Cartron
Community Biodiversity Action Plan
2021-2026

Actions for Biodiversity in Cartron, Sligo

View from Cartron looking over the mudflats towards Benbulben

Produced for the

Cartron Community Recreation Committee and the Cartron Community

by MS Ecology

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1 Introduction

1.1 About the Cartron Biodiversity Action Plan

Ecologist Melinda Swann was commissioned by the Cartron Community Recreation Committee to provide an ecological baseline report for the townland of Cartron with the view to protecting and enhancing biodiversity. The committee was initially set up to improve one of the green spaces and adapt it into a mixed-use area for all ages to enjoy. They are a non-profit organisation set up in 2016 with goals to '*increase community based recreational and positive activities for the residents of Cartron*'. Their aim is to '*develop social events and community activities within the Cartron area that will positively enhance the mental and physical well-being of all our residents and which will in turn foster a sense of cohesion and togetherness within our community*'.

As part of this vision in partnership with the local community, Cartron Tidy Towns and Sligo County Council they realised that by enhancing biodiversity in the green spaces, as well as in the rest of Cartron, that this would bring benefits to both the local community as well as for nature. The group applied for funding from the Community Foundation for Ireland's Biodiversity fund and were successful in their bid.

Based on the Community Foundation for Ireland (2019) '*The ultimate aim of the funding scheme is that successful community groups will develop a Community Biodiversity Plan based on the expert recommendations arising from the ecological study of their area*'. All the data collected during the surveys for this plan will be submitted to the National Biodiversity Data Centre in Waterford where it will be kept and mapped and will be accessible to all. This plan will help the residents of Cartron and the County Council to always keep maximising benefits to nature in mind when carrying out management and when developing new projects.

This plan using best practice for biodiversity will also be useful to groups seeking financial or material support for future projects.

2 Biodiversity & protecting it

2.1 What is biodiversity

Biodiversity means the variety of life on Earth, everything from the smallest bacteria in the soil to the largest mammal (the Blue whale) living in our oceans. It encompasses the places (habitats) that animals and plants live, or in simpler terms the nature that surrounds us! It also includes genetic diversity within species – how one person differs from the next. Humans are part of nature and increasingly have a fundamental effect on the way natural systems work.

Plate 1: Biodiversity around Cartron
Photographs taken by Mallacai Wolfe


Male & female mallards


Common wasp – an important pollinator


Wild pansy


Small tortoiseshell feeding on dandelions

2.2 Biodiversity: Why is it important?

Nature and keeping it diverse is an integral part to human survival on Earth. Complex interactions between living things and their environments occur throughout the world and are referred to as ecosystems. Nature provides us with everything we need to live including food, clean water, clean air as well as medicines and beautiful landscapes. These services that nature supplies are referred to as ecosystem services. Upsetting or damaging one part of a system leads to other parts of that system breaking down. If an ecosystem is healthy and diverse it can usually re-balance itself, but if large in-balances occur then the system is less resilient and may not recover. For example, if we remove a key species, such as a predator, then all the other species increase their population sizes and competition for resources increases, leading to the balance in nature being lost. Furthermore, if we introduce something into a system that did not previously belong there it too can have serious repercussions for the balance of the overall system. Examples of these two scenarios are removal of a fox from a system and rabbits increase or the introduction of invasive species such as Japanese knotweed, cherry laurel and rhododendron along riverbanks, roadside verges and into woodlands that then outcompete native flora.

The human population has been growing exponentially and two hundred years ago, there were less than a billion people on Earth. Today, there are 7.8bn and our population is still growing. This huge population increase has led to habitat loss and overexploitation of resources at an unprecedented rate. This has led to an unsustainable consumption of our resources which in turn has led to declines in populations of many other species. According to scientists we are currently in the 6th Mass Extinction, which has been driven mainly by humans and the current rate of biodiversity loss is ten thousand times faster than for millions of years before.

Clearing land for development, food crops, intensification of farming, pesticide use and the loss of habitats has pushed nature to the brink in many areas. The overuse of fossil fuels as well as the loss of important habitats such as woodlands and bogs which act as carbon sinks is driving climate change. We now realise that we need to help nature to return for our own existence.

2.3 Ireland's National Biodiversity Plan

Based on the National Biodiversity Plan (2017-2021), Ireland's vision for biodiversity is '*That biodiversity and ecosystems in Ireland are conserved and restored, delivering benefits essential for all sectors of society and that Ireland contributes to efforts to halt the loss of biodiversity and the degradation of ecosystems in the EU and globally*' The plan sets out seven objectives and 18 targets as follows:

Objective 1 – Mainstream biodiversity into decision-making across all sectors

Target 1.1. - Shared responsibility for the conservation of biodiversity and the sustainable use of its components is fully recognised, and acted upon, by all sectors

Target 1.2. - Strengthened legislation in support of tackling biodiversity loss in Ireland

Objective 2 – Strengthen the knowledge base for conservation, management and sustainable use of biodiversity

Target 2.1. - Knowledge of biodiversity and ecosystem services has substantially advanced our ability to ensure conservation, effective management, and sustainable use by 2021

Objective 3 – Increase awareness and appreciation of biodiversity and ecosystems services

Target 3.1 - Enhanced appreciation of the value of biodiversity and ecosystem services amongst policy makers, businesses, stakeholders, local communities, and the general public.

Objective 4 – Conserve and restore biodiversity and ecosystem services in the wider countryside

Target 4.1. - Optimised opportunities under agriculture and rural development, forestry and other relevant policies to benefit biodiversity

Target 4.2. - Principal pollutant pressures on terrestrial and freshwater biodiversity substantially reduced by 2020

Target 4.3. - Optimised benefits for biodiversity in Flood Risk Management Planning and drainage schemes

Target 4.4. - Harmful invasive alien species are controlled and there is reduced risk of introduction and/or spread of new species

Target 4.5. - Improved enforcement of wildlife law

Objective 5 – Conserve and restore biodiversity and ecosystem services in the marine environment

Target 5.1. - Progress made towards good ecological and environmental status of marine waters over the lifetime of this Plan

Target 5.2. - Fish stock levels maintained or restored to levels that can produce maximum sustainable yield, where possible, no later than 2020

Objective 6 – Expand and improve management of protected areas and species

Target 6.1. - Natura 2000 network designated and under effective conservation management by 2020

Target 6.2. - Sufficiency, coherence, connectivity, and resilience of the protected areas network substantially enhanced by 2020

Target 6.3. - No protected species in worsening status by 2020; majority of species in, or moving towards, favourable status by 2021

Objective 7 – Strengthen international governance for biodiversity and ecosystem services

Target 7.1. - Strengthened support for biodiversity and ecosystem services in external assistance

Target 7.2. - Enhanced contribution to international governance for biodiversity and ecosystem services

Target 7.3. - Enhanced cooperation with Northern Ireland on common issues

Target 7.4. - Reduction in the impact of Irish trade on global biodiversity and ecosystem services

Many of the above targets have not been met and there is still a long way to go. This CBAP will go towards addressing some of the above targets set out under objectives two to four.

2.4 Sligo's Heritage Plan

As part of the Sligo Heritage Plan (2016-2020) it provides four objectives for Biodiversity,

Objective 1: To enable the delivery of the Sligo Biodiversity Action plan through appropriate resourcing and partnership work. To ensure that many different sectors are working together with common goals and adequate resources.

Objective 2: To raise awareness of biodiversity in Sligo, its value and the issues facing it. The role of biodiversity, its importance and the threats facing it are often not well known and need to be taken to target audiences.

Objective 3: To better understand the biodiversity of Sligo. In many cases we know so little about the biodiversity that we share our county with that it is unclear what we need to do to help it.

Objective 4: To protect and enhance habitats and species in Sligo, taking account of national and local priorities. Often because of the lack of value placed on biodiversity, it is facing a number of threats from many human influences. Not only is there a need to stop damaging our environment, but we also need to make areas better to make amends for past losses.

The objectives are supported by 28 biodiversity actions, for more details see the County Sligo Heritage plan at: www.sligococo.ie

2.5 Legislation protecting biodiversity

Environmental law exists to protect biodiversity. At a European level, the EU Habitats Directive (92/43/EEC) on the conservation of natural habitats of wild fauna and flora and the EU Birds Directives (2009/147/EC) on the conservation of wild birds, state that countries must designate important areas for conservation. Habitats and species are designated as special Areas of Conservation (SACs) and birds and their habitats as Special Protection Areas (SPAs). There is a network of protected sites across Europe called the Natura 2000 network. The SACs and SPAs have been transposed into Irish law by the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477 of 2011), as amended.

Habitats that are used by birds such as wetlands are given further protection under The Ramsar Convention on Wetlands. This is an international treaty for the conservation and sustainable use of wetlands of International Importance, especially as waterfowl habitats. It is named after the city of Ramsar in Iran, where the convention was signed in 1971.

Within Ireland The Wildlife Act (1976) gives further protection to wildlife and their habitats that may not be covered by the above directives. There are two categories of protected sites and species under the Wildlife Act namely Natural Heritage Areas (NHAs) and proposed Natural Heritage Areas (pNHAs). These afford protection to important habitats or to plants and animals whose habitats need protecting. The regulations that give rise to the protection of other animal species and birds under the Wildlife Act are detailed in the relevant sections of the act. Furthermore, the Flora (Protection) Order lists the plant species protected by Section 21 of the Wildlife Act. (See www.npws.ie/legislation for further information).

2.6 The EU Water Framework Directive

The EU Water Framework Directive (2000/60/EC) requires all Member States to protect and improve water quality in all waters so that good ecological status can be achieved by 2015 or, at the latest, by 2027. The directive was given legal effect in Ireland by the European Communities (Water Policy) Regulations 2003 (S.I. No. 722 of 2003) and applies to rivers, lakes, groundwater, and transitional coastal waters. The Directive requires that management plans be prepared on a river basin basis and specifies a structured method for developing these plans, (www.gov.ie). This directive applies to the rivers, estuaries and mud flats and the salt marshes near Cartron.

2.7 The All Ireland Pollinator Plan

The All Ireland Pollinator Plan was produced in 2015 and examines how all sectors of society could take actions to help pollinators. There were 81 actions set out in the first plan ranging from stopping pesticide use to creating meadows for pollinators. A new plan to further this work has now been written and will continue until 2025. It follows on from the success of the first plan and sets out a total of 186 actions. For more information see the National Pollinator Plan at https://pollinators.ie/

2.8 Community Biodiversity Action Plans

Biodiversity Action Plans are now produced because of the convention on Biological diversity in 1992, which aims to protect biodiversity, protect it for future generations and share the benefits of biodiversity equally. Biodiversity action plans look at what habitats and species occur in an area and identify what the threats might be to the habitats and species within those areas.

Plans identify the actions needed to protect and enhance biodiversity as well as the actions needed to address any issues. Action plans look at who is going to carry out the actions, the time frame and the resources that will be needed to complete the actions. It is not always achievable to carry out everything that a group would like to do, so it is worth prioritising actions based on the availability of both human resources and funding sources.

The priority of a good plan should always be to help nature rather than to damage it in any way. Therefore, keeping in mind how we can achieve this is the main aim of a biodiversity action plan. Action plans should be reviewed every five years to see what has been achieved, what is still to be achieved; whether new actions have been identified and what resources are needed to carry out the remaining actions.

2.9 Why an action plan?

Community biodiversity action plans (CBAPs) are produced to advice on the best practice for protecting, managing and enhancing nature at a community level. It is based on a series of actions that groups and individuals can carry out to benefit species and habitats in their locality. This plan is for the Cartron community recreation committee, the resident's associations, the tidy towns group, St Brendan's School, Sligo County Council, as well as for the community. It will raise awareness of what is already in Cartron and spark interest in the natural world and empower groups to make positive contributions that will both benefit wildlife and the community over the coming years.

3 Local Context

3.1 Aims of the Cartron Community Biodiversity Action Plan

For the Cartron Community Biodiversity Action Plan the following aims were set out:

1. Carry out a habitat survey and produce a habitat map.
2. Produce a set of recommendations for each habitat that has ecological value to protect and or enhance them.
3. Set out actions that could improve less diverse areas that could benefit from management and/or enhancement.
4. Encourage actions that can raise awareness of the importance of biodiversity and how it can be conserved.
5. Carry out other relevant surveys (e.g., mammal, insect, breeding birds, bats) to gain knowledge of what species are present in Cartron.

3.2 Time frame

The plan was drawn up over several meetings and site visits between September 2019 and October 2021. The first part of the project involved meeting with the committee and then reaching out to the community, businesses, and the school within Cartron. The fieldwork was carried out in May to September 2021 and a desk top study and final write up was carried out in October and November 2021. The plan will cover 5 years and is due for review in 2026.

3.3 Community involvement

With Aim 4 in mind and to involve the school children, several workshops on the Garden Bird Survey were run in October 2019 for some of the older classes at St. Brendan's National School in Cartron. The survey aims to study biodiversity in our back gardens and the workshops showed the children how biodiversity is measured scientifically. It is a citizen science survey and anyone in Ireland can get involved (see https://birdwatchireland.ie/ for more details). The principal of St Brendan's had in the past already introduced several measures to increase biodiversity under the Green Schools initiative. These included a vegetable patch, a bug hotel, planting of trees and shrubs and a wildflower patch. There are further plans by the school to carry out more projects such as creating a sensory garden and a pollinator friendly planting scheme.

To involve the wider community and to highlight the project, two talks on biodiversity were held, one via Zoom in March 2021 and one for a small group in person in May 2021. Some of the ideas that were brought up were a walk, a community garden, a men's shed, beehives and play areas. A **Facebook page** called **Cartron Biodiversity** has been set up to share ecological knowledge and any upcoming events to the Cartron community. Residents can contact the project via the page and share any interesting sightings of animals or plants and if they need help in identification of species. There is also an email address for the project and any queries can be sent to: cartronbiodiversity@gmail.com.

To carry out the actions that are set out in the CBAP for Cartron it is important to keep community engagement a priority into the future. An online survey, information evenings, a variety of workshops such as What is biodiversity?; How to compost; What are invasive species?; Identifying mammals, birds, insects & plants of Cartron and so on, are all ways to share information. Family events such as a Bioblitz (teams collect records of as many species in the locality in a day), can be great fun and an excellent way of gathering data. Experts can be brought in for these events and this further increases knowledge sharing.

In relation to enhancing the green spaces of Cartron for biodiversity the Committee asked the author to produce provisional plans for two of the greens, namely Seaview Drive/Ferndale (Green 1) and Classiebawn/Ard Na Mara (Green 4). These can be seen in **Figure 1** and **Figure 2** and set out some ideas, such as planting regimes, 'Don't Mow Let it Grow', play areas and adult exercise machine installation.

Plate 2: Excellent example of a wildlife patch at Cartron

Plate 3: Example of biodiversity in action at Cartron – Small tortoiseshell feeding on four types of flower

Photographed by Mallacai Wolfe

4 Methodology

4.1 Desktop study

The following data sources were accessed to get a picture of what species and habitats have been recorded in Cartron and any information gaps that could be filled through surveys during this and future projects:

1. The National Parks and Wildlife Service (NPWS) website https://www.npws.ie/maps-and-data/habitat-and-species-data for site synopses and red list species, including:
   - Site synopsis: Cummeen Strand/Drumcliff Bay (Sligo Bay) SAC - https://www.npws.ie/protected-sites/sac/000627
   - Site synopsis: Cummeen Strand SPA - https://www.npws.ie/protected-sites/spa/004035
   - Red list species - https://www.npws.ie/sites/default/files/publications/pdf/IWM%20116%20Checklists%20Protected%20and%20Threatened%20Species%202019.pdf
   - The Salt Marsh Monitoring Project - https://www.npws.ie/sites/default/files/publications/pdf/IWM108.pdf
2. BirdWatch Ireland -
   - IWeBs data request for Sligo Bay
   - Birds of Conservation Concern in Ireland 2020-2026 (BoCCI, Gilbert *et al.*, 2021)
3. Biodiversity Maps - The National Biodiversity Data Centre's map viewer
   - https://maps.biodiversityireland.ie/
   - Invasive species https://maps.biodiversityireland.ie/Species?speciesDesignation=d1
4. Bat Conservation Ireland website -
   - https://www.batconservationireland.org/
5. The Environmental Protection Agency (EPA) map viewer for information on water bodies and water quality -
   - EPA Maps
6. The Geology Survey of Ireland for bedrock and soils information -
   - Geological Survey Ireland Spatial Resources (arcgis.com)
7. The Ordnance Survey Ireland (Geohive) for historical map imagery -
   - https://webapps.geohive.ie/mapviewer/index.html
8. The library of Ireland websites for place names
   - https://osi.ie/education/third-level-and-academic/history-of-place-names/
   - https://www.logainm.ie/en/1404196
   - https://www.libraryireland.com/IrishPlaceNames/Cartron-Root-Word.php
9. The National Monuments map viewer and the wrecks map viewer
   - https://maps.archaeology.ie/historicenvironment/
   - https://dahg.maps.arcgis.com/apps/webappviewer/index.html?id=89e50518e5f4437abfa6284ff39fd640
10. The Heritage Council's Best Practice Guidance for Habitat Survey and Mapping (2011) was consulted and the. Hedgerow Appraisal System (2013) by Foulkes *et al.*

The National Biodiversity Data Centre's map viewer (Biodiversity Maps) was accessed to generate a list of all the species recorded in Cartron in the past. A townland only search and a 2x2km (tetrad G63Y) search encompassing Cartron were carried out to generate an indicative list of species that have or could potentially

occur in Cartron. As bats can be wider ranging the search area around Cartron was extended to 10km. In addition, Michael Bell provided moth records for a moth survey conducted in 2015.

Irish Wetland Bird Surveys (IWeBS) have been carried out in the estuary beside Cartron for the past 28 years (Michael Bell, pers. comm. 2021). Data requests to BirdWatch Ireland and Michael Bell for the count data for the last five years were submitted. IWeBs data for two sections, namely Sligo Harbour and Cartron Marsh (north of the headland) were obtained, and results have been tabulated to show peak counts for each species.

The National Parks and Wildlife Service (NPWS) designations viewer shows all the protected sites around Ireland. A search for protected sites such as NHAs, SACs and SPAs was carried out for the area surrounding Cartron to determine whether there were any designations on the site or nearby. A search for habitat surveys that were previously done in or adjacent to Cartron was also undertaken, including the Salt Marsh Monitoring Project 2018. Data (shapefiles) showing the distribution of salt marsh habitats adjacent to Cartron were downloaded and incorporated into the habitat mapping for the CBAP using QGIS.

The Geology survey of Ireland was accessed to find out about the underlying geology and soils in the townland. The Environmental Protection Agency's (EPA) website was used to identify river names and investigate water quality. Karen Kennedy, the Waters Officer also sent through some data on the two small rivers near Cartron, namely the Copper River and the Willsborough stream. The Ordnance Survey Ireland map viewer (Geohive) was used to look at the historical six-inch maps and investigate how land use and boundaries had changed over time.

The Library of Ireland website gives the origin of the place name Cartron and the archaeology of the area was also investigated to see if there were any national monuments located in Cartron or in the surrounding waters.

4.2 Ecological surveys

1. Habitat surveys and mapping was undertaken following Smith *et al.* (2011), with all habitats classified into recognised communities defined by Fossitt (2000) and cross-referenced to Annex I habitats. All habitat surveys were conducted during summer 2021, within the optimal survey period for the habitat types occurring. A habitat map for the townland of Cartron was produced using QGIS.
2. Michael Bell was employed by the project to carry out a moth survey in July 2021. Two traps namely, a Heath Actinic Trap (6W) and a Robinson MV Trap (125W) were each placed in two separate gardens in Cartron on the night of 21/07/21. Overnight the light attracts moths into the traps, and these were checked the next day. The different species were recorded and then released.

Plate 4: Moth trap

3. Multidisciplinary walkover surveys were undertaken over summer 2021 to accessible areas noting mammal signs such as paths through grassy areas and other signs, such as prints and droppings. During walkovers other species including birds, insects and plants, especially invasive species were also recorded.

4. Breeding bird surveys were completed for selected areas including the housing estates of Hollymount, Cartron Bay, Cartron Heights and Ard Na Mara to provide a snapshot of what species are using the residential areas for breeding.

5. A voluntary hedgehog survey was carried out on the 19/07/21 to 23/07/21 following the methods set out be the All Ireland Hedgehog Survey (https://www.irishhedgehogsurvey.com/). This consists of putting out plastic footprint tunnels to capture any hedgehog activity in an area. Each one meter long, triangular tunnel is baited with dry cat foot, black poster paint and blank sheets of A4 paper. The animal enters the tunnel to eat the bait and walks in the paint leaving prints on the paper. Recorders can opt to put one tunnel in their garden or take on a local area survey of ten tunnels. The latter method was carried out during this survey and three tunnels were put out within the townland of Cartron and seven in the surrounds, all within a one-kilometre boundary.

Plate 5: Hedgehog tunnels for surveying small mammals

6. A bat survey was carried out on 30/06/21 using a Batlogger and employed walked and driven transects to sample accessible parts of Cartron. Survey methodology followed those outlined in Collins (2016). Surveying commenced at 21:50 (sunset 22:12) and ended at 00:06 (duration 2h 15mins). Bat calls were analysed using BatExplorer Analysis Software. Survey conditions were optimal, being warm, dry and with light winds.

All the species recorded during surveys were submitted to the NBDC's app 'Biodiversity' on the day or later via on the website.

QGIS which is a geographical information mapping program was used to produce the habitat maps and other maps throughout this plan. QGIS is freely available to download from the internet (https://qgis.org/en/site/)

5 Ecological Baseline for Cartron

An ecological baseline study is an analysis of the current situation to identify the starting points for a project. It is the benchmark against which future progress can be assessed or comparisons made. The ecological baseline for Cartron is set out below.

5.1 Boundaries of the plan

According to Joyce (1902) the name Cartron means a quarter of land (Anglo-Norman) and the Irish translation of Old Cartron Hill is *Sheanchnoc an Chartúin*.

The townland of Cartron is a residential suburb in Sligo Town and is located on a headland forming part of the eastern shoreline of the estuary at the mouth of the Garravogue River. **Map 1** shows the townland boundary, which runs along the north side of the Copper River, continuing around the shoreline of Cartron Point to the mouth of the Willsborough stream at the northern base of the headland. The boundary deviates from the Willsborough stream to follow a 1st Order stream to the N15 (now culverted in parts), where it turns south encompassing a retail area and Old Cartron Hill. It then veers east to Ballytivnan Road along a field boundary which has been lost to residential developments. The boundary follows the Ballytivnan Road south back to the Copper River.

Map 2 is a copy of the first edition 1837 six-inch to one mile map, where the townland boundary is slightly different from the present day and used to encompass Ballytivnan House and grounds. **Map 3** is a copy of the final edition Cassini map which shows the present day townland boundary where Ballytivnan House has been excluded. As shown in the historical maps Cartron was farmland before being developed for housing.

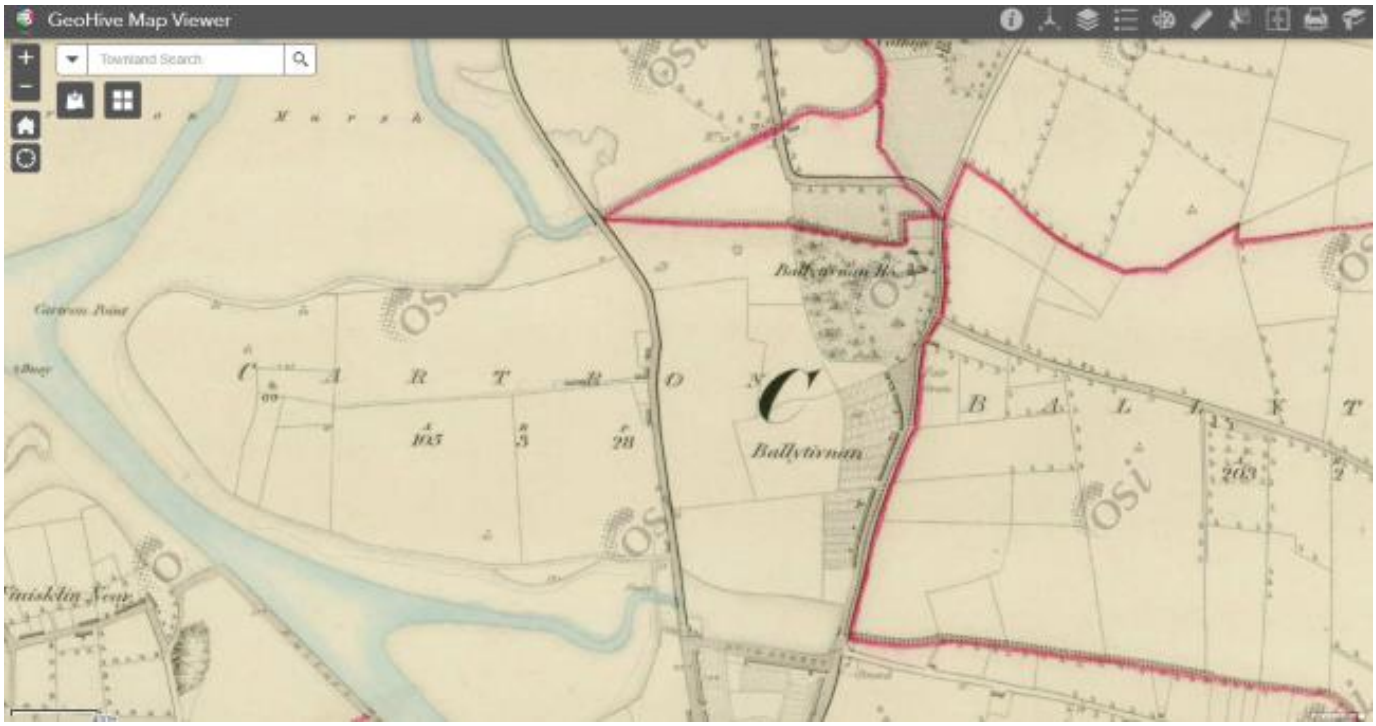
The archaeology of the area was examined to see if there were any national monuments located in Cartron or in the surrounding waters. The National Monuments map viewer showed that there was a quarry in Avondale housing estate in the 1830's (outside the townland) and that there was an old wreck in the surrounding waters called the Molbeck. This boat was a lighter, a type of flat-bottomed barge used to transfer goods and passengers to and from moored ships. The Molbeck was driven ashore at Cartron Point in Sligo Harbour during a storm in January 1932. The wreck was moved in the 1960s and now lies in a small dock in the River Garravogue, adjacent to Lower Quay Street, Sligo Town.

