Biodiversity Action Plan

Letterkenny parks

Sentry Hill - Famine Memorial Gardens - Ballyraine Park

LETTERKENNY TIDY TOWNS

Caring for our environment

This report was compiled by Aengus Kennedy of NatureNorthWest on behalf of Letterkenny Tidy Towns, 2024.

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Introduction

A Biodiversity Action Plan (BAP) takes account of environmental issues and challenges present in the study areas at this time and provides a framework to manage biodiversity in the area. As it is an 'open' document, it is something that will need to be regularly reviewed and updated by the tidy town group. BAP's are by no means the answer to all biodiversity issues in an area, they are however, a guide to help enhance and protect biodiversity taking into account its current health and future potential. This plan will be delivered in stages, with a number of areas highlighted within the town and a plan created for each. This initial version of the plan lays out a vision for Letterkenny providing a network of refuges for visiting thrush species and many others. The plan has an appendix with guides for various actions which can be added to if needs be. It also includes the first three areas mapped, described and actions suggested.

Initial 9 areas identified for possible plans, demonstrating the spread and reach each of these areas could have if turned into biodiversity hotspots. Background image © Apple maps

Biodiversity

Biodiversity, or biological diversity, means all living things. This includes all life from flora to fauna, from microbial to the largest plants and animals. For many Irish habitats, the more biodiversity that is present, the more robust the habitat is to the many pressures that currently exist. The term does not include the non-living, environmental factors.

Threats to biodiversity

Biodiversity is under constant threat in Ireland and worldwide from three main sources, habitat loss, invasive species and climate change.

Habitat loss is as it says, where a plant or animals habitat (where it lives and its surrounding environmental factors) have been removed and not replaced. As our towns and cities expand, biodiversity comes under constant strain from this expansion. Increasingly, our habitats tend to shrink, becoming isolated islands for wildlife which cannot sustain the same levels of biodiversity. Unfortunately it's not only development that leads to habitat loss, cutting or destroying hedgerows, spraying roadside verges and clearing of scrub land are all examples of habitat loss that is often applied with good intentions.

Invasive species are plants or animals that are brought in from another country, establish themselves and out-compete the local flora and/or fauna. There are currently 48 invasive species regarded as high impact in Ireland and 78 as medium impact. Many of these occur when we are moving or creating gardens/soil/plant material so towns that are rapidly developing are particularly susceptible to the arrival of invasive species. Each area studied will be assessed for the presence of any of the known invasive species present in Ireland today.

In Ireland, climate change is predicted to lead to warmer and drier summers, milder and wetter winters and an increase in the frequency of extreme weather events. This can already be seen across the island with highly disturbed weather patterns, rainfall patterns in particular and a constant tumbling of records in regard to heat on both land and in our oceans, nationally and internationally. Such climatic changes will disrupt Irish wildlife and our natural environment. Flora and fauna in general react slowly to changes in climate patterns and might not be able to adapt to our extremes in weather and our rising temperatures, no matter how small. There are many examples of climate change on Irish plants and animals; one of the most visual is the expansion of the Little Egret across Ireland. Lough Swilly on any given winter day can host at least a dozen of these birds, a species that did not exist in Donegal twenty years ago.

Flood control will also become a bigger issue with climate change. Inishowen already has a rivers trust that is working towards informing and involving the public in what is required to climate proof the region. More trusts like this are required to protect our river catchments. Water retention, cleaning and potential storage will be features for all areas studied for the plan.

Letterkenny and surrounding habitats demonstrating the network of hedges and small woodlands present. Background image © Apple maps

Letterkenny biodiversity

Letterkenny's biodiversity is rich, mixed and varied. The area has a variety of habitats which reflect the surrounding low lying hilly countryside. Tree cover is reasonable, for an Irish context, scattered tree-lines and hedgerows are present across the towns footprint in all directions. A mix of parkland with good levels of shrub and tree cover complement the network of gardens. The town is based at the southern end of Lough Swilly with the Swilly river running from roughly west to east. The Swilly river rises in the Meentygrannagh bog, which is a special area of conservation (SAC). Water quality in the river and its tributary the Corravady burn has a Q value of 4 (with 5 being pristine) at all 7 monitoring stations from west to east (catchments.ie). Lough Swilly is also designated an SAC and additionally a special protected area (SPA). Despite the large footprint that the town commands, significant green areas are available for nature in many dispersed pockets, scattered amongst the hard surface areas. This allows for hedge cover to continue in all directions from the town. Mixed farming is the main land use type in the towns surrounding areas. Fanad peninsula and the larger Inishowen peninsula stretch north, the Derryveagh mountains are to the west and the fertile Lagan area with its more intensive dairy farming management lies to the east.

Map of the river Swilly and surrounding catchment from the website catchments.ie

Potential for Letterkenny as a nature corridor for migrating thrush species

With Lough Swilly effectively acting as a funnel stretching north, the most biodiversity to be found in the Letterkenny area is specialist birdlife roosting on the shores of Lough Swilly and its islands and foraging in the soft silty substrate as the tide recedes. As well as attracting large numbers and diversity of shore bird species, lough Swilly is also on the migratory route of many of our thrush species. Blackbirds, song and mistle thrushes have all been recorded breeding in Letterkenny. Their numbers are bolstered considerably by migrating birds from the same species flowing south to escape harsh winter weather in countries further north. These birds along with winter visiting non-breeding thrush species, redwing and fieldfare, are constantly seeking berries from trees such as our native rowan, hawthorn and blackthorn trees.

Thanks to Letterkenny's ample green spaces, hedges and clusters of small woodlands, there is plenty of food and shelter to accommodate these migrating visitors as well as supporting our resident species. The biggest challenge these birds face is competition between their own

species and other similar species for a limited food resource. With this in mind, the approach of connectivity has been applied to these reports. To bolster the biodiversity potential in any one area, however small, is certainly a very useful exercise. To create a network of small yet biodiversity rich parks and areas, all within easy striking distance of each other, is to use the existing space in a way that will enhance and protect Letterkenny's nature, both resident and those that pass through.

Letterkenny study areas

Three areas were chosen to study in Letterkenny. These are:

Sentry Hill - Famine Memorial Garden - Ballyraine Park

Area plans

Each area was surveyed looking at habitat types using the Irish habitat classification system (Fossitt 2000), dominant plant species, presence of invasive and drainage potential. Each area has a specific plan. Within the plan is a habitat map, a map with action areas, a description of each area and a description of the actions and the reasons for their inclusion. All actions are a suggestion only and would be subject to funding and landowners approval.

Any one area study should not be seen as a stand alone piece, rather one small habitat group in a network of areas that are already refuges for nature. Each area will have its own specific plan to enhance nature in a way that will suit best for that particular park. Often these solutions will repeat themselves from place to place. Once all areas are studied and plans applied, potential linkage through hedgerow and treelined corridors may be explored. In time, despite the large and sprawling built footprint of Letterkenny, a series of biodiversity havens which provide shelter and food to a large and potentially growing number of species will be provided.

Each of these areas also offers an opportunity to educate through practical demonstration and through appropriate information. These education opportunities are essential for any biodiversity action plan to be successful. When local residents and landowners understand the reasons behind actions such as tree planting or allowing grass areas to have less management, experience shows that most are very supportive. The understanding of the biodiversity crisis that grips Ireland is increasing amongst the general public. Without adequate and easily understandable signage and communication around the various actions, an important opportunity to increase that awareness will have been missed.

Within each study site, three broad concepts are applied. Trees, hedges and connectivity is one. Shelter and sustenance for pollinator species is a second. The opportunity to inform and educate is the third. Within these three concepts there is a huge number of potential actions that may be applied and potential learning opportunities, often indirect, that can be delivered. If sufficient food, shelter and water sources are in place at each site, not only does this enhance bird and pollinator life but it also provides the space and opportunity for a large number of other, often unseen species to thrive within an urban setting, thereby bolstering Letterkenny's biodiversity.

Sentry Hill

Grid reference: **NV 32471 77059**

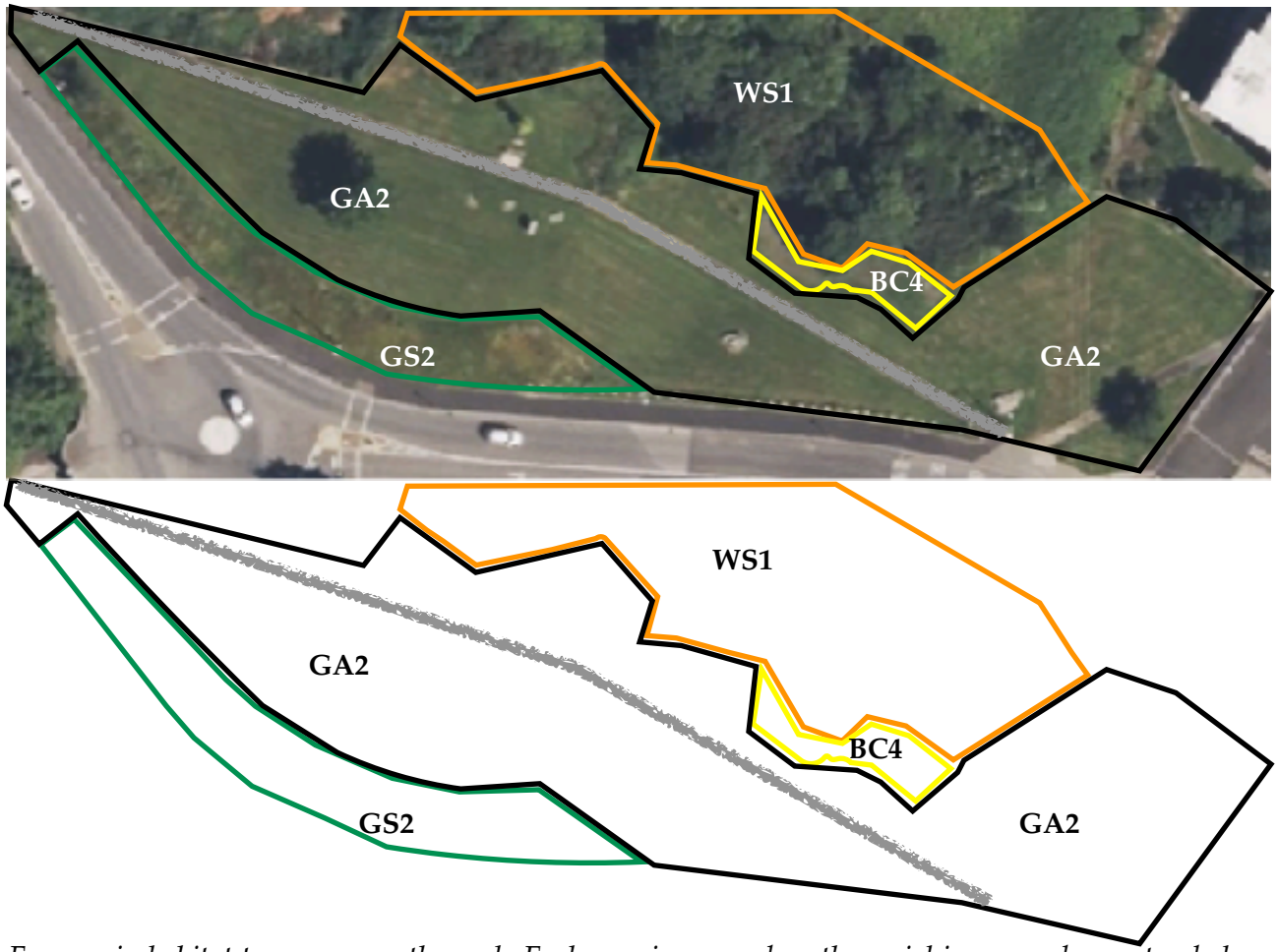
Area: **3,700 ㎡**

Habitats:

Habitat type	Fossitt code	Description	Colour on map
Scrub	WS1	Mix of species transitioning to woodland	Orange
Flower beds and borders	BC4	Planted area with a mix of native and non-native flowering species	Yellow
Dry meadows and grass verges	GS2	Area of grass managed to allow native wildflower species to slowly replace grass species	Green
Amenity grassland	GA2	Species poor grass dominated habitat	Black

This small park has a south facing aspect and falls steeply towards the Sentry hill road. Located in a northern yet central position in the town, directly north lies an extensive area of scrub which has great potential for a source of nature that could visit the park. An amenity pitch borders the park to the northwest, extensive gardens and brown field sites surround the area. The curious habitat mix with its variety of completely wild areas and heavily managed grasslands provide an ideal refuge for nesting birds and insects alike.

Sentry Hill park with surrounding habitats and nature corridors. Background image © Apple maps



Four main habitat types occupy the park. Each area is mapped on the aerial image and as a stand alone map. The path is marked as grey. Background image © Apple maps.

