tel: (046) 907000 E-mail heritage@meathcoco.ie
Meath Naturalists Field Club	www.meath.ie
National Biodiversity Data Centre	www.biodiversityireland.ie
National Parks & Wildlife Service	www.npws.ie
Notice Nature	www.noticenature.ie
NPWS District Conservation Ranger	Tel. 076 1002625
NPWS Local Conservation Ranger	Tel. 076 1002636

Trees and Plants

Botanical Society of Britain and Ireland	http://www.bsbi.org.uk/ireland.html
Coillte	www.coillte.ie
Crann	www.crann.ie
Irish Bryophytes	Facebook: Irish Bryophytes
Irish Seed Savers Association	www.irishseedsavers.ie
Native Woodland Trust	www.nativewoodlandtrust.ie
The Tree Council of Ireland	www.treecouncil.ie
Wildflowers of Ireland	www.wildflowersofireland.net
Woodlands of Ireland	www.woodlandsofireland.com

Birds and Bats

Bat Conservation Ireland	www.batconservationireland.org
Bat Conservation Trust	www.bats.org.uk
Birdwatch Ireland	www.birdwatchireland.ie
Birdwatch Ireland Meath Branch	www.facebook.com/BirdwatchIrelandMeath
Duhallow Raptor Conservation Trust	http://duhallow.blogspot.ie
Royal Society for the Protection of Birds	www.rspb.org.uk

Other groups

Butterflies of Ireland -	www.irishbutterflies.com
Irish Whale and Dolphin Group	www.iwdg.ie
Lichens	www.lichens.ie
Limerick's Buzzing	www.limericksbuzzing.ie

References

All-Ireland Pollinator Plan 2015-2020. National Biodiversity Data Centre Series No. 3, National Biodiversity Data Centre, Beechfield House, Waterford Institute of Technology West Campus, Carriganore, Waterford.

Bat Conservation Trust www.bats.org.uk

Bumblebee Conservation Trust www.bumblebeeconservation.org

Crofts A. & Jefferson R.G. (Eds) (1999) *The Lowland Grassland Handbook* English Nature/The Wildlife Trusts. www.publications.naturalengland.org.uk/publication

Department of Agriculture (2011) *Native Woodland Scheme Manual 2011*. Forest Service Department of Agriculture, Fisheries & Food Johnstown Castle Estate Co. Wexford

ENVISION 2013 - Community Heritage Project Road Verge Pilot 2012/13 – ISSUE 1 (November 2013) National Museums Northern Ireland

Invasive species Ireland www.invasivespeciesireland.com

Irish Seed Savers Association Guide to Planting and Orchard www.irishseedsavers.ie

Kent Bat Trust www.kentbatgroup.org.uk

Lusby J. & O'Clery M. (2014) *Barn Owls in Ireland: Information on the Ecology of Barn Owls and their Conservation in Ireland*. Birdwatch Ireland.

Maller C., Townsend M., St Leger L., Henderson-Wilson C., Pryor Anita, Prosser L. and Moore M. (2008) *Healthy Parks, Healthy People: A Review of Relevant Literature* 2nd ed. School of Health and Social Development Faculty of Health, Medicine, Nursing and Behavioural Sciences, Deakin University Burwood, Melbourne, Australia.

Meath Biodiversity Plan 2015-2020. Meath County Council.

Meath County Development Plan 2013-2019. Meath County Council.

Meath Heritage Plan 2015-2020. Meath County Council.

O'Meara D., Harrington A., O'Neill D., Coffey L., Turner P., Guest B. and O'Reilly C. (2015) *Small Mammals in School Yards – A Report for Schools (2015)* www.mise.ie

Plantlife (2015) *Road Verges and Wildlife Management Guidelines* www.plantlife.org.uk

Royal Society for the Protection of Birds
www.rspb.org.uk/makeahomeforwildlife/advice/helpingbirds/nestboxes/

Teagasc, *Managing Meadow Grass Farming to Enhance Habitats* Series. www.teagasc.ie

Teagasc (2009) *New Farm Hedgerows* Countryside Management Series. www.teagasc.ie

Teagasc (2009) *Managing Meadow Grass Farming to Enhance Habitats Series*
www.teagasc.ie

Teagasc (2009) *New Farm Hedgerows Countryside Management Series 4* www.teagasc.ie

Townsend M. Henderson-Wilson C., Warner E., and Weiss L. (2015) *Healthy Parks, Healthy People the state of the evidence 2015*. Parks Victoria, State Government Victoria.