Plate 6: Flowers at Cartron Point
Photographed by Mallacai Wolfe in the grasslands on the playing pitch at Cartron Point

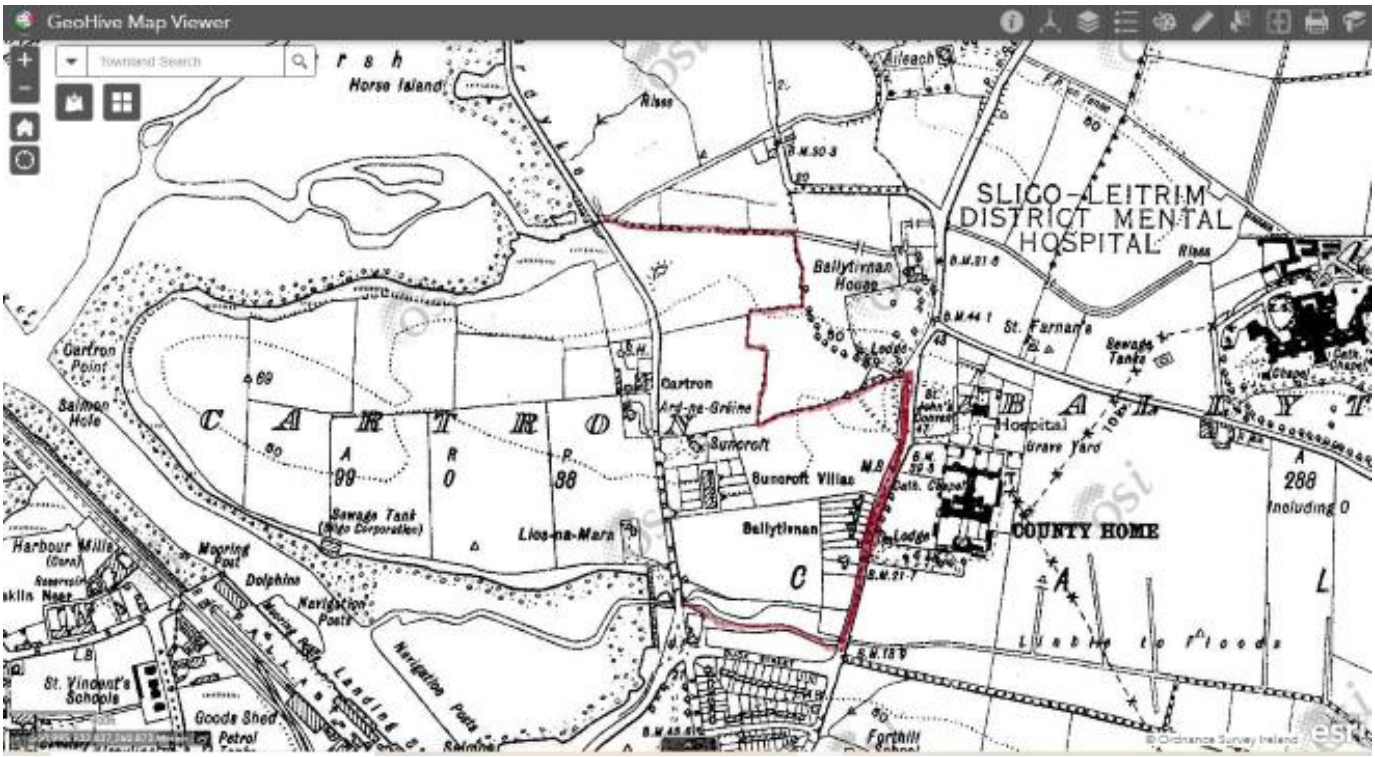
Scarlet pimpernel
Anagallis arvensis

Dandelion
Taraxacum vulgaria
Seed head forming the dandelion clock

Map 1: Townland boundary of Cartron
Dashed black line shows the inland extent and it runs round mean high tide line at the coast.
Source: © Ordnance Survey Ireland/Government of Ireland Copyright Permit No. MP 006021



Map 2: The first edition of the 1837 six-inch to one mile map showing the townland of Cartron
Note that Ballytivnan house is no longer in the townland.
Source: OSI.ie https://webapps.geohive.ie/mapviewer/index.html#



Map 3: Final edition of the six-inch to one mile Cassini map
Source: OSI.ie https://webapps.geohive.ie/mapviewer/index.html#

5.2 Geology and soils

The bedrock underlying Cartron is Glencar Limestone. The formation consists of an alternation of calcareous shales and limestones. The soil map showed that the north part of the headland of Cartron, as well as near the Copper River and in Avondale Park has soil that is deep well drained mineral soil (mainly acidic). There is an area north of Willsborough stream which is shallow peaty poorly drained mineral soil (mainly basic). The rest of Cartron is classified as 'Made Ground' because of the overlying, built environment that dominates the townland.

5.3 Hydrology and water quality

The rivers in Cartron are the Willsborough stream to the north which has good water quality and right beside this a small 1st order stream called the Shannon Eighter. The Copper river lies to the south and has been given a rating of poor water quality by the EPA.

Plate 7: Confluence of the Willsborough and Shannon Eighter streams
The water course is tidal along this section and it flows west under the Mardyke into Cartron Marsh

5.4 Sites designated for nature conservation

There are no designated sites within the townland of Cartron, however the estuary surrounding the headland is designated as both a Special Area of Conservation (SAC) and a Special Protection Area (SPA).

5.4.1 Special Area of Conservation (SAC)

Cartron is surrounded by the Cummeen Strand/Drumcliff Bay (Sligo Bay) SAC - see **Map 4**. This designation covers a very large area and not all habitats and species for which the SAC is designated are ecologically linked to Cartron. The site has been selected for the following important habitats listed on Annex I and species listed on Annex II of the E.U. Habitats Directive:

Note: Habitats and species with an Asterix are ecologically linked to Cartron

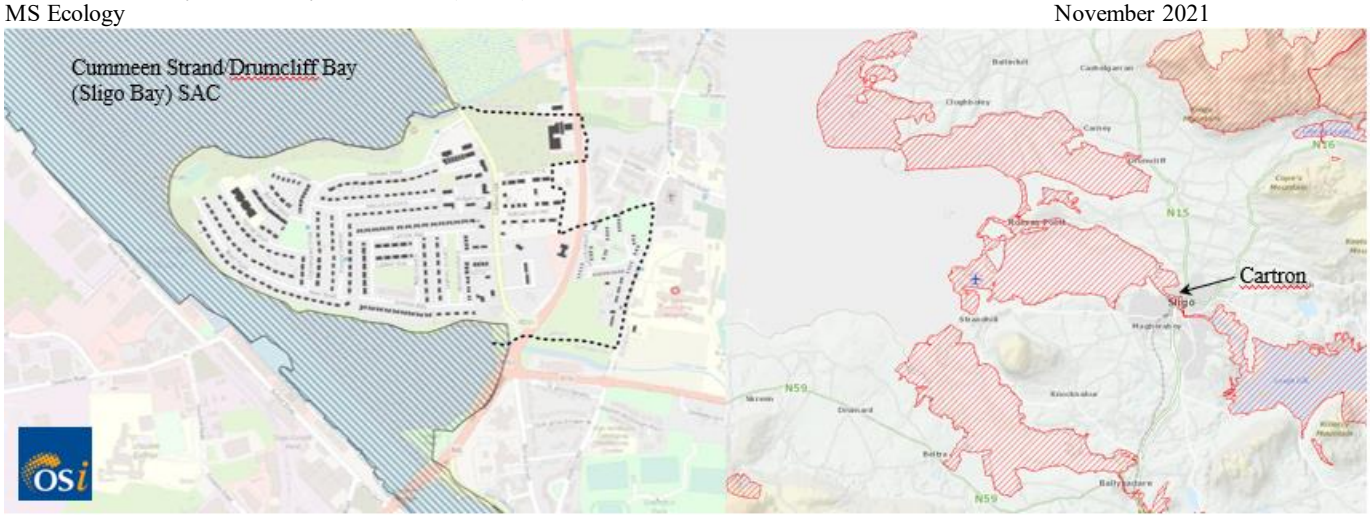
- Estuaries*,
- Tidal mudflats and sand flats*,
- Embryonic shifting dunes,

- Marram dunes,
- Fixed dunes,
- Juniper scrub,
- Semi-natural dry grasslands and scrubland facies on calcareous substrates,
- Orchid-rich calcareous grassland,
- Petrifying springs,
- Salt marsh*,
- Narrow-mouthed whorl snail,
- River lamprey, *,
- Sea lamprey*,
- Common (harbour) seal*.

The dominant coastal habitats around Cartron are estuaries and intertidal sand and mud flats. Sligo Harbour receives the waters of the Garravogue River and the Copper River, which both flow from Lough Gill, while to the north of Cartron, the estuary receives water from the Willsborough stream and the Shannon Eighter stream. The Willsborough stream is fed from a reservoir located between the townlands of Drumcliff and Calry to the north east. At low tide extensive areas of the intertidal mud flats are exposed both north and south of Cartron. These mudflats support a diverse macrofauna, with invertebrate species such as lugworm, common cockle, sand mason worm, Baltic tellin, spire shell and common mussel being the most numerous. As shown in **Map 4**, the mudflats are designated within the Sligo Bay SAC, with the inset showing that the SAC extends up the Garravogue River to Lough Gill, which is designated as part of the Lough Gill SAC.

Plate 8: Habitats in the SAC

The site synopsis for the SAC also notes the occurrence of several Red Data Book plants (i.e., that are critically endangered in the wild) and should be kept in mind when carrying out surveys. The following red list species have been recorded from the SAC, (but not in Cartron itself), including rough poppy (*Papaver hybridum*) which is also listed under the Flora Protection Order 2015, hoary whitlowgrass (*Draba incana*) and yellow saxifrage (*Saxifraga aizoides*). Other red data book species include sea lamprey (*Petromyzon marinus*) and river lamprey (*Lampetra fluviatilis*), which have both been recorded in the Garravogue River. The Sligo Bay SAC is also designated for harbour seals which are often found hauled out on sand banks further to the north in Drumcliff Bay.



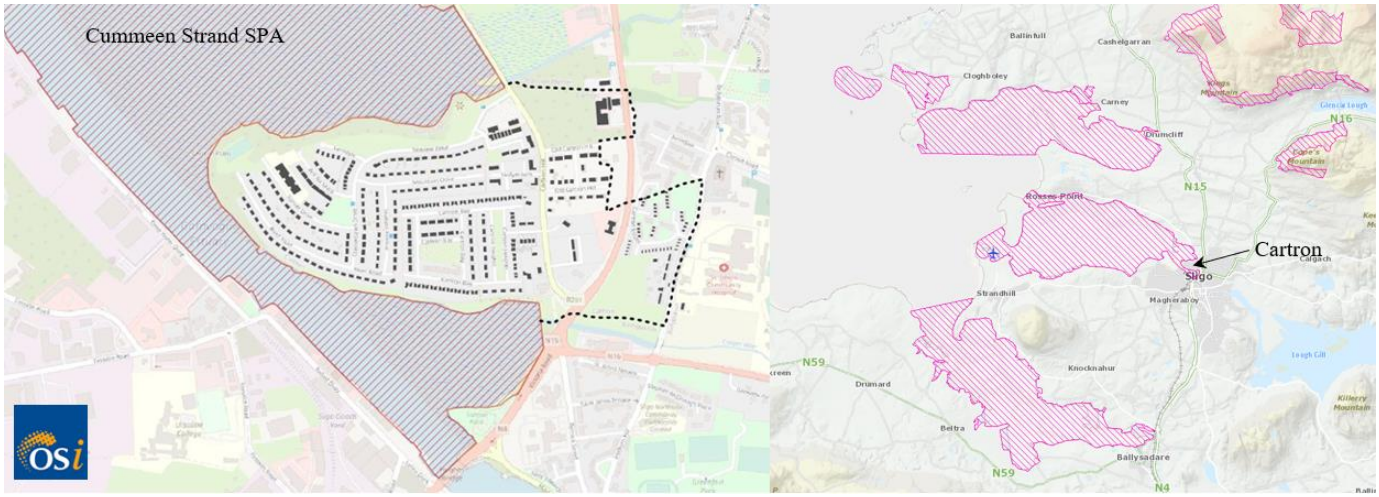
Map 4: Cummeen Strand/Drumcliff Bay (Sligo Bay) SAC surrounding Cartron
Source © Ordnance Survey Ireland/Government of Ireland Copyright Permit No. MP 006021 and NPWS designation viewer https://dahg.maps.arcgis.com/apps/webappviewer/index.html?id=8f7060450de3485fa1c1085536d477ba

5.4.2 Special Protection Area (SPA)

Cummeen Strand is designated as a Special Protection Area (Cummeen Strand SPA) for birds under the E.U. Birds Directive – see **Map 5**. The Cummeen Strand SPA is designated for the following species and features:

- Light-bellied brent goose
- Oystercatcher
- Redshank
- Wetland and Waterbirds

According to the NPWS site synopsis the E.U. Birds Directive pays particular attention to wetlands, and as these form part of this SPA, the site and its associated waterbirds are of special conservation interest for wetland and waterbirds and it is also recognised as a Ramsar site. The mud flats provide very important feeding grounds for a whole host of bird species and support an internationally important population of light-bellied brent goose and nationally important populations of oystercatcher and redshank. The regular presence of bar-tailed godwit is also of particular note as these species are listed on Annex I of the E.U. Birds Directive. Large numbers of other waterfowl which use the mud flats in autumn/winter also, include ringed plover, lapwing, knot, curlew, dunlin, turnstone, grey heron, teal, wigeon, mallard, shelduck, and red breasted merganser. Light bellied brent geese arrive to the mudflats and surrounding bays in October from their breeding grounds in eastern Greenland. They feed mostly on eel grass, which grows on muddy estuaries as well as on grasslands where they move to when food on the estuaries has depleted. They depart back to Greenland in April to breed (www.BirdWatchIreland.ie).



Map 5: Cummeen Strand SPA surrounding Cartron
Source: © Ordnance Survey Ireland/Government of Ireland Copyright Permit No. MP 006021and NPWS designation viewer https://dahg.maps.arcgis.com/apps/webappviewer/index.html?id=8f7060450de3485fa1c1085536d477ba

Plate 9: Bird life using the intertidal waters and mudflats around Cartron
Birds photographed by Mallacai Wolfe


Redshank


Grey heron


Curlew


Little egret

View over the mudflats from Ferndale, Cartron

5.5 Habitats found in Cartron

Table 1 provides a list of the habitat types found within Cartron and the internationally important habitats found adjacent to the townland that are designated within the Sligo Bay SAC, including salt marsh, estuaries and mud/sand flats. **Map 6** shows distribution of habitat types across the townland.

Table 1: Habitat types occurring in Cartron and environs

Code	Fossitt (2000) habitat types	Corresponding habitat in Map 6	Biodiversity value
BC4	Flower beds & borders	Flower beds	Low to medium local importance – depending on planting scheme & management regime
BL1	Stone walls and other stonework	Old stone walls	High local importance
BL3	Buildings and artificial surfaces	Distinction made between: • Buildings (Houses) • Paths & playgrounds • Alleys Note: Gardens were not mapped and are shown in light grey in **Map 6**	Low to medium local importance – can provide habitat features in an urban setting such as breeding/ roosting sites for birds and bats
CC1	Sea walls, piers and jetties	Rock armour	Low to medium local importance – new sea defences can have negative ecological impacts
CM1/ CM2	Upper salt marsh and lower salt marsh	Salt marsh (CM)	High – internationally important habitat designated as SAC
CW2	Tidal rivers	Tidal rivers	Some sections classed as High – internationally important habitat designated as SAC, with some sections not being designated and classed as high local importance
ED3	Recolonising bare ground	Bare ground	Low local importance
FW2	Depositing/lowland rivers	Lowland rivers	High local importance
GA1	Improved agricultural grassland	Improved grassland	Low local importance
GA2	Amenity grassland	Amenity grassland	Low local importance
GA2/ GS1	Species rich amenity grassland, with elements of dry neutral grassland	Species rich amenity grassland	Medium local importance
GS2	Dry meadows and grassy verges	Grassy verges	Medium to high local importance
LS4	Mud shores	Mixed sand/mud flats - not mapped	High – internationally important habitat designated as SAC
MW4	Estuaries	Garravogue River estuary – not mapped	High – internationally important habitat designated as SAC
WD5	Scattered trees and parkland	Parkland and scattered trees	Medium local importance
WL1	Hedgerow	Hedgerow	High local importance
WL2	Treelines	Treelines and linear scrub	High local importance
WS1	Scrub	Scrub	High local importance
WS3	Ornamental/non-native shrubs	Gardens that often support ornamental shrubbery were not mapped and are shown in light grey in **Map 6**	Low to medium local importance – depending on planting scheme and management regime

Map 6: Habitat map of Cartron

Map 7: Management areas

5.5.1 Biodiversity in existing areas

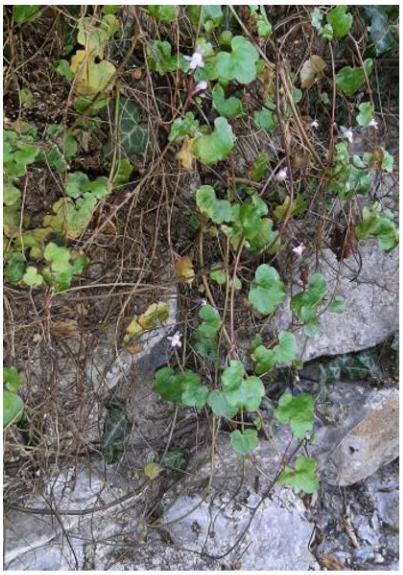
Firstly, it is important to enhance and protect what is already there. Habitats such as hedgerows, trees, woods, scrub, rivers, salt marsh and waste ground are all wildlife refuges. Secondly creating new habitats is a great way of enhancing biodiversity.

BL1 Old stone walls

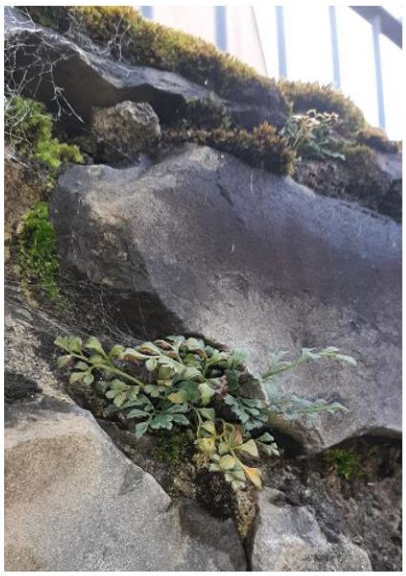
There are several old stone walls along the R291 at Old Cartron Hill and these act as refuges for insects and lichens (an algae and fungi living mutually together) as well as plant species such as ivy, Hart's tongue fern, spleenwort fern and wall-rue. The ivy clad walls provide cover for birds and the high fat content of the berries are nutritious food for wood pigeons, thrushes, blackbirds and blackcaps. There is a small section of rock amour at the mouth of the Willsborough Stream, as well as some at the south side of the headland. Interesting lichens can often be found on the stonework of rock armour as well as on stone walls and during the summer months can be refuges for Ireland's only reptile the common lizard. They are quite often seen sunning themselves on the stonework. Old walls can also support roosting bats, and Daubenton's bats often uses the crevices in old bridges. There are many native plant species found on the walls indicating little disturbance to the habitat. The non-native ivy-leaved toad flax was noted on one wall. Threats to the habitat may include unnecessary removal of ivy and other plants and the spread of non-native species.

Plate 10: Examples of biodiversity inhabiting stone walls

Hart's tongue
A fern species



Ivy-leafed toadflax
A pretty but non-native species



Wall rue
A species of fern inhabiting rock cervices

Plate 11: Old stone wall along the R291 at Cartron Court
Shows the older (green) section of the wall supporting biodiversity

Actions for old stone walls

Old walls should be maintained as is. No removal of ivy unless it is encroaching into the fabric of the walls or the foundations. Ivy-leaved toadflax, which is an introduced species is present on some of the walls and should be monitored.

CM Saltmarsh

Salt marsh is recognised as an internationally important habitat and is listed as a feature of interest for the Sligo Bay Special Area of Conservation. Areas of salt-marsh fringe Cartron and are found all along the edge of the headland and to the north on the sand spits of Standalone Point. The salt tolerant wildflowers occurring in salt marsh, such as sea aster, thrift and sea lavender with showy purple and pinkish flowers provide vibrant splashes of colour along the shoreline of Cartron over the summer. People wild foraging are often on the hunt in this wonderfully diverse habitat for the delicate glasswort and leafy sea beet to garnish dinner plates. There is a large area of salt marsh located north of the townland to the right if you are walking/driving from Cartron to Rosses Point along the R291. This area, previously called the Mardyke Road on the old six-inch maps is outside the townland of Cartron, but has been included on the habitat map, as the salt marsh monitoring project mapped the area in 2007, 2009 and again in 2018. They also mapped a small area of salt marsh east of Ballytivnan Road, which is degraded due to heavy grazing by horses and may have the potential to be restored in the future. Some new areas of salt marsh were located south of Cartron headland during this project and can be seen on the habitat map – see **Map 6**.

Plate 12: Example of saltmarsh habitat

The condition of the salt marsh around Cartron is good, while threats include invasive species and litter, as well as rising sea levels caused by climate change. In a naturally functioning coastal system, this would not necessarily be a problem; as the salt marsh, along with its associated species, has the capacity to 'migrate' inland to avoid inundation. However, in urban areas like Cartron, habitats 'escaping' rising sea levels will meet hard infrastructural defences where there is a risk of them being squeezed out of existence. This dual effect on habitats is known as coastal squeeze and many flood relief schemes are being designed to accommodate the inland movement of habitats, as habitats like salt marsh are recognised in protecting coastlines for erosion and flooding; as well as storing carbon.

Table 2: Salt tolerant species recorded in salt marsh around Cartron

Beta vulgaris subsp. maritima	Sea beet	*Cochlearia officinalis*	Common scurvy grass
Tripleurospermum maritimum	Sea mayweed	*Limonium vulgare*	Sea lavender
Triglochin maritima	Sea arrowgrass	*Aster tripolium*	Sea aster
Atriplex prostrata	Spear-leaved orache	*Plantago maritima*	Sea plantain
		Glaux maritima	Sea-milkwort


Common scurvy grass


Sea beet


Sea aster


Sea lavender

Actions for saltmarsh

Maintain the existing salt marsh by preventing any encroachment of invasive species or scrub by controlling nearby plants. Keeping the rivers entering the estuaries of a good water quality will also keep the waters around the salt marshes and bay clean. Litter washes in from the bays onto the salt marshes and blows in from Cartron. Litter picks should be organised along the area surrounding the headland.

CW2 Tidal rivers and FW2 Lowland rivers

Rivers drain landscapes and carry water and nutrients into many bays and estuaries around Ireland. They provide excellent food and habitats for countless organisms and many different species of fish, invertebrates, mammals and birds live in and along these important ecosystems. Pollution further upstream can have wide reaching affects far beyond the source and so it is very important to keep rivers clean for both humans, as well as the many species that depend on them for food and shelter. Although the EPA has given the Copper River a water quality status of poor, several high conservation value species have been noted using the river. A grey wagtail was seen at the mouth of the river during the survey and a kingfisher has been sighted recently along the river (Martin Enright pers comm., 2021). Otters are also known to use this river as it could provide food such as fish and shellfish.

Tidal rivers are very dynamic having regular fluctuations in salinity, turbidity and variations in the rate and direction of flowing water. The mouth of the Copper River and the Willsborough stream/Shannon Eighter stream are tidal, while further upstream they are classed as lowland rivers. Lowland rivers include watercourses, or sections of these, where fine sediments are deposited on the riverbed. Depositing conditions are typical of lowland areas where gradients are low and waterflow is slow and sluggish (Fossitt, 2000). Threats to the rivers near Cartron include run-off from agricultural fields up-stream and polluted run-off water in urban areas as well as litter entering the systems.

Actions for rivers

It is important to keep these rivers unpolluted, as they affect the salt marsh and the surrounding bays, but also the species that use the rivers. The two rivers should be tested for water quality and an invertebrate survey could be carried out by an expert to gain knowledge of the creatures in the two rivers. Plastic waste most probably gets washed down the rivers so litter picks could be organised at low tide if safe to do so.

LS4 Mud shores and MW4 Estuaries

The estuaries and mudflats are directly influenced by the rivers mentioned above, the condition of the Copper River is poor, while the Willsborough stream is of good quality. Threats include nitrates from farmland washing into the bay, polluted run-off water directly from Cartron, litter and wastewater.

Actions for estuarine habitats

Sligo county council is responsible for producing river catchment area management plans and should incorporate buffer zones along farmland beside rivers to prevent any runoff entering rivers, which in turn will prevent it entering the bays and estuaries. Residents can play their part by adopting cleaning products that are more environmentally friendly and decreasing the use of herbicides in parks and gardens, which can end up in ground water and run-off surface water. Sustainable drainage systems (SuDS) such as green roofs and swales ('rain gardens') can be very helpful in urban areas to limit large volumes of polluted runoff water entering drainage systems and ending up in the estuary. For more information on this see **Appendix 1b**.