Habitat description:

WS1 An area of scrub/transitional woodland, known as scrub bordering the north of the park. Dominant species are common ash, European gorse, common ivy and bramble species along with a mix of grasses and wildflowers. There are a number of hawthorn trees within.

BC4 A planted wildflower area along the southern edge of the scrub habitat that has been planted in recent years. This small patch would fall under the classification of flower beds and borders. A large number of native and non-native flowers are within this area, dominated by ox-eye daisy. This patch is being managed in a way that will encourage the growth of wildflowers species by cutting in late summer and removing the cut material.

GS2 The steep banks bordering over half of the southern edge of the park have been allowed to start transitioning into a habitat called dry meadows and grass verges . While still dominated by vigorous grass species such as sweet vernal and rye grasses, in time, with correct management this will become a vibrant pollinator patch with good wildflower diversity.

GA2 The remaining grass area, dissected by a concrete path running from east to west is classified as amenity grassland . This area has been managed as a lawn for many years and as such, supports very little species beyond the expected dandelions, buttercups, daisies and grass species.

Actions for Sentry Hill park

Actions are coded by letter, the area for each action is included on the habitat map. Instructions of how to create each action where necessary is included in the appendix.

The actions laid out below would enhance the already rich nature areas of scrub habitat while aiming to extend this area on both sides. An orchard of native trees would help to provide colour and shape. The tree species indicated do not grow too large and would provide food for pollinators in the spring and birds in the autumn. Well placed bird and bat boxes would be quickly occupied given the cover already existing.

Continued management of both wildflower areas and extension of both would add to the appeal for pollinators. Planting these areas with yellow rattle will help reduce the dominance of grasses.

A rain garden is an excellent opportunity to introduce the concept of cleaning and storing water runoff without the challenges a pond would bring in terms of maintenance. Signage could be created at each action point to guide visitors through the nature in the area and inform them of the decision making process.

Birds-foot trefoil in GS2 habitat

A The scrub habitat is already providing a safe and mixed habitat for a number of bird species. Thrush species, tit species, finch species as well as robins, wrens, starlings and pigeons were all observed using the WS1 habitat during the survey period. There are approximately eight common ash trees that are succumbing to ash dieback disease. These will need to be removed in time and replaced with small trees such as hawthorn, blackthorn and rowan. These will continue to provide shelter, roosting and display areas for thrush species amongst others while increasing the food resources for birds and other animals. A small number of hawthorns are already present.

B A stand of blackthorn allowed to natural spread through its own root system at the west side of the park would extend the WS1 habitat while being reasonably sturdy in light of the passing footfall the park receives. This will turn into a dense copse, impenetrable for most but ideal for nesting birds. The early flowers give colour in spring and sustenance to pollinators, the berries adding to the food stock for passing birds in autumn.

C A number of crab apple trees on the western end of the WS1 habitat would add spectacular colour in spring while providing food for passing birdlife in autumn. They would also add to the food resources for pollinating and other insects. In time the block on the east end between the primary school and the footpath could be planted with rowan, bird cherry and crab apple, adding colour and form to this part of the park.

D Bird and bat boxes would enhance the potential for breeding birds and shelter for resident bat species. These would be erected on existing trees (not ash) within the scrub area.

E Continue to manage the GS2 habitat and extend as much as is possible in agreement with the council. Seed with yellow rattle. Keep removing cut grasses / flowers 2 weeks after a late august cut to keep removing possible nutrients from the patch.

F Create a rain garden on the west side of the park which is very damp in winter. This will support different species, offer an opportunity to educate public and water capture and filtration and help to alleviate damp/floods from the surrounding grassland habitat. A gutter would need to be created running from the highest elevation along the south side of the path. This would feed into the rain garden and help to stop access runoff to the grass area. Damp loving species of reeds and flowers such as flag iris and cuckoo flowers could be planted in this area.

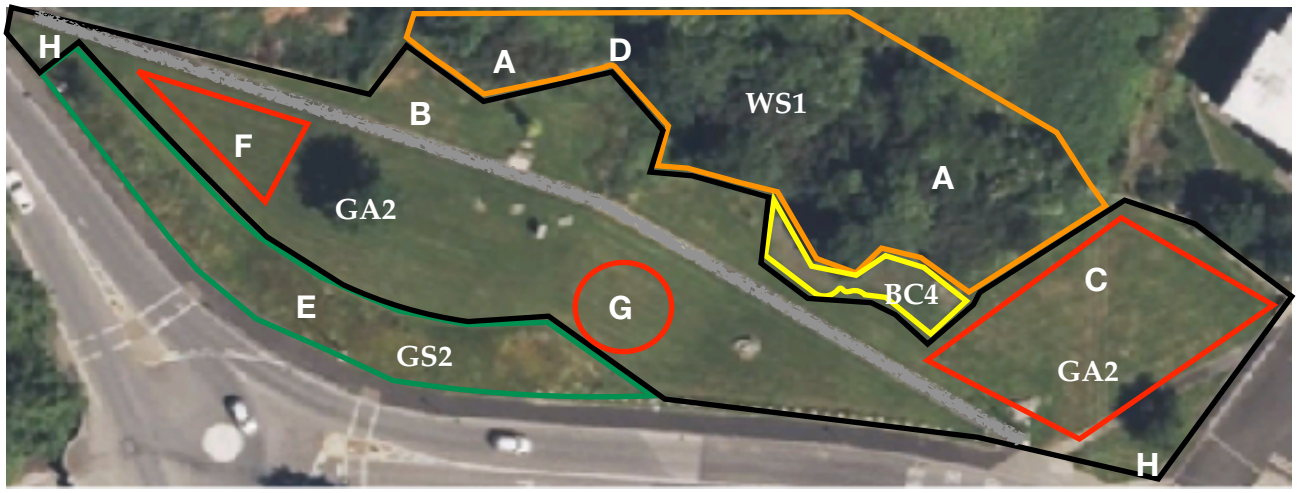
G Plant a small willow circle with 4 curved fences placed inside. Their would be a gap for entrance on both east and west sides. The willow in time could be woven together by local schools and used as natural materials for arts and crafts. This area could be used by the local schools or any other group as an outdoor classroom space.

H Signage at each action area explaining what has been altered and why. An introduction sign at both east and west entrances to the park explaining the ambition to create a refuge for passing thrushes and the benefits for other nature could be installed.

Crab apple in blossom

Habitat	Action	Description
WSI	A	Replace ash with native berry trees
WS1	D	Erect bird and bat boxes
BC4	E	Continue to manage for wildflowers, gradually reducing the dominance of ox-eye daisy
GS2	E	Keep managing for wildflowers, sow with yellow rattle and allow area to spread as much as possible
GA2	B	Plant with blackthorn
GA2	C	Plant with crab apple, rowan and bird cherry
GA2	F	Create a rain garden with runoff from path and higher ground
GA2	G	Plant a willow circle which in time is trimmed to a height of 1 metre. The circle would be 10 metres in diameter, open on both sides and fitted with four curved benches
GA2	H	Erect signage at both entrances discussing a nature area for visiting birds, highlighting the enhancements for all wildlife

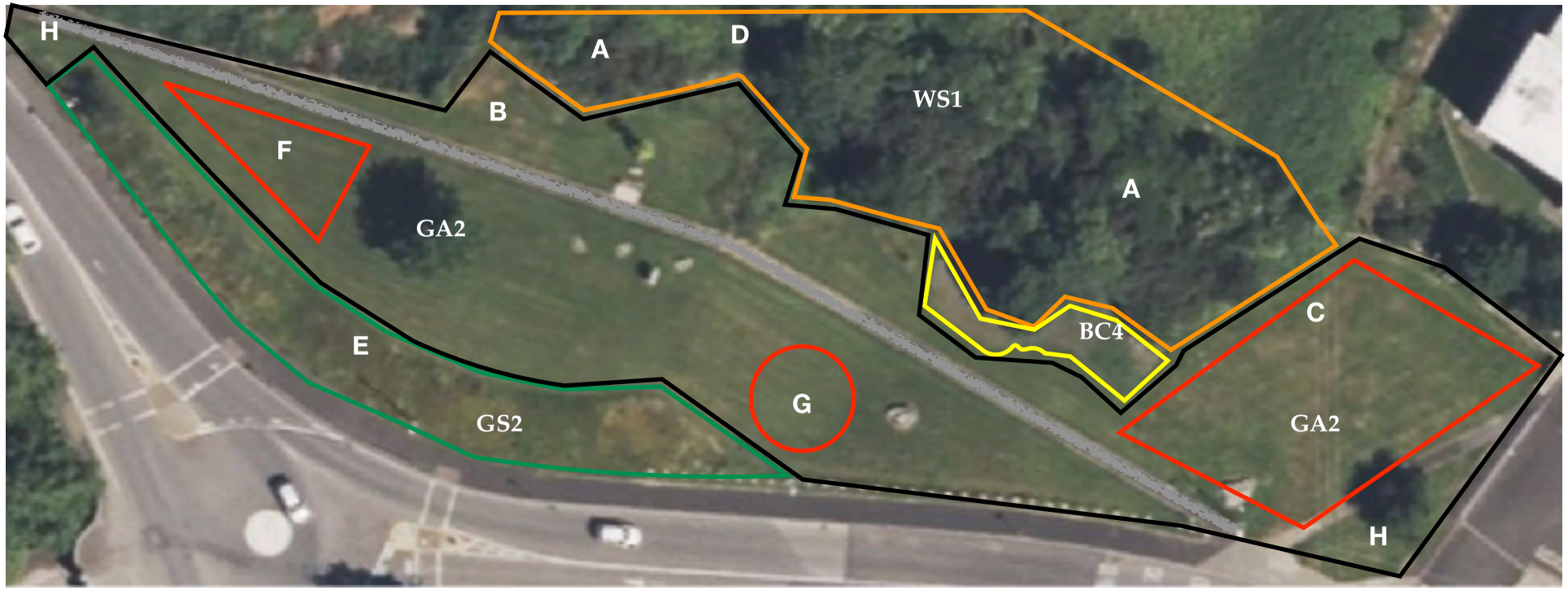
Habitat actions, codes and descriptions



Habitat map + actions (large action areas in red). Background image © Apple maps

Habitat type	Fossitt code	Description	Colour on map
Scrub	WS1	Mix of species transitioning to woodland	Orange
Flower beds and borders	BC4	Planted area with a mix of native and non-native flowering species	Yellow
Dry meadows and grass verges	GS2	Area of grass managed to allow native wildflower species to slowly replace grass species	Green
Amenity grassland	GA2	Species poor grass dominated habitat	Black

Habitats and codes with map colours



Sentry hill habitat map with action codes. Background image © Apple maps

Famine Memorial Garden

Grid reference: **NV 32996 77235**

Area: **960 ㎡**

Habitats:

Habitat type	Fossitt code	Description	Colour on map
Stone walls	BL1	Walls with ivy and cotoneaster spp.	Blue
Flower beds and borders	BC4	Thin planted areas with a mix of native and non-native flowering species	Yellow
Scattered trees and parkland	WD5	Amenity grass species with scattered trees, including birch, common ash, and some fine specimens including oak, lime, elm and sycamore	Light blue
Ornamental/non-native shrub	WS3	Variety of non-native shrub species with some young birch, ash and sycamore species present	Pink
Amenity grassland	GA2	Species poor grass dominated habitat with occasional mature trees	Black

