

DRAFT

Dublin City University

Biodiversity Action Plan 2020-2025

Executive Summary

The overall aim of DCU's Biodiversity Action Plan is to enhance and protect biodiversity, and to ensure that every member of the DCU community understands its importance in our lives. The Convention on Biological Diversity state that biodiversity is the critical foundation of the Earth's life support system on which the welfare of current and future generations depends. Humans depend on biodiversity and the ecosystem services that stem from it for many basic needs. Biodiversity is important for sustainable development and relates to all 17 Sustainable Development Goals but there are two proposed goals that explicitly refer to it; goals 14 (Life below Water) and 15 (Life on Land).

DCU is committed to protecting biodiversity and embedding this protection into decision making across all sectors of the University including: building and grounds management, public realm spaces and in the construction of new buildings. The use values associated with biodiversity are immense and can be categorised as economic, socio-cultural and health values, with each category having a number of benefits associated with it.

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1. Introduction

1.1 Background

This Biodiversity Action Plan has been developed to:

- I. Highlight DCU's unique biodiversity value
- II. Propose recommendations to maintain the University's biodiversity
- III. Enhance pollinator diversity and increase the carbon absorption by vegetation
- IV. Identify opportunities for the University to enhance and protect its biodiversity
- V. Communicate the importance of biodiversity to the DCU community
- VI. Support the Dublin City Council Climate Change Action Plan 2019-2024, the All Ireland Pollinator Plan 2015-2020, the EU Biodiversity Strategy and the United Nation's Sustainable Development Goals.

1.2 The importance of Biodiversity

The Convention on Biological Diversity state that biodiversity is the critical foundation of the Earth's life support system on which the welfare of current and future generations depends³. Humans depend on biodiversity and the ecosystems services that stem from it for many basic needs. Biodiversity is important for sustainable development and relates to all 17 Sustainable Development Goals but there are two proposed goals that explicitly refer to it; goals 14 (Life Below Water) and 15 (Life on Land)³. There is also extensive research into the health and well-being benefits that accrue from green spaces, which plants and pollinators play an important role in sustaining^{4,5}.

1.3 Threats to Biodiversity

Worldwide up to one million plant and animal species are threatened with extinction^{6,7}. In the next 50 years this figure is expected to rise⁸. Land-use change and habitat fragmentation⁹, overexploitation (the harvesting of species from the wild at rates that cannot be compensated for by reproduction or regrowth), agriculture (the production of food, fodder, fibre and fuel crops; livestock farming; aquaculture; and the cultivation of trees), pollution, invasive species¹⁰, and climate change¹¹ are considered to be the greatest threats to global biodiversity.

In the last decade, honey bee populations have increased on a global scale, however unprecedented colony losses have been reported in Europe^{12,13} including Ireland¹⁴. Multiple causes of colony loss are suspected, including infection by pathogens (including viruses, bacteria, fungi and parasites¹⁵⁻¹⁷, poisoning by chemical compounds (including pesticides¹⁸⁻²²), and habitat loss, which has contributed to a reduction in the abundance and diversity of floral resources^{23,24}. There is growing evidence that many bumble bee species have declined in recent decades, particularly in Western Europe and North America^{25,26}. Like honey bee

losses, it has been suggested that the combination of habitat fragmentation, pesticide use and infection by pests and diseases and the interactions between these are the main causes of bumble bee decline ²⁴. In Ireland the occurrence and spread of invasive and non-native is increasing and may lead to the displacement of native species and considerably alter biodiversity, and subsequently, ecosystem processes and services ²⁷.

Tilman *et al.* 2017 state that *“The policies and actions that we adopt now will be instrumental in determining which, and how many, species will survive the present era of environmental change”*. DCU is committed to maintaining adequate green space cover within the grounds of University in order to mitigate against both climate change effects and biodiversity loss.

1.4 Biodiversity in DCU

The International Union for Conservation Network (IUCN) developed a method to identify key biodiversity areas (KBA) on a global scale. This method is based on specific criteria and thresholds with the aim of identifying sites that contribute significantly to the global persistence of biodiversity ²⁸. Using a modified version of the IUCN KBA Standard Method, the KBA in DCU have been identified and are highlighted in Fig. 1.



Figure 1 DCU's 6 Key Biodiversity Areas (highlighted in yellow)

The method used to identify KBA in DCU is based on several thresholds within five criteria.