ED3 Recolonising bare ground

This habitat occurs on bare or disturbed ground including, artificial surfaces such as tarmac, derelict sites, concrete or hard core that have been invaded by herbaceous plants. Vegetation cover should be greater than 50% for inclusion in this category. A range of colonising species are likely to be present and typically ruderals like docks, thistles, dandelion, willow herbs and ragworts are well represented along with species like colt's foot and in nutrient rich patches nettles (Fossitt 2000). These species are often considered as weeds; however, in urban areas, recolonising bare ground can be an important haven for wildlife often supporting a diverse flora, rich in wildflowers and crops of seed heads providing sources of energy rich foods in the late summer and autumn. Flocks of colourful finches are often observed busily feeding in these areas.

As shown in **Map 6**, there are two small areas of this habitat within the townland, occurring adjacent to the N15 and are associated with vegetation clearance works. One area is on the bank cut into the slope behind the garage (Circle K) and the other area is beside Horkan's Garden Centre. Plant species found in these areas include willow herbs, ox-eye daisy, mouse ear hawkweed, meadow hawkweed, buddleia and pampas grass. Mosses are also colonising the area. Year on year, bare ground is constantly changing and left to its own devices will become fully vegetated and can eventually develop scrub and trees. Bare ground in urban settings is often associated with construction and sometimes occurs on areas sprayed with herbicides. Bare ground can facilitate the invasion of non-native species, such as butterfly-bush (buddleia), Japanese knotweed and many other garden escapes.

Plate 13: Bank of re-colonising ground at Circle K garage

Actions for recolonising bare ground

Monitor areas of bare ground in Cartron, as and when they occur and ensure that they are not overly dominated by non-native species. While these areas will re-vegetate naturally over time, certain beneficial native plants could be introduced to add a splash of colour, such as ox-eye daisies. Herbicide use should be discouraged.

WL1 Hedgerows

Hedgerows are a prominent feature in the Irish landscape. They are an essential part of the countryside and are important ecosystems. They act as wildlife corridors and as places to hide, feed and live for many species. Indeed, they are fascinating biodiversity hotspots as they often support numerous plants in a small strip. The mix of tall growth species such as hawthorn, blackthorn, elder, wild rose, guelder rose, hazel, willow, holly, oak and ash and lower growth species including bramble, honeysuckle and many flowering plants allows many species to co-exist. The sources of food found in hedgerows that support numerous pollinating insects, birds and mammals include nuts from hazel, berries from bramble and hawthorn and nectar from honeysuckle, elder, yarrow and hogweed. Insects that breed and congregate around hedgerows are an important food source for bats that feed along the edges at night.

Plate 14: Example of Leylandii hedge in Cartron
Although non-native and generally considered poor for supporting biodiversity these hedges can provide dense cover for nesting birds like goldcrest

Hedgerows are not an outstanding feature in the townland of Cartron and only two unmanaged, bramble-dominated hedges were noted on either side of the Copper River at the estuary mouth. There have been a few beech hedgerows planted along the N15 and there is one non-native hedgerow containing Leyland cypress at the edge of one of the greens at Cartron Bay. There are many hedges in gardens, which consist mainly of exotic shrubs and were not mapped. In terms of biodiversity and structure, the condition of the existing non-garden hedgerows were found to support a relatively low number of species, as they were dominated by brambles with a limited ground flora visible. Nevertheless, in the context of Cartron they are still considered to be of high nature value, providing connectivity between other habitats and the wider countryside. Threats to hedgerows and the associated wildlife include inappropriate management such as cutting too low, cutting too often limiting availability of berry crops and cutting at the wrong time of year, e.g., during the bird breeding season.

Actions:

Planting new hedgerows can be used to link different habitats throughout Cartron to create a network of wildlife corridors. New hedges could be used to screen walls or unsightly fences. Planting native trees and hedgerow species will enhance these important ecosystems. Hedgerows can be kept low, so as not to block views, or they can be allowed to go wilder in areas where this is not such an issue. It is suggested that native hedgerows are planted around some of the green spaces namely, Classiebawn green, the playing pitch at

Cartron Point and along the non-native Leylandii hedgerow in Cartron Bay. Native species, such as crab apple could be planted within existing exotic hedgerows to enhance biodiversity.

Hedgerows should only be cut outside the bird breeding season, which is the 1st March to 31st August (under the Wildlife Act is it illegal to cut within these dates). However, it is important to note that birds can breed before and after these dates, especially with changes in our climate. Furthermore, this should apply to hedges in gardens, but it is up to the owners to check if there are birds nesting before cutting. Native hedges should only be cut on a three-year rotation to allow the berries to flourish.

Carry out a citizen science survey of gardens in Cartron to establish where all the hedgerows are, the species composition (native vs non-native hedges) and investigate through mapping how further planting of hedgerows could be used to link garden habitats throughout all the housing estates.

Plate 15: Example of hedgerows in Cartron

WL2 Treelines and WS1 Scrub

There are many treelines and linear scrub areas, both in Cartron and adjoining the townland linking to wider countryside - see **Map 6**. A variety of trees were noted during the CBAP including native species like oak, ash, downy birch, alder, willow, elder and holly. Non-native trees were found throughout the urban areas and included Italian alder, sycamore, beech, red sycamore, whitebeam, horse chestnut and holm oak to name but a few. Like hedgerows, treelines and scrub create important wildlife corridors and provide connectivity with the wider landscape. Treelines are good for bat foraging, as well as for other animals that travel large distances along wildlife corridors (e.g., fox and badger). In addition, holes in veteran trees provide bat roosts and can even support breeding barn owls if large enough.

As shown in **Map 6**, the undeveloped areas of Cartron are often dominated by scrub including at Area 1 opposite Seaview Drive and Ferndale, Area 4 beside the playing pitch and along the path at Cartron Point, Muddy Alley and a number of areas north and south of the petrol stations on the N15, as well as east of the N15. Around the seaward side of the headland scrub provides some screening from artificial lighting spilling from houses and streetlamps. This can be important for light sensitive animals, like some species of bats.

Removal of scrub and treelines, often for further development or to establish views and amenity grassland threatens these habitats. Even removal of short sections of treelines can lead to habitat fragmentation and limiting usage for some species, including bats.

Table 3: Species recorded in scrub at Cartron Point

Rubus fructicosus	Bramble
Equisetum spp.	Horsetail *spp.*
Urtica dioica	Nettle
Ranunculus acris	Meadow buttercup
Cirsium palustre	Marsh thistle
Arrhenatherum elatius	False oat grass
Dactylis glomerata	Cock's foot
Juncus spp.	Rush spp.
Alnus glutinosa	Alder
Fuchsia magellanica	Fuchsia
Sambucus niger	Elder
Fallopia japonica	Japanese knotweed
Salix spp.	Willow *spp.*

Table 4: Species recorded in the scrub along Muddy Alley

Rubus fructicosus	Bramble
Urtica dioica	Nettle
Cirsium vulgare	Spear thistle
Fuchsia magellanica	Fuchsia
Sambucus niger	Elder
Salix spp.	Willow spp.
Betula spp.	Birch spp.
Cupressus × leylandii	Leyland cypress
Fallopia japonica	Japanese knotweed

Actions for treelines and scrub

Plate 16: Oak tree in Cartron

Planting more trees is always good for the environment, as trees are the lungs of the planet. Trees take in carbon dioxide and give out oxygen, with woody tissue storing large amounts of carbon. Carbon dioxide is one of the main greenhouse gases that is driving climate change and trees helps to remove the excess carbon dioxide from the atmosphere. The planting of certain tree species such as native oaks can be very beneficial for biodiversity. Research studying the biodiversity associated with oaks, revealed this species' ability to significantly influence biodiversity (Mitchell *et al.*, 2019). The study found that oak supports an astonishing 2,300 different species, ranging from plants to animals. The study also found that 326 species depend solely on oak and 229 species are rarely found on trees other than oak. While this study was conducted on trees in Britain, the wildlife benefits of retaining existing oak trees and establishing new ones are likely to be comparable in an Irish context.

Leaving areas grow under the trees further increases diversity in woodlands and grasslands and gives animals places to hide, feed and live. If, however, planting trees is not a feasible option, leaving areas to go wild will allow them to turn into scrub and woodland in the future as seeds blow in from nearby trees or are brought in by other species. For example, badgers, squirrels, jays and wood mice in particular all love acorns and jays and squirrels help the tree spread by caching the acorns and forgetting where they put them.

Maintain treelines and scrub in the townland and in the wider countryside and plant more trees on the green spaces within the housing estates to provide interest as well as habitats (see **Appendix 2** for species to plant). An orchard could be planted, or a few small orchards and residents could plant a fruit tree in their gardens (see **Appendix 3** - the Dispersed Urban Orchard Project by Monaghan Tidy Towns). Birds and bat boxes should be erected on the existing trees in the townland. Making the county council aware of the treelines and scrub on the habitat map as well as where invasive species occur would be an important action also.

Grassland habitats of Cartron

- **GA1: Improved agricultural grassland**
- **GA2 Amenity grassland (species poor) & GA2-GS1 species rich amenity grassland**
- **WD5: Scattered trees and parkland**

There were two main types of grassland habitats recorded in Cartron including **GA2 Amenity grassland** and **GA1 Improved agricultural grassland**. Ireland has an image of being green due to the many fields dominating the landscape. However, most of the grassland is used for either grazing and silage or amenity (lawns/parks) and is often heavily fertilised, regularly mown, treated with herbicide, drained and re-seeded. Today, there is very little semi-natural grassland remaining in Ireland. The traditional hay meadows of the past (GS2 Dry meadows) where the grass was only cut once a year, typically after plants had flowered and gone to seed, have become very scarce. As the tradition of saving hay dies out in favour of regular silage cuts, so to do the species that these meadows once supported, such as orchids and other wildflowers. Many lawns (GA2), like intensively managed agricultural grassland (GA1), often only support one or two species of grass and have a limited diversity of wildflowers. Frequent mowing favours grasses over broadleaved herbs.

When grasslands are managed like hay meadows, they can produce a profusion of wildflowers, which in turn are food, shelter and a place to live for many types of insects, mammals and birds. The reason wildflowers thrive in traditionally managed hay meadows is that nutrient inputs were lower and over time continuous removal of hay depleted the nutrients in the soil, and this allows less vigorous species to survive, rather than grasses that become dominant under high nutrient and frequent mowing regimes. The last vestiges of these species rich meadows are often found as grassy verges, that occur along the edges of roads, tracks and the edges of fields/lawns - see GS2 Grassy verges.

There are numerous areas of **GA2: Amenity grassland** associated with the housing estates in Cartron. These are highly managed by mowing and overall species richness is relatively low. The swards of the greens were found to support a variety of grasses and broadleaved herbs, such as daisy (*Bellis perennis*), dandelions (*Taraxacum* spp.), clovers (*Trifolium* spp.) and plantains (*Plantago* spp.). Some of the greens or areas of greens were found to be more species-rich, with elements resembling the habitat category GS1 (dry calcareous and neutral grassland). These areas of **GA2-GS1 species-rich amenity grassland** were found to have mowing regimes where the clippings were removed, limiting nutrient build-up locally. As some of the greens in Cartron have scattered trees on the amenity grassland they have been classed **WD5: Scattered trees and parkland**. This category can be used in situations where scattered trees, standing alone or in small clusters, cover less than 30% of the total area under consideration but are a prominent structural or visual feature of the habitat (Fossitt, 2000).

The urban setting of Cartron is not noted for agricultural production and there was only one area of **GA1 Improved agricultural grassland**. This was a large, improved field north of Old Cartron Hill. In the past the field was dominated by encroaching willow scrub that was subsequently cleared and the area is now mown annually. This area is zoned for development (SEDP, 2010-2016) and is enclosed in mesh fencing, which is designed to limit accessibility for larger wildlife like badgers and foxes. Nevertheless, there is evidence of a hedgehog trail running from the gate at Old Cartron Hill estate to an area of scrub near Horkan's Garden Centre. These fences also limited access for surveying as part of the CBAP mapping

project and the field was visually inspected from adjacent areas. It was dominated by grasses and rushes (*Juncus* spp.), with herb species including creeping buttercup (*Ranunculus repens*), plantains (*Plantago* spp.), nettle (*Urtica dioica*), thistles (*Cirsium* spp.) and docks (*Rumex* spp.).

Actions for grassland

More detailed habitat descriptions and actions for each green on the headland of Cartron are set out in **Section 6**.

For amenity grasslands, areas that do not receive heavy footfall could be managed as meadows, these will quickly become a haven for wildlife no matter how big or small they are. The edges of gardens and parks and indeed along roadsides are great places to let go wild, as it is both cost effective and good for wildlife. Meadows with grasses and flowers that are allowed go to seed at the end of their flowering period provide food for birds. These meadows are also insect rich areas that provide great foraging places for bats which need to eat large amounts of insects to survive. Indeed, bats can take up to two and a half thousand insects per night, helping us by keeping the insect populations in check.

'Be Slow to Mow' could be a campaign adopted in the amenity/parkland areas (as well as in gardens). Pick patches that are not hugely used and allow them to grow for the flowering season. These benefit pollinators and are a focal point to enjoy. Then at the end of the flowering season they can be mown or strimmed or even scythed, which could be a nice community event. Always remember to remove the clippings or if scythed as hay, leave to lie for a couple of days to let seeds drop before removing. Haystacks could even be made and once dried could be taken or sold as hay to local farmers or horse owners.

For the field of improved grassland north of Old Cartron Hill, which is earmarked for development, green areas and a native hedgerow/tree planting scheme should be incorporated into any plans, with the aim of maximising connectivity through the development and with the wider landscape. In addition, as the field slopes down to the Shannon Eighter stream the plans should also include a green buffer zone to avoid run-off into this important ecosystem. A lighting plan should be adopted to limit artificial light spilling onto linear features, potentially utilised by nocturnal wildlife, like bats and otters.

Plate 17: Examples of grassland in the housing estates of Cartron

Source: NBDC.

GS2 Grassy verges

Roadside verges and edges of parks in many places are the last refuges for flora and fauna if the surrounding areas are dominated by farmland or amenity grassland. If managed correctly, through implementing seasonally appropriate mowing regimes and removal of clippings, verges can emulate the species richness found in traditional hay meadows.

To keep areas looking 'tidy', verges are often cut too regularly and sprayed with herbicides to kill off vegetation. The use of herbicides, especially glycophosphate products, such as Round-up kills insects and should be avoided. Leaving the edges of lawns uncut creates areas for creatures such as bumblebees, hedgehogs and other small mammals to live, hide and forage in. Wider margins at the edges of parks may support foraging areas for large mammals such as foxes and badgers.

Grassy verges are found along the edges of Ferndale/Seaview/Ard Na Mara greens, the playing pitch and all the way along the path leading to Muddy Lane on the south side of the headland. This habitat can support many of the wild grasses and flowers that are prevented from flowering elsewhere and should be retained. At Cartron species diversity in grassy verges is not particularly rich and threats include nutrient enrichment from dumping of garden waste, which can also result in invasive species taking hold. There are already areas south of the playing pitch where invasive species are found in the verges, including winter heliotrope, Himalyan balsam and Himalayan honeysuckle.

Plate 18: Examples of grassy verges in Cartron

Grassy verge at Cartron Point pitch

Grassy verge at Ferndale/Seaview Drive

Table 5: Species in grassy verge opposite Ard Na Mara (Green 3)

Cirsium vulgare	Spear thistle
Rubus fructicosus	Bramble
Rumex acetosella	Sheep sorrel
Epilobium parviflorum	Small flowered willow herb
Arrhenatherum elatius	False Oat grass
Lolium perenne	Perennial ryegrass
Holcus lanatus	Yorkshire fog

Table 6: Species in grassy verge at edge of playing pitch (Green 4)

Rubus fructicosus	Bramble
Centaurea nigra	Knapweed
Urtica dioica	Nettle
Rumex obtusiflolius	Dock
Cirsium palustre	Marsh Thistle
Equisetum spp.	Horsetail *spp.*
Lathyrus pratensis	Meadow vetchling
Vicia cracca	Tufted vetch
Arrhenatherum elatius	False Oat grass

Actions for grassy verges

- Remove garden waste and erect signage to explain to people the threats to the habitat.
- Monitor and control/remove invasive species as required.
- Do not use herbicides.

5.6 Non-native invasive species

Invasive species are plants and animals that have been introduced from other countries and have become a problem species. For example, non-native plants such as Japanese knotweed and *Rododendron ponticum* would have been brought in as exotic garden plants. These plants may be lovely in gardens but when they escape into the wild the problems begin. They can change the landscape by blocking out light for native plants which are outcompeted, and the non-native species then take over the habitats, such the understory of woodlands or riverbanks. In the marine and freshwater environment non-native species are often unwittingly spread by boats. A well-known mammal invasive species that have become problematic in Ireland are American mink, which escaped or were released from fur farms. Mink are a voracious predator eating a wide variety of food including birds and can have significant negative impacts on ground nesting birds, especially rare breeding duck species like common scoter or colonial species such as terns. Mink have been recorded on the Garravogue River, upstream of Cartron.

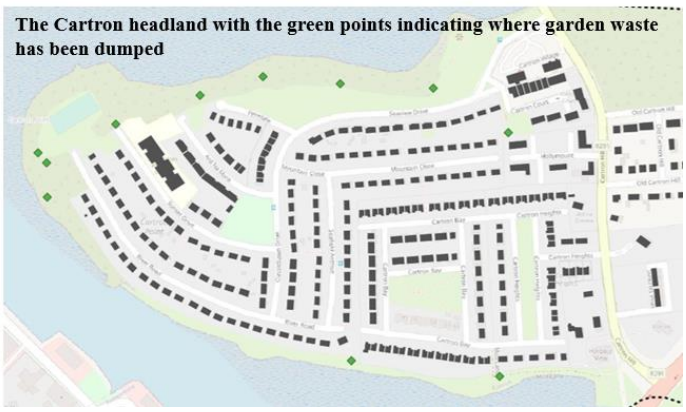
Plate 19: Example of non-native plants occurring in Cartron

Japanese knotweed | Winter heliotrope | Himalayan honeysuckle

As shown in **Map 8**, one of the main invasive species identified during habitat surveys in Cartron was Japanese knotweed. There is notably a large patch of it west of the boundary of St Brendan's School spreading into the scrub and some smaller patches along Muddy Alley (Near Mud Lane) to the south of Cartron Heights. Winter heliotrope was noted around the path on Cartron Point and can become dominant along roadside verges and under hedgerows where it totally outcompetes the native flora. There were also several other non-native species that are dotted along the walkway around Cartron Point, and while the negative ecological effects of some are balanced somewhat by providing sources of nectar for insects such as Buddleia (the butterfly bush) or berry crops like sea buckthorn, they still occur at the expense or instead of native species. In the case of sea buckthorn, the negative invasive effect in certain habitats can be significant and it becomes highly invasive in dune systems. Birds foraging on sea buckthorn berries can unintentionally spread this shrub into sensitive habitats. Other non-natives found in Cartron such as Fuchsias which originate from South America and are now so common in Irish hedgerows they are often considered as a naturalised species.

Other non-native species included Himalayan balsam and Himalayan honeysuckle along the path south of the scrub at Cartron Point and have most probably established themselves when garden waste was disposed of here in the past – see **Plate 20** for images of dumped garden waste and a map indicating dumps where the risk of exotic garden plants escaping into the wild is increased.

Plate 20: Map shows where garden clippings have been dumped around Cartron



Actions to prevent the introduction and spread of non-native species

For the locations where stands of Japanese knotweed were identified it is recommended that all the patches are:

- Signposted warning people not cut plants as this increases the risk of spreading the species
- Treated by a qualified company employed by the County Council to halt the further spread of the plant

Leaflets could be distributed informing residents of the main invasive plant species potentially occurring in gardens and how to avoid introducing these species by choosing native, locally sourced species whenever possible and where invasives do occur how to avoid spreading them into the wild, e.g., by bagging clippings.

Continue monitoring the occurrence of non-native invasive species – reporting records to NBDC

Garden waste should always be disposed of in the corner of a garden or compost bin and not be placed into the wilder areas of the estate. A central composting station or a series of small composting stations may help with this problem.

Plate 21: Example of a simple composting bay

Map 8: Non-native and invasive plant species identified at Cartron

5.7 Other species recorded

A search on the National Biodiversity Data Centre's map viewer shows all the species recorded in the past in Cartron ranging from birds to mammals, to insects and flowering plants - see **Appendix 4**. All species noted during the CBAP surveys have been submitted via the NBDC's app or website.

5.7.1 Invertebrates – the creepy crawlies

The group invertebrate encompasses a vast array of animals, including jellyfish, worms, starfish, insects, spiders, snails and shellfish (molluscs). The one feature they all have in common is the absence of a backbone. This group includes important pollinating insects like bees, moths and butterflies which are integral to sustaining biodiversity.

5.7.1.1 Why do we need to help pollinators?

Source: Adapted from NBDC 'How to Guides'

Humans need pollinators so that we can continue to have the variety of fruit and vegetables that we have become accustomed to being plentiful to us in our everyday lives. For example, strawberries, apples and rapeseed that we obtain oil from, as well as many vegetable varieties including tomatoes and courgettes, all need pollinators to produce good crops. Pollinators, such as bees, butterflies and moths, are also needed to pollinate all the wildflowers of our landscapes, thus providing seeds and fruits for birds and mammals.

Plate 22: Pollinators at work
Photographed by Mallacai Wolfe in scrub at Cartron Point and in front of Ferndale Green

Common carder bee
Bombus pascourum

Early bumblebee
Bombus pratorum

Common drone fly
Eristalis tenax
This is actually a hoverfly and is named not for the sound it makes in flight but for its similarity to a honey worker bee, a drone. They can be seen early in spring taking advantage of the nectar in the spring flowers. The one is on *Brassica* spp. flowers

The footballer hoverfly
Helophilus pendulus
The Latin name for this species translates to 'dangling marsh lover'. This one is on a dandelion flower

There are 99 different species of bee on the island of Ireland. We have 21 species of bumblebee, 77 species of solitary bee and one honeybee. Honeybees live in colonies in hives and are looked after by beekeepers

and are the only bees that produce honey. Bumblebees live in colonies made up of a queen, female workers and males and make their nests hidden in long grass. The queen hibernates for winter, emerges in the spring and starts her new colony. When she emerges from hibernation, she is extremely hungry. One of the first food sources available to her is the nectar from dandelions, so leaving this lovely plant grow is very important for the survival of the queens. In fact, according to the National Biodiversity centre, a bumblebee queen needs to visit up to 6,000 flowers in the spring to maintain the heat needed to brood her first laid eggs. The queens lay their eggs and throughout the summer go about pollinating the flowers and crops. The new queen (the other one dies in late summer along with all the other female workers and males) also needs to fatten up for hibernating over the winter. Therefore, for the life cycle to be completed bumblebees need food from early spring all the way to autumn.

Solitary bees are just that, solitary and they make their nests by burrowing into south or east facing slopes of bare earth that can be either in sand, soil, clay or peat. The males and females hibernate over winter and emerge in the spring. They make their nest, mate and the female lays eggs in single burrows along the banks, leaves a supply of pollen, covers over each hole and then when the job is done the females and males die. The eggs hatch and larvae eat the pollen and then overwinter as cocoons in the burrows until the following spring. Therefore, it is important to always be conscious of this when doing any work on banks or roadside verges, as these habitats could easily be destroyed.

Unfortunately, one third of the 98 bees that live in the wild in Ireland are now threatened with extinction. The honeybee populations are also declining. Bees are in trouble as they have less places to live and there is less food throughout the landscape as a whole. We spray lots of pesticides in the summer months, especially along edges of roads and this kills them out right or kills the food source that they may have used. Introduced pests as well as diseases from other countries have also had a huge impact on populations.

Moth surveys

Michael Bell set out two moth traps in two gardens in Ard Na Mara in July 2021 and a total of 38 species of moth were recorded, including heart and dart (*Agrotis exclamationis*), true lover's knot (*Lycophotia porphyrea*), light brown apple moth (*Epiphyas postvittana*), July highflyer (*Hydriomena furcata*) and brimstone (*Opisthograptis luteolata*) to name but a few. A similar survey conducted in 2015 recorded a total of 41 species of moth. All the moth species recorded in both years are listed in **Appendix 4**, with additional species registered by the NBDC also listed.

Plate 23: Examples of moths trapped in July 2021 at Cartron

When carrying out site visits for habitat mapping the author noted butterflies, bees and other invertebrates along the way including:

- Butterflies seen included, green-veined white, speckled wood, small tortoiseshell, peacock, small white and ringlet.
- Bees seen included white-tailed bumblebee, common carder bee, early bumblebee and a near threatened species, the large red-tailed bumblebee, which was seen feeding near St Brendan's school.
- Other insects recorded included a seven-spot ladybird and a type of snail-eating beetle (*Silpha atrata*).
- The only mollusc noted was an amber snail (*Succinea putris*), however there are many more snail species in Cartron that were not recorded.
- Several spiders were recorded including the nursery web spider (*Pisaura mirabilis*) and the European garden spider (*Araneus diadematus*) which were noted in the gassy verges.

Plate 24: Examples of other invertebrate species
Photographed by Mallacai Wolfe

5.7.2 Amphibians and reptiles

There are three native species of amphibians found in Ireland, two of which occur in Co. Sligo, namely common frogs and smooth newts. There are records of frogs occurring in the 2x2km tetrad around Cartron and they could potentially occur within the townland. However, there are no records of newts in the environs of Sligo town. Most breeding amphibians are sensitive to saline environments and Cartron, which is surrounded by the sea, does not provide any notable areas of standing fresh water required by amphibians for breeding.

Ireland's only native reptile is the common lizard. There are no lizard records on Biodiversity Maps for Cartron or the surrounding areas and the closest records are from Knocknarea, where the heathy habitats typically favoured by this species occurs. Although it is possible, it is considered unlikely that lizards occur in Cartron.

Actions for amphibians

Create ponds in suitable areas of parks, for example Hollymount and residents could create ponds in their gardens.