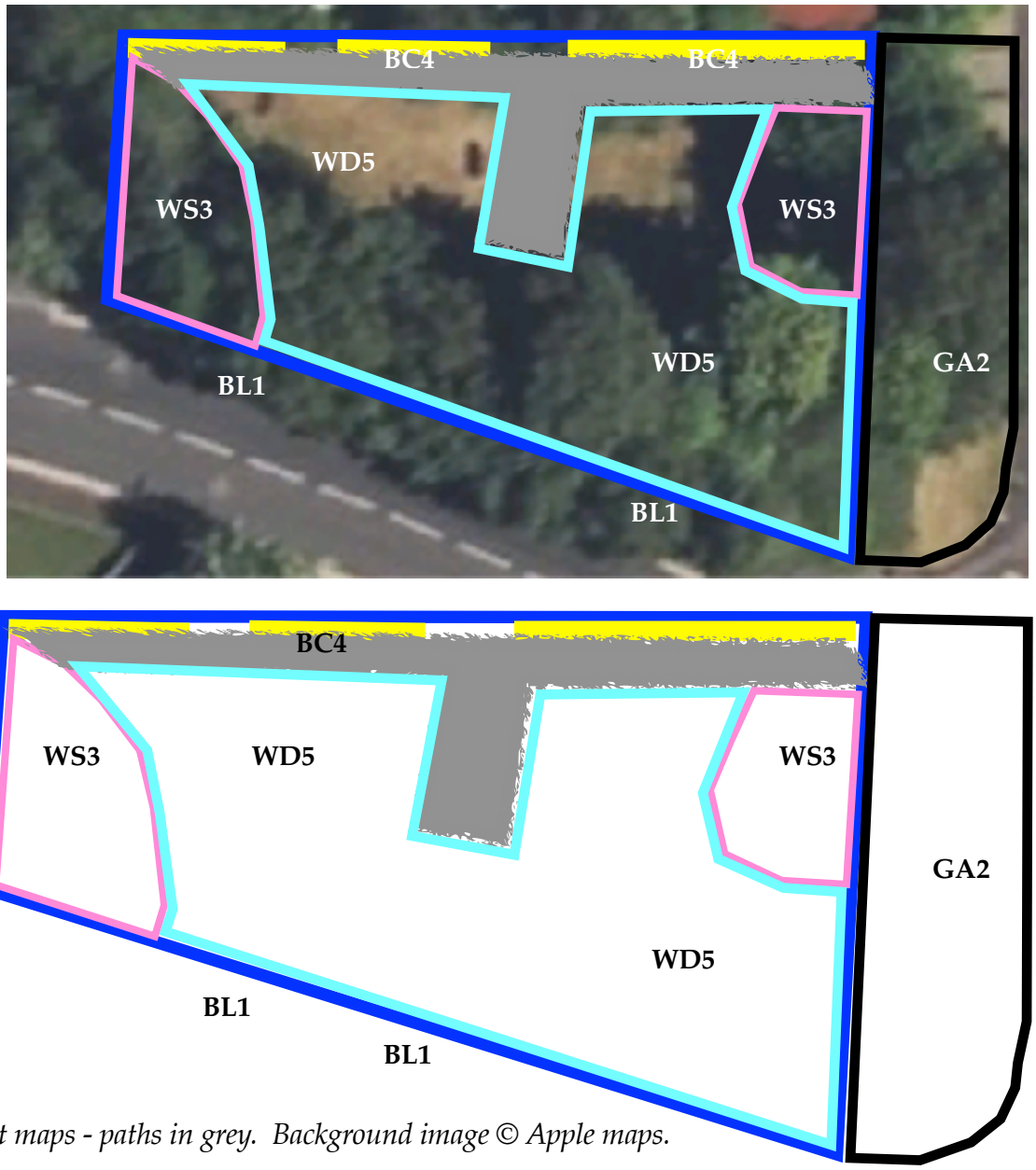
The famine memorial park has a surprising mix of habitats for such a small area. Despite it being the smallest of the parks surveyed, there are many opportunities for wildlife to find both shelter and sustenance. The walls that border the park are draped in many places, particularly on the west side bordering High road, with an extensive cover of ivy. Cotoneaster species has tended to dominate the south side. This cover, in particular the ivy, is providing shelter for many invertebrates and potentially bat species during the summer, while providing an invaluable source of nutrition for newly emerged queen wasps and bees in October and a vital source of berries in February and March when food is at its least abundant.

Maturing trees with a varied mix of species run inside the walls on the west, south and north side. The west end has some mature sycamore and birch species planted outside the park walls. In the southwest corner and opposite north corner and extending to the north east entrance there is currently a rich mix of shrub species, many being non-native yet non-invasive species. Flower beds run along most of the west side inside the wall, the centre of the park is planted with grass species.

A number of trees species are present, with a number of birch running along the south side. Sycamore, birch and common ash are present in the south west corner. The relatively rare native wych elm species are present in the north west corner. The park also supports fine oak, lime and sycamore species.

Birch trees sheltering cotoneaster and ivy species that drape the stone walls. © Google maps

There is a gently sloping border of approximately 4 metres depth which runs from the south west corner and continues past the park to the nearby county museum. The south wall has a large number of young willow trees that have self seeded. Despite the central position of the park, so close to the start of main street, there are plenty of tree-lines, gardens and vacant sites/fields within a short distance. The much larger Letterkenny town park and extensive Gortlee estate are within no more than 450 metres to the north west, as the thrush flies.



Habitat maps - paths in grey. Background image © Apple maps.

Habitat type	Fossitt code	Colour on map
Stone walls	BL1	Dark blue
Flower beds and borders	BC4	Yellow
Scattered trees and parkland	WD5	Light blue
Ornamental/non-native shrub	WS3	Pink
Amenity grassland	GA2	Black

Actions for the Famine Memorial Park

The maturing trees are both beautiful specimens and species that support biodiversity. The large oak in the centre of the south side of the park supports more species than any other tree in Ireland. The wych elm trees, while young, are a reasonably unusual tree in Ireland due to the presence of Dutch elm disease. The numerous bird trees can produce up to 1,000,000 seeds each which is a valuable source of food in autumn for passing flocks of small birds such as finch species. The lime tree and the numerous sycamore, despite being non-native, all support many pollinating insects. The common ash trees in the southwest corner are showing signs of ash dieback disease and will need to be removed in time. Bird cherry and crab apple could be planted along the length of the southern wall on the inside.

The numerous and dense shrubbery that have been allowed to thrive in the southwest corner provide a multi layered vegetation structure that is conducive for nesting birds and numerous invertebrate species. Pruning at the appropriate time of year for each species would be a great management strategy, this would promote more dense, vigorous growth providing yet more shelter. The rhododendron species that reside in the north and south east corners could be removed to provide more light in general for the park.

The flowers beds could be planted with native woodland flowering species. Lesser Celandine and golden saxifrage are both present within the grass, this indicates they would thrive here. Later flowering species such as Bowles mauve wallflower could also be planted to enhance the pollinator cover.

The amenity grassland outside the park could have regular 1 square meter wildflower patches, managed by trimming in late summer only and removing the cuttings. They could be bordered by wood. As the park is a memorial garden, keeping the grass within the park as is will keep areas for sitting and reflection.

The walls provide great shelter for invertebrates and possibly bats in the summer and nesting birds in any wall cavities. These should be left as is, with management required to give a neat appearance.

Signage erected at both entrances to the park highlighting the management for nature would be very beneficial. A small map with a labelled tree trail around the park would give an opportunity to educate as well as complement the reflective nature of the park already existing. Their are currently some wooden signs indicating tree species, these are in need of maintenance if they are to be kept.

A Remove common ash trees that are infected with ash dieback disease. This will also allow more light into the shrub habitat

B Manage the numerous shrub species that exist in both northeast and south west corners but particularly the latter. These provide nest cover, food and year round shelter for many species.

C Remove the rhododendron species in the northeast corner and along the southern wall. This will open these areas for light. These shrubs offer very little support to nature of any kind.

D Plant a line of alternating bird cherry and crab apple trees along the inside of the souther wall. These trees are a manageable size and are easy to maintain while providing very beautiful form and colour, food for pollinators in spring and sustenance for passing thrushes and other bird species in autumn.

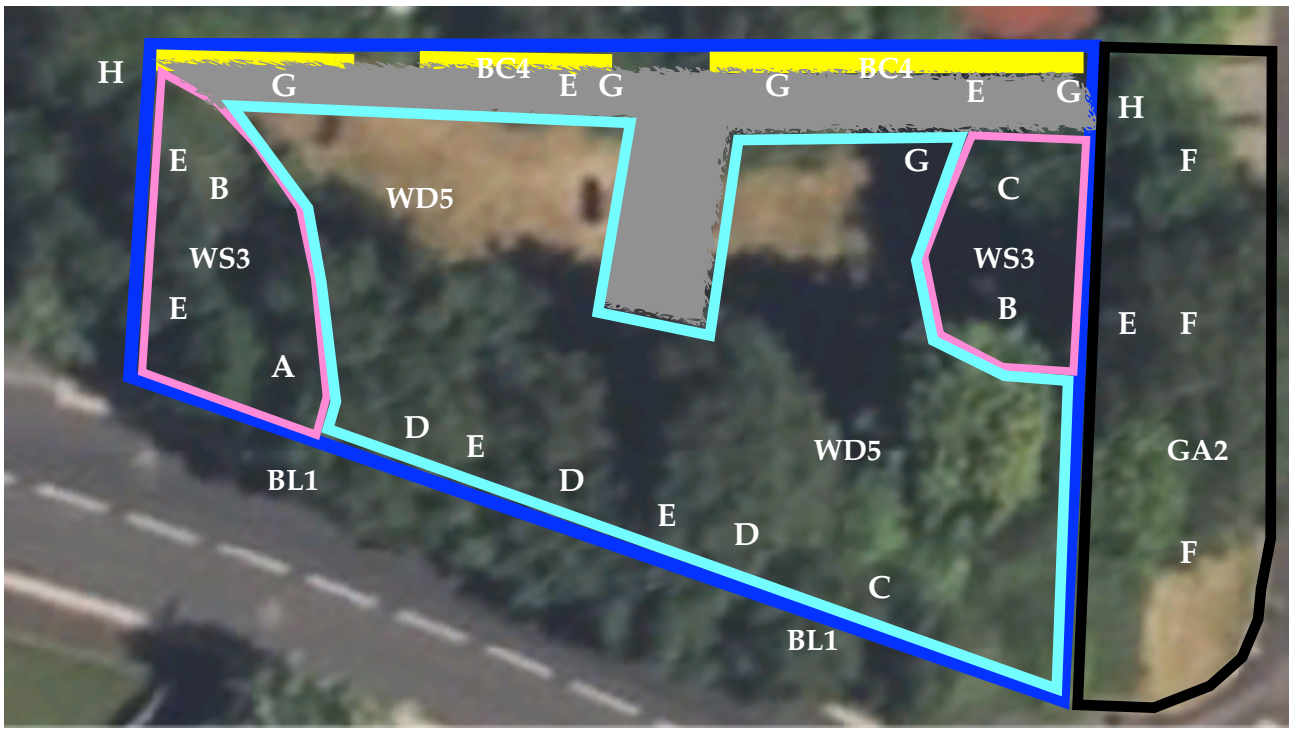
E Bird and bat boxes erected in mature trees and walls. Small holed coal tit and blue tit boxes provided along the north facing wall as high as possible. Open fronted boxes provided for both Robin's and pied wagtails on the north sides of trees. A series of bat boxes to run along the southern facing wall.

F 1 meter square wildflower patches reflecting a 'no mow' policy fitted along the grass verge running towards the museum. Each square to be bordered by solid wooden surroundings, such as non-toxic sleeper boards. These may be let grow and managed for pollinators or specifically planted with pollinator friendly plants.

G Native woodland understory flowering species such as lesser Celandine, wood anemone, golden saxifrage and bluebells to planted in all existing follower beds. Plant wallflowers such as Bowles mauve which will take over from summer onwards into mid autumn, providing much needed sustenance for butterflies and other pollinators.

H Signage provided at both park entrances highlighting the habitats and the reasons why vegetative structure is managed in this way. A map with a tree trail, following a circular route around the park which each tree labelled.

Lesser celandine



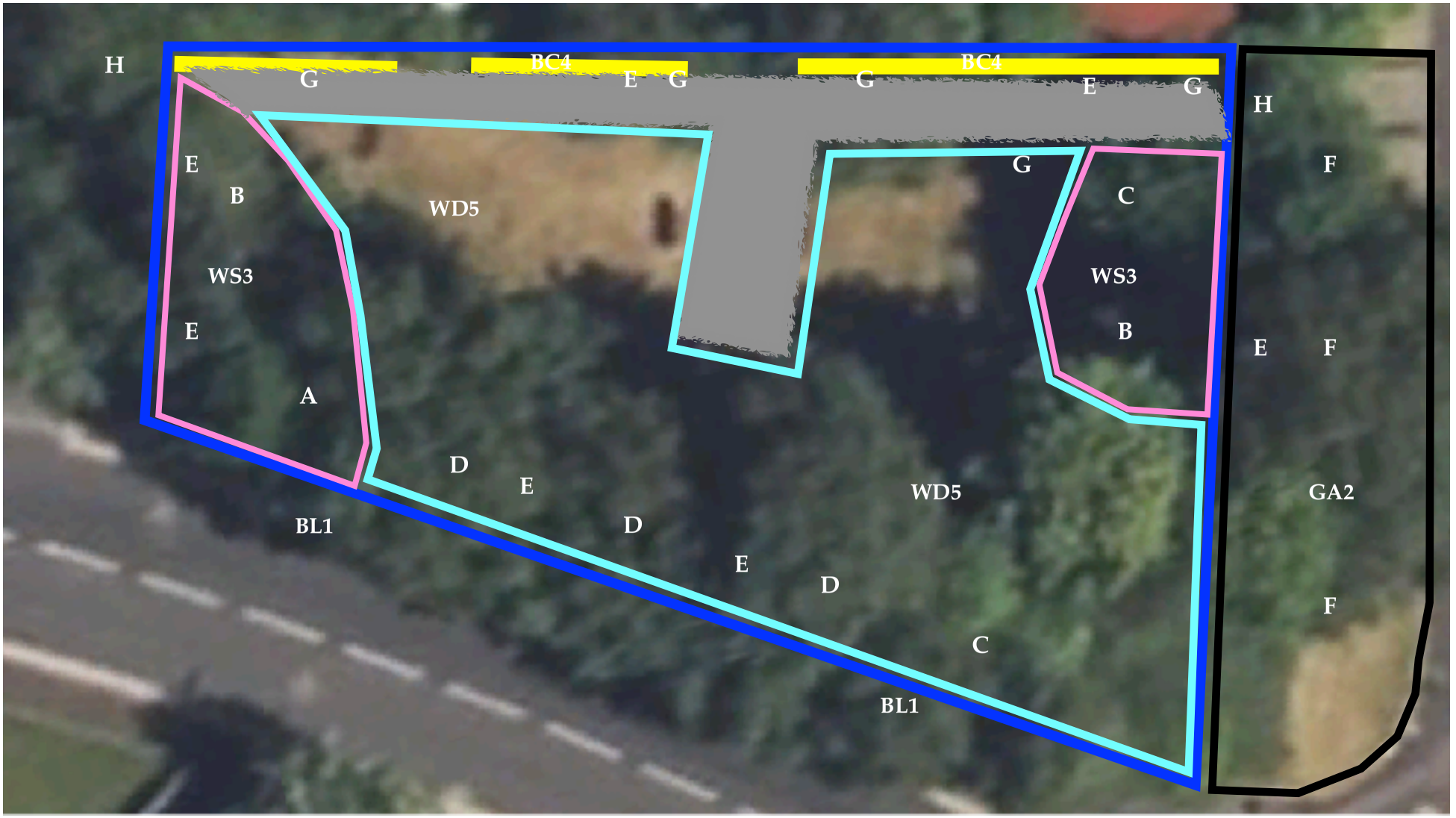
Habitat map with actions. Background image © Apple maps.