- a. threatened biodiversity
- b. variety of species
- c. uniqueness of habitat
- d. number of native plant species
- e. potential carbon sink

Four thresholds within each of the five criteria were used to score areas within the University grounds. The higher the score achieved for each area, the higher the biological significance of the area. KBAs identified under criterion C should ideally be delineated to be at least 10m² in size. The thresholds associated with each criteria are listed in the Appendix (Section 4.4).

Carbon sequestration of vegetation can depend on the plant species characteristics and the amount of pervious surfaces^{29–31}. Although there is limited evidence that supports the carbon sequestration efficacy of urban vegetation³¹, net CO₂ flux measurements in urban areas suggest that there is greenery sink capacity however it is limited. Revelli *et al.* suggest that urban trees can contribute to carbon sequestration and the authors conclude that although carbon sequestration can be non-negligible it can be enhanced with proper design³².

A brief overview of the habitats and plant species currently found in DCU are listed below. This information was used to identify areas within the University that have the highest biodiversity value and areas with a capacity for carbon sequestration.

1.4.1 Habitats in DCU

During a brief casual survey in April 2019 six habitats were identified across four of the five DCU campuses: All Hallows, Alpha, Glasnevin and St Patrick's (Fig. 2). This corresponds to approximately 60ha of surveyed area. Habitats were classified according to Fossit 1999³³. There are several grassland sites within the University Grounds that do not fit into Fossit's Habitat Categories. These sites have been suggested as KBA for the University (Fig. 1).

Buildings and artificial surfaces cover approximately one third of the surveyed area and is one of the habitats of least value to wildlife. Detailed information regarding each of the habitat types can be found in the Appendix Section 5.2.



Figure 2 Map highlighting the four DCU Campuses in Yellow

1.4.2 Plants in DCU

A DCU Plant list has been generated based on surveys carried out between 2013 and 2019. Two hundred and eighty-four species of plants are located within the university grounds. A list of plants is provided in Appendix Section 5.3 (Table 6). This list contains the Latin name, common name and the most recent year of record.

1.4.3 Other species in DCU

Casual records of other species recorded within the grounds of DCU between 2013 and 2019 are listed in Appendix Section 5.4. Thirty-two species of bird, twenty-six species of lichen, twenty-five species of insects, seventeen species of molluscs, thirteen non-insect invertebrates, seven mammals and 5 species of fungus were recorded (Table 7).

1.5 Potential links to Teaching and Learning and Research

Staff within the university that can link to the Biodiversity Action Plan are listed in Table 1. It is expected that teaching staff within the University incorporate the Biodiversity Action Plan into teaching and learning and research where possible.

Table 1 List of Staff within DCU that can link teaching and learning to the Biodiversity Action Plan.

Name	Position	School
John Connolly	Senior lecturer	Business School
Jennifer Lawler		School of Biotechnology
Blánaid White	Associate professor	School of Chemical Sciences
Fiona Regan	Associate professor	School of Chemical Sciences

Brian Kelleher	Associate professor	School of Chemical Sciences
Barry McMullen		School of Electronic Engineering
Lorna Fitzsimons	Assistant Professor	School of Mechanical and Manufacturing Engineering
Eilish McLoughlin	Associate Professor	School of Physical Sciences
Susan Pike		School of STEM Education, Innovation & Global Studies
Cliona Murphy	Associate professor	School of STEM Education, Innovation & Global Studies
Orla Kelly	Lecturer	School of STEM Education, Innovation & Global Studies

1.6 Overview of objectives

DCU's Biodiversity Plan has six objectives:

1. Provide habitats where pollinators can survive and thrive
2. Combat Invasive Species
3. Manage the landscape to maintain and enhance biodiversity
4. Contribute to Dublin City Council's Climate Action Plan
5. Collect evidence to monitor change and measure success
6. Raise awareness and encourage engagement

2. Objectives and Actions

Specific targets have been set for the University, as a whole and across each of the four campuses. These targets are linked with both Dublin City Councils Climate Action Plan and the All Ireland Pollinator Plan. There are 19 actions listed below (Table 2) associated with at least one of the six objectives. The staff that can assist with each action to be taken to meet each of the objectives as well as the progress indicators of each action are also listed in Table 2 and further explained below.