5.7.3 Birds

The intertidal mud and sand flats surrounding Cartron provide an internationally important habitat for wintering waterbirds and is designated as an SPA and Ramsar site. Based on IWeBS counts, approximately

36 species of wintering waterbirds have been recorded feeding on the mudflats surrounding Cartron in the last five years and many more in the previous decades. There have also been some rarer sightings over the years including Ross's gull (Russia), Bonaparte's gull (Alaska,) American wigeon and Kumlien's Iceland gull (Arctic region of Canada). Little egrets, which have spread into Ireland from the Mediterranean and north Africa first started breeding in Cork in 1997. They are now widely distributed across Ireland including Sligo Bay and were recording feeding in the shallow waters of the mudflats during the current study in September 2021.

In addition to providing an indicative species list of birds likely to occur at Cartron, **Appendix 4** provides the peak counts from wetland bird surveys (IWeBS) covering the estuary surrounding Cartron. The results of breeding bird survey conducted at selected parts of Cartron during the 2021 breeding season are also provided in **Appendix 4**.

The birds recorded breeding around the greens of Cartron were species associated with human development such as house sparrows, starlings, blackbirds and jackdaws. Other urban birds such as swallows and house martins migrate from Africa every year and return to the exact spot to breed again. Swallows were noted catching insects over the houses. Swifts breed in Sligo town and could be encouraged into Cartron by putting up nest boxes for them on St Brendan's school. There were a total of seventeen different bird species noted around the green spaces in Cartron during the surveys of the CBAP.

Actions for birds

Encourage residents to get involved with bird conservation through Bird Watch Ireland, including taking part in the Garden Bird Survey and IWeBS.

Inform residents on the benefits of feeding birds during the winter and encourage planting of native berry and seed rich plants in gardens. Keep some weedy patches to provide a source of seeds.

A more comprehensive breeding bird survey within the housing estates of Cartron could be carried out in the future. This would further inform the types of bird boxes needed and where they could be effectively positioned for the species occurring. For example, the proximity of parts of Cartron to open saltmarsh and farmland means the area has the potential to support rare breeding species like barn owl and kestrel. These species can be provided with large nest boxes on trees or buildings.

Workshops could be run on building nest boxes, for example through a men's shed group.

5.7.4 Terrestrial mammals

Appendix 4 provides a list of all the mammals recorded within the 2x2km tetrad encompassing Cartron, within which foxes, badgers, otters, pygmy shrews, wood mice, rats and deer have been recorded. Otters have been recorded regularly in Sligo Harbour, at the Copper River and along the mud flats beside Cartron. Many of these species are likely to be found on the headland of Cartron, as there are areas of scrub that link the headland to the wider area. No obvious fox or badger signs were noted during the CBAP walkovers; however, there were well worn mammal tracks through the saltmarsh surrounding the headland and these were judged to be trails regularly used by foxes or badgers. The strandline around the headland is likely to offer a source of food washed up on the tide that will be regularly patrolled by scavengers, like foxes. Some residents have had sightings of foxes over the past few years. The author had one fox sighting in Rathbruagh Park, north of the townland during the hedgehog survey.

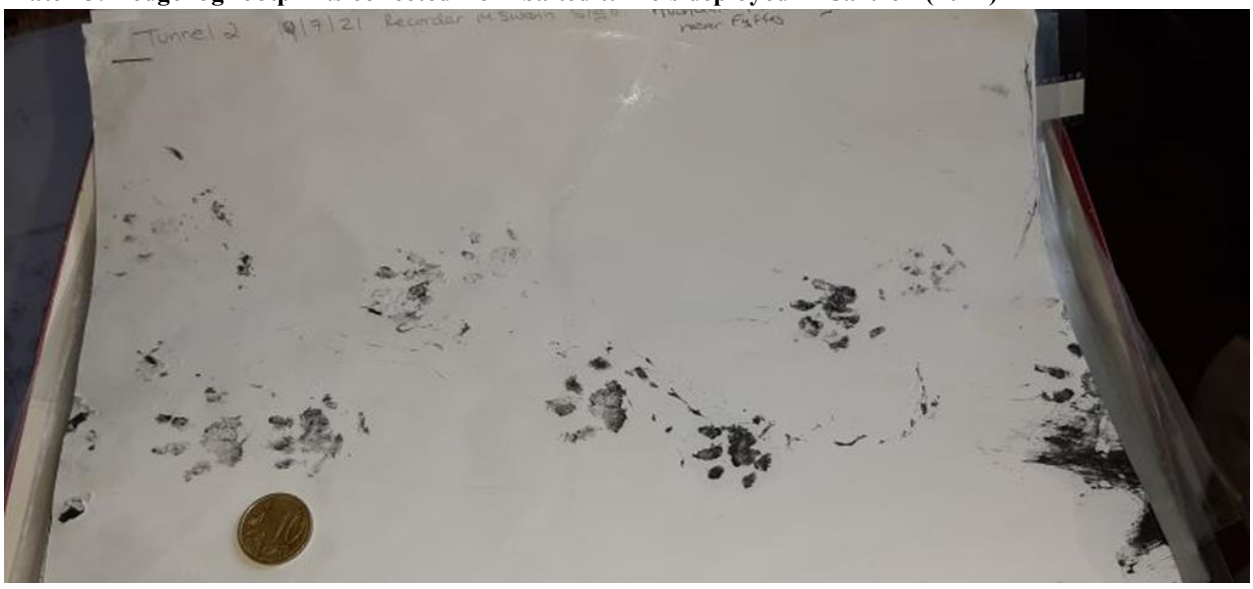
Results of the hedgehog survey

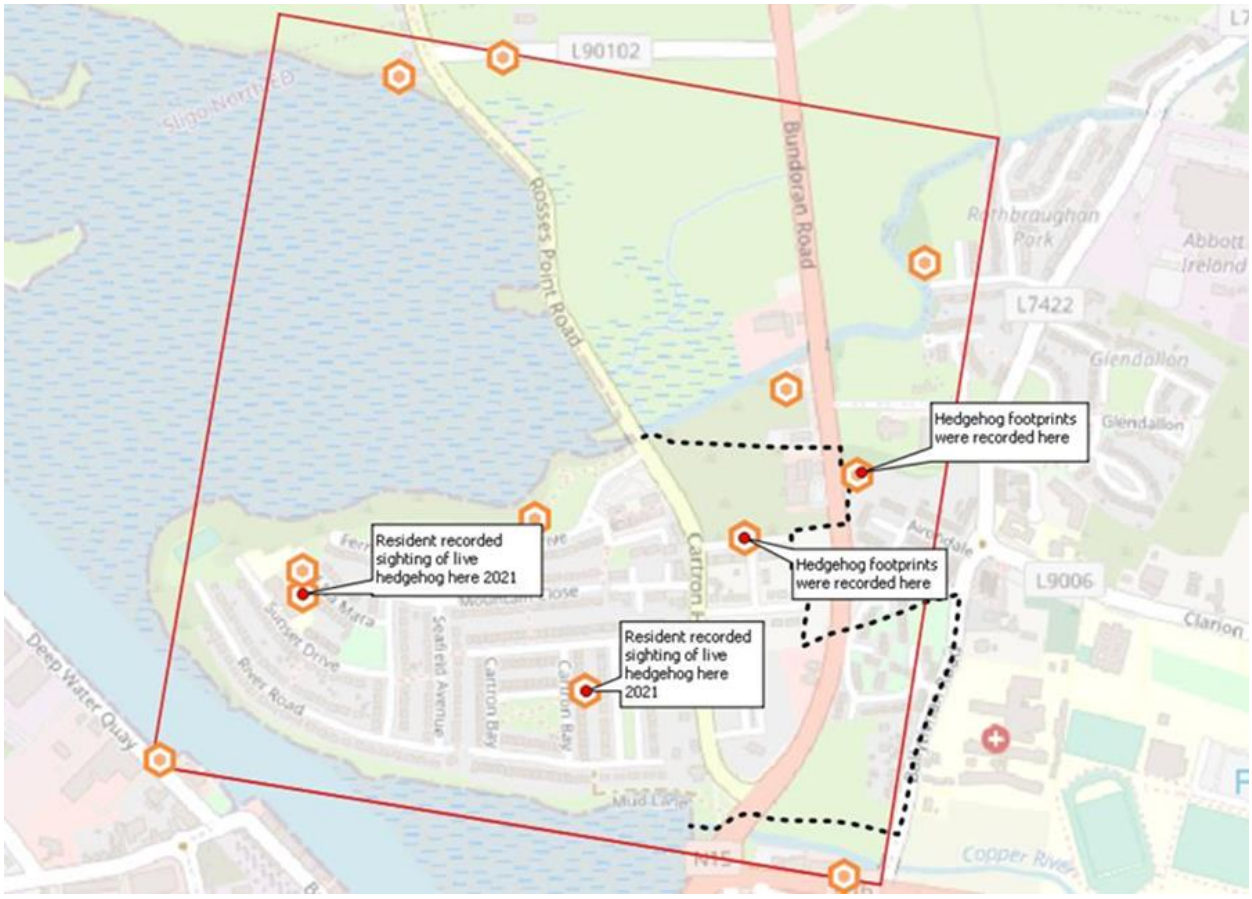
Hedgehog footprints were found in Cartron Hill housing estate beside the large field. According to a local resident a hedgehog was seen coming from the field through the gate to the green area in the previous year. There are trees and scrub near the field which would provide hibernating, foraging and hiding areas for the species. Footprints were also recorded in Avondale green area beside Avondale housing estate, which is outside the townland, but very close to Cartron. There is a nice treeline of Italian alder and scrub, as well as

tall grasses that would provide cover for hedgehogs. Two residents (one in Cartron Heights and one in Ard Na Mara) also provided records for hedgehogs visiting their gardens and can be found in **Appendix 4**. **Map 9** is an aerial photo taken from Biodiversity Maps showing the past records for hedgehogs, with **Map 10** showing the points where tunnels were deployed during the CBAP survey and the tunnels where footprints were recorded.

Map 9: Map of past hedgehog distribution in the townland of Cartron
Source: NBDC Biodiversity Map (01/07/2021).

Plate 25: Hedgehog footprints collected from baited tunnels deployed in Cartron (2021)





Map 10: Location of hedgehog tunnels deployed around Cartron (2021) and hedgehog records

Actions for terrestrial mammals

A survey using motion sensor wildlife cameras could provide some interesting insights into what mammals utilise the headland and highlight important habitat features. A native hedgerow could be planted near the entrance to Cartron Village to create a wildlife corridor between the scrub in Area 1 and the Willsborough stream.

Creating a hedgehog den from garden debris would be beneficial for this species and could be carried out in greens and private gardens.

5.7.5 Bats

Based on the Biodiversity maps website, no bats have been recorded within the townland of Cartron, which is likely to be the result of the area not being surveyed previously. In the wider area Daubenton's bat, which use rivers have been recorded along the Garravogue River and at Lough Gill, so it is likely that they may travel to Cartron, as there are two rivers nearby. Other species that use treelines and scrub include common pipistrelles, soprano pipistrelles, Natterer's bat and Leisler's bats, which have all been recorded using either Lough Gill and the Garravogue River and therefore could potentially forage or commute through Cartron. No brown long eared bats have been recorded in the environs of Cartron and this may be due to this species being particularly sensitive to artificial lights in urban areas.

As shown in **Map 11**, a bat survey conducted at the end of June 2021 found small numbers of bats foraging or commuting at several locations within Cartron. Two species were recorded, including common and soprano pipistrelles.

Actions for bats

Put up bat boxes around Cartron on the taller trees and if there are any old houses/veteran trees they could be surveyed for roosts.

Ivy on trees should be retained, as this can provide cover for roosting bats and also supports higher levels of insect activity upon which bats feed.

Develop a lighting plan for Cartron – to limit light pollution for foraging bats, including investigating planting for screening and optimising lighting efficiency through use of directional lighting and the types of bulbs used.

Plate 26: Bat and bird boxes can be put on mature trees

Map 11: BatExplorer map output showing bat distribution recorded on 30/06/2021

6 Biodiversity enhancement areas and recommended actions

There are many different types of habitats you can create either in your local park or right on your doorstep in your garden, school, or business. Small scale ideas that will all add nature value to an area include planting a native hedgerow, native trees, a small orchard, allowing a meadow to grow, planting a native wildflower mix on an area of low biodiversity value, creating raised beds or adding hanging/window baskets with wildflower mixes. Consider making a bank or un-vegetated verge or making a small pond. Other ideas include bug/bee hotels, putting up bat boxes and bird boxes on trees or on the sides of houses/buildings, creating bird feeding stations or simply allowing birds or bats to make their homes in the eves of houses. Creating piles of leaves or log piles in quiet areas are good for hibernating hedgehogs and invertebrates. You could also get together with neighbours and decide to grow certain types of vegetables that are good for nature but that you too can benefit from and adopt a 'swap scheme'. You could obtain funding and sell trees to the residents on a larger scale and create a community tree scape or an orchard by simply planting them in your gardens. (for more info on this see Monaghan Tidy Town's great idea in **Appendix 3**). Below are the habitats found in Cartron.

The following sections provide descriptions of the green spaces within Cartron and recommended actions for each green. The summary table in Section 7 gives indicative time frames and approximate costings for the actions recommended.

Green 1: Seaview Drive and Ferndale

This green is managed as amenity grassland (GA2) and is the first large green area you see on the right-hand side as you drive into Cartron Village. It is located on the northern part of the headland and looks out over the mudflats of Cartron Marsh. As shown on **Map 6** and **Map 7**, Green 1 has been classified into species rich amenity grassland (Area 1a and Area 1b) and further up the hill as amenity grassland with scattered trees (Area 1c: WD5 – parkland).

Plate 27: Area 1a &Area 1b


Common spotted orchid


Green 1 Seaview Drive


Biodiversity in grassland

Area 1a and Area 1b has elements of a more semi-natural grassland and has been classed as amenity grassland/semi-natural grassland (GA2/GS1). The reason the lower parts of this green is more species rich is because after mowing the clippings are removed, limiting nutrients. A common spotted orchid was identified growing in the wetter area that slopes down to the bird viewing area. This is an interesting find

and illustrates how different management regimes can affect species richness in grasslands. There are several trees planted on the green including sycamores and further up the hill on the seaward side of the green, is an area of scrub with willow and alder dominating.

Table 7: Species recorded for Green 1: Area 1a & Area 1b

Trifolium pratense	Red clover
Trifolium repens	White clover
Ranunculus repens	Creeping buttercup
Plantago major	Greater plantain
Carex flacca	Glaucous sedge
Prunella vulgaris	Self heal
Trifolium campestre	Hop trefoil
Leucanthemum vulgare	Oxeye daisy
Dactylorhiza fuchsii	Common spotted orchid
Plantago lanceolata	Ribwort plantain
Jacobaea vulgaris	Ragwort
Bellis perennis	Daisy
Cardamine pratensis	Cuckooflower
Potentilla anserina	Silverweed

Taraxacum officinale	Dandelion
Leontodon saxitilis	Lesser hawk-bit
Heracleum sphondylium	Hogweed
Rumex obtusiflolius	Dock
Cerastium fontanum	Common mouse-ear
Carex spp.	Sedge spp.
Centaurea nigra	Knapweed
Rhytidiadelphus squarrosus	A moss species
Holcus lanatus	Yorkshire fog
Agrostis capillaris	Common bent
Festuca rubra	Red fescue
Cardamine pratensis	Cuckooflower
Bellis perennis	Daisy

Actions for Green 1: Area 1a & Area 1b

Potential ideas for enhancing biodiversity across Green 1 are presented in **Figure 1**.

- Continue with the current mowing regime, removing clippings and decrease mowing to once every six weeks and if possible, to once in the season.
- Do not use herbicide.
- Update the signage as you enter Cartron to promote the area and to highlight the viewing area over the mudflats.
- Put up bird and bat boxes on the sycamore trees.

Green 1: Area 1c

The grassland above the blue fence (Area 1c) was found to be floristically less diverse and was mainly dominated by grasses. This area is mowed, but the clippings are left to lie, which increases the nutrients in the soil and encourages the dominance of grasses over flowering plants. There are trees within this part of the green and some non-native shrubs including buddleia and Fuchsia. Considering the occurrence of scattered trees across this area the habitat was classified as WD5 Scattered trees and parkland (Fossitt, 2000). During the summer of 2021, the unmown grassy verges at the edge of the green were alive with insects including bees, butterflies and hoverflies feeding on the flowers.

Table 8: Species recorded for Green 1: Area 1c

Taraxacum officinale	Dandelion
Ranunculus repens	Creeping buttercup
Trifolium repens	White clover
Prunella vulgaris	Self heal
Rumex spp.	Dock spp.
Holcus lanatus	Yorkshire fog
Festuca rubra	Red fescue
Lolium perenne	Perennial ryegrass
Species in grassy verge at seaward side of green	
Anthriscus sylvestris	Cow Parsley
Geranium robertianum	Herb Robert
Fumaria capreolata subsp.babingtonii	White ramping fumitory
Brassica napus	Rapeseed

Epilobium parviflorum	Small flowered willow herb
Trees & shrubs	
Acer pseudoplatanus	Sycamore
Fraxinus excelsior	Ash
Prunus serrulata	Cherry
Alnus glutinosa	Alder
Sorbus aucuparia	Rowan
Crataegus monogyna	Hawthorn
Prunus laurocerasus	Cherry laurel
Escallonia rubra macrantha	Escalonia
Buddleja davidii	Buddleia (butterfly bush)

Actions for Green 1 Area 1c

Potential ideas for enhancing biodiversity across Green 1 are presented in **Figure 1**.

- To increase diversity in the grassland over the coming years, when mowing, remove clippings and decrease mowing regime to once every six-week and if possible, to once a season. If the latter is not be fully achievable across the whole green, consider designating some areas that could be left as meadows and mow paths through the meadows. This creates interesting walks for people and provides open areas for foraging birds that can hunt for insects hiding in the longer vegetation. Put up signage to explain 'Slow to Mow' approach.
- Erect signage to promote composting and to not dump garden waste into the grassy verges at the sides of the green.
- Bird and bat boxes should be put up on the trees.
- Planters should be planted with pollinator friendly plants (see **Appendix 2** for lists of species) and no pesticide should be used including slug pellets.

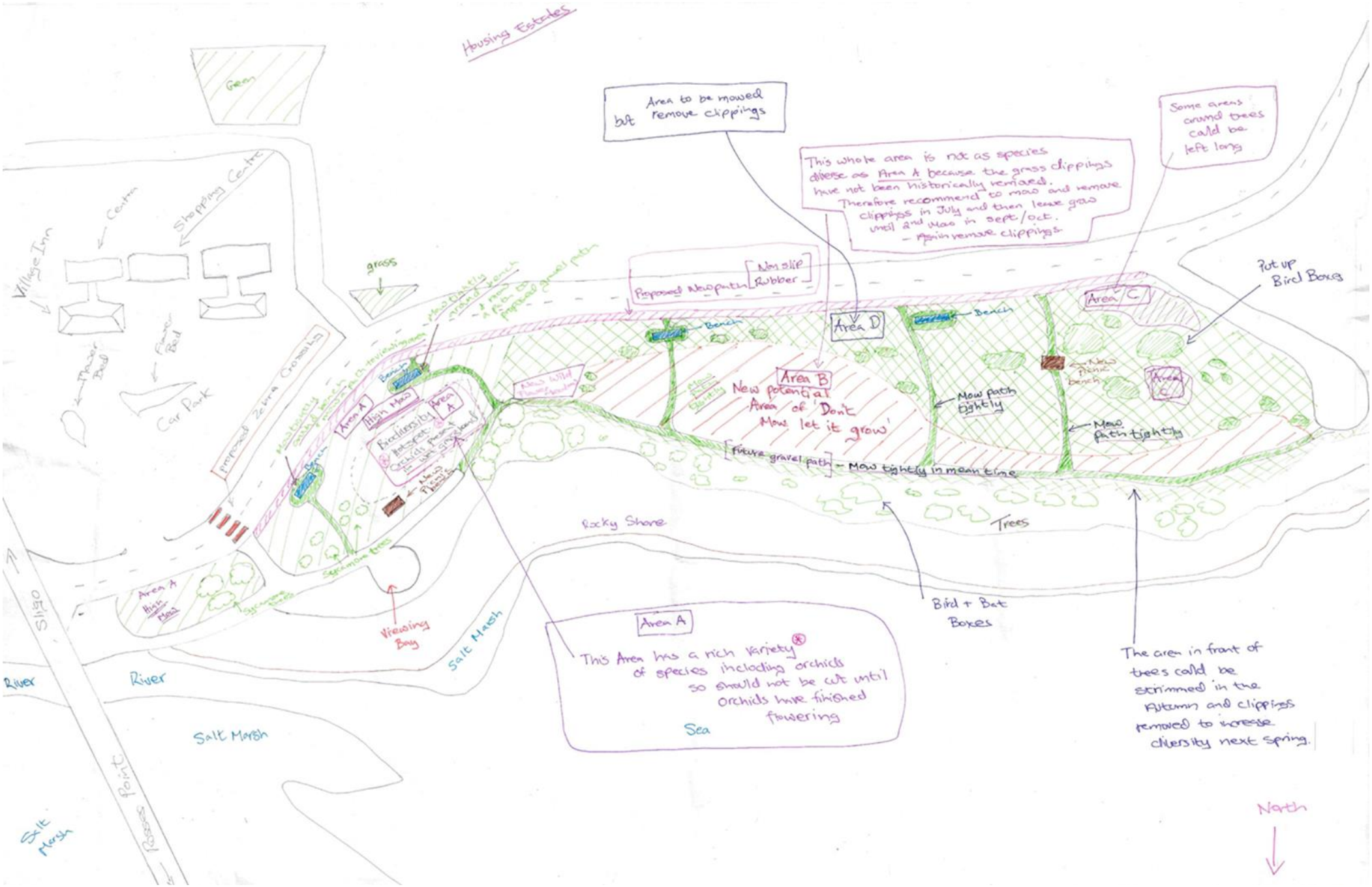


Figure 1: Proposed actions for Green 1: Seaview Drive and Ferndale

Green 2 - Cartron Court

Green 2 is located behind Keady's Dry Cleaners on the way into Cartron Court and was classified as amenity grassland (GA2). The green is unmanaged, and grass has become 'rank', meaning that it has grown up as tall as it can and has then fallen over on itself forming many matted clumps. It is dominated by one to two species of grass with some bramble encroaching. Intermingled amongst the grasses are garden shrubs (mainly at the back wall) and garden escapees including Montbretia. There is one native downy birch tree, but the shrubs at the back are mainly cherry laurel and Fuchsia.

In unmanaged grassland the natural progression is for grassland to develop into scrub and this is already occurring with the encroachment of brambles. In urban settings scrub can provided important cover for animals, such as breeding birds. The long, rank sward can provide shelter for snails and overwintering insects, such as bees and could also be used by hedgehogs. Garden waste was noted as being dumped at the back wall, increasing the risk of invasive species propagating, as well as increasing nutrient levels over the area.

Table 9: Species recorded for Green 2 – Cartron Court

Holcus lanatus	Yorkshire Fog
Festuca rubra	Red Fescue
Lolium perenne	Perennial ryegrass
Rubus fructicosus	Bramble
Fuchsia magellanica	Fuchsia
Prunus spp.	Laurel
Betula pubescens	Downy Birch
Hedera helix	Ivy

Plate 28: Habitats at Cartron Court

Actions for Green 2 - Cartron Court

As there is currently no management of this green and there may be no management into the future, it could be left to its own devices. Leaving areas to 'go wild' has been shown to be an effective way to store carbon as a measure to combat climate change.

- Either leave shrubbery as is and trim from time to time to keep in check or remove/control non-native species and replace with native shrubs, such as willow, holly, crab apple.
- Any scrub clearance should be undertaken out of the bird breeding season (1st March to 31st August) and the possibility of hibernating hedgehogs and bees should also be given careful consideration if any works were to be carried out. It is recommended that area is initially strimmed and then only cut once a year at the end of the flowering season. Clippings need to be removed to decrease nutrients in the soil over time.
- Areas infected with non-native plants should be identified and care should be taken not to cause the spread of these species when mowing, which risks broadcasting plant fragments that can regenerate in new

locations. To this end it would be desirable to remove the patches of Montbretia, as this plant outcompetes native flora.
- Clear rubbish and erect signs to stop garden waste being dumped. Put up bird boxes on walls and the established birch tree to enhance the area for nesting birds.

Green 3 Ard Na Mara

Green 3 is located near the back of St Brendan's school and at the end Ard Na Mara road. It is a continuation of the Ferndale green (Green 1), but it is richer in species diversity. This area is mown, and the clippings removed, again creating species diversity as the nutrients are taken away after each cut. It was considered as species rich amenity grassland (**GA2-GS1**).

Plate 29: Example of green spaces at Ard Na Mara

Scrub | Green 3 | Viewing area | Wall for mural

Table 10: Species recorded for Green 3 - Ard Na Mara

Bellis perennis	Daisy
Trifolium pratense	Red clover
Trifolium repens	White clover
Taraxacum officinale	Dandelion
Ranunculus acris	Meadow buttercup
Prunella vulgaris	Self heal
Plantago lanceolata	Ribwort plantain
Plantago major	Greater plantain
Trifolium campestre	Hop trefoil
Festuca rubra	Red fescue
Holcus lanatus	Yorkshire fog
Carex flacca	Glaucous sedge
Carex spp.	Sedge *spp.*

Actions Green 3 Ard Na Mara

- Continue removal of clippings, reduce mowing to either once every six weeks or once a season if possible. If this is not feasible leave areas un-mown along the back fence and wall. Leaving wild patches at the edges creates refuges for insects and creates hiding places and will act as wildlife corridors to other long grassy verges that are already located on the seaward side of Greens 1 and Green 3.
- Put up bird and bat boxes on surrounding houses for resident bird species and to create roosting areas for bats that may use the area.
- A bug hotel could be established here and a local composting station to prevent garden waste being dumped in the grassy verges.
- There is scope to visually enhance the area by painting the wall with a mural, with a wildlife or heritage theme.