Habitat	Action	Description
WS3	A	Remove common ash
WS3	B	Manage shrubbery year round
WS3	C	Remove rhododendron species from northeast corner and southern wall
WD5	D	Plant alternating bird cherry and crab apple species along southern wall
BL1 + WS3	E	Erect bird and bat boxes
GA2	F	Create series of small pollinator wildflower patches
BC4	G	Plant native woodland spring flowers and summer pollinator cover
WD5	H	Erect signage at both entrances discussing a nature area for visiting birds, highlighting the enhancements for all wildlife.

Habitat codes, actions and descriptions

Habitat type	Fossitt code	Colour on map
Stone walls	BL1	Dark blue
Flower beds and borders	BC4	Yellow
Scattered trees and parkland	WD5	Light blue
Ornamental/non-native shrub	WS3	Pink
Amenity grassland	GA2	Black

Habitats with codes and map colours



Habitat map with actions. Background image © Apple maps.

Ballyraine Park

Grid reference: **NV 34572 76943**

Area: **6,900 ㎡**

Habitats:

Habitat type	Fossitt code	Description	Colour on map
Stone walls	BL1	Walls with ivy	Blue
Treelines	WL2	Tree-line including birch, common ash, oak, alder, willow and sycamore	Light green
Mixed broadleaved woodland	WD1	Variety of non-native shrub species with some young birch, ash and sycamore species present	Purple
Amenity grassland	GA2	Species poor grass dominated habitat with occasional mature trees. Bordering on transitioning to WD5 - scattered trees and parkland habitat	Black

Ballyraine park is a thin strip running south to north, creating a green barrier between Ballyraine road and Ballyraine park estate. The park boasts a line of maturing trees of mixed species that is over 250 metres long with a mixed understory dominated by ivy, with large areas of native woodland flowers. Witch hazel is present along the east side along the wall. Tree lines are very important habitats for foraging bats that have been recorded at Ballyraine park in the summer and also provide roosting opportunities all year round for visiting birds. A small scrub patch with some mature trees dominates the south corner of the park.

On the east side of the path which divides the tree line from the grass area is a steep slope of no more than six metres. The remaining grass strip is quite damp in winter and times of access rain, something which we will see more of in the future due to climate change. Ireland's rainfall has increased by at least 5% in recent years and this is expected to keep increasing according to the Climate Authority Regional Office (caro.ie). The grass area has the usual mix of amenity grass species along with creeping buttercup, daisy, selfheal, cuckoo flower and various doc species. The presence of cuckoo flowers indicates the damp nature of the ground, slow drainage and points towards opportunities in this area.

Invasive species cherry laurel and salmon berry are both present. An approximately 40 metre strip of laurel runs along the north end of the tree-line and another mature patch at the south end. Salmon berry is present at the north end of the tree-line and a large patch is thriving in the southern end of the park. Two rhododendron species are also present and need removal.

The park currently appears as an area that provides lots of shelter for flora and fauna yet is bursting with potential. To have such an established belt of mature trees beside such open space gives scope for a variety of projects. The grass area as it is currently managed is a damp meadow in waiting, a dormant seed bank waiting to be released. Ballyraine park is an important stopgap with potential for increasing its value as a refuge for migrating birds, foraging bats and a lot of invertebrate diversity.

Actions for Ballyraine park

The tree line is the most attractive and best biodiversity promoting feature of the park. Maintenance of trees for public safety must be conducted regularly and in a sympathetic way so as to inflict the minimum damage to the trees and to ensure the habitat does not become a faster that breeds anxiety due to brach fall in storms. Common ash trees that are showing signs of ash dieback must be removed as soon as possible. Wherever ash is removed, they should be replaced with sessile oak. Laurel stands, rhododendron species and salmon berry need to be removed and replaced with native trees.

The understory could be planted with a mix of hawthorn, holly and hazel. This will help suppress the dominance of ivy, add a new layer of vegetative structure and provide shelter and food for many of the visiting bird species. Native flower species such as lesser celandine, wood anemone and bluebells could be planted underneath.

The scrub and tree area in the southern corner could be turned into a designated 'Hares Corner' (see appendix 1 pg.41). This small patch measuring approximately 900 ㎡ has a large common ash specimen on the north end which will need to be monitored. The trees could be added to with oak and a shelter belt of hazel on the borders. Once the oak has established, the hazel could be thinned or removed. The ivy would be removed and replaced with native flower species such as lesser celandine, wood anemone and bluebell to supplement the native flowers already present. Bird and bat boxes would be erected within and signage near the southern entrance to the park explaining the concept of creating a small wild patch for nature. Salmon berry needs to be removed urgently.

A rain garden could be created in two locations along the strip. Either side of the central rose with path and outdoor gym equipment becomes very wet in the winter and in months of excessive rainfall. Guttering, potentially from bricks, would be created to collect water that flows off the path and steep slope running along the west length of the park. These would direct water into a shallow area scraped out in the centre of the grass areas. These areas would be planted with damp tolerant species and have an outflow guttering system fitted to connect potential overflow to the numerous nearby road drains. This would help capture any pollution coming from hard surfaces, help store water, slowing down flood potential on excess rain events and would serve as an educational piece on the value of water retention. Signage would be required to explain the process and the council would need to be a partner to help with the guttering and to facilitate excess water drains to cut through the path on the east side.

The north corner could be planted with a mix of rowan, crab apple and bird cheery trees, creating a copse for winter visitors. Winter visiting thrushes would benefit from this added food resource as would biodiversity all year round.

One/two square meter areas could be marked out and defined with log borders and allowed to grow as pollinator patches. They would be maintained by, mowing in late summer only and the removal of the cuttings to deplete nutrition, allowing wildflowers to compete with the existing grass species. Bird and bat boxes could be installed along the tree-line. Signage for all features as well as signage at all entrances mapping and explaining the work being delivered for biodiversity would be essential.

A Remove common ash and replace with sessile oak. Maintain trees regularly for potential branch drop and fall hazards. Label as many species as possible.

B Add hawthorn, hazel and holly trees as understory layer where space exists.

C Plant lesser celandine, bluebells, golden saxifrage and wood anemone under tree-line. Ivy and other dominating ground cover would need to be cleared.

D Create a 'Hares Corner' by planting hazel, sessile oak and native woodland flower species. Clear existing dominant ground cover plants. Create signage explaining 'Hares Corner' concept. Monitor common ash tree for ash dieback disease.

E Create two rain gardens filled with run off from the path and the steep bank to the east on the wettest parts of GA2 habitat. Construct a brick gutter to collect and feed water to the damp areas. Scrape the damp areas to clay level, keeping the surface uneven to offer different depths. Plant with some damp loving species (less than 50%). Allow the rest of the area to be colonised by native seed bank. Consult with the council around a runoff drain to existing road drains and about water collection. Create signage explaining the reasons and benefits of these wet areas.

F Plant an orchard of bird cherry, rowan and crab apple, scattered amongst the existing trees in the north end of the park area. Keep easy maintainable spaces between the trees.

G Fit bird and bat boxes to the tree-line area and into the hares corner. Tit species boxes higher up and open nest boxes wherever dense cover exists. Bat boxes at intervals along the south side of existing mature trees.

H Create signage at both entrances and along the path explaining the actions for the area. A map of the basic habitats and action that are being implemented at the entrance points, more specific signage for each action at each action site, particularly the hares corner and rain gardens.

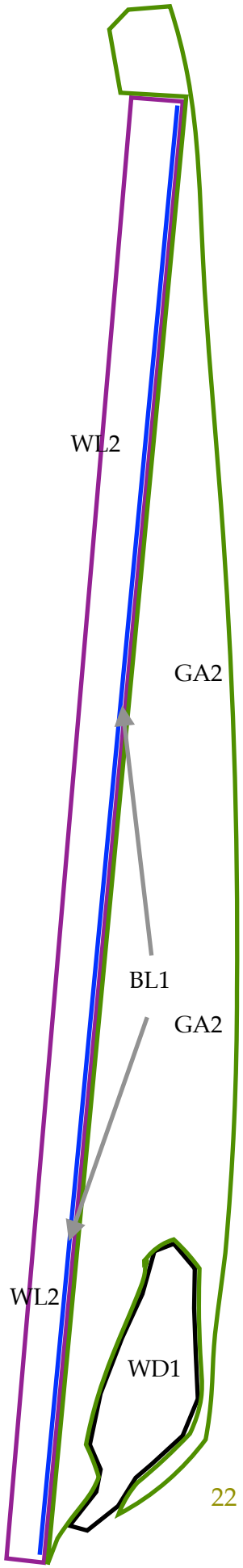
I Remove laurel opposite petrol station, and south end of tree-line, rhododendron species and salmon berry at north end of tree line and south end of Hare's corner area.

Cuckoo flower, sometimes known as lady's smock

Habitat type	Fossitt code	Colour on map
Stone walls	BL1	Blue
Treelines	WL2	Light green
Mixed broadleaved woodland	WD1	Purple
Amenity grassland	GA2	Black

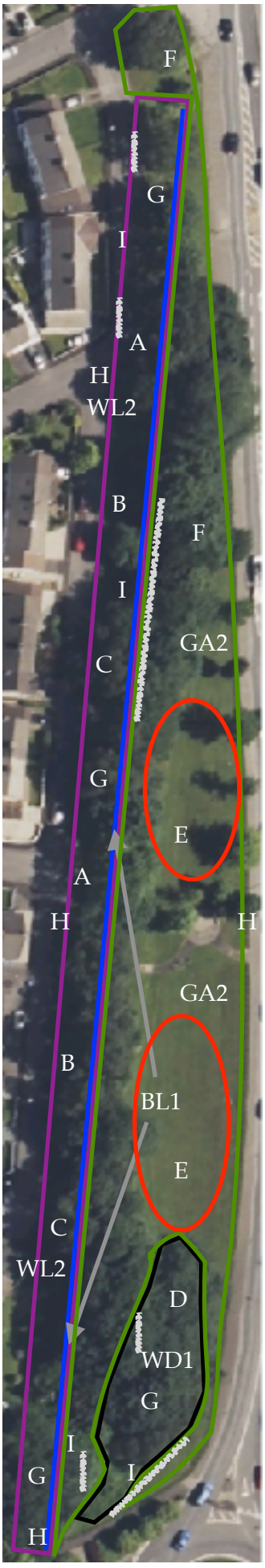
Habitat maps and codes with colour key.

Background image © Apple maps.



Habitat	Action	Description
WL2	A	Remove common ash and replace with oak and label tree species. Keep maintenance ongoing
WL2	B	Add understory shrubs
WL2	C	Plant with native woodland flowering species
WD1	D	Create Hare's Corner
GA2	E	Create rain gardens
GA2	F	Plant native tree orchard for birds
WL2 + WD1	G	Fit bird and bat boxes
All areas	H	Erect signage at both entrances discussing a nature area for visiting birds, highlighting the enhancements for all wildlife and explaining specific action concepts
WL2 + WD1	I	Remove laurel stands and salmonberry and rhododendron

Habitat codes, action codes and descriptions



Habitat map with habitat codes and action codes and locations. Rain garden areas marked in red ovals. Invasive species are marked in silver. Background image © Apple maps.

Appendix 1 - Information to inform actions

Pollinators

The All Ireland Pollinator Plan includes a large variety of agencies working together both north and south in a bid to enhance habitats for pollinating insects. In the years 2013-2107, our bumblebee species have declined by 14% and it is estimated that our 98 species of bee (only one of which is a honey bee) will suffer an extinction rate of 30%+ by 2030. One third of our food comes from pollinated plants. Reversing this trend of decline is very possible with the help of robust planting, hedge cutting management, eliminating chemical use and awareness raising.

Donegal county council are partners of the all Ireland pollinator plan and as such, have agreed to participate in enhancing areas for pollinators. Listed below are a number of plants that would be ideal planting in any pollinator friendly areas that are being developed. This is one of the many resources available at pollinators.ie

Pollinator friendly plants from the pollinator plan for Ireland

Pollinator friendly plants to provide cover through all 4 seasons

Pollinator friendly grass cutting

Creating a patch, no matter how small for pollinators in your grass areas or lawns is an enormously beneficial action to take. The basic premise is that grass likes nutrients so the more you can deplete the nutrients and make sure no fertiliser is applied, the more native flowers that are dormant as seeds will thrive. Wind blown seeds will also colonise in time if allowed. The soil in any given area acts as a seed bank, with many species able to lie dormant for decades waiting for conditions to suit.

By allowing it all to grow and only cutting in late summer, leaving to dry for a couple of weeks so the seeds fall off and then crucially, removing the old cuttings before they release their nutrients back into the soil, wildflowers will start to establish. This will take a number of years before large diversity takes hold but it will come. Another method is take the cuttings from another wildflower meadow and spread these as a source for seeds. More information form the excellent website, pollinators.ie is laid out below.

These areas can be very special additions to any park or gardens as long as the edges are trimmed and maintained, giving a managed appearance. For large areas paths may be cut through the meadow. Do not buy packs of wildflower seeds unless you are very sure that all seeds are native to your area.


Pollinator-friendly grass cutting
Reducing your grass cutting regime is the most cost-effective way to help bees – these actions do not involve purchasing wildflower seed
All-Ireland Pollinator Plan 2015-2020
Short-flowering meadow:
Cut parts or all of your grass less frequently to allow wildflowers to grow and provide food
Long-flowering meadow provides food and shelter for pollinators
Kept short for humans
Short-flowering meadow provides food for pollinators
These flowers will naturally grow in slightly longer grass. The more of these flowers the better!
Dandelion
Red nettles
Selfheal
Bird's-foot-trefoil
Clover
This image shows a mosaic of three different grass cutting regimes.


In a long-flowering meadow additional plants like these will grow naturally and provide food
Adding Yellow rattle seed after a meadow has established will help keep down grasses and encourage other wildflowers
Long-flowering meadow:
Cut once a year to provide food and shelter for pollinators.
Cut once a year in September. Let the cuttings lie for a few days to allow any seed to drop and then remove. Meadows managed in this way will allow wildflowers to bloom throughout the pollinator season and also provide undisturbed areas for nesting.
These can be large areas or strips/patches within a more traditional grass cutting regime. Small areas can be cut with a scythe or strimmer. Larger areas may require specialised equipment or an arrangement with a local farmer. In large areas it is helpful to leave some small sections entirely uncut each year for other over wintering insects to nest.
Vetches
Oxeye Daisy
Devil's-bit-Scabious
Knapweed
To naturally improve your meadow collect wildflower seed locally. Sow in trays and grow-on as small plants (plugs) which can be added to the meadow in spring or autumn.
How-to-guide
Remove the cuttings each year and be patient!
Most meadows will look very grassy for the first few years. If you remove the cuttings each autumn the soil fertility will drop and it will gradually become more flower rich on its own. The poorer the soil - the more flower-rich your meadow will be!
Years 1-2
Year 4
National Biodiversity Data Centre
www.pollinators.ie

Hedgerow management

Hedges often suffer from a desire to apply a 'neat' effect on them. Allowing hedges to grow, raising their height over five years and filling in older hedges with native stock will bring huge amounts of biodiversity locally. Hedgerow management should be kept to a minimum, cutting every three years maximum where road safety is not an issue. Cut into "A" shape to maintain species diversity. Good maintenance practice is to cut either one side or the top only, changing the side to be cut from year to year. As so many of Irelands native plants and animals are originally woodland species, hedgerows provide refuge for a great variety of life.

Native trees

Planting the right tree in the right places is crucial for the tree to thrive and for biodiversity to be enhanced. From the hardy downy birch that can grow on acidic and nutrient poor soil to trembling poplar or aspen for very wet areas, there is a tree for all conditions that Donegal can offer. Below is a list of of just some native trees and plants worthy of consideration. Remember that all trees should be sourced from local stock, planted as very young (1-2 year) trees and planted between December and March.

Alder	The common Alder is a water loving species. It also fixes nitrogen into the ground; enhancing the quality of the soil over time. Its cones provide autumn food for many bird species.
Aspen	Another water loving tree. Tends to sucker and can take over a damp patch of unused land. Ideal for creating a dense cluster of trees or for taking over a patch of land.
Ash	Common Ash prefers reasonably fertile and well drained land. It is the most common tree in Irish hedgerows today. Unfortunately due to ash die back disease many will need to be removed. First seen in the country in 2012, the disease became very visible in 2021 in Donegal. Most of the common ash observed during thesis surveys will need to be removed.
Birch	Attracts huge numbers of insects. Downy birch is hardier and more tolerant of acidic soil than Silver Birch. Will grow in most Donegal environments. Known as a pioneering species, often seen colonising an area of bare ground along with alder and willow.
Bird Cherry	Hardy, provides food for pollinating insects and birds. Small to medium sized tree. Not as showy as hybrid non-native versions of cherry but attracts more native invertebrate life.
Blackthorn	Small tree often used in hedgerows due to its sharp thorns. Ideal for planting in an area to be colonised as it spreads from suckers much like aspen. In time will create dense cover for birds and other animals. Flowers early and before leaves appear, has deep purple coloured berries in autumn known as sloes. Small tree.

Crab apple	Small hardy native apple tree producing deep pink flowers in spring and very small cherry sized apples in autumn. Ideal tree for planting in places that are too exposed for decorative cherry species.
Guelder Rose	As well as providing a beautiful flower, this native shrub is ideal for filling gaps in existing hedges. It also provides fruit for birds and other animal species in autumn.
Hawthorn	Great for birds nests, hedgerow reinforcement and pollinating insects. Hawthorns flower in May after their leaves appear. Visiting thrush species very reliant on abundance of hawthorn availability. Small tree.
Hazel	Small multi-stemmed tree providing cheerful colour in early spring with its brightly coloured male catkins and produces hazel nuts in autumn. Good hedgerow or under-storey species.
Holly	Grows well in shaded places as an understory tree and supports lots of insect life. Linked with the holly blue butterfly. Provides berries in late winter.
Juniper	Threatened in Ireland, was the dominant plant 12,000 years ago approx. Has historic value and is host to 42 types of plant eating insects. Provides berries and shelter for birds.
Oak	Attracts more insects than any other native tree plus supports huge amounts of epiphytes such as mosses, lichens and ferns. Sessile oak as well as being our national tree is hardier than our other native oak, pedunculate oak.
Rowan	Masses of flowers in the spring for insects and berries in autumn for birds. Along with hawthorn is an essential plant for migrating thrushes and other bird species. Will grow at a higher altitude than any other Irish tree. Small tree.
Scots Pine	A hardy and native pine tree that can tolerate poor, shallow, acidic soil and high altitudes. Evidence of the abundance of this tree in our uplands can be found from its stumps preserved in peat.
Whitebeam	Hardy, rare (in its natural form) and decorative tree. Planted extensively in gardens and parks throughout the country as a decorative tree. Small tree.
Willow	Attracts insects and can be used for sculptures such as living chairs, domes etc. Goat willow and eared willow are very hardy. Ideal for living classrooms, and other such projects as it can be pruned vigorously, can grow in most soils and is easily manipulated. Along with alder and aspen, helps to dry wet ground.

Bird boxes

By erecting bird boxes the number of blue, great and coal tits can dramatically increase. Robins and pied wagtails can also nest in boxes with a more open entrance. Placing the boxes a reasonable distant apart from each other, at least fifty meters and facing north increases chances. Once birds establish breeding this increases peoples engagement and appreciation of their presence. If these boxes are successful it is possible to attract more diverse species such as dippers and grey wagtails by the river, barn owls or kestrels by woodlands and so on.

Small song birds will lay one egg a day for up to thirteen days, then incubate the eggs for approximately two weeks, then feed the chicks until they fledge about three weeks later. Cameras can be used for a variety of wildlife projects; one of the most popular is to mount them in a waterproof box beside a bird feeder, excellent for survey work.

Instructions for bird boxes:

Nest Box Location:
North or North East Walls to avoid prevailing wind/rain and direct sun. On a tree is ideal but the side of a building can work equally well. Box angled downwards slightly to avoid water entering the entrance hole and flooding the nest. Reasonable distance from other nest boxes, from bird feeders and from other ideal nest sites such as cavities in an old wall. Ideally shrubs and trees nearby. This increases chances of occupation as it appears as a more natural setting. Birds will often prospect a variety of sites so if nothing happens this season be patient. Some birds build several nests in a season and only one is used. Droppings are usually carried away by birds that use nest boxes so the site should remain. Small holed bird boxes should be placemat least 2.5 meters up and out of easy access rom cats. Open nest boxes should be places below two meters and in dense vegetative cover.

Time of year:
Ideally before the end of February as birds are prospecting for nest sights from then. Any time outside of this can also work, boxes put up in April have been successful that season. Also some birds use the boxes for shelter in winter.

Nest Box Type:
Small hole at front ~ Blue tits and Great Tits, minimum of 2.5 metres above ground. These two species are by far the most common users of nest boxes. Large rectangular entrance ~ Robins and Wagtails, 0.5 - 2 metres in height.

Maintenance:
After use between November and January boxes should be cleaned of old nest material and scalded with boiling water to kill any bird parasites. Boxes should not be disturbed once up between the months of February and October. Eggs / nest material should never be removed during these months. Be aware of cats, they are one of the largest threats to small nesting birds.

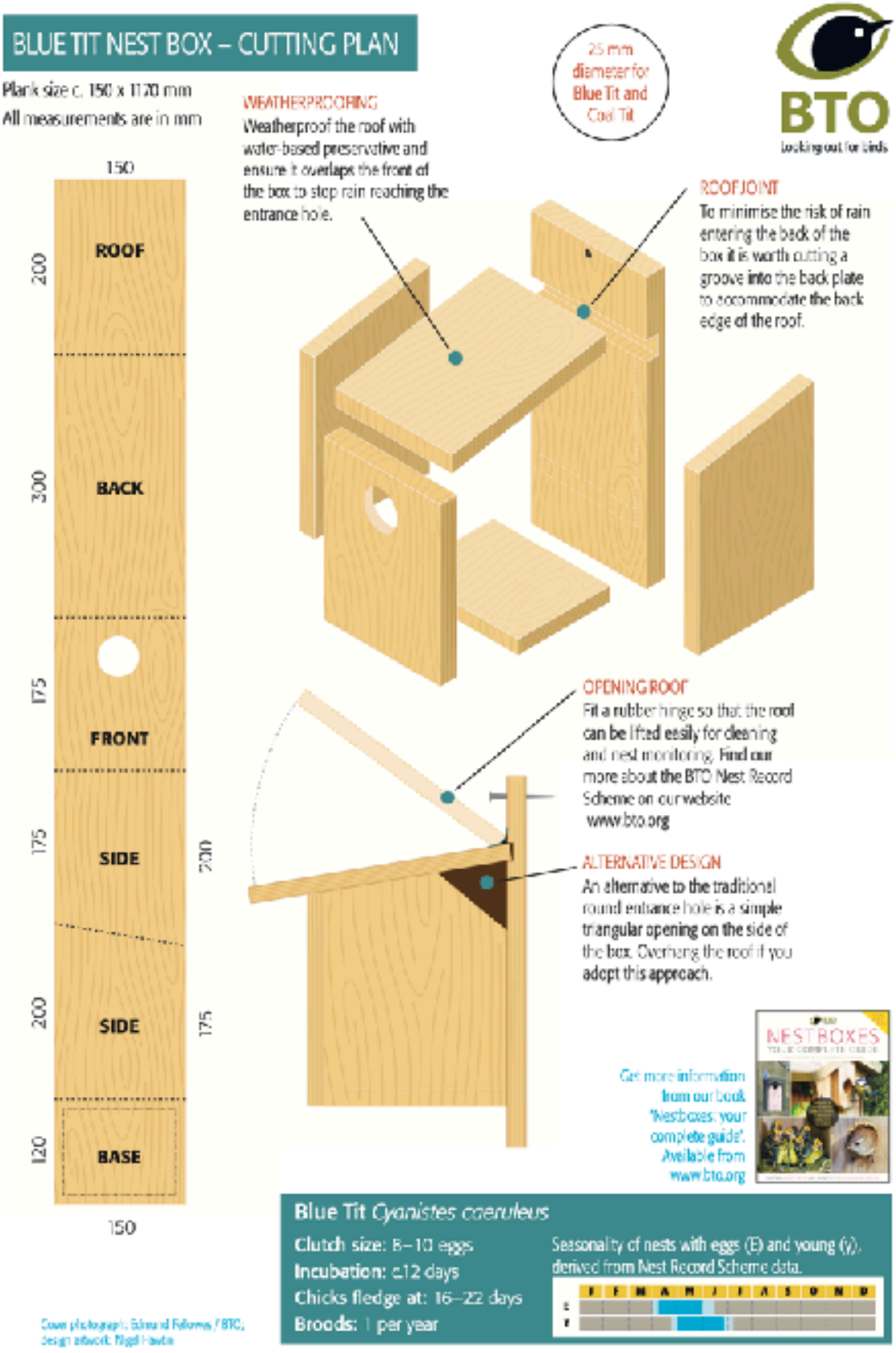
Cameras:
Fixed line ~ Preferred method, 1 power source required, gives a stronger signal. Direct line from camera to recording device or screen.
Wireless ~ 2 power sources required. The power for the camera could be battery as opposed to mains. Still good signal, can beam signal to a receiver within line of sight up to 50 metres. Receiver can be inside glass and is wired to a recording device or straight to the screen.
Hard drive boxes or (with a special adaptor) laptops can be used to record footage and create a movie of the birds nesting which can be potentially streamed to promote the area. Streaming live nest boxes is becoming increasingly popular and is an excellent way of engaging with the public. Zoom accounts for streaming are a way that is affordable and user friendly.