Green 4 - Pitch on Cartron Point

Green 4 is the playing pitch located at Cartron Point. This area is mown and the clippings are removed. This has allowed a more species diverse grassland to grow and the mushroom Blackening waxcap, which is an indicator of semi-natural grasslands was found growing on the pitch. Therefore, the green was classed as species rich amenity grassland (**GA2-GS1**). The pitch is surrounded by scrub and grassy verges offering refuge for birds and many invertebrates. There were several different bird species seen feeding on the pitch during site visits including rooks and common gull. There is a high density of potential invasive plants, probably garden escapees due to dumping, occurring in the area at the southern end of the pitch.

Plate 30: Habitat and species at Cartron
Mushroom & pansy photographed by Mallacai Wolfe

Scrub at Cartron Point | Blackening waxcap | Wild pansy | Pitch at Cartron Point

Table 11: Species recorded for Green 4 – Pitch on Cartron Point

Bellis perennis	Daisy
Heracleum sphondylium	Hogweed
Trifolium repens	White clover
Cerastium fontanum	Common mouse-ear
Trifolium pratense	Red clover
Plantago lanceolata	Ribwort plantain
Holcus lanatus	Yorkshire fog
Ranunculus acris	Marsh buttercup
Carex flacca	Glaucous sedge
Potentilla anserina	Silverweed
Hygrocybe conica	Blackening waxcap

Taraxacum officinale	Dandelion
Leontodon saxitilis	Lesser hawk-bit
Plantago major	Greater plantain
Prunella vulgaris	Self heal
Rumex obtusiflolius	Dock
Centaurea nigra	Knapweed
Cirsium palustre	Marsh thistle
Rumex acetosella	Sheep sorrel
Anagallis arvensis	Scarlet pimpernel
Viola tricolor	Wild pansy

Actions for Green 4 - Pitch on Cartron Point

- Continue mowing regime and removal of grass clippings.
- Continue to leave grassy verges un-mown and plant a native hedgerow.
- Investigate cost and practicalities of controlling/removing of garden escapes. Some of the buddleia and fuchsia could be left, as it provides nectar for butterflies and bees. However, buddleia has the capacity to spread prolifically and should be monitored.
- Put up signs to stop garden waste being dumped and establish a local composting station.
- Put up bird and bat boxes in the area both on houses and on the trees at the other end of the playing pitch.

Green 5 - Ard Na Mara/Classiebawn Drive

Green 5 is located between Ard Na Mara, Classiebawn Drive and Sunset Drive. This green is amenity grassland (GA2), is species poor due to nutrient enrichment from grass cuttings that are left to lie. The green is surrounded by a low wall on three sides and a high wall at the back. There are some areas around the edges on the inside of the walls that are not mowed. As a result, there are some plants that manage to flower but overall, the grass is kept quite tight.

Table 12: Species recorded for Green 5 – Ard Na Mara/Classiebawn Drive

Prunella vulgaris	Self heal
Bellis perennis	Daisy
Ranunculus repens	Creeping buttercup
Plantago lanceolata	Ribwort plantain
Plantago major	Greater plantain
Holcus lanatus	Yorkshire fog
Taraxacum officinale	Dandelion
Rumex obtusiflolius	Dock

Cerastium fontanum	Common mouse-ear
Lolium perenne	Perennial ryegrass
Matricaria discoidea	Pineapple weed
Cirsium vulgare	Spear thistle
Rumex acetosella	Sheep sorrel
Lamium purpureum	Dead nettle
Hedera helix	Ivy

Plate 31: Green 5 showing long vegetation in verge with dead nettle, indicative of lower mowing frequency



Actions for Green 5 - Ard Na Mara/Classiebawn Drive

This green is the reason the Cartron Community Recreation Committee was formed. A group of parents got together in the hope of improving the green as a mixed-use area for all. They envisage turning some parts into play areas for young children and possibly a basketball or small astro pitch for older children, as well as installing exercise machines for adults. They also hope to increase biodiversity on the green so a sensory garden, small orchard, wetland area and planting schemes for pollinators could be implemented. There is also plenty of scope for other ideas such as friendship benches and perhaps some of the ideas could be adapted and continued onto other green areas in the housing development. There were trees around all the edges in the past, but the roots started to grow into the surrounding sewers and caused damage so this would need to be kept in mind with any future tree planting schemes. A public meeting with a brain storming session would help with the progression of this project and some potential ideas for enhancing biodiversity, aesthetics and usage across Green 1 are presented in **Figure 2**.

Plate 32: Examples of play park and exercise elements that could be introduced to Green 5





The following actions are suggested:

- After mowing remove clippings - leave edges un-mown
- Plant native hedgerow on inside of walls to increase biodiversity and provide nesting areas for birds (this can be maintained as a low growing hedge)

- Involve the school and/or local artist to draw a mural on the tall wall at the back, with themes for example relating to birds or trees of the local area or the legends associated with Benbulben and Knocknarea. A mural could also be drawn to visually enhance the electricity box (with agreement with the ESB)
- Some native low growing trees/shrubs should be planted in the corners such as holly, rowan and silver birch (consult parks department in the County Council for best species to ensure they do not grow into sewers or other infrastructure).
- A sensory garden including pollinator friendly planting could be established.
- Bird boxes should be put up on surrounding houses for resident sparrows, house martins and starlings.
- Bat boxes could also be placed on gable ends to attract bats.

Figure 2: Proposed actions for Green 5: Ard Na Mara/Classiebawn Drive

Green 6 - Cartron Bay

Green 6 (John Reilly Park) is located in Cartron Bay, it is criss-crossed by a concrete path and has a small flower bed in one corner, scattered trees in a number of places and is backed by a tall non-native Leylandii hedge. The grass is mown regularly, and the clippings are left to lie and has a relatively low species diversity being largely grass dominated. Although it is predominately amenity grassland it has a number of trees and therefore has been classed as WD5 scattered trees and parkland (Fossitt, 2000).

Plate 33: Green 6 at Cartron Bay

Table 13: Species recorded for Green 6 – Cartron Bay

Trifolium pratense	Red clover
Trifolium repens	White clover
Taraxacum officinale	Dandelion
Rumex obtusiflolius	Dock
Prunella vulgaris	Self heal
Cerastium fontanum	Common mouse-ear
Plantago major	Greater plantain
Plantago lanceolata	Ribwort plantain
Ranunculus repens	Creeping buttercup
Lolium perenne	Perennial ryegrass
Holcus lanatus	Yorkshire fog
Festuca rubra	Red fescue
Bellis perennis	Daisy
Potentilla anserina	Silverweed
Centaurea nigra	Knapweed
Jacobaea vulgaris	Ragwort
Rumex acetosella	Sheep sorrel
Leontodon saxitilis	Lesser hawk-bit
Carex spp.	Sedge spp.
Agrostis capillaris	Common bent
Rhytidiadelphus squarrosus	A moss species
Trees	
Aesculus hippocastanum	Horse-chestnut
Prunus serrulata	Cherry
Acer spp.	Red sycamore
Betula pubescens	Downy birch
Alnus cordata	Italian alder
Acer pseudoplatanus	Sycamore
Crataegus monogyna	Hawthorn
Sorbus aria	White beam
Cupressus × leylandii,	Leyland cypress

Actions for Green 6 - Cartron Bay

- Remove clippings after mowing to decrease nutrients over time and decrease mowing to once every six week or once a season. Alternatively, the green could be partitioned for mixed uses delineated by the existing paths. For example, some areas could be left to grow long as meadows for pollinators. The

layout of the paths lends itself to creating raised beds, a sensory garden a play park and/or installing adult exercise machines.
- Erect bird boxes on the trees as there are many sparrows and starlings nesting in the surrounding eves of houses
- A native hedge to be planted in front of the Leylandii and non-native removed in the future
- A bug hotel could be a nice project for the local children as well as pollinator friendly bulb planting.

Green 7 - Cartron Heights

Green 7 is in Cartron Heights and has a number of native trees scattered around the edges. It is mowed regularly, and the clippings are removed. As a result, the abundance of flowering plants, in particular self-heal was higher than on Green 6 where grasses were dominant. Although it is predominately amenity grassland it has a number of trees and therefore has been classed as WD5 scattered trees and parkland (Fossitt, 2000).

Table 14: Species recorded for Green 7 – Cartron Heights

Bellis perennis	Daisy
Taraxacum officinale	Dandelion
Rumex spp.	Dock
Festuca rubra	Red fescue
Holcus lanatus	Yorkshire fog
Ranunculus repens	Creeping buttercup
Prunella vulgaris	Self heal
Potentilla anserina	Silverweed
Cerastium fontanum	Common mouse-ear
Lolium perenne	Perennial ryegrass
Trifolium repens	White clover
Plantago major	Greater plantain
Plantago lanceolata	Ribwort plantain
Jacobaea vulgaris	Ragwort
Agrostis capillaris	Common bent
Rumex acetosella	Sheep sorrel
Rhytidiadelphus squarrosus	A moss species
Pillosella aurantiaca	Foxes & Cubs
Trees	
Aesculus hippocastanum	Horse-chestnut
Betula spp.	Birch spp.
Alnus cordata	Italian alder
Crataegus monogyna	Hawthorn
Fagus sylvatica	Beech
Prunus serrulata	Cherry
Acer spp.	Red sycamore
Sorbus aucuparia	Rowan
Quercus spp.	Oak
Ilex aquifolium	Holly
Acer pseudoplatanus f. Variegatum	Variegated sycamore

Plate 34: Examples of features at Cartron Heights

Actions for Green 7 - Cartron Heights

- Remove clippings after mowing and decrease mowing to once every six weeks or once a season if feasible.
- There is an area with the non-native plant species, foxes and cubs and this species can become invasive and therefore should be monitored and if spreading excessively it should be removed.
- Bird and bat boxes could be erected on trees.
- A bug hotel could be put on the green involving the children from the nearby crèche.
- There is also scope for creating a small play space and installing exercise machines for adults.

Green 8 - Hollymount

Plate 35: Green at Hollymount

Green 8 is located around the Hollymount development. The green has a number of well-established old trees and therefore was classed as WD5 scattered trees and parkland (Fossitt, 2000). Buildings in the area supported a small colony of nesting house sparrows. There are plenty of trees where bird and bat boxes could be erected and a nice wall where a bug hotel could be established.

Table 15: Species recorded for Green 8 – Hollymount

Ranunculus repens	Creeping buttercup
Bellis perennis	Daisy
Taraxacum officinale	Dandelion
Rumex obtusifolius	Dock
Festuca rubra	Red fescue
Holcus lanatus	Yorkshire fog
Trifolium repens	White clover
Plantago major	Greater plantain
Plantago lanceolata	Ribwort plantain
Lolium perenne	Perennial rye-grass
Agrostis stolonifera	Creeping bent grass
Dactylis glomerata	Cock's foot
Rhytidiadelphus squarrosus	A Moss species
Trees	
Fagus sylvatica	Beech
Fraxinus excelsior	Ash
Aesculus hippocastanum	Horse-chestnut
Quercus robur	Pedunculate Oak

Actions for Green 8 Hollymount

- Continue removal of grass clippings after mowing. Decrease mowing to once every six weeks or once a season. If once a season is not feasible pick areas that could be left to grow longer.
- Allow a nettle patch to become established to attract butterfly larvae.
- Create a wildlife pond. Ponds can be controversial due to safety concerns for children, however nowadays there are grids that can be put just under the water surface to prevent children falling in. Small wildlife ponds can be very beneficial for increasing biodiversity in an area and can attract many species such as dragonflies, damselflies, pond-skaters, beetles, frogs and newts.
- Put up bat and bird boxes on the trees and buildings.

Muddy Alley

There is an alleyway called Mud Lane that leads from Cartron Heights down to an old gravel path known locally as Muddy Alley. The path connects Cartron Heights and the other housing estates on the headland with Sligo town and runs along the edge of the estuary. The path has grassy verges on either side, with some bramble intermixed on the landward side. The sea ward side is flanked by salt marsh and continues all the way around the headland. There were a few Japanese knotweed plants noted along this section. There was a profusion of spear thistles on one side with many butterflies such as small white and small tortoiseshell feeding on them. Birds such as robins and sparrows were feeding chicks and a willow warbler was heard in the scrub further along the path. A grey wagtail was also seen feeding on the Copper river which is a red listed species. The area is therefore very interesting for biodiversity but could be further enhanced.

There has been a new development built and a park constructed beside Muddy Alley leading to the N15 and this new park connects to Sligo town. The park has been planted with one species of grass and non-native trees as well as non-native hedgerows including beech and fuchsia so is floristically species poor at present. This area should be enhanced for pollinators and there is scope for placing picnic tables both in the new park and perhaps one on the seaward side of Muddy Alley. This idea would have to be carefully considered, as visitors may leave rubbish behind which would blow into the estuary and be both unsightly and a negative impact on the salt marsh/estuary. Bins in the new park may go towards preventing this.

Actions for Muddy Alley

- Develop a plan with Sligo County Council, an ecologist and the residents of Cartron to upgrade the path and install picnic tables and or a viewing area over the estuary.
- Place pollinator friendly planting boxes in the new park and create a wildflower meadow.
- Maintain the existing hedge and treat Japanese knotweed along Muddy Alley using a reputable company.
- Put up signage pointing out the biodiversity of the area. Organise regular litter picks. Muddy Alley walk could be linked from Sligo town to the green spaces within Cartron via signage explaining the Geocache project (See **Appendix 3**).
- Murals could be painted along Mud Lane and well as along many other alleys within the housing estates. Lighting in the alleyways could be improved (keeping the impact on bats in mind). Wildlife signs could be put up at Muddy Alley and along a trail leading to each green. A picnic table could be placed in the new green space beside the N15 and one at the Muddy Alley entrance looking over the estuary. The area around the picnic table can be strimmed leaving the rest grow tall for pollinators.

Plate 36: Views along Muddy Alley

7 Summary of action ideas for biodiversity

Main Biodiversity Action ideas for Cartron	
1	Habitat Mapping – see **Map 6**
2	Improve green spaces for humans and biodiversity in particular pollinators
3	Education and knowledge sharing
4	Research, recording and monitoring
5	Preserve and enhance existing habitats including salt marsh, rivers, treelines, hedgerows, scrub, grassy verges
6	Birds, bees and bats – habitat enhancement
7	Preserve old walls
8	Manage invasive species
9	Create a community garden
10	Establish a walking trail – see **Appendix 3**
11	Dispersed Orchard Project – see **Appendix 3**
12	St Brendan's – create a school biodiversity plan

Action Ideas & Who will carry out work.	Suggested Time frame					Indicative Costs
	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	
1. Habitat Mapping	1	2	3	4	5	**Costs**
1.1 Produce habitat map for Cartron to Fossitt (2000) Level 3. To be undertaken by suitability experienced ecologist	This action has been completed					
1.2 Train residents how to recognise different habitats so that they can be protected into the future – **Ecologist**						**< €1,000.00**
2. Improve green spaces for humans and biodiversity	1	2	3	4	5	**Costs**
Green 1 Seaview Drive/Ferndale						
2.1 Develop a management plan with mowing contractors, residents' association, tidy towns & parks department. Remove clippings & decrease mowing to every six weeks or once in the season. Do not use pesticide. Plant pollinator friendly plants in planters, do not use slug pellets- **Contractors & Residents**						**< €5,000.00**
2.2 Update signage at entrance to Cartron to promote the area & to highlight the viewing area over the mudflats. **Local Businesses**						**> €5,000.00**
2.3 Expert to carry out an invertebrate survey in scrub & grassy verge areas on seaward side of this green. Repeat in Year 5 to see if there is an increase in biodiversity if 'Slow to Mow' regime adopted. See Appendix 1a. **Invertebrate Expert**						**< €1,000.00**
2.4 Put up signs to deter dumping of garden waste and promote composting Put up Bird and bat boxes. **Residents**						**< €500.00**
Green 2 Cartron Court						
2.5 Develop a management plan with residents & businesses. Carry out an invertebrate & breeding bird survey prior to commencing any work. **Ecologist**						**< €1,000.00**
2.6 Either leave shrubs, but trim or remove non-native shrubs & replace with native shrubs such as willow, holly, crab apple. Remove montbretia; strim the area initially & then only cut once a year at the end of the flowering season, remove clippings Do not use pesticide. **Residents & a Contractor**						**< €5,000.00**
2.7 Clear rubbish & put-up signs to stop garden waste being dumped. **Residents**						**< €500.00**
2.8 Put up bird boxes on walls & the established downy birch to create more nesting sites for the resident sparrows & starlings. **Residents**						**< €500.00**

Action Ideas & Who will carry out work.	Suggested Time frame					Indicative Costs
	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	
Green 3 Ard Na Mara						
2.9 Develop a management plan with residents, mowing contractors & parks department. Continue removal of clippings, cut mowing down to either every six weeks or once a season if possible. If this is not feasible leave areas un-mown along the back fence & wall. **Contractors & Residents**						**< €5,000.00**
2.10 Put up bird and bat boxes on surrounding houses for resident bird species and to create roosting areas for bats. **Residents**						**< €500.00**
2.11 A bug hotel could be established here and a local composting station to prevent garden waste being dumped in the grassy verges and paint mural. **Residents & school children.**						**< €5,000.00**
Green 4 Playing Pitch Cartron Point						
2.12 Continue mowing regime & removal of grass clippings; continue to leave grassy verges un-mown or strimmed. **Contractors**						**< €5,000.00**
2.13 Removal of garden escapes could & should be carried out over the coming years. Some of the Buddleia & Fuchsia can be left, as it provides nectar for butterflies & bees; however, do not allow these species to encroach into existing patches of scrub. **Residents & Contractors**						**< €2,000.00**
2.14 Put up signs to stop garden waste being dumped. Establish a local composting station to prevent this. **Residents**						**< €1,000.00**
2.15 Put up bird & bat boxes in the area both on houses & on the trees at the other end of the playing pitch. **Residents**						**< €500.00**
Green 5 Ard Na Mara/Classiebawn Drive						
2.16 Develop a management plan with the mowing contractors & parks department – after mowing remove clippings. Leave edges un-mown. Plant native hedgerow on inside of walls to increase biodiversity & provide nesting areas for birds. **Residents & Contractors**						**< €5,000.00**
2.17 Develop a plan for a mixed-use area for all to enjoy with residents, Sligo county council the parks department & the mowing contractors, See Figure 2. **Ecologist & Garden Designer**						**> 15,000.00**
2.18 Involve the school &/or local artist to draw a mural on the tall wall at the back of the green & mural drawn on the electricity box. **Artist & School Children**						**< €2,000.00**
2.19 Some native low growing trees should be planted in the corners, such as holly & silver birch. **Residents**						**< €1,000.00**
2.20 A sensory garden & pollinator friendly planting should be established. **Tidy Towns & Garden Designer**						**< €2,000.00**
2.21 Bird boxes should be put up on surrounding houses for resident sparrows & starlings. Bat boxes could also be placed on gable ends to attract bats. **Residents**						**< €500.00**
Green 6 Cartron Bay						
2.22 Develop a management plan with mowing contractors & parks department & residents associations. Remove clippings after mowing to decrease nutrients over time; decrease mowing to every six weeks or once a season. **Contractors**						**< €5,.00000**
2.23 Trim back all the bases of Leylandii hedge to allow light on to ground. Plant a native hedge in front of the non-native Leylandii – when this is established remove Leylandii. **Residents & Contractors**						**< €2,000.00**
2.24 Some areas could be left to grow long as meadows for pollinators; a sensory garden & raised beds could be established in one section; plant pollinator friendly bulbs in the already established flower bed, such as snowdrop, crocus & grape hyacinth (daffodils offer little or no nectar to queen bees in the spring). **Residents, Garden designer & local children**						**< €1,000.00**
2.25 Erect bird boxes on the trees as there are many sparrows & starlings nesting in the surrounding eves of houses. **Residents**						**< €500.00**

Action Ideas & Who will carry out work.	Suggested Time frame					Indicative Costs
	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	
2.26 Establish a bug hotel & local composting station. **Residents & local children**						**< €1,000.00**
2.27 Due to the layout of the paths there could be an area with a play park and adult exercise machines. **Council & Contractors**						**> 15,000.00**
Green 7 Cartron Heights						
2.28 Establish a management plan with residents, mowing contractors and parks department – Remove clippings after mowing; decrease mowing to six weekly method or once a season if feasible. **Contractors**						**< €5,000.00**
2.29 Monitor or remove non-native plant species foxes and cubs. **Residents**						**N/A**
2.30 Different sized bird boxes and bat boxes to be placed on established trees. **Residents**						**< €500.00**
2.31 A bug hotel could be constructed on the green. **Residents & children attending the nearby crèche**						**< €100.00**
2.32 There is also scope for put up a small play space & exercise machines for adults. **Council & Contractors**						**> 15,000.00**
Green 8 Hollymount						
2.33 Establish a management plan with residents, mowing contractors & parks department. Continue removal of grass clippings after mowing; decrease mowing to every six weeks or once a season; if once a season is not feasible pick areas to go wild. **Contractors**						**< €5,000.00**
2.34 Allow a nettle patch to become established to attract butterfly larvae. **Residents & Contractors**						**N/A**
2.35 A wildlife pond could be incorporated into the park. **Residents & Garden Designer**						**< €1,000.00**
2.36 Put up bat and bird boxes on the trees and buildings for the resident birds and to attract bats into the area. **Residents**						**< €500.00**
3 Education & Knowledge Sharing	1	2	3	4	5	**Costs**
Employ experts to carry out talks & workshops e.g., Recognising the different habitats of Cartron, Biodiversity & how to record it using NBDC's app & website, Composting, Bird ID and how to make bird boxes, Bat ID and how to use a bat detector/bat walk during summer months, insect identification (butterflies, ladybirds etc.), how to establish a community garden, how to compost. **Expert Ecologists**						**< €3,000.00**
Establish a group to oversee already established Facebook page & email address (Facebook page: Cartron Biodiversity & email cartronbiodiversity@gmail.com). **Residents**						**N/A**
4. Research, Recording & Monitoring	1	2	3	4	5	**Costs**
Repeat surveys e.g., breeding birds in Cartron; bat surveys; hedgehogs, moths & carry out a mammal survey and invertebrate survey. **Ecologist**						**< €2,000.00**
5 Preserve & enhance existing habitats – salt marsh, rivers, hedgerow, treeline & scrub, grassy verges	1	2	3	4	5	**Costs**
The salt marsh that surrounds Cartron is an Annex 1 habitat under the EU Habitats Directive & should be protected; treat invasive species near salt marsh along Mud Lane. Organise a community clean up along the path that runs along the salt marsh at Muddy Alley & which also extends from Cartron Point to the sewage treatment facility. **Residents – Contact Clean Coasts**						**< €1,000.00**
The Copper River and Willsborough stream & Shannon Eighter stream run into the estuaries surrounding Cartron & these should be targeted for water quality sampling & clean ups. **Contact Waters Officer & Fresh Water Ecologist**						**< €2,000.00**
Maintain scrub and treelines in Cartron & the wider landscape. Scrub to be maintained at Ferndale, the playing pitch/St Brendan's & south of the playing pitch. Remove/control invasive species from within scrub. **County Council & Contractors**						**< €2,000.00**

Action Ideas & Who will carry out work.	Suggested Time frame					Indicative Costs
	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	
The grassy verges around the playing pitch, with the scrub at Ferndale & along the paths at Cartron Point should all be allowed to continue to exist & any invasive shrubs within treated. Garden waste should be removed & signage erected to deter dumping. **Residents & Contractors**						**< €2,000.00**
6 Birds, bees & bats	1	2	3	4	5	**Costs**
Establish a Men's Shed to make bird & bat boxes & possibly beehives. **Residents**						**Free**
Establish team of volunteers to put up the boxes around Cartron. **Residents**						**Free**
Erect boxes on trees, houses & around the shopping centre buildings. **Residents**						**< €500.00**
7 Preserve old walls & improve areas	1	2	3	4	5	**Costs**
There are some nice old walls around Cartron, especially on old Cartron Hill – do not remove plants from the walls or ivy unless it is causing structural damage. **County Council**						**N/A**
Rebuild the walls around the shopping centre & Ard Na Mara green. **Businesses & Contractors**						**> €5,000.00**
Create wildlife & pollinator friendly flowerbeds in the car park of the shopping centre. **Businesses & Tidy Towns**						**< €2,000.00**
8 Manage invasive species	1	2	3	4	5	**Costs**
Establish a management plan to remove invasive species around Cartron with **Sligo County Council, the parks department & a reputable company** that will dispose of them in an environmentally safe manner & monitor patches into the future.						**> 10,000.00**
9 Community Garden	1	2	3	4	5	**Costs**
There are several residents interested in establishing a community garden; consider smaller projects in the interim such as a vegetable 'swap scheme' (grow a few types and swap with your neighbours). **Residents**						**< €2,000.00/ < €500.00**
10 Establish a walking trail (Geocache project) from Mud Alley	1	2	3	4	5	**Costs**
Muddy Alley walk could be linked from Sligo town to the green spaces within Cartron via signage explaining the Geocache project (See **Appendix 3**). **Residents**						**< €2,000.00**
Murals painted in alleyways; lighting improved; wildlife signs put up along way especially along Muddy Alley. **Residents & Artist**						**< €2,000.00**
A picnic table could be placed in the new green space beside the N15 & one at Muddy Alley entrance looking over the estuary. Viewing area could be constructed. **County Council & Residents.**						**> 10,000.00**
Strim the area around the picnic area leaving the rest grow tall for pollinators; treat invasive species. **County Council & a reputable company**						**< €2,000.00**
11 Dispersed Orchard Project	1	2	3	4	5	**Costs**
See **Appendix 3** for ideas from Monaghan. **Residents**						**> 10,000.00**
12 Sustainable Drainage System (SuDS)	1	2	3	4	5	**Costs**
See **Appendix 1b** SuDS. **Residents**						**< 2,000.00**
13 St Brendan's School Plan	1	2	3	4	5	**Costs**
Employ an **ecologist** to produce a biodiversity plan for the school, including investigating erecting swift boxes						**< €1,000.00**

8 References

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https://maps.biodiversityireland.ie/Species?speciesDesignation=d1Monaghan Tidy Towns Dispersed Urban Orchard Project – Available at: https://pollinators.ie/monaghans-dispersed-urban-orchard-for-pollinators/

Tulla Tidy Towns Geocache Project – Available at: https://www.tidytowns.ie/wp-content/uploads/2020/11/Issue-8-of-2020.pdf)

Useful contacts
Facebook page: Cartron Biodiversity
Email cartronbiodiversity@gmail.com

Seed Savers
Email info@seedsavers.ie
Tel: 061921856

Blooming native
Email: info@connectingnature.ie
Tel: 051 552038

Connaught Weed Control for removal of invasive species
Tel: +353 (0)83 036 1460
Email: info@connachtweedcontrol.ie

MS Ecology
Email: msecology2019@gmail.com

Woodrow Sustainable Solutions
www.woodrow.ie
Email: info@woodrow.ie
Tel: +353 (0)71 914 0542

Useful resources for funding
Community Foundation for Ireland Grants Scheme -
https://www.communityfoundation.ie/grants/types-of-grants/environment-and-nature-fund

Sligo County Council Grants Scheme - https://www.sligococo.ie/Grants/
Tel: +353 (0)71 911 1111
Email: info@sligococo.ie

Sligo Leader
Rural Development Programme Team:
June Murphy and Shona Heffernan on +353 (0)71 914 1138
Email: info@sligoleader.com
Email: sheffernan@sligoleader.com

Appendix 1a: How to create a meadow

The best way to create a meadow is to just let areas grow. The native wildflower seeds are usually in the seed bank already unless it is an area that has been reseeded and fertilised for many years. If this is the case wildflower meadows can still be established, it will just take a bit longer and there could well be seeds locked away in the soil waiting to appear under the right conditions. Leaving areas uncut in a 'don't mow let it grow' manner is the most cost-effective way of creating a meadow and there are two methods that can be adopted by householders, businesses, schools, or community groups:

Mow on either a 6 weekly rotation cut to allow low growing plants such as clover and birds foot trefoil to grow or by managing it as a hay meadow by cutting it once at the end of the flowering season in late Sept/Oct **See Method A & B.** Signage can be erected to explain what you are doing. The most important step when an area has been mowed is to remove the clippings. This stops nutrients re-entering the ground and depletes the soil nutrients over time, which is what our native wildflowers need. It may take many years for this to occur but with perseverance you will see more and more species growing every year and an increase in the diversity of the meadow over time. As the green areas are managed by contractors coming in to mow these above methods would need to be discussed with them.