N.B. Make sure an appropriate licence is sought from NPWS if bird cameras are being fitted into any bird box.

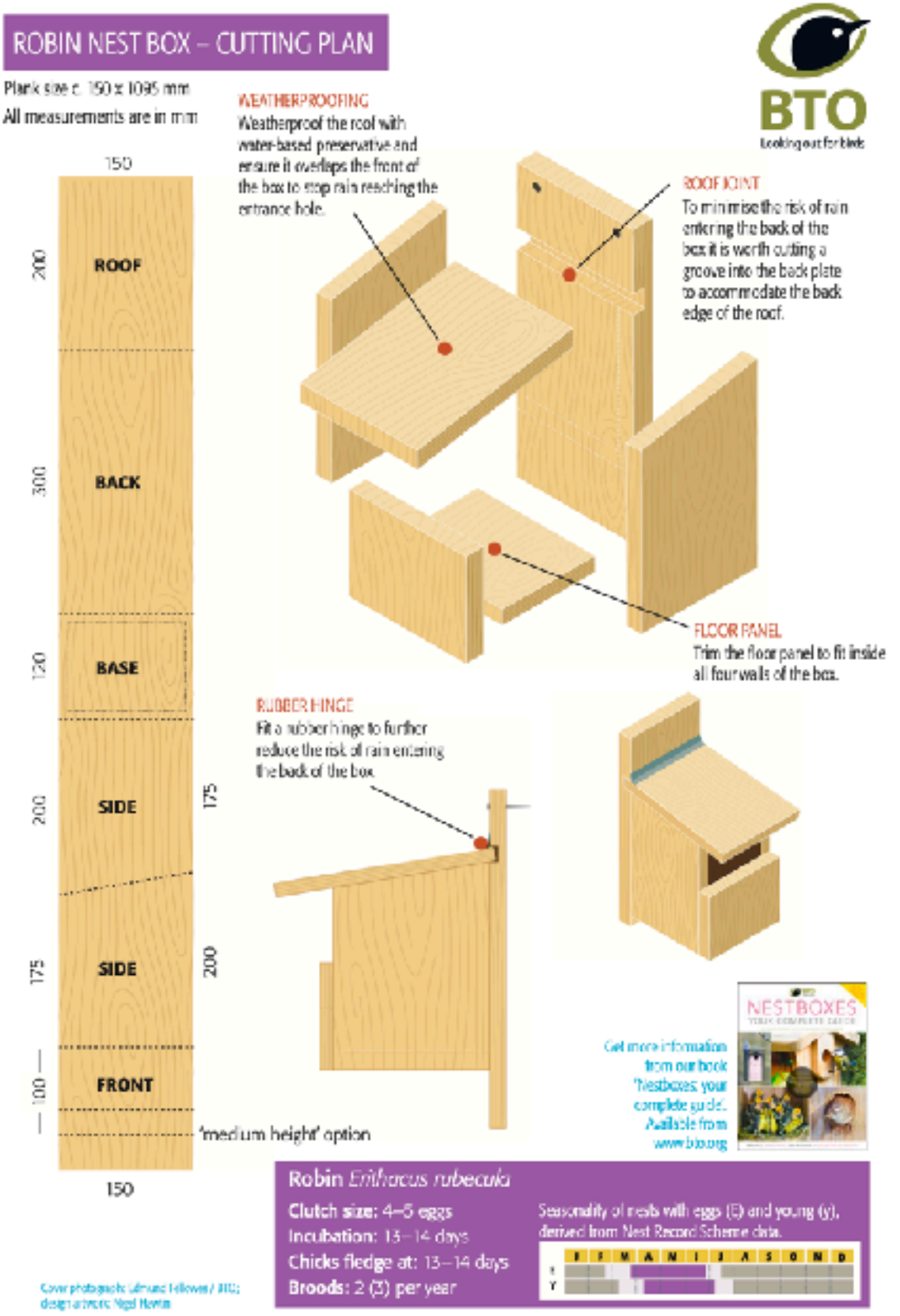
Birds will often prospect a variety of sites so if nothing happens this season be patient. Some birds build several nests in a season and only one is used. Droppings are usually carried away by birds that use nest boxes so the site should remain.

Bird box instructions

Instructions for a small-holed nest box for blue, coal and great tit species. *Instructions courtesy of the British trust for Ornithology.*



Instructions for an open fronted robin nest box. *Instructions courtesy of the British trust for Ornithology.*



Bat boxes

Instructions and information on fitting and maintaining bat boxes. *Information courtesy of Bat Conservation Ireland.*

There are a number of species of bat that have been recorded foraging in and around Letterkenny. While female bats will often roost in buildings, using roof specs as their maternity ward, males and some females rely on tree cavities,. Holes in old walls and ivy cover for protection during the day. All species rely on fixed foraging lines made up of tree lines, hedgerows or in some cases water courses. Bats can be very faithful to foraging lines, if a row of trees or a hedge is removed in spell the end for that particular population. As well as being protected by the wildlife act, each bat will consume over 3,000 invertebrates each night, making them an essential partner in pest control.

Bat box instructions, courtesy of Bat Conservation Ireland:

Bat Conservation Ireland Information Leaflet no. 3 – Bat Boxes

If you have set up bat boxes in you garden or at your school, register your bat box scheme with Bat Conservation Ireland. We are always interested in hearing your reports on the types of bat boxes used and the success of your bat box scheme.

Email: batline@iol.ie
Batline phone number: 046 9242882
Address: Bat Conservation Ireland, Deerpark House, Main, Kells, Co. Meath
Web site address: www.batconservationireland.org

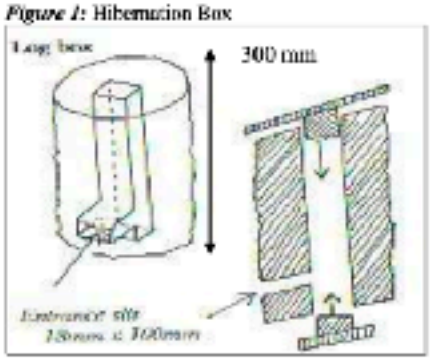
Alternative Roosts: Bat Boxes

Bats are social animals and often congregate in large numbers. Providing bat boxes offer bats additional roosting areas, or can often help to replace lost or degraded roosting sites once sited correctly. They are particularly suitable for providing artificial roosting sites in areas such as coniferous plantations where there is a shortage of natural sites. Bat box schemes are also a great education tool and allow communities and schools to get involved in bat conservation.

Many bat box designs are available. A basic bat box is constructed from untreated rough sawn timber and resembles a bird box, but the typical access hole in front of the box is replaced by a narrow slit of up to 1.5 cm in width on the underside of the box (Information Box A). Many alternatives to the traditional wooden bat box design are available including the 'Tanglewood Wedge' bat box (Gwent Bat Group), which is considered to increase the life-span of the bat box under weather conditions, reduce the loss of warm air within the box and prevent injury to bats during inspection of the box contents (Information Box B). A more advanced bat box comes in the form of Schwegler 'Woodcrete' bat box, which offer considerable advantages over the basic wooden box (Information Box C). This type of bat box is made from sawdust and concrete moulded into the required shape (numerous designs are available). Woodcrete boxes have excellent thermal insulation properties with less fluctuation of internal temperature conditions providing a more suitable environment for roosting bats. They are also longer lasting than wooden boxes. Wooden bat boxes are the simplest to make while Schwegler Woodcrete bat boxes are alternatively available to purchase.

The bat boxes described below are essentially for summer occupancy since they lack the required insulating properties to make them suitable as hibernation sites. Hibernation boxes require sufficient wall thickness to insulate bats from the extremes of cold. Bats are often found in hollow branches of trees with a minimum thickness of 80-100mm on all sides and internal height of 300mm. A winter box therefore can be made by hollowing out a suitable sized log (Figure 1) or with 100mm planks of wood. However, such boxes are heavy so a lightweight alternative is to sandwich polystyrene insulating materials between 20mm thick wood ensuring that the polystyrene is weathered to remove odours. Additionally, large maternity bat box designs are available as well as bat boxes suitable for particular species and particular environments (e.g. Daubenton's bat roosting in bridges). An array of websites discusses these in more detail (See Bibliography).

Figure 1: Hibernation Box



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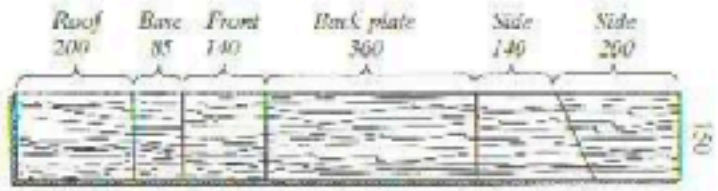
Mitchell-Jones, A. J. and McLeish, A. P. (1999) The Bat workers' manual, 2nd Edition, JNCC.

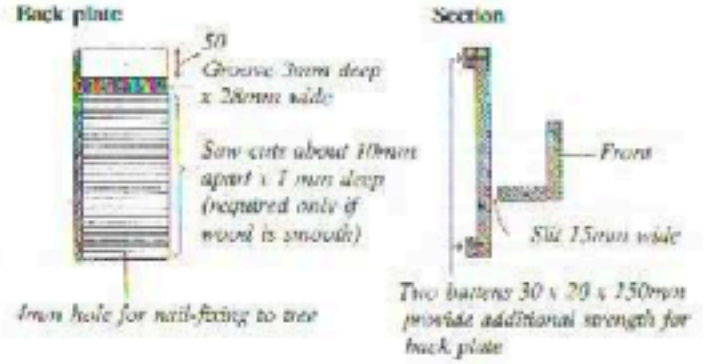
Stebbings, R. E. and Walsh, S. T. (1991) *Bat Boxes: A guide to the history, function, construction and use in the conservation of bats.* The Bat Conservation Trust.

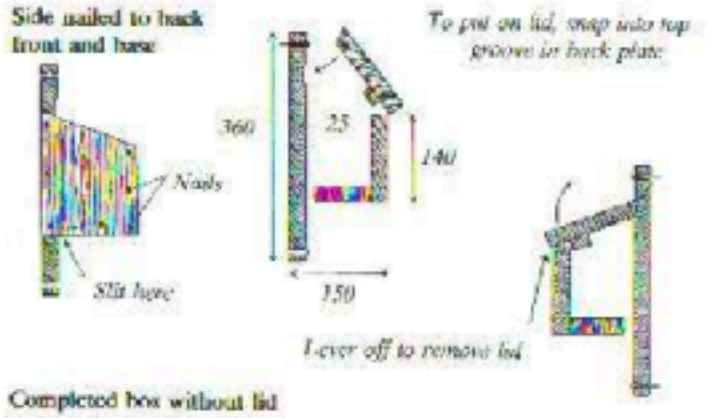
Bat Conservation Trust (GB) www.bats.org.uk
Maternity Bat Boxes
www.dnr.state.md.us/wildlife/batboxes.html
Alternative designs www.jwaller.co.uk/batgroup/

Information Box A

Basic Wooden Bat Box







Completed box without lid

Underside of lid

Alternative lid

Source: Stebbings and Walsh (1991)

Always use untreated timber as wood preservatives are harmful to bats

Make sure the box is well sealed to ensure that it is draught free and rainproof

Softwood should be rough all over. Saw cuts on the back plate are only necessary if wood is smooth.

A hinge lid is an alternative to the described snap lid. A strip of tyre inner tube is tracked to the lid and back plate with a wire hook fitted to the front to prevent animals or the wind lifting the lid.

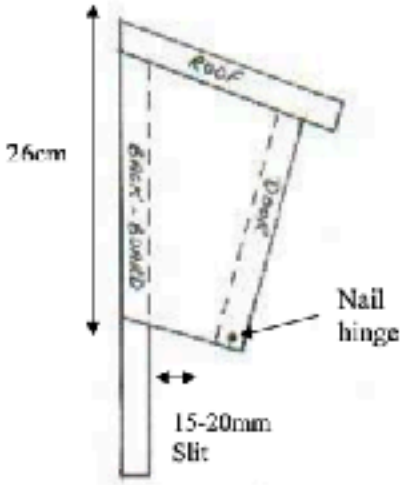
A well fitted lid greatly improves the chances of boxes being used by bats.

Front or side opening boxes are alternatives to the design described.

Construction: figures show the construction of a basic wooden bat box. The box may be glued using a waterproof resin glue or fixed by nails or a combination of both. Roof felt cover over the lid offers extra rainproofing.

Bat boxes with exterior paint (dark colours) allow boxes absorb sunlight quicker and may make boxes less conspicuous. Non-toxic paints should be used.

Information Box B ***The 'Tanglewood Wedge' bat box***



The acute angled ends of triangular sides are cut off to give the entrance slot of required width. The top edge of the backboard must be bevelled to fit. The roof and backboard are next to each other on the cutting plan so that, with a tilting circular saw or jig-saw, the bevels can be cut in one go. The cutting edge is approximately 60^{O}.

The front opening door is pivoted at the bottom on two clout nails. A hole is drilled high up through one side of the box and into the side of door. This takes a loose-fitting clout nail which holds the door firmly closed against the doorstops. These are cut from 10-12mm strip and are fitted at the top and sides of the door opening to act as a doorframe and aid waterproofing. The side doorstops are cut off about 3cm short of the bottom to allow freedom of movement of the door. A small screw is fitted as a knob for opening the door.

Cutting Plan & Side view of bat box Source: BCT leaflet The 'Tanglewood Wedge' Bat Box

Information Box C
Schwegler 'Woodcrete' bat box

Woodcrete boxes have the highest rate of occupation for all bat boxes. Numerous designs are available with the simplest design shown in photograph (2F Bat Box). This bat box is suitable for species including Pipistrelle, Long-eared and Daubenton's bats. Additional designs are available including a hibernation Box. An array of boxes is available for purchase through www.alanaecology.com and www.jacobjayne.com.

Siting and fixing bat boxes

Careful siting of bat boxes is crucial to their success

Bat boxes are intended for attachment to trees. Some boxes are available for attachment to other structures such as bridges and buildings. But the following guidelines can be followed, in general, for all bat box schemes.

Fixing of bat boxes

Bat boxes should be attached firmly and safely to trees to ensure suitability for use by bats. Nailing is the cheapest method. Iron nails can be used on trees for non-commercial use while aluminium nails on trees destined for the commercial market. Headless nails should be used to allow growing trees to push off the box with minimum damage to the tree. Alternatively, the method described in Figure 2 can be used to accommodate growing trees. Another method

used tie bands or cord and wire on the top and bottom of the bat box, which allows readjustment during the life of the bat box. However, this method is considered to be less secure.

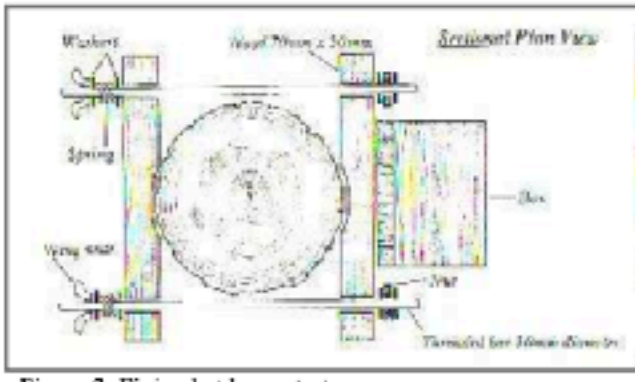


Figure 2: Fixing bat boxes to trees

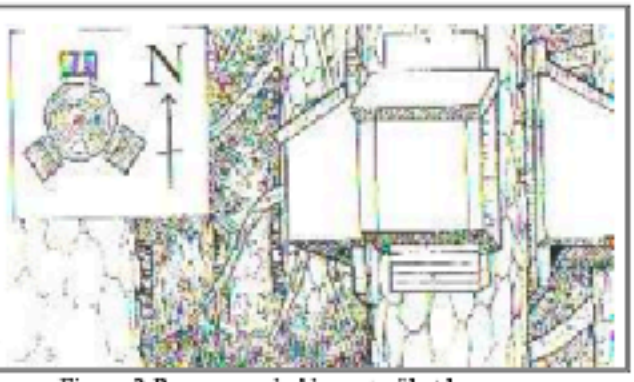


Figure 3:Recommended layout of bat boxes

Height above ground

Bat Boxes are, in general, intended for attachment to trees. There should be no crowding branches or other obstructions for three meters radius around where the bat boxes are to be fitted. It is best to site bat boxes in places where they can be easily relocated for inspection e.g. woodland rides. In general, the higher the boxes, the safer it is and therefore the greater likelihood that bats will use them. However, different heights do suit different species but to reduce vandalism, aim to position bat boxes as high as is convenient (3-5m).

Aspect

The number of boxes per tree will depend in the size of the project. For projects with fewer than ten boxes then place two boxes per tree in a south-east and south-west facing so sun falls on most of them for part of the day. In larger projects, three bat boxes per tree arranged in a north, south-east and south-west facing (Figure 3). This allows a range of temperatures for residing boxes with south facing boxes receiving sun while a north facing box remains cool for day where temperatures are too high. Warm boxes are essential for bats to reduce energy expenditure especially for pregnant females and later for young bats. Having several boxes on one tree allows bats to move about during the day without too much risk from predation.

Siting

The best areas to site bat boxes are those where bat forage regularly and where natural roosting sites are rare. They need to be sheltered from strong winds and where exposure to sunlight is assured. Generally woodland rides or glades adjacent to wet grasslands are the best. Bat boxes in garden are also possible with success improved when all the above guidelines are followed.

Inspection of boxes

It is essential to that bat boxes are being used and reposition unused boxes to a more suitable site. If a bat box or group of bat boxes are not used over a two-year period then they should be repositioned. However, if some bat boxes in an area are regularly used and others in the same are not, leave them. Often bat will use boxes without leaving any evidence. Inspect that area around the bat box to look for signs of usage e.g. droppings or alternatively, watch the box at emergence time to observe whether bats leave the box.

Boxes should never be inspected from mid-May to mid-August when bats are giving birth or lactating. Disturbance at that time can cause abortions or abandonment of young.

Bat droppings may be black to brown and vary in size. Roll a dropping between index finger and thumb and if the dropping crumbles into a fine dust, this is an indication of a bat dropping. However other animals especially birds may use bat boxes and if is essential that boxes are cleaned out over the winter period to make them available to bats in the following season.

Rain garden

A now common feature in other countries, rain gardens are coming into focus in Ireland. Ranging from roof fed shallow ponds to damp areas in a park or garden, rain garden are designed to capture water, capture toxic runoff from hard surfaces, slow water flow to aid flood prevention and to increase biodiversity. Below is some information taken from the guide *'A Householders Guide to Sustainable Drainage (SUDS)' courtesy of South Dublin county council. The full guide can be found in the links section of appendix 2.*

Designing your own raingarden

Hopefully, this guide has inspired you to build your very own raingarden - but where do you start?

Below is some useful step-by-step advice to talk you through the process.

Image: typical raingarden profile

Image: suggested raingarden planting

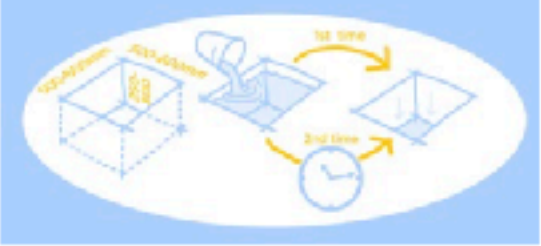
Pick a place where you can get water from a roof or driveway to your raingarden and where, if it overflows, the water can return to the surface water sewer or a natural watercourse and not into your house or a neighbour's property.

The location should have enough space for your raingarden and you may want to think about how the raingerden will effect the design and functionality of your existing garden.

It is recommended that rain gardens are situated at least 3m (10 feet) from any building and if your property is situated in an area with chalk or other material that could be adversely affected by localised increases in the flow of ground water you should contact your local authority Building Control Officer for advice.

If the rain garden is situated on clay, then separation distance is less of an issue, but be sure to provide an overflow.

step 2 : work out how easily water soaks into your ground



Dig a hole around 500-600mm square and around 250-300mm deep. Make a note of how deep it is.

Have a few buckets or containers with water in then fill the hole in one go.

Wait for the water to soak away.

Fill the hole again in one go and then time how long the water takes to soak away - it could take minutes and often hours.

Divide the depth (in mm) of water when you filled it by the number of hours it took to drain down to find your infiltration rate. For example 300mm depth of water draining down in 2.5 hours = 120mm per hour infiltration (300÷2.5 = 120).

If your garden infiltrates at a rate of 50mm per hour or more, it is ideal for a raingarden.

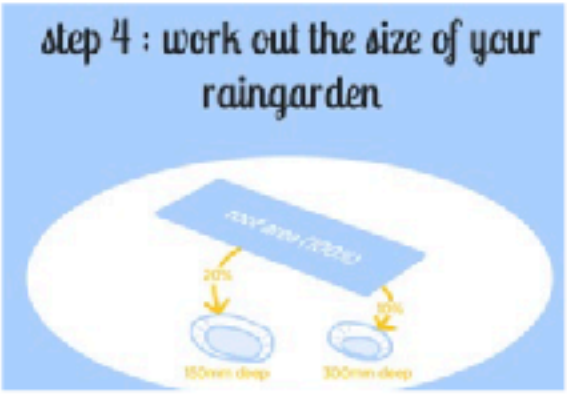
Slower than 50mm per hour? You can still build a raingarden but you may want to include a device to allow it to drain down slowly so that you don't have a 'bog garden'!

step 3 : work out how much roof or surface you are collecting water from

Work out which downpipes you can disconnect and divert or which areas of hard surfacing you can direct to your proposed raingarden location.

Roughly work out how many square metres each roof or hard surface you can connect to the raingarden is. Do this by measuring how wide and long the roof or area is in plan (not measuring the diagonal length of the roof) and multiply them together. You can measure this on the ground - no need to climb up on the roof! For example, one slope of a typical terrace roof may be around 5m x 6m. Therefore the roof area is 30m (5 x 6 = 30).

step 4 : work out the size of your raingarden



Work out which downpipes you can disconnect and divert or which areas of hard surfacing you can direct to your proposed raingarden location.

Roughly work out how many square metres each roof or hard surface you can connect to the raingarden is. Do this by measuring how wide and long the roof or area is in plan (not measuring the diagonal length of the roof) and multiply them together. You can measure this on the ground - no need to climb up on the roof! For example, one slope of a typical terrace roof may be around 5m x 6m. Therefore the roof area is 30m (5 x 6 = 30).

image: recently planted tree and rain garden redesigned around the underground services

step 5 : design your raingarden

The ideal size for your raingarden will depend upon how deep you want it to be:

A 150mm deep raingarden would ideally be around 20% of the area of the roof or hard surface feeding it. For our 30m roof example earlier, this would be 6m (or around 3m long and 2m wide).

A 300mm deep raingarden would be around 10% of the area of the surface feeding it - 3m for our example roof.

There is no harm in your raingarden being bigger if you have the space - it will work even harder to reduce flooding - and if you don't have enough space to achieve the recommended area for you roof or hard surface, don't let it put you off as anything is better than nothing!

Now you know how big it needs to be you can decide on the overall shape and character of your raingarden and the types of plants you would like to grow in it. Raingardens are actually dry much of the time and so most garden plants are suitable - we recommend not using silver-leaved plants as these tend not to like being soaked for periods of time.