Steps to create the wild meadow – Adapted from 'how to guide for local communities' produced by the National Biodiversity Data Centre.

Method A

A 6-week meadow

Are there areas in your community or indeed your garden that could be only mowed every six weeks? The small areas of grass outside houses, or areas that are right beside the long meadows or along the paths mown through the longer areas. This gives clover and bird's-foot-trefoil a chance to grow and gives a further layer of interest to the walkways as well as provides areas for species that like shorter grass.

Method B

1. Identify an area that it is possible to allow a wildflower meadow to grow.

2. Always wait until April to do the first cut so that dandelions have a chance to flower.

3. Let the grass grow long into the summer months and cut pathways through so that they become interesting walkways for walkers and children. If the edges along roads and footpaths need to be kept short mow 1 meter in from these.

4. Cut the grass in September or even early October to allow all the flowers to finish flowering and set seed. If, however the grass begins to fall over to the side under its own weight a cut in July and September can be done.

5. Always take the grass cuttings away to reduce the soil fertility.

6. Seed saving events can be carried out prior to the cutting so residents/schools can grow the seeds for the following spring and plug plant them back into the meadow if needed or used in their own gardens.

Appendix 1b: Green roofs, swales and how to create a rain garden

Urban Areas – Sustainable drainage systems (SuDS)

Flooding has become a serious problem in many areas of Ireland over the last decade due to climate change. There is now more rain filling up street drains, rivers and in turn bays than in the past. To alleviate some of the problems of excess water in urban areas planners and developers now incorporate sustainable drainage systems (SuDS) when building new developments. SuDS is a series of management practices and control structures that aim to mimic natural drainage. SuDS reduces flood risk, improves water quality, and provides amenity using permeable paving, swales (see below), green roofs, rainwater harvesting, retention basins, ponds, and wetlands.

SuDS can achieve multiple objectives such as removing pollutants from urban run-off at source, controlling surface water run-off from developments and ensuring flood risk does not increase further downstream from a development. Furthermore, SuDS offers the opportunity to combine water management with green space, which can increase amenity and biodiversity.

Some novel ideas for improving biodiversity on houses are the use of green roofs and large planters, which can be installed under downpipes to catch water.

Sustainable drainage systems could be adopted by households in Cartron.

Swales are broad, shallow, linear vegetated channels which can store or convey surface water (reducing runoff rates and volumes) and remove pollutants www.susdrain.org.

Examples of a swales for urban areas

Source: www.innovyze.com

Source: www.susdrain.org

Source: www.newlifeonahomestead.com

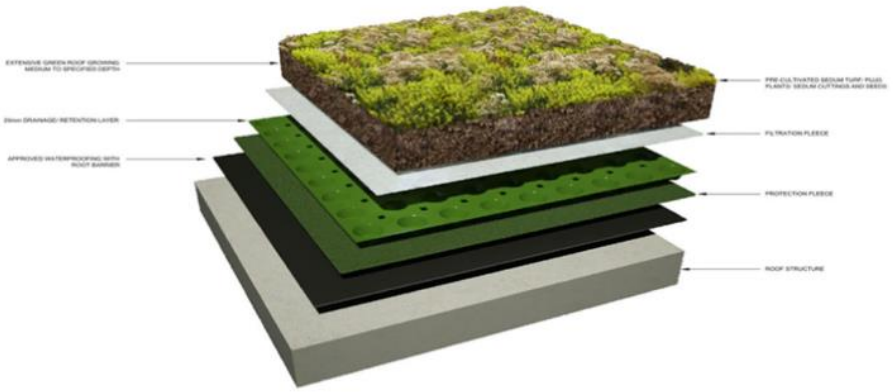
Green roofs

Green roofs are a great way of catching water at source. A green roof is a layer of vegetation planted over a waterproofing system that is installed on top of a flat or slightly sloped roof. Green roofs are also known as vegetative

or eco–roofs (for more details see www.nps.gov). Green roofs can aid Ireland in reaching its carbon emission reduction targets. An example of a low maintenance green roof with a depth of substrate of 20-200mm would be one where the vegetation type is restricted to mosses, sedums and grasses. They are very light in weight and can be implemented on most roofs without additional structural support. Some maintenance is required initially when plants are establishing but depending on species can be self-propagating. The cost of this type of green roof is relatively low and it can keep heat in in winter and keep the roof cooler in summer.

Example of a green roof

Source: How to make a green roof. (www.dfroofing.com)

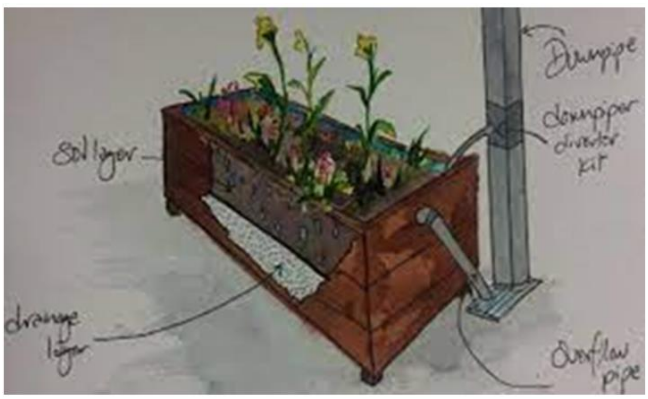


Green Roof Build-up Exploded View

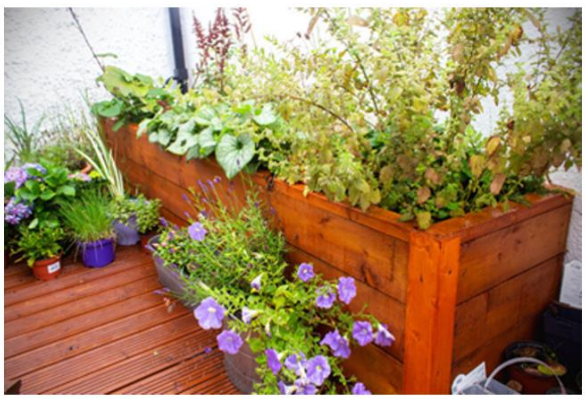
Rainwater retention planter

Dublin City council's project explains that by intercepting and using rainwater from your roof before it reaches the ground is a great way to make use of water. A rainwater retention planter is a very simple green infrastructure feature that you can put in your property. Its purpose is to allow rainwater falling on the roof of your property to drain into it rather than directly into the storm water drain near your property.

A rainwater planter is an overground, vegetated container into which rainwater from a roof flows. It is a very simple task to divert the existing downpipe from the roof into the planter. The image below shows you what a rainwater retention planter looks like. (www.Dublincity.ie)



Source: www.dublincity.ie



Source: www.biurban.ie

How do they work?

'Built to fit neatly into available space adjacent to a downpipe, these planters harvest rainwater and filter it through a purpose-built garden to diminish urban runoff. Plants which adapt to both dry and damp periods are selected to create a self-sustaining, maintenance free growing space. If an extreme downpour takes place, an overflow pipe allows excess water to leave the planter, preventing flooding of plants & soil. There are many Rain Garden designs with instructions on how to build them available to download online,' (Source: www.biurban.ie).

Appendix 2: Suitable plants for enhancing biodiversity

Table A2.1: List of native species important for pollinators in different habitats

Woodland, Hedgerow	Short grass meadows	Long grass meadows	Hedges, borders, woodland edge	Disturbed ground	Ponds, wetlands
Trees & Shrubs	**Flowering Plants**				
Blackthorn Bramble Broom Crab apple Elder Gorse Guelder rose Hawthorn Hazel Honeysuckle Ivy Rowan Whitebeam Wild cherry Wild privet Wild rose Willow	Bird's-foot-trefoil Bugle Cowslip Creeping buttercup Dandelion Germander speedwell Harebell Red clover Selfheal Tormentil White clover Wild thyme	Agrimony Autumn hawkbit Cat's ear Creeping thistle Devil's bit scabious Field scabious Goldenrod Knapweed Meadow buttercup Meadow vetchling Ox-eye daisy Spear thistle Vetch Wild carrot Wild marjoram Yarrow Yellow rattle	Bluebell Brassica Dead nettles Foxglove Herb Robert Hogweed Lady's bedstraw Lesser celandine Weld Ramsons Red campion Willowherb Woundworts Vetches Wild strawberry	Charlock Coltsfoot Deadnettle Forget-me-not Geranium Hawksbeard Mullein Mustard poppy Red bartsia Speedwells Willowherb Vetches	Angelica Bisort Bogbean Crowfoot Cuckoo flower Meadowsweet Fleabane Purple loosestrife Marsh marigold Mint Ragged robin Valerian Willowherb Woundwort

Many other habitats such as bogs, heath and dunes provide pollinators with a wide variety of food. Adapted from the NBDC's 'How to Guide for Councils'

These species are not recommended for hedgerows: horse chestnut, beech, Laburnum, lilac, lime. These species can be considered invasive and should not be planted: Fuchsia, cherry laurel, Rhododendron, sycamore, snowberry.

Table A2.2: Plants providing pollen and nectar sources showing typical flowering periods

Trees/shrubs	Fruit trees/bushes	Herbs
Berberis (April-May) Broom (March-April) Ceanothus (April-Sept) Deutzia (June-July) Firethorn (May-June) Forsythia (March-April) Hebe (June-Oct) Horse chestnut (May-June) Lime (June-July) Mahonia (Dec-May) Sycamore (April-June) Tetrodium (Aug-Oct) Viburnum (April-May) Non-native Willows (Feb-March) e.g., *Salix aegyptica, Salix hastata 'Wehrhahnii'*	Apple (April-May) Cherry (April-May) Currants (April-May) Plum (April-May) Raspberry (June-Aug)	Basil (July-Sept) Borage (April-Oct) Lavender (June-Aug) Oregano (June-Aug) Rosemary (April-June) Sage (June-Aug) Thyme (May-Aug)

Perennial plants are generally better sources of pollen and nectar than annuals. They are also cost effective as they grow and continue to flourish over following years. In some cases, particularly appropriate varieties are listed, otherwise any species/variety of these plants will be good for pollinators.

Table A2.3: Perennial bedding plants providing pollen and nectar

Perennial plants	
Helleborus (Feb-March) e.g., *Helleborus orientalis* Comfrey (March-June) Pulmonaria (March-May) Calamint (May-Sept) e.g., *Calamintha nepeta* spp *nepeta* Catmint (May-Sept) e.g., *Nepeta* Six Hills Giant, Walkers Low Lamium (May-July) e.g., Lamium 'Pink Chablis', Lamium mac. 'Album', *Lamium galeobdolon* Poppy (May-Oct) Rock rose (May-July) Allium (June-Aug) e.g., *Allium aflatunense, Allium christophii, Allium giganteum* Bellflower (June-Sept) Delphinium (June-July) Gaillardia (June-Sept) Helenium (June-Aug) e.g., *Helenium 'Moerheim* Beauty'	Salvia (June-Sept) e.g., *Salvia nemorosa 'Caradonna'*, 'May Night', 'East Friesland' Scabious (June-Sept) e.g., *Scabious atropurpurea* varieties Stachys (June-Sept) e.g., *Stachys officinalis* 'Hummelo' Viper's bugloss (June-July) Aster (July-Oct) e.g., *Aster ageratoides* 'Asran', Aster × *frikartii* 'Mönch' Coneflower (July-Oct) Globe thistle (July-Aug) Liatris (July-Oct) e.g., *Liastris spicata* Perovskia (July-Oct) e.g., *Perovskia* 'Blue Spire' Stonecrop (July-Sept) e.g., *Sedum* 'Autumn Joy' Verbena (July-Oct) e.g., *Verbena bonariensis* Eupatorium (Aug-Sept) e.g., *Eupatorium atropurpureum* Heathers (Aug-Sept)

Table A2.4: Suitable species of annuals, bulbs and for hanging baskets

Annual plants	**Bulbs**
Californian Poppy *Cerinthe major* 'purpurascens' Cornflower Cosmos Lavatera *Limnanthes douglasii* Annual poppy Scabious Night scented stock Single sunflowers	Snowdrop (Jan-Feb) e.g., *Galanthus nivalis* Crocus (Feb-March) Muscari armeniacum (Mar-May) Allium (June-July) Single flowered Dahlia especially Bishop series (July-Nov) Colchium (Sept-Oct)
	Hanging Baskets
	Conventional trailing plants can be mixed with some of these: Ageratum Alyssum 'Sweet White' Heliotrope 'Dwarf Marine' Verbena 'Blue Lagoon',' Desert Jewels Mixed'

8.1.1.1 Wildflower seed

Source: Taken from the How to Guide for Communities' NBDC **www.pollinators.ie**

Please consider these important points before buying wildflower seed:

1. Wildflower meadows can be created naturally by reducing mowing regimes. Overtime this will gradually lead to a flower rich meadow and avoids the need to purchase wildflower seed. This is the recommended option.

2. If you do decide to deliberately plant a wildflower meadow with commercially bought seed, it is important to use native species collected and grown on the island of Ireland. Please be aware that not all wildflower seed mixes will be pollinator friendly. Often wildflower seed bought commercially in supermarkets will not be native and may not contain pollinator friendly plants. Creating and managing a wildflower meadow from seed can be costly and requires careful planning and management to have any chance of success.

3. If you are considering "seed bombing" as a quick way of introducing wildflower seed, please be aware that it is unlikely to be successful and is not recommended by the All-Ireland Pollinator Plan other than for awareness raising. If you do use seed bombs please, try to ensure they are made up of native pollinator friendly species collected in Ireland.

Appendix 3: Walking trails for Cartron

In the past there was a plan for a walk around the edge of Cartron peninsula, however as this is right beside the designated Cummeen Strand Special Area of Conservation (SAC) and Special Protection Area (SPA), as well as being behind many houses, it is unlikely that planning permission would be granted. However, there may be scope for negotiations with householders as it could decrease anti-social behaviour behind the houses. There is salt marsh all the way around the edge of the peninsula and this should be carefully considered if a path was to be safely constructed. There is already a path at Muddy Lane and there are many nice green spaces in Cartron as well as alleys that connect these spaces. These offer scope for a way marked trail leading from Sligo town through the green spaces ending at the bird viewing point opposite Cartron Village. Each green space could be developed for mixed use in an eco-friendly way and visitors could be directed to end up at the village shopping area for refreshments, which would bring more revenue to the existing businesses. For examples of other urban projects that could be adapted to Cartron such as a geocache trail https://www.geocaching.com/ and a chain of new trees in the form of an orchard see Boxes below for projects around Ireland.

Project 1 Tulla Tidy Towns Geocache Project

Geocaching for anyone new to the concept is, in short, an online, interactive, worldwide 'Treasure Hunt', that you can access from the palm of your hand, in any country, anywhere in the world. All you need is a mobile device and a thirst for adventure.

The Tidy Towns group in the village of Tulla in Ennis decided to create such a trail to attract visitors into the area. They developed a trail of hides that would bring the visitor through the village, stopping to take in the hide, read its history and learn about culture and heritage of the village. They picked three locations that gave a broad spectrum of the village history, and a surprise location at the end if they found all three. They designed their hides to include trinkets to swap and take away or leave as they found them. Once the hides were checked by Geocache, local reviewers they were given the green light and published on the website and mobile app. Since then, they have had numerous hits and visits from the Geocache community. The reviews left behind only serve to illustrate that the trail is doing what it was designed to do, "Thank you for bringing us to this amazing location...., we only came here because of your caches and it was a great day." (For further information see https://www.tidytowns.ie/wp-content/uploads/2020/11/Issue-8-of-2020.pdf).

Project 2 The Dispersed Urban Orchard (DUO) Project

Monaghan Tidy Towns group came up with the novel idea of creating an orchard in the gardens around Monaghan town. They had commissioned a mapping project of all the important greens areas around the town and then they looked for possible ways of creating connections for wildlife between these areas. The Problem was that in between the best bits were lots of houses, however almost all the houses had gardens. Their solution was The Dispersed Urban Orchard (DUO) Project, which was a great success for increasing biodiversity around the town. See below

A horticulturist sourced lots of fruit trees from Seed Savers and they advertised: "Fruit Trees for a Fiver: All you have to do is be a Monaghan Town resident and (crucially) tell us exactly where you live and commit to planting it there". It was so successful they had to hold a second weekend selling trees. "Harnessing the power of online mapping we could now map the progress of what we believe is a unique network of long-term, stable habitats of benefit to pollinators (as well as for other bugs, birds and people too)". For more information see Monaghan's 'Dispersed Urban Orchard' for Pollinators » All-Ireland Pollinator Plan

Appendix 4: Species lists for Cartron and environs

The following sections set out the lists of species found in Cartron as listed by Biodiversity Maps (NBDC) and the species recorded during the CBAP surveys. **Plate 37** and **Plate 38** show the extent of search areas used to generate species lists on Biodiversity Maps, including the townland search and the tetrad (2x2km) search respectively.

Plate 37: Cartron townland boundary used to generate townland species list
Source: NBDC map viewer

Plate 38: Tetrad (2x2km square) used to generate tetrad species report for Cartron
Source: NBDC map viewer

8.1.1.2 Plant records for Cartron

Table A4.1: NBDC species list for Cartron townland search

Source: Biodiversity Maps - NBDC

Species group	Species name	Record count	Latest record	Title of dataset
bird	Black-billed Magpie (*Pica pica*)	1	09/01/2006	Birds of Ireland
bird	Blue Tit (*Cyanistes caeruleus*)	1	09/01/2006	Birds of Ireland
bird	Chaffinch (*Fringilla coelebs*)	2	24/03/2011	Birds of Ireland
bird	Coal Tit (*Periparus ater*)	1	24/03/2011	Birds of Ireland
bird	Common Blackbird (*Turdus merula*)	3	24/03/2011	Birds of Ireland
bird	Common Linnet (*Carduelis cannabina*)	1	24/03/2011	Birds of Ireland
bird	Common Starling (*Sturnus vulgaris*)	1	09/01/2006	Birds of Ireland
bird	Common Wood Pigeon (*Columba palumbus*)	1	24/03/2011	Birds of Ireland
bird	Eurasian Collared Dove (*Streptopelia decaocto*)	1	11/11/2010	Birds of Ireland
bird	Eurasian Jackdaw (*Corvus monedula*)	1	09/01/2006	Birds of Ireland
bird	Eurasian Siskin (*Carduelis spinus*)	1	24/03/2011	Birds of Ireland
bird	European Greenfinch (*Carduelis chloris*)	1	24/03/2011	Birds of Ireland
bird	European Robin (*Erithacus rubecula*)	1	09/01/2006	Birds of Ireland
bird	Goldcrest (*Regulus regulus*)	1	24/03/2011	Birds of Ireland
bird	Great Tit (*Parus major*)	1	24/03/2011	Birds of Ireland
bird	Hedge Accentor (*Prunella modularis*)	2	24/03/2011	Birds of Ireland
bird	Hooded Crow (*Corvus cornix*)	1	09/01/2006	Birds of Ireland
bird	House Sparrow (*Passer domesticus*)	1	09/01/2006	Birds of Ireland
bird	Meadow Pipit (*Anthus pratensis*)	1	24/03/2011	Birds of Ireland
bird	Rook (*Corvus frugilegus*)	1	09/01/2006	Birds of Ireland
bird	Song Thrush (*Turdus philomelos*)	1	09/01/2006	Birds of Ireland
bird	Winter Wren (*Troglodytes troglodytes*)	1	09/01/2006	Birds of Ireland
insect - hymenopteran	Bombus (*Bombus*) *lucorum*	1	09/04/2016	Bees of Ireland
insect - hymenopteran	Bombus (*Bombus*) *terrestris*	1	23/09/2000	Bee Records - Don Cotton
terrestrial mammal	West European Hedgehog (*Erinaceus europaeus*)	3	24/07/2014	Atlas of Mammals in Ireland 2010-2015

Table A4.2: Plant species recorded within the 2x2km square encompassing Cartron

Source: Biodiversity Maps – NBDC

Non-native species are shown in **bold**, with any Schedule 3 invasive shown in **red**

Species group	Species name	Record count	Date of last record	Title of dataset
flowering plant	Alexanders (Smyrnium olusatrum)	1	31/12/1999	BSBI tetrad data for Ireland
flowering plant	American Speedwell (Veronica peregrina)	1	16/04/2016	Atlas of Vascular Plants 2012 Onwards
flowering plant	Annual Sea-blite (Suaeda maritima)	1	31/12/1999	BSBI tetrad data for Ireland
flowering plant	Ash (Fraxinus excelsior)	2	12/08/2009	River Biologists' Database (EPA)
flowering plant	**Butterfly-bush (Buddleja davidii)**	2	03/01/2019	Atlas of Vascular Plants 2012 Onwards
flowering plant	Cochlearia officinalis sens.lat.	1	31/12/1999	BSBI tetrad data for Ireland
flowering plant	Coltsfoot (Tussilago farfara)	1	31/12/1986	BSBI tetrad data for Ireland
flowering plant	Common Nettle (Urtica dioica)	2	27/04/2020	Atlas of Vascular Plants 2012 Onwards
flowering plant	Common Saltmarsh-grass (Puccinellia maritima)	1	31/12/1999	BSBI tetrad data for Ireland
flowering plant	Cuckooflower (Cardamine pratensis)	3	25/05/2021	Atlas of Vascular Plants 2012 Onwards
flowering plant	Curled Dock (Rumex crispus)	1	31/12/1999	BSBI tetrad data for Ireland
flowering plant	Dipsacus fullonum sensu lato	1	31/12/1999	BSBI tetrad data for Ireland
flowering plant	False Fox-sedge (Carex otrubae)	1	31/12/1999	BSBI tetrad data for Ireland
flowering plant	**Giant Hogweed (Heracleum mantegazzianum)**	2	25/09/2006	National Invasive Species Database
flowering plant	Great Mullein (Verbascum thapsus)	1	31/12/1999	BSBI tetrad data for Ireland
flowering plant	Greater Sea-spurrey (Spergularia media)	1	31/12/1999	BSBI tetrad data for Ireland
flowering plant	Groundsel (Senecio vulgaris)	1	31/12/1999	BSBI tetrad data for Ireland
flowering plant	Hard-grass (Parapholis strigosa)	1	31/12/1999	BSBI tetrad data for Ireland
flowering plant	Hawthorn (Crataegus monogyna)	1	12/08/2009	River Biologists' Database (EPA)
flowering plant	Hedge Mustard (Sisymbrium officinale)	1	31/12/1999	BSBI tetrad data for Ireland
flowering plant	Knotgrass (Polygonum aviculare)	1	31/12/1999	BSBI tetrad data for Ireland
flowering plant	Lesser Celandine (Ranunculus ficaria)	1	31/12/1986	BSBI tetrad data for Ireland
flowering plant	Lesser Swine-cress (Coronopus didymus)	1	31/12/1999	BSBI tetrad data for Ireland
flowering plant	Mind-your-own-business (Soleirolia soleirolii)	1	31/12/1999	BSBI tetrad data for Ireland
flowering plant	Musk-mallow (Malva moschata)	1	31/12/1999	BSBI tetrad data for Ireland
flowering plant	New Zealand Willowherb (Epilobium brunnescens)	1	31/12/1999	BSBI tetrad data for Ireland
flowering plant	Oxford Ragwort (Senecio squalidus)	1	31/12/1999	BSBI tetrad data for Ireland
flowering plant	Pale Willowherb (Epilobium roseum)	1	31/12/1999	BSBI tetrad data for Ireland
flowering plant	Pellitory-of-the-wall (Parietaria judaica)	1	31/12/1999	BSBI tetrad data for Ireland
flowering plant	Perennial Sow-thistle (Sonchus arvensis)	1	31/12/1999	BSBI tetrad data for Ireland
flowering plant	Polygonum aviculare agg. sensu lato	1	31/12/1999	BSBI tetrad data for Ireland
flowering plant	Primrose (Primula vulgaris)	1	27/04/2020	Atlas of Vascular Plants 2012 Onwards