A raingarden can be dug into the ground or formed in a raised bed - or somewhere

between the two. Having a slightly raised raingarden can reduce the amount of digging you need to do and can make overflowing back to the sewer easier because you have some height to make the water flow downhill to where you want it.

You can use a pipe or surface channel to take overflow from the raingarden to a stream or the surface water sewer - the easiest might be back to where the rainwater pipe used to run underground or to a nearby yard gully.

If you had an infiltration rate below 50mm per hour it is advisable to think about a way of allowing the raingarden to drain down slowly. A pipe with a cap on the end, with a 15mm hole drilled in the cap, buried in the base of the raingarden with gravel protecting the hole from blocking and the other end connected back to the surface water sewer or to a stream will do this and still help reduce flooding.

Image: an unlined raingarden within 5m of a building

Important!

Installing an unlined rain garden or permeable pavement within 5m of a building foundation - check if soils such as chalk or running sands are present. This will not be the case for the vast majority of South Dublin.

Hares corner case study from the *'Blue/Green Infrastructure and nature based solutions'*

Approaches to Design

The Hare's Corner Initiative

Clare, Ireland

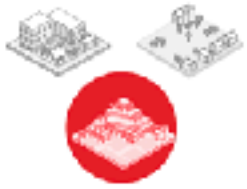
Completion Date

2022

Key Societal Challenges

Climate Resilience, Biodiversity, Water Security, Placemaking

Settlement Types



Immediate Environments

BGI & NbS 3.1
Approaches to Design

Description

This is an initiative to help landowners make more space for nature by creating a pocket-sized woodland, orchard, or pond on their land. Participating landowners incur no cost and minimal paperwork is needed. All trees, materials and contractors are locally sourced. Farmers are required to dedicate an area of up to 0.1ha for the creation of a native woodland habitat. The Burrenbeo Trust provide up to 400 native trees including 100 endangered Buren Pine trees. Those creating a pond are asked to dedicate 5x5m. For the mini-orchard 6-12 fruit trees are supplied by Irish Seedsavers. Funding, guidance and training are provided to farmers as required.

Relevance to the Southern Region

As an active project within the Region, this initiative is improving Clare's green infrastructure in a way that is sensitive to and supportive of the needs of local farmers and landowners. This approach could be trialled in other counties across the Region. The Hare's Corner project is improving farm's climate resilience as well as contributing to farming family's sense of enjoyment and wellbeing. The initiative creates a natural legacy in the Region to be enjoyed by future generations. When participating in the initiative, farmers are asked to sign a pledge this may help them to market their food products and other farm services.

Weeding and controlling of plants ***courtesy of Dr. Trish Murphy***

There are a wide range of methods used to control vegetation and pesticides are often the first choice. However most pesticides are non-specific and can kill not just the pest you are targeting but can have an impact on a whole range of other species. It is possible to manage gardens, yards and our shared spaces safely while enhancing the biodiversity of the area for all to enjoy.

What is a weed?
A weed is defined as 'a plant in the wrong place'. Weeds are generally wild flowers growing in areas that are controlled by humans for growing crops, feeding livestock or growing ornamental plants.

What is a pesticide?
A pesticide is a chemical used to kill pests. There are different types of pesticides e.g. insecticide (used against insects), herbicide (used against plants) and fungicide (used against fungi). Many of these are man-made compounds but some are derived from natural products.

Benefits of Organic Approach
1. Cost saving
2. Kinder to your health, your pets and the environment
3. Pollinators habitats and food sources protected.
4. Using less herbicides means there will be less build up of these harmful chemicals in our environment.

Choosing a Control Method
What method you use to control vegetation depends on a number of factors including:
1. Type of weed
2. Size of the area that you are controlling

It does not take much time and effort to weed an area of ground 2m x 2m but a half acre could end up being a difficult task.
Before you start try asking yourself the following questions:
- What is the weed? Is it an invasive species?
- Do I really need to eliminate this weed? Try embracing the weeds! Many 'weeds' are wonderful wildflowers that are hardy in our environment and perfect for our native biodiversity.
- If I choose to use a herbicide am I fully aware of the risks? (see section on Keeping Safe)
- Can I use a control method that does not harm the environment?

Suggested Control Methods
Manual removal – Scraping or hand removal - weeds can be scrapped from a hard surface relatively easily. If the plant is tall, strim it down low in advance before using a sharp spade to lift the remainder of the plant up. If removing by hand there are several types of tools for different weeds such as a tap root remover (for dandelions).

Burning – A burner or flame thrower can be used to heat the weeds and can be very effective at killing the whole plant including the roots. Point the burner at the weeds and walk at a steady pace with the burner flame skimming over the plants. Burning is most effective on dry days when the next day is also expected to be dry. Repeat the walk-over the following day. Heating the plant will kill the internal cells effectively. Do not burn the plant completely as this will produce potash which will feed the weeds instead. The plants will die in a couple of days. For small areas a small burner can be used. A larger burner will be needed for larger areas but safety precautions must be
adhered to. Do not burn on hot days and be careful not to singe wood, or burn near plastic etc.

Mulching – Some weeds can be suppressed by providing a thick layer of mulch material over it. These include wood bark, coconut coir, mushroom compost, cardboard covered with a mulch. A membrane layer can be laid down and covered with a layer of mulch.

Organic Herbicides – Home made recipes can be effective for some plants. Pouring or spraying these onto a plant can be effective in the short term – vinegar (neat), salty water, epsom salts. Pelargonic acid is a natural, organic herbicide that can be purchased from gardening suppliers and online. Sprayed onto the leaves, it is effective against many of the common weeds such as horsetail, thistle, dandelion and prevents root growth.

Disposing of weeds

- Compost them - If you have a small amount of weeds you could find an area in your garden and keep them in this area. Cover it to prevent the weeds growing again. This pile will die down over time.
- Take it to the recycling centre.
- Do you know someone who has goats, chickens or rabbits? Sometimes these animals will take certain weeds such as dandelions.
- Hedge clippings – can be chipped and used on paths or under hedging (where they act as a weed suppressant)

Please do not dispose of waste plants on someone else's land or public lands. This causes the spread of undesirable plants and can spread invasive species.

Keeping Safe and Following Legislation

Please ensure you carry out your chosen control method safely.

Read the label - Most pesticides are dangerous to our health and can be cancer causing. Avoid excessive use, dispose of safely and keep up to date with health and safety risks. There is a considerable debate globally about the potentially harmful effects of using glyphosate (found in Roundup). Many herbicides have been used for years before they have been eventually banned. They can persist in the environment for considerable periods of time. Evidence is now emerging of significant amounts of pesticides in our drinking water. We can all help to ensure we have safe water to drink. *Think carefully before you spray and never spray near water.*

If you employ staff to spray, it is important that you are aware of pesticides legislation (S.I. No. 155/2012 - European Communities (Sustainable Use of Pesticides) Regulations 2012) and ensure the safety of personnel and livestock. In Ireland, a number of local authorities have now voted to end the use of glyphosate in public spaces. If you are spraying in an area it is a duty to notify local beekeepers so they can keep their bees safe during the spraying activity.

Wear Personal Protective Equipment (PPE) – Ensure you wear safety goggles when weeding, a face guard and ear muffs when strimming and a good quality face mask when spraying. Providing PPE to employees and volunteers is a duty of all organisations.

Hedge Cutting – It is recommended that hedge cutting does not take place between 1st March and 31st August to avoid interfering with the breeding activity of birds. This is covered under Section 40 of the Wildlife Act 1976 (Amendment) Act 2000. There are derogations for hedge cutting along roads where there is a road safety risk as defined under the Roads Act 1993.

Invasive species information ***courtesy of Dr. Trish Murphy***

Invasive plants are a cause for much concern for many areas across Donegal and globally invasive species are cited as one of the key threats to biodiversity. There are a few key species growing along our riverbanks, road verges and spreading across fields in the county. These plants can create significant challenges for our native biodiversity and can be a nuisance, cause erosion and can be a health hazard. Invasive species often out-compete our native plants and take over an area.

Himalayan Balsam is an annual plant that spreads rapidly by seed. If allowed to spread it will take over an area and prevent native plants from colonising. Along a riverbank this means that during the winter when the plant dies back the banks will be exposed to erosion.

Japanese Knotweed is a pioneer species that grows rapidly in disturbed soil. In Ireland there is only one sex (females only) and so the plants can only spread vegetatively, that is, when small parts of the stems or roots spread to a new area. Cutting and trimming Japanese Knotweed is a key factor in its spread and this is why it has become an offence to cause it to spread. Japanese Knotweed will break through tar and weakened or cracked concrete. It is a perennial plant and will return year on year, growing into large stands of thick stemmed plants. Control and management should be carried out by qualified personnel only.

Giant Hogweed presents a public health hazard as it can cause severe skin 'burns'. Therefore it is important to be vigilant of its arrival to the area as it is very difficult to eradicate.

Cherry laurel outcompetes native woodland species and should always be removed. Birds spread the berries making its distribution patchy.

Salmon berry outcompetes native plants. It is spread by birds and other animals eating the raspberry looking fruits and passing out the seeds. Easily removed, all specimens should be destroyed from any woodlands.

More information on invasive species can be found on www.invasivespeciesireland.com

Donegal county council are currently working with KPM on a project to control Japanese Knotweed using organic composting methods in Letterkenny town park.

Appendix 2 - Potential Sources of funding and useful websites

The following organisations provide funding from time to time for environmental and biodiversity projects.

- Donegal Local Development Company
- ChangeMakers
- Community Foundation Ireland
- Donegal County Council - Members Development Fund, Development Fund Initiative, Community Environment Action Fund, DCC Environment Pack
- Climate Action Fund
- ORIS (Outdoor Recreational Infrastructure Fund)
- Health Service Executive
- Heritage Council
- LEADER Programme
- Peatlands Community Engagement Fund
- Native Woodlands Scheme
- Rethink Ireland
- The Wheel (provide a list of funds available through their digital resource Funding Point)
- Inland Fisheries Ireland
- National Parks and Wildlife Service
- The Ireland Funds
- Royal Irish Academy
- EU funding such as LIFE Programme, Horizon 2020, Interred, Northern Periphery and Artic Programme

Useful websites	
An Taisce the National Trust:	www.antaisce.ie
Bat Conservation Ireland:	www.batconservationireland.org
Biodiversity Data Centre:	www.biodiversityireland.ie
Birdwatch Ireland:	www.birdwatchireland.ie
Blue/Green Infrastructure and nature based solutions	www.southernassembly.ie/uploads/general-files/BGC_Framework_web.pdf
Boom Tree Bees:	www.boomtreebees.com
Botanical Society of Britain and Ireland:	www.bsbi.org.uk
British Trust for Ornithology:	www.bto.org
Burren Beo - Hares corner	www.burrenbeo.com/thc/info/
River catchments and quality	www.catchments.ie
Cleancoasts:	www.cleancoasts.org
Climate Action Regional Office	www.caro.ie
Composting, RHS:	www.rhs.org.uk/advice/profile?PID=444
Conservation Volunteers:	www.conservationvolunteers.ie
Crann:	www.crann.ie
Donegal County Council	www.donegalcoco.ie
Environmental Protection Agency	www.epa.ie
Floodwater retention	www.nrcsolutions.org/floodwater-detention/#:~:text=A
Heritage Council:	www.heritagecouncil.ie
Inishowen Rivers Trust:	www.inishowenriverstrust.com
Inland Fisheries Ireland:	www.fisheriesireland.ie
Invasive species Ireland	www.invasives.ie
Irish Moths and Dragonflies:	www.irishmoths.net
Irish Peatland Conservation Council:	www.ipcc.ie
Irish Seed Savers:	www.irishseedsavers.ie
Irish Wildlife Trust:	www.iwt.ie
Lichens:	www.lichens.ie

Useful websites	
Local Authority Water Program:	www.lawaters.ie
National Parks & Wildlife:	www.npws.ie
Native Irish wildflower seeds:	www.wildflowers.ie
NatureNorthWest:	www.naturenorthwest.ie
Notice Nature - Hedgerows:	www.noticenature.ie/Hedgerow.html
Pollinator plan:	www.pollinators.ie
Rain garden instructions	www.nemo.uconn.edu/raingardens/
RHS rain garden instructions	www.rhs.org.uk/garden-features/rain-gardens
Sustainable Urban Drainage information (SUDS)	www.sdcc.ie/en/services/environment/environmental-health/water-services/sustainable-drainage-systems/sdcc-householders-guide-to-sustainable-drainage-suds-.pdf
Sustainable Water Network:	www.swanireland.ie
True Harvest Seeds:	www.trueharvestseeds.org
The Ordnance Survey of Ireland:	www.osi.ie/mapviewer
Water and Communities Office:	www.watersandcommunities.ie
Wildflowers of Ireland:	www.irishwildflowers.net

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Caring for our environment