Species group	Species name	Record count	Date of last record	Title of dataset
flowering plant	Ribwort Plantain (Plantago lanceolata)	1	31/12/1999	BSBI tetrad data for Ireland
flowering plant	Rue-leaved Saxifrage (Saxifraga tridactylites)	2	07/03/2016	Atlas of Vascular Plants 2012 Onwards
flowering plant	Salicornia aggregate	1	31/12/1999	BSBI tetrad data for Ireland
flowering plant	Saltmarsh Rush (Juncus gerardii)	1	31/12/1999	BSBI tetrad data for Ireland
flowering plant	Sea Arrowgrass (Triglochin maritimum)	1	31/12/1999	BSBI tetrad data for Ireland
flowering plant	Sea Aster (Aster tripolium)	1	31/12/1999	BSBI tetrad data for Ireland
flowering plant	Sea Mayweed (Tripleurospermum maritimum)	1	31/12/1999	BSBI tetrad data for Ireland
flowering plant	Sea Plantain (Plantago maritima)	1	31/12/1999	BSBI tetrad data for Ireland
flowering plant	Sea-milkwort (Glaux maritima)	1	31/12/1999	BSBI tetrad data for Ireland
flowering plant	Spear Mint (Mentha spicata)	1	31/12/1999	BSBI tetrad data for Ireland
flowering plant	Spear-leaved Orache (Atriplex prostrata)	1	31/12/1999	BSBI tetrad data for Ireland
flowering plant	**Sycamore (Acer pseudoplatanus)**	2	12/08/2009	River Biologists' Database (EPA)
flowering plant	Tansy (Tanacetum vulgare)	1	31/12/1999	BSBI tetrad data for Ireland
flowering plant	Taraxacum aggregate	1	22/04/2021	Atlas of Vascular Plants 2012 Onwards
flowering plant	Thale Cress (Arabidopsis thaliana)	1	31/12/1999	BSBI tetrad data for Ireland
flowering plant	Thrift (Armeria maritima)	1	31/12/1999	BSBI tetrad data for Ireland
flowering plant	Turnip (Brassica rapa)	1	31/12/1999	BSBI tetrad data for Ireland
flowering plant	Wallflower (Erysimum cheiri)	1	31/12/1999	BSBI tetrad data for Ireland
flowering plant	White Dead-nettle (Lamium album)	1	31/12/1999	BSBI tetrad data for Ireland
flowering plant	Wild Celery (Apium graveolens)	1	31/12/1999	BSBI tetrad data for Ireland
flowering plant	**Winter Heliotrope (Petasites fragrans)**	1	15/12/2016	National Invasive Species Database
flowering plant	Yellow-wort (Blackstonia perfoliata)	1	31/12/1999	BSBI tetrad data for Ireland

Table A4.3: Non-native and invasive plant species recorded in Cartron during 2021 surveys

Source: M. Swann (2021)

Date	Taxon name	Common name	Location name	Lat.	Long.	Habitat	Additional information
2021-05-06	*Fallopia japonica*	**Japanese Knotweed**	Muddy Alley	54.278602	-8.4785577	Grassy verge/Salt marsh	A few clumps spreading beside estuary
2021-05-08	*Fallopia japonica*	**Japanese Knotweed**	Cartron Point	54.281755	-8.484218	Scrub/transitional woodland	Big clump
2021-06-26	*Fallopia japonica*	**Japanese Knotweed**	Cartron townland	54.279626	-8.4719566	Scrub/transitional woodland	Large clumps further into willow scrub
2021-06-26	*Fallopia japonica*	**Japanese Knotweed**	Cartron Village	54.28233	-8.476256	Improved grassland	Across road in large field
2021-06-26	*Hippophaerhamnoides*	**Sea Buckthorn**	Cartron Point	54.281128	-8.48642	Scrub	large clumps further into scrub
2021-06-30	*Buddleja davidii*	**Butterfly-bush**	Cartron Point	54.280868	-8.4861175	Disturbed ground	Along path south of playing field, Scrub
2021-06-30	*Fallopia japonica*	**Japanese Knotweed**	Cartron Point	54.280868	-8.4861175	Disturbed ground	Along path south of playing field, Scrub
2021-07-01	Fuchsia magellanica	**Fuchsia**	Cartron Point	54.281043	-8.4861883	Disturbed ground	Along path south of playing field, Scrub
2021-07-02	Petasites fragrans	**Winter Heliotrope**	Cartron Point	54.280882	-8.4861758	Disturbed ground	Along path south of playing field, Scrub
2021-07-03	Petasites fragrans	**Winter Heliotrope**	Cartron Point	54.280491	-8.486053	Disturbed ground	Along path south of playing field, Scrub
2021-07-04	*Impatiens glandulifera*	**Himalayan Balsam**	Cartron Point	54.280541	-8.485624	Disturbed ground	Along path south of playing field, Scrub
2021-07-04	*Leycesteria formosa*	**Himalayan Honeysuckle**	Cartron Point	54.28074	-8.485834	Disturbed ground	Along path south of playing field, Scrub

8.1.1.3 Invertebrate records for Cartron

Table A4.4: Moth species recorded within the 2x2km square encompassing Cartron
Source: Biodiversity Maps - NBDC

Species group	Species name	Record count	Date of last record	Title of dataset
insect - moth	*Ancylis badiana*	1	25/05/2008	Moths Ireland
insect - moth	Angle Shades (*Phlogophora meticulosa*)	1	18/10/1979	Moths Ireland
insect - moth	*Anthophila fabriciana*	1	20/10/1979	Moths Ireland
insect - moth	Barred Rivulet (*Perizoma bifaciata*)	1	31/12/1883	Moths Ireland
insect - moth	Bee Moth (*Aphomia sociella*)	1	18/10/1979	Moths Ireland
insect - moth	Brown House-moth (*Hofmannophila pseudospretella*)	1	18/10/1979	Moths Ireland
insect - moth	Clouded Brindle (*Apamea epomidion*)	1	04/07/1949	Moths Ireland
insect - moth	Mother of Pearl (*Pleuroptya ruralis*)	1	18/10/1979	Moths Ireland
insect - moth	Silver-ground Carpet (*Xanthorhoe montanata*)	1	10/06/1983	Moths Ireland
insect - moth	Six-spot Burnet (*Zygaena filipendulae*)	2	25/05/2008	Moths Ireland
insect - moth	Snout (*Hypena proboscidalis*)	1	18/10/1979	Moths Ireland
insect - moth	White Plume Moth (*Pterophorus pentadactyla*)	2	20/07/1983	Moths Ireland
insect - moth	White-shouldered House-moth (*Endrosis sarcitrella*)	2	12/06/1983	Moths Ireland

Table A4.5: Moth species trapped from a garden in Cartron on 12/07/2015
Source: Michael Bell

Robinson MV Trap (125W)			Heath Actinic Trap (6W)		
Taxonomic name	**Common Name**	**Quantity**	**Taxonomic name**	**Common Name**	**Quantity**
Pandemis cerasana	Barred Fruit-tree Tortrix	1			
Autographa pulchrina	Beautiful Golden Y	1			
Lacanobia oleracea	Bright-line Brown-eye	4	*Lacanobia oleracea*	Bright-line Brown-eye	1
Spilosoma luteum	Buff Ermine	9	*Spilosoma luteum*	Buff Ermine	1
Diachrysia chrysitis	Burnished Brass	1			
Lomaspilis marginata	Clouded Border	1			
Epirrhoe alternata	Common Carpet	4			
Cabera exanthemata	Common Wave	1			
Apamea monoglypha	Dark Arches	2			
Abrostola triplasia	Dark Spectacle	2			
			Apamea remissa	Dusky Brocade	1
Zanclognatha tarsipennalis	Fan-foot	1	*Zanclognatha tarsipennalis*	Fan-foot	1
Axylia putris	Flame	3			
Ochropleura plecta	Flame Shoulder	3			
Xanthorhoe fluctuata	Garden Carpet	1			
Chrysoteuchia culmella	Garden Grass-veneer	4			
Arctia caja	Garden Tiger	1	*Xanthorhoe fluctuata*	Garden Carpet	1
Agrotis exclamationis	Heart and Dart	14	*Agrotis exclamationis*	Heart and Dart	1
Diarsia mendica	Ingrailed Clay	1			
Crambus pascuella	Inlaid Grass-veneer	2			
Noctua pronuba	Large Yellow Underwing	7	*Noctua pronuba*	Large Yellow Underwing	2
Chiasmia clathrata	Latticed Heath	1			
Oligia strigilis agg.	Marbled Minor agg.	1			
			Monopis crocicapitella	Pale-backed Clothes Moth	1
Thyatira batis	Peach Blossom	1			
Biston betularia	Peppered Moth	1			
Laothoe populi	Poplar Hawk-moth	1			
Diarsia brunnea	Purple Clay	1			
Euphyia unangulata	Sharp-angled Carpet	1			
Hypena proboscidalis	Snout	1			

Robinson MV Trap (125W)			Heath Actinic Trap (6W)		
Taxonomic name	**Common Name**	**Quantity**	**Taxonomic name**	**Common Name**	**Quantity**
Rivula sericealis	Straw Dot	1			
Ourapteryx sambucaria	Swallow-tailed Moth	1			
Spilosoma lubricipeda	White Ermine	2			
Peribatodes rhomboidaria	Willow Beauty	2			
Eupithecia absinthiata	Wormwood Pug	1			

Table A4.6: Moth species trapped a garden in Cartron on 21/07/2021

Source: Michael Bell

Robinson MV Trap (125W) G685371 [54.28129, -8.483625]			Heath Actinic Trap (6W) G685371 [54.281472, -8.483715]		
Taxonomic name	**Common Name**	**Quantity**	**Taxonomic name**	**Common Name**	**Quantity**
Agriphila straminella		18	*Agriphila straminella*		2
Lacanobia oleracea	Bright-line Brown-eye	1	*Lacanobia oleracea*	Bright-line Brown-eye	1
Opisthograptis luteolata	Brimstone Moth	1			
Habrosyne pyritoides	Buff Arches	1			
Lomaspilis marginata	Clouded Border	1			
Apamea monoglypha	Dark Arches	2	*Apamea monoglypha*	Dark Arches	2
Abrostola triplasia	Dark Spectacle	1			
Xestia baja	Dotted Clay	1			
Graphiphora augur	Double Dart	1			
Gymnoscelis rufifasciata	Double-striped Pug	1			
Cosmia trapezina	Dun-bar	1			
Selenia dentaria	Early Thorn	2	*Selenia dentaria*	Early Thorn	1
			Axylia putris	Flame	1
Ochropleura plecta	Flame Shoulder	1			
Xanthorhoe fluctuata	Garden Carpet	1			
			Agrotis exclamationis	Heart and Dart	5
Hydriomena furcata	July Highflyer	1			
			Noctua pronuba	Large Yellow Underwing	1
Epiphyas postvittana	Light Brown Apple Moth	1			
Hypenodes humidalis	Marsh Oblique-barred	1			
Idaea aversata	Riband Wave	2			
Scoparia subfusca		1			
Idaea dimidiata	Single-dotted Wave	1			
Photedes minima	Small Dotted Buff	1	*Photedes minima*	Small Dotted Buff	1
Idaea biselata	Small Fan-footed Wave	1			
Hypena proboscidalis	Snout	2			
Xestia xanthographa	Square-spot Rustic	4	*Xestia xanthographa*	Square-spot Rustic	2
Lycophotia porphyrea	True Lover's Knot	4	*Lycophotia porphyrea*	True Lover's Knot	3
			Chloroclystis v-ata	V-Pug	1
Peribatodes rhomboidaria	Willow Beauty	2	*Peribatodes rhomboidaria*	Willow Beauty	5

Table A4.7: Butterfly species recorded within the 2x2km square encompassing Cartron
Source: Biodiversity Maps - NBDC

Species group	Species name	Record count	Date of last record	Title of dataset
insect - butterfly	Green-veined White (*Pieris napi*)	3	22/05/2013	Butterflies of Ireland
insect - butterfly	Large White (*Pieris brassicae*)	3	24/08/2016	Butterflies of Ireland
insect - butterfly	Orange tip (*Anthophila fabriciana*)	3	06/05/2016	Butterflies of Ireland
insect - butterfly	Painted lady (*Vanessa cardui*)	1	24/08/2016	Butterflies of Ireland
insect - butterfly	Peacock (*Inachis io*)	3	24/08/2016	Butterflies of Ireland
insect - butterfly	Small Tortoiseshell (*Aglais urticae*)	5	24/08/2016	Butterflies of Ireland
insect - butterfly	Speckled Wood (*Pararge aegeria*)	2	24/05/2008	Butterflies of Ireland

Table A4.8: Butterflies recorded in Cartron during 2021 surveys
Source: M. Swann (2021)

Date	Species	Common name	Location	Lat.	Long.	Additional information	Habitat	No.	Stage
2021-05-06	*Aglais urticae*	Small Tortoiseshell	Ferndale Cartron	54.278748	-8.4781195	on brambles	Disturbed ground	1	Adult
2021-06-23	*Pararge aegeria*	Speckled Wood	Cartron Point	54.28201	-8.4855105	flying over grassy verge	Semi-natural grassland	2	Adult
2021-05-07	*Pieris napi*	Green-veined White	Hollymount	54.28138	-8.4766446	flying over grass	Built land	1	Adult
2021-05-07	*Inachis io*	Peacock	Hollymount	54.281361	-8.4759047	lands on car	Built land	1	Adult
2021-07-17	*Pieris rapae*	Small White	Ferndale Cartron	54.282078	-8.481642	flying over rapeseed	Grassy verge	6	Adult
2021-07-17	*Aphantopus hyperantus*	Ringlet	Ferndale Cartron	54.282078	-8.481642	flying over rapeseed	Grassy verge	2	Adult
2021-07-17	*Aphantopus hyperantus*	Ringlet	Ard Na Mara	54.281906	-8.483175	flying over grass	Grassy verge	2	Adult
2021-07-20	*Aphantopus hyperantus*	Ringlet	Seaview Drive water treatment	54.28208	-8.478611	flying over grass	Scrub/Grassy verge	4	Adult
2021-09-21	*Aglais urticae*	Small Tortoiseshell	Cartron	54.281857	-8.4795381	on dandelion	Scrub/Grassy verge	2	Adult
2021-09-21	*Aglais urticae*	Small Tortoiseshell	Cartron point	54.281281	-8.4858804	on buddleia	Scrub/Grassy verge	1	Adult
2021-09-21	*Pieris rapae*	Small White	Cartron Point	54.280589	-8.4859661	on brambles	Scrub/Grassy verge	1	Adult
2021-09-21	*Aglais urticae*	Small Tortoiseshell	Cartron Point	54.280589	-8.4859661	on buddleia	Scrub/Grassy verge	1	Adult

Table A4.9: Bee species listed for Cartron townland
Source: Biodiversity Maps - NBDC

Species group	Common name	Record count	Date of last record	Title of dataset
insect - hymenopteran	White-tailed bumblebee (*Bombus lucorum*)	1	09/04/2016	Bees of Ireland
insect - hymenopteran	Buff-tailed bumblebee (*Bombus terrestris*)	1	23/09/2000	Bee records - Don Cotton

Table A4.10: Bee species recorded within the 2x2km square encompassing Cartron
Source: Biodiversity Maps - NBDC

Species group	Species name	Record count	Date of last record	Title of dataset
insect - hymenopteran	*Bombus* (*Bombus*) *lucorum*	1	09/04/2016	Bees of Ireland
insect - hymenopteran	*Bombus* (*Bombus*) *terrestris*	3	08/04/2015	Bee records - Don Cotton
insect - hymenopteran	*Bombus lucorum* agg.	2	24/08/2016	Bees of Ireland
insect - hymenopteran	Common Carder Bee (*Bombus* (*Thoracombus*) *pascuorum*)	4	24/08/2016	Bees of Ireland

Table A4.11: Bee species recorded in Cartron during 2021 surveys
Source: M Swann (2021)
Note: *B. lapidarius* is a near threatened species*

Date	Species	Common name	Location	Lat.	Long.	Habitat
2021-05-07	*Bombus lapidarius*	Large red tailed bumblebee *(NT)	Cartron near St Brendan's school	54.281728	-8.4847753	Disturbed ground
2021-06-01	*Bombus lucorum*	White-tailed bumblebee	Cartron Point Scrub	54.281137	-8.486083	Scrub
2021-09-21	*Bombus pascuorum*	Common carder bee	Cartron Point Scrub	54.281079	-8.485959	Scrub
2021-09-22	*Bombus pratourum*	Early bumblebee	Ferndale Cartron	54.282138	-8.48147	Grassy verge on *Brassica spp.*

Table A4. 12: Other invertebrate species recorded in Cartron during 2021 surveys
Source: M Swann (2021)

Date	Species	Common name	Location	Lat.	Long.	Habitat
2021-09-21	*Coccinella septempunctata*	7-spot ladybird	Seaview Park	54.282381	-8.477831	Grassy verge
2021-09-21	*Silpha atrata*	Snail-eating beetle	Cartron Point	54.280716	-8.485751	Grassy verge
2021-09-21	*Eristalis tenax*	Common drone fly	Cartron Point Scrub	54.280716	-8.485751	Scrub
2021-09-22	*Helophilus pendulus*	The Footballer hoverfly	Cartron Point Scrub	54.280945	-8.485926	Scrub
2021-09-21	*Pisaura mirabilis*	Nursery web spider	Cartron Point	54.281137	-8.486083	Grassy verge
2021-09-21	*Araneus diadematus*	European garden spider	Cartron Point	54.281079	-8.485959	Grassy verge
2021-09-21	*Succinea putris*	Amber snail	Seaview Park	54.282435	-8.478169	Grassy verge

Table A4. 13: Other invertebrate species recorded within the 2x2km square encompassing Cartron
Source: Biodiversity Maps - NBDC

Species group - Invertebrates	Species name	Record count	Date of last record	Title of dataset
annelid	Eiseniella tetraedra	1	25/09/2006	River Biologists' Database (EPA)
centipede	Lithobius (Lithobius) forficatus	1	01/04/1994	Centipedes of Ireland
centipede	Lithobius (Sigibius) microps	1	01/04/1994	Centipedes of Ireland
millipede	Blunt-tailed Snake Millipede (Cylindroiulus punctatus)	2	28/11/1993	Millipedes of Ireland
millipede	Boreoiulus tenuis	3	03/04/1994	Millipedes of Ireland
millipede	Brachychaeteuma bagnalli	1	03/04/1994	Millipedes of Ireland
millipede	Brachydesmus superus	3	14/05/1994	Millipedes of Ireland
millipede	Brachyiulus pusillus	1	28/11/1993	Millipedes of Ireland
millipede	Bristly Millipede (Polyxenus lagurus)	1	05/09/1994	Millipedes of Ireland
millipede	Common Flat-backed Millipede (Polydesmus angustus)	2	14/05/1994	Millipedes of Ireland
millipede	Cylindroiulus britannicus	3	03/04/1994	Millipedes of Ireland
millipede	Eyed Flat-backed Millipede (Nanogona polydesmoides)	1	28/11/1993	Millipedes of Ireland
millipede	Leptoiulus belgicus	4	27/03/1994	Millipedes of Ireland
millipede	Macrosternodesmus palicola	1	03/04/1994	Millipedes of Ireland
millipede	Ophiodesmus albonanus	1	03/04/1994	Millipedes of Ireland
millipede	Ophyiulus pilosus	2	14/05/1994	Millipedes of Ireland
millipede	Polydesmus coriaceus	2	14/05/1994	Millipedes of Ireland
millipede	Spotted Snake Millipede (Blaniulus guttulatus)	2	28/11/1993	Millipedes of Ireland
millipede	White-legged Snake Millipede (Tachypodoiulus niger)	3	03/04/1994	Millipedes of Ireland
false scorpion (Pseudoscorpiones)	Common Chthonid (Chthonius (Chthonius) ischnocheles)	1	13/09/1992	Pseudoscorpions of Ireland
false scorpion (Pseudoscorpiones)	Nest Chernes (Dinocheirus panzeri)	1	31/07/1992	Pseudoscorpions of Ireland
false scorpion (Pseudoscorpiones)	Reddish Two-eyed Chelifer (Roncus (Roncus) lubricus)	1	13/09/1992	Pseudoscorpions of Ireland
harvestman (Opiliones)	Paroligolophus agrestis	1	19/01/1993	Harvestmen (Opiliones) of Ireland
insect - beetle (Coleoptera)	2-spot Ladybird (Adalia bipunctata)	1	26/04/2014	Ladybirds of Ireland
insect - beetle (Coleoptera)	7-spot Ladybird (Coccinella septempunctata)	1	21/06/2020	Ladybirds of Ireland
insect - beetle (Coleoptera)	Elmis aenea	2	12/08/2009	River Biologists' Database (EPA)
insect - beetle (Coleoptera)	Graptodytes pictus	1	13/07/1909	Water Beetles of Ireland
insect - beetle (Coleoptera)	Haliplus (Haliplinus) ruficollis	1	13/07/1909	Water Beetles of Ireland
insect - beetle (Coleoptera)	Haliplus (Haliplus) obliquus	1	13/07/1909	Water Beetles of Ireland
insect - beetle (Coleoptera)	Helophorus (Atracthelophorus) brevipalpis	2	13/07/1909	Water Beetles of Ireland
insect - beetle (Coleoptera)	Hydroporus discretus	1	13/07/1909	Water Beetles of Ireland
insect - beetle (Coleoptera)	Hydroporus palustris	1	13/07/1909	Water Beetles of Ireland
insect - beetle (Coleoptera)	Hydroporus pubescens	1	13/07/1909	Water Beetles of Ireland
insect - beetle (Coleoptera)	Hygrotus (Hygrotus) inaequalis	1	13/07/1909	Water Beetles of Ireland
insect - beetle (Coleoptera)	Ilybius fuliginosus	1	13/07/1909	Water Beetles of Ireland
insect - beetle (Coleoptera)	Laccophilus minutus	1	13/07/1909	Water Beetles of Ireland

Species group - Invertebrates	Species name	Record count	Date of last record	Title of dataset
insect - beetle (Coleoptera)	Limnius volckmari	2	12/08/2009	River Biologists' Database (EPA)
insect - beetle (Coleoptera)	Ochthebius (Hymenodes) punctatus	1	13/07/1909	Water Beetles of Ireland
insect - dragonfly (Odonata)	Blue-tailed Damselfly (Ischnura elegans)	1	21/06/2020	Dragonfly Ireland 2019 to 2024
insect - dragonfly (Odonata)	Common Darter (Sympetrum striolatum)	1	13/10/2002	Dragonfly Ireland
insect - earwig (Dermaptera)	Common Earwig (Forficula auricularia)	1	30/09/1984	Grasshoppers, Crickets and Allied Insects (Orthoptera) of Ireland
insect - mayfly (Ephemeroptera)	Baetis rhodani	1	12/08/2009	River Biologists' Database (EPA)
insect - mayfly (Ephemeroptera)	Green Drake (Ephemera danica)	1	31/12/1910	Mayflies (Ephemeroptera) of Ireland
insect - mayfly (Ephemeroptera)	Heptagenia sulphurea	1	31/12/1910	Mayflies (Ephemeroptera) of Ireland
insect - mayfly (Ephemeroptera)	Serratella ignita	1	12/08/2009	River Biologists' Database (EPA)
insect - orthopteran	Common Green Grasshopper (Omocestus viridulus)	1	24/07/2001	Grasshoppers, Crickets and Allied Insects (Orthoptera) of Ireland
insect - true fly (Diptera)	Conops quadrifasciatus	1	08/08/2015	Conopidae of Ireland
insect - true fly (Diptera)	Eristalis pertinax	1	13/09/2015	Hoverflies (Syrphidae) of Ireland
mollusc	Arion (Arion)	1	26/06/1983	All Ireland Non-Marine Molluscan DD
mollusc	Brown Lipped Snail (Cepaea (Cepaea) nemoralis)	1	27/07/1983	All Ireland Non-Marine Molluscan DD
mollusc	Cellar Snail (Oxychilus (Oxychilus) cellarius)	1	27/07/1983	All Ireland Non-Marine Molluscan DD
mollusc	Chestnut Slug (Deroceras (Deroceras) panormitanum)	1	26/06/1983	All Ireland Non-Marine Molluscan DD
mollusc	Clear Glass Snail (Aegopinella pura)	1	27/07/1983	All Ireland Non-Marine Molluscan DD
mollusc	Common Chrysalis Snail (Lauria (Lauria) cylindracea)	2	27/07/1983	All Ireland Non-Marine Molluscan DD
mollusc	Common Garden Snail (Cornu aspersum)	1	27/07/1983	All Ireland Non-Marine Molluscan DD
mollusc	Darparnaud's Glass Snail (Oxychilus (Oxychilus) draparnaudi)	1	26/06/1983	All Ireland Non-Marine Molluscan DD
mollusc	Eccentric Grass Snail (Vallonia cf. excentrica)	1	27/07/1983	All Ireland Non-Marine Molluscan DD
mollusc	Freshwater Nerite (Theodoxus (Theodoxus) fluviatilis)	1	31/12/1991	All Ireland Non-Marine Molluscan DD
mollusc	Garlic Snail (Oxychilus (Oxychilus) alliarius)	2	27/07/1983	All Ireland Non-Marine Molluscan DD
mollusc	Great Black Slug (Arion (Arion) ater)	1	27/07/1983	All Ireland Non-Marine Molluscan DD
mollusc	Hydrobia acuta	1	27/07/1983	All Ireland Non-Marine Molluscan DD
mollusc	Moss Chrysalis Snail (Pupilla (Pupilla) muscorum)	1	27/07/1983	All Ireland Non-Marine Molluscan DD
mollusc	Netted Slug (Deroceras (Deroceras) reticulatum)	2	27/07/1983	All Ireland Non-Marine Molluscan DD
mollusc	Pellucid Glass Snail (Vitrina pellucida)	1	27/07/1983	All Ireland Non-Marine Molluscan DD
mollusc	Pointed Snail (Cochlicella (Cochlicella) acuta)	1	27/07/1983	All Ireland Non-Marine Molluscan DD
mollusc	Rayed Glass Snail (Nesovitrea (Perpolita) hammonis)	1	27/07/1983	All Ireland Non-Marine Molluscan DD
mollusc	Rock Snail (Pyramidula pusilla)	2	27/07/1983	All Ireland Non-Marine Molluscan DD
mollusc	Slippery Moss Snail (Cochlicopa cf. lubrica)	1	27/07/1983	All Ireland Non-Marine Molluscan DD
mollusc	Two-toothed Door Snail (Clausilia (Clausilia) bidentata)	2	27/07/1983	All Ireland Non-Marine Molluscan DD
mollusc	Two-toothed White Snail (Leucophytia bidentata)	1	27/07/1983	All Ireland Non-Marine Molluscan DD
mollusc	Wandering Snail (Radix balthica)	2	12/08/2009	River Biologists' Database (EPA)

8.1.1.4 Vertebrate records for Cartron

Table A4.14: Vertebrate species recorded within the 2x2km square encompassing Cartron

Source: Biodiversity Maps - NBDC

Species group - Vertebrates	Species name	Record count	Date of last record	Title of dataset
amphibian	Common Frog (Rana temporaria)	1	04/03/2003	Irish National Frog Database
Waterbird species				
bird	American Herring Gull (Larus smithsonianus)	1	29/03/1992	Rare birds of Ireland
bird	American Wigeon (Anas americana)	1	23/02/1991	Rare birds of Ireland
bird	Bar-tailed Godwit (Limosa lapponica)	1	11/02/2006	Birds of Ireland
bird	Black-headed Gull (Larus ridibundus)	16	31/12/2011	Bird Atlas 2007 - 2011
bird	Black-tailed Godwit (Limosa limosa)	3	31/12/2011	Bird Atlas 2007 - 2011
bird	Bonaparte's Gull (Larus philadelphia)	1	20/02/2011	Rare birds of Ireland
bird	Brent Goose (Branta bernicla)	1	05/02/2004	Birds of Ireland
bird	Common Goldeneye (Bucephala clangula)	5	31/12/2011	Bird Atlas 2007 - 2011
bird	Common Greenshank (Tringa nebularia)	3	31/12/2011	Bird Atlas 2007 - 2011
bird	Common Moorhen (Gallinula chloropus)	3	31/12/2011	Bird Atlas 2007 - 2011
bird	Common Redshank (Tringa totanus)	8	31/12/2011	Bird Atlas 2007 - 2011

Species group - Vertebrates	Species name	Record count	Date of last record	Title of dataset
bird	Common Snipe (Gallinago gallinago)	2	31/12/2011	Bird Atlas 2007 - 2011
bird	Dunlin (Calidris alpina)	2	31/12/2011	Bird Atlas 2007 - 2011
bird	Eurasian Curlew (Numenius arquata)	8	03/01/2019	Birds of Ireland
bird	Eurasian Oystercatcher (Haematopus ostralegus)	9	09/11/2016	Birds of Ireland
bird	Eurasian Teal (Anas crecca)	3	31/12/2011	Bird Atlas 2007 - 2011
bird	Eurasian Wigeon (Anas penelope)	6	31/12/2011	Bird Atlas 2007 - 2011
bird	European Shag (Phalacrocorax aristotelis)	1	31/12/2011	Bird Atlas 2007 - 2011
bird	Gadwall (Anas strepera)	1	31/12/2011	Bird Atlas 2007 - 2011
bird	Glaucous Gull (Larus hyperboreus)	1	13/01/2004	Birds of Ireland
bird	Great Black-backed Gull (Larus marinus)	3	31/12/2011	Bird Atlas 2007 - 2011
bird	Great Cormorant (Phalacrocorax carbo)	4	31/12/2011	Bird Atlas 2007 - 2011
bird	Great Crested Grebe (Podiceps cristatus)	1	31/12/2011	Bird Atlas 2007 - 2011
bird	Great Northern Diver (Gavia immer)	2	31/12/2011	Bird Atlas 2007 - 2011
bird	Greater Scaup (Aythya marila)	1	31/12/2011	Bird Atlas 2007 - 2011
bird	Grey Heron (Ardea cinerea)	6	20/07/2015	Birds of Ireland
bird	Herring Gull (Larus argentatus)	7	31/12/2011	Bird Atlas 2007 - 2011
bird	Iceland Gull (Larus glaucoides)	2	31/12/2011	Bird Atlas 2007 - 2011
bird	Kumlien's Iceland Gull (Larus glaucoides subsp. kumlieni)	2	29/03/2011	Rare birds of Ireland
bird	Lesser Black-backed Gull (Larus fuscus)	1	24/03/2011	Birds of Ireland
bird	Little Egret (Egretta garzetta)	1	31/12/2011	Bird Atlas 2007 - 2011
bird	Little Grebe (Tachybaptus ruficollis)	1	31/12/2011	Bird Atlas 2007 - 2011
bird	Mallard (Anas platyrhynchos)	15	31/12/2011	Bird Atlas 2007 - 2011
bird	Mediterranean Gull (Larus melanocephalus)	1	31/12/2011	Bird Atlas 2007 - 2011
bird	Mew Gull (Larus canus)	11	31/12/2011	Bird Atlas 2007 - 2011
bird	Mute Swan (Cygnus olor)	11	20/07/2015	Birds of Ireland
bird	Northern Lapwing (Vanellus vanellus)	4	31/12/2011	Bird Atlas 2007 - 2011
bird	Red-breasted Merganser (Mergus serrator)	2	31/12/2011	Bird Atlas 2007 - 2011
bird	Ring-billed Gull (Larus delawarensis)	4	31/12/2011	Bird Atlas 2007 - 2011
bird	Ross's Gull (Rhodostethia rosea)	1	06/05/1983	Rare birds of Ireland
bird	Ruddy Turnstone (Arenaria interpres)	2	31/12/2011	Bird Atlas 2007 - 2011
bird	Whooper Swan (Cygnus cygnus)	2	31/12/2011	Bird Atlas 2007 - 2011
Birds found on rivers and streams				
bird	Common Kingfisher (Alcedo atthis)	5	22/01/2014	Birds of Ireland
bird	Grey Wagtail (Motacilla cinerea)	3	31/12/2011	Bird Atlas 2007 - 2011
bird	White-throated Dipper (Cinclus cinclus)	2	11/07/2017	Birds of Ireland
Birds that use buildings				
bird	Barn Swallow (Hirundo rustica)	1	31/12/2011	Bird Atlas 2007 - 2011
bird	Common Starling (Sturnus vulgaris)	10	31/12/2011	Bird Atlas 2007 - 2011
bird	Common Swift (Apus apus)	1	31/12/2011	Bird Atlas 2007 - 2011
bird	Eurasian Jackdaw (Corvus monedula)	10	31/12/2011	Bird Atlas 2007 - 2011
bird	House Martin (Delichon urbicum)	1	31/12/2011	Bird Atlas 2007 - 2011
bird	House sparrow (Passer domesticus)	7	31/12/2011	Bird Atlas 2007 - 2011
Other birds				
bird	Black-billed Magpie (Pica pica)	8	31/12/2011	Bird Atlas 2007 - 2011
bird	Blue Tit (Cyanistes caeruleus)	8	31/12/2011	Bird Atlas 2007 - 2011
bird	Chaffinch (Fringilla coelebs)	7	31/12/2011	Bird Atlas 2007 - 2011
bird	Coal Tit (Periparus ater)	2	24/03/2011	Birds of Ireland
bird	Common Blackbird (Turdus merula)	10	31/12/2011	Bird Atlas 2007 - 2011
bird	Common Bullfinch (Pyrrhula pyrrhula)	1	31/12/2011	Bird Atlas 2007 - 2011
bird	Common Chiffchaff (Phylloscopus collybita)	2	31/12/2011	Bird Atlas 2007 - 2011
bird	Common Linnet (Carduelis cannabina)	2	31/12/2011	Bird Atlas 2007 - 2011
bird	Common Pheasant (Phasianus colchicus)	1	31/12/2011	Bird Atlas 2007 - 2011
bird	Common Wood Pigeon (Columba palumbus)	6	31/12/2011	Bird Atlas 2007 - 2011
bird	Eurasian Collared Dove (Streptopelia decaocto)	5	31/12/2011	Bird Atlas 2007 - 2011
bird	Eurasian Siskin (Carduelis spinus)	1	24/03/2011	Birds of Ireland
bird	Eurasian Sparrowhawk (Accipiter nisus)	2	31/12/2011	Bird Atlas 2007 - 2011
bird	European Goldfinch (Carduelis carduelis)	3	31/12/2011	Bird Atlas 2007 - 2011
bird	European Greenfinch (Carduelis chloris)	2	31/12/2011	Bird Atlas 2007 - 2011
bird	European Robin (Erithacus rubecula)	8	31/12/2011	Bird Atlas 2007 - 2011
bird	Goldcrest (Regulus regulus)	4	31/12/2011	Bird Atlas 2007 - 2011
bird	Great Tit (Parus major)	5	31/12/2011	Bird Atlas 2007 - 2011
bird	Dunnock (Prunella modularis)	8	31/12/2011	Bird Atlas 2007 - 2011
bird	Hooded Crow (Corvus cornix)	6	31/12/2011	Bird Atlas 2007 - 2011
bird	Lesser Redpoll (Carduelis cabaret)	2	31/12/2011	Bird Atlas 2007 - 2011
bird	Long-tailed Tit (Aegithalos caudatus)	2	31/12/2011	Bird Atlas 2007 - 2011
bird	Meadow Pipit (Anthus pratensis)	7	31/12/2011	Bird Atlas 2007 - 2011

Species group - Vertebrates	Species name	Record count	Date of last record	Title of dataset
bird	Mistle Thrush (Turdus viscivorus)	4	11/02/2006	Birds of Ireland
bird	Pied Wagtail (Motacilla alba subsp. yarrellii)	7	11/02/2006	Birds of Ireland
bird	Redwing (Turdus iliacus)	7	15/01/2010	Birds of Ireland
bird	Reed Bunting (Emberiza schoeniclus)	1	10/06/2015	Birds of Ireland
bird	Rock Pigeon (Columba livia)	1	31/12/2011	Bird Atlas 2007 - 2011
bird	Rock Pipit (Anthus petrosus)	2	31/12/2011	Bird Atlas 2007 - 2011
bird	Rook (Corvus frugilegus)	11	31/12/2011	Bird Atlas 2007 - 2011
bird	Sand Martin (Riparia riparia)	3	31/12/2011	Bird Atlas 2007 - 2011
bird	Song Thrush (Turdus philomelos)	7	31/12/2011	Bird Atlas 2007 - 2011
bird	Stonechat (Saxicola torquata)	3	31/12/2011	Bird Atlas 2007 - 2011
bird	White Wagtail (Motacilla alba)	2	31/12/2011	Bird Atlas 2007 - 2011
bird	Willow Warbler (Phylloscopus trochilus)	1	31/12/2011	Bird Atlas 2007 - 2011
bird	Winter Wren (Troglodytes troglodytes)	6	31/12/2011	Bird Atlas 2007 - 2011
terrestrial mammal	**American Mink (Mustela vison)**	1	24/08/2018	Mammals of Ireland 2016-2025
terrestrial mammal	**Brown Rat (Rattus norvegicus)**	4	22/08/2013	Atlas of Mammals in Ireland 2010-2015
terrestrial mammal	Eurasian Badger (Meles meles)	4	29/07/2008	Road Kill Survey
terrestrial mammal	Eurasian Pygmy Shrew (Sorex minutus)	3	22/06/2015	Atlas of Mammals in Ireland 2010-2015
terrestrial mammal	European Otter (Lutra lutra)	13	04/02/2013	Atlas of Mammals in Ireland 2010-2015
terrestrial mammal	**European Rabbit (Oryctolagus cuniculus)**	6	21/11/2015	Atlas of Mammals in Ireland 2010-2015
terrestrial mammal	Red Fox (Vulpes vulpes)	7	03/11/2011	Atlas of Mammals in Ireland 2010-2015
terrestrial mammal	West European Hedgehog (Erinaceus europaeus)	10	24/06/2015	Atlas of Mammals in Ireland 2010-2015
terrestrial mammal	Lesser Noctule (Nyctalus leisleri)	7	18/08/2013	National Bat Database of Ireland
terrestrial mammal	Natterer's Bat (Myotis nattereri)	1	31/12/2009	National Bat Database of Ireland
terrestrial mammal	Pipistrelle (Pipistrellus pipistrellus sensu lato)	4	31/12/2009	National Bat Database of Ireland
terrestrial mammal	Soprano Pipistrelle (Pipistrellus pygmaeus)	30	18/08/2013	National Bat Database of Ireland
terrestrial mammal	Daubenton's Bat (*Myotis daubentonii*)	5	01/07/2008	National Bat Database of Ireland
marine mammal	Common Seal (Phoca vitulina)	2	02/10/1982	Atlas of Mammals in Ireland 2010-2015

Table A4.15: Mammal species recorded in Cartron during 2021 surveys

Source: M Swann & M. Kinsella (2021)
Note: The fox was recorded within 2km of Cartron but not in Townland

Date	Species	Common name	Location	Lat.	Long.	Habitat
2021-07-22	*Vulpes vulpes*	Red Fox	Rathbruagh Park	54.2849393	-8.4700357	Park/Woodland
2021-07-24	*Lepus timidus subsp. Hibernicus*	Irish Hare	Finisklin	54.2790296	-8.4864994	Road
2021-10-13	*Erinaceus europaeus*	West European Hedgehog	Avondale Housing Estate Park	54.28263363	-8.4720534	Park/Treeline
2021-10-13	*Erinaceus europaeus*	West European Hedgehog	Old Cartron Hill	54.28185383	-8.4741197	Green area in housing estate, beside a field
2021-08-02	*Erinaceus europaeus*	West European Hedgehog	Cartron Bay	54.2799047	-8.4775173	Garden
2021-08-03	Erinaceus europaeus	West European Hedgehog	Cartron Bay	54.2799047	-8.4775173	Garden
2021-06-30	Pipistrellus pipistrellus	Common pipistrelle	Cartron	See Map 11		Treeline
2021-06-30	Pipistrellus pygmaeus	Soprano pippistrelle	Cartron	See Map 11		Treeline

Table A4.16: Breeding bird surveys for Cartron conducted in 2021

Source: M. Swann (2021)

Date	Species	Common name	Lat.	Long.	Count	Activity	Comment	Habitat
Area: Cartron Birds								
2021-05-07	*Passer domesticus*	House Sparrow	54.2797437	-8.4776737	1	Singing male	birch in garden male singing from top - territorial display/prob breeding	Built land
2021-05-07	*Sturnus vulgaris*	Starling	54.2801416	-8.477917	1	Occupied nest	adult seen entering gutter, chicks heard – confirmed breeding	Built land
2021-05-07	*Passer domesticus*	House Sparrow	54.2801416	-8.477917	1	Singing male	male singing -territorial display/prob breeding	Built land
2021-05-07	*Passer domesticus*	House Sparrow	54.2803468	-8.4780262	1	Singing male	male singing -territorial display/prob breeding	Built land
2021-05-07	*Sturnus vulgaris*	Starling	54.280333	-8.4779784	1	Occupied nest	adult seen entering gutter, chicks heard – confirmed breeding	Built land
2021-05-07	*Passer domesticus*	House Sparrow	54.2798404	-8.4792215	1	Occupied nest	adult seen going into gutter and calling on roof – prob breeding	Built land
2021-05-07	*Passer domesticus*	House Sparrow	54.2796528	-8.4795493	1	Singing male	male singing -territorial display/prob breeding	Built land
2021-05-07	*Sturnus vulgaris*	Starling	54.2792314	-8.479776	1	Occupied nest	adult seen entering gutter, chicks heard – confirmed breeding	Built land
2021-05-07	*Sturnus vulgaris*	Starling	54.2792314	-8.479776	1	Occupied nest	adult seen entering gutter, chicks heard – confirmed breeding	Built land

Date	Species	Common name	Lat.	Long.	Count	Activity	Comment	Habitat
2021-05-07	*Passer domesticus*	House Sparrow	54.2794217	-8.4798834	2	Singing male	male singing -territorial display/prob breeding	Built land
2021-05-06	*Sturnus vulgaris*	Starling	54.2793251	-8.4789148	1	Occupied nest	adult seen entering gutter, chicks heard – confirmed breeding	Built land
2021-05-06	*Turdus merula*	Blackbird	54.2790759	-8.4775915	2	Carrying food/ faecal sac	in back garden – confirmed breeding	Built land
Area: Cartron Heights								
2021-05-07	*Turdus merula*	Blackbird	54.2791479	-8.4763685	1	Occupied nest	adult seen going into shrubs chicks heard – confirmed breeding	Built land
2021-05-07	*Turdus merula*	Blackbird	54.2803586	-8.4765054	2	Occupied nest	adults seen entering a shrub – prob. Breeding	Built land
2021-05-07	*Sturnus vulgaris*	Starling	54.2806661	-8.4759818	1	Occupied nest	adult seen flying out of gutter – prob. Breeding	Built land
2021-05-07	*Passer domesticus*	House Sparrow	54.2805494	-8.4773219	1	Occupied nest	adult seen entering gutter, chicks heard – confirmed breeding	Built land
2021-05-06	*Passer domesticus*	House Sparrow	54.2793789	-8.4770184	2	Occupied nest	adult seen entering gutter, chicks heard – confirmed breeding	Built land
2021-05-06	*Passer domesticus*	House Sparrow	54.2795593	-8.4766757	1	Occupied nest	adult seen entering gutter – prob. breeding	Built land
2021-05-06	*Sturnus vulgaris*	Starling	54.2790965	-8.4774127	1	Occupied nest	adult seen entering gutter, chicks heard – confirmed breeding	Built land
2021-05-07	*Falco tinnunculus*	Kestrel	54.2806348	-8.4759477	1	Flying over	seen hovering here for a few mins then flew over Cartron towards docks	Built land
2021-05-07	*Turdus merula*	Blackbird	54.2806433	-8.4761581	1	Present	male singing from top of tree	Built land
Area: Cartron Point								
2021-05-08	*Sturnus vulgaris*	Starling	54.2815164	-8.4833061	1	Occupied nest	adult seen entering gutter, chicks heard – confirmed breeding	Built land
2021-05-08	*Corvus monedula*	Jackdaw	54.2810668	-8.4827781	1	Nest building	adult seen entering facia poss. Breeding	Built land
2021-05-08	*Sturnus vulgaris*	Starling	54.2810488	-8.4826019	1	Occupied nest	adult seen entering gutter, chicks heard – confirmed breeding	Built land
2021-05-08	*Sturnus vulgaris*	Starling	54.2796939	-8.4831704	1	Occupied nest	adult seen entering gutter, chicks heard – confirmed breeding	Built land
2021-09-21	*Corvus corax*	Common Raven	54.2805726	-8.4859505	1	Seen flying over		Mud Flats
2021-09-21	*Egretta garzetta*	Little Egret	54.2818569	-8.4795381	5	Feeding in bay		Mud Flats
2021-05-07	*Corvus frugilegus*	Rook	54.281767	-8.485875		Feeding on pitch		Grassland
2021-05-07	*Hirundo rustica*	Swallow	54.281390	-8.482761		Feeding		skies
2021-05-07	*Larus canus*	Common gull	54.281767	-8.485875		On pitch		Grassland
Area: Hollymount								
2021-05-07	*Sturnus vulgaris*	Starling	54.2815143	-8.4760089	2	Occupied nest	adult seen entering gutter, chicks heard – confirmed breeding	Built land
2021-05-07	*Passer domesticus*	House Sparrow	54.2813871	-8.4766517	1	Occupied nest	adult seen entering gutter, chicks heard – confirmed breeding	Built land
2021-05-07	*Passer domesticus*	House Sparrow	54.2813445	-8.4765949	1	Occupied nest	adult seen in gutter calling	Built land
2021-05-07	*Sturnus vulgaris*	Starling	54.2812698	-8.4769099	1	Occupied nest	adult seen entering gutter, chicks heard – confirmed breeding	Built land
2021-05-07	*Cyanistes caeruleus*	Blue Tit	54.2814209	-8.4771069	1	Singing male	male singing -territorial display/prob breeding	Built land
2021-05-07	*Passer domesticus*	House Sparrow	54.2813445	-8.4765949	12	Recently fledged young	Hawthorn/ fuchsia bushes - a few families, at least 6 fledglings being fed by adults	Built land
2021-05-07	*Passer domesticus*	House Sparrow	54.2813973	-8.4753033	1	Present	adults sitting on gutter preening	Built land
2021-05-07	*Streptopelia decaocto*	Collared Dove	54.281361	-8.4759093	2	Present	heard singing	Built land
2021-05-07	*Columba palumbus*	Woodpigeon	54.281361	-8.4759093	1	Present	heard high in chestnut tree	Built land
2021-05-07	*Fringilla coelebs*	Chaffinch	54.281361	-8.4759093	1	Present	feeding beach tree	Built land
2021-05-07	*Erithacus rubecula*	Robin	54.281361	-8.4759093	1	Present	feeding around tree	Built land
2021-05-07	*Passer domesticus*	House Sparrow	54.2814305	-8.4764588	1	Present	sitting on branch	Built land
2021-05-07	*Carduelis spinus*	Siskin	54.281364	-8.4766555	1	Present	feeding on dandelion seeds	Built land
2021-05-07	*Periparus ater*	Coal Tit	54.2809782	-8.4771102	2	Pair seen	2 adults seen feeding on lichen on hawthorn	Built land
Area: Mud Lane								
2021-05-06	*Erithacus rubecula*	Robin	54.2788299	-8.4764709	4	Recently fledged young	confirmed breeding in Leylandii	Grassy verge

Date	Species	Common name	Lat.	Long.	Count	Activity	Comment	Habitat
2021-05-06	*Passer domesticus*	House Sparrow	54.2788299	-8.4764709	2	Present -	in clump of Birch spp. and brambles	Grassy verge
2021-05-06	*Phylloscopus trochilus*	Willow Warbler	54.2786921	-8.4778649	2	calling	2 males heard	Tree
2021-05-06	*Passer domesticus*	House Sparrow	54.2787435	-8.4798142	4	Recently fledged young	confirmed breeding	Grassy verge
Area: Copper River								
2021-05-06	*Motacilla cinerea*	Grey Wagtail	54.27832	-8.474814	1	Feeding	River Red listed species	River

8.1.1.5 IWeBS - Irish Wetland Bird Survey data for Cartron Marsh & Sligo Docks

Table A4.17: Annual peak bird counts (IWEBS) at Cartron Marsh 2015-2020

Source: IWeBS - BirdWatch Ireland

Species	2015/16	2016/17	2017/18	2018/19	2019/20	BoCCI Status
Mute Swan	2	8		4		Amber
Whooper Swan		4				Amber
Light-bellied Brent Goose	34	2	4		116	Amber
Shelduck					21	Amber
Wigeon	41	58	16		122	Amber
Teal	13	63			30	Amber
Mallard	125		20	50	15	Amber
Red-breasted Merganser		29		2	8	Amber
Little Grebe		4				Green
Cormorant		5	3			Amber
Great Northern Diver	1					Amber
Little Egret	6	2	2	5	3	Green
Grey Heron	8	3	7	1	2	Green
Cattle Egret		6				Not assessed
Oystercatcher	29	13	12	7	12	Red
Lapwing	117	93	71	122	102	Red
Bar-tailed Godwit			1			Red
Snipe		3				Red
Knot	10			2		Red
Dunlin	83					Red
Curlew	107	63	66	42	100	Red
Greenshank	15	5	2		4	Green
Redshank	119	165	130	58	67	Red
Turnstone	11	3			1	Amber
Black-headed Gull	146	205	210	28	114	Amber
Common Gull	12	15	18	77	13	Amber
Lesser Black-backed Gull	1	3				Amber
Herring Gull	78	39	76	6	66	Amber
Iceland Gull		1				Not assessed
Glaucous Gull		1				Not assessed
Great Black-backed Gull	3	5	4	1	4	Green

Table A4.18: Annual peak bird counts (IWEBS) at Sligo Docks 2015-2020

Source: IWeBS - BirdWatch Ireland

Species	2015/16	2016/17	2017/18	2018/19	2019/20	BoCCI Status
Mute Swan	4	3		14		Amber
Light-bellied Brent Goose	1					Amber
Shelduck	40					Amber
Wigeon		47	48	57	7	Amber
Teal		43	6			Amber
Mallard	30	35	56	56	35	Amber
Feral/hybrid Mallard type	3					n/a
Red-breasted Merganser	3	4	6	3	3	Amber
Little Grebe	1	4	4	4	4	Green
Red-throated Diver	1		1	1		Amber
Great Northern Diver	2		2	5		Amber
Great Crested Grebe	2		1			Amber
Cormorant	6	27	20	6	5	Amber
Shag	1	3	3	2		Amber
Little Egret	2	2	4	4	1	Green
Grey Heron	7	3	2	6	2	Green
Oystercatcher	320	25	12	6	17	Red
Lapwing		1	22		6	Red
Bar-tailed Godwit	12					Red
Snipe		10	3			Red
Dunlin		50				Red
Dipper		1				Green
Curlew	52	11	19	8	6	Red
Greenshank		2	4	1	2	Green
Redshank	64	107	100	34	17	Red
Black-headed Gull	207	238	98	199	100	Amber
Common Gull	9	58	11	7	10	Amber
Herring Gull	34	61	129	81	62	Amber
Iceland Gull	1	6				Not assessed
Glaucous Gull		1				Not assessed
Great Black-backed Gull	1	2	1	2	8	Green

Birds are given a rating of how vulnerable they are using guidelines set out in the birds of conservation concern in Ireland (BoCCI), (Gilbert et al. 2021), which uses a traffic light system of green, amber and red, with green being of least concern and red highest concern.