Table 2 List of Objectives and Actions for DCU under the Biodiversity Action Plan

	Objective	Actions Over the next 3 years we will	Progress indicators	Staff who could assist
1	Provide habitats where pollinators and can survive and thrive	Reduce the frequency of mowing and collect clippings	Reduction in fuel and contractor costs (see Table 3 for cost estimates)	Estates officer, facilities manager, grounds staff and contractors
		Introduce artificial solitary bee nests and bird boxes	Increase in the number of pollinator species	Lecturers, maintenance services
		Wildflower meadow management and introduction	Increase in the number of wildflower meadows on campus	Head of estates, grounds staff, contractors
2	Remove invasive alien species	Identify all medium and high impact invasive plant species	List of invasive species put on University Website	Sustainability manager, project student, contractor
		Remove invasive species from 2 sites per year	Reduction in the number of sites with invasive species and increase in number of flowers	Facilities manager, grounds staff, contractors
3	Landscape management to maintain and enhance biodiversity	Prioritising native plants in new planting schemes (at least 75% of plants to be pollinator friendly)	Number of native species will increase	CEO, Head of estates, grounds staff, contractors
		Reduce hedge cutting and cut between November and January and 5 keep fertilisers, pesticides and herbicides well away from trees, hedges and verges	Reduction in fuel, pesticide and contractor costs	CEO, facilities manager, grounds staff, contractors
		Identify at least 10 locations that are mown under a pollinator friendly regime (5 cut and lifts per year after 15th April)	Reduction in fuel and contractor costs	CEO, facilities manager, grounds staff, contractors

		Identify areas where the use of herbicide fungicide and, insecticide can be eliminated. Do not Spot spray until after the 15th April	Reduction in pesticide and contractor costs	Sustainability and facilities manager, project student, grounds staff
		Identify at least 4 areas that can be converted to perennial planted boarder	Number of pollinators and flowers will increase	President, sustainability manager, project student, contractor
4	Contribute to Dublin City Council's Climate Action Plan	Assess the feasibility of green walls	Feasibility study completed	Sustainability and facilities manager
		Assess the feasibility of a wetland	Feasibility study completed	Sustainability and facilities manager
		Create and Promote a DCU Tree Trail	Tree Trail Completed	Sustainability and facilities manager, grounds staff
		Implement Dublin City Council Invasive Alien Species Action Plan	Reduction in Invasive species	Sustainability and facilities manager, grounds staff
5	Monitor change and measure success	Develop a Biodiversity Team to contribute to annual progress report and	Team developed	Facilities manager
		Log existing and new 'Actions for Pollinators' on the mapping system (pollinators.ie)	Number of actions logged	Facilities manager
6	Raise awareness and encourage engagement	Put up signage to identify pollinator friendly habitats	Signage erected	Maintenance services
		Facilitate or deliver training on biodiversity and how to take action to protect it	Number of events and participation	Sustainability and facilities manager
		Identify interested people and set up at least one bumblebee monitoring scheme walk within key sites	Number of bumblebee monitoring events	Sustainability and facilities manager

Objective 1: Provide habitats where pollinators can survive and thrive

With the current concerns of pollinator decline comes a crucial need for improving pollinator habitats. Bees provide a vital service to both natural ecosystems and farming and therefore should be offered a high level of protection given the potentially far-reaching effects of their decline. Bee abundance and diversity has been shown to depend on the surrounding landscape and the floral resources within. Many methods and land management techniques have been implemented, and shown to have positive impacts on bees and their floral resources³⁴. A large portion of the human diet³⁵ and essential nutrients³⁶ come from crops pollinated by insects. Globally, 87 of the leading food crops (accounting for 35% of the world food production volume) depend on animal pollination³⁵. Pollination is essential for crop products and is proven to increase their seed yield and economic value. Klein *et al.* (2007) report a 75% increase in fruit or seed set with animal pollination for the world's leading food crops³⁵. Bees are considered the dominant pollinators in many habitats across the world,³⁷ although non-bee pollinators (flies, beetles, moths, butterflies, birds and bats, among others) also play an important role³⁸. In temperate regions, including Ireland most animal pollination is provided by honey bees (*Apis mellifera*), bumble bees (*Bombus spp.*), solitary bees, wasps and hover flies.

There are numerous strategies which can improve bee forage and provide shelter and safety in the urban environment. For example: planting flowers with accessible and high quantity and quality rewards, cutting during non-flowing periods, reducing or stopping the unnecessary use of pesticides³⁹. In Ireland, the past five years have shown significant advances in relation to the sustainable management of land use for the provision of flowers and bees, including initiatives such as the All Ireland Pollinator Plan³⁹ and the Irish National Action Plan for the Sustainable Use of Pesticides (Plant Protection Products)⁴⁰. Given the exponential rate at which research is being conducted both nationally and internationally, the next five years are likely to be equally, if not more, active.

Action 1: Reduce the frequency of mowing

Nesting sites for bumblebees can be created by allowing the grass to grow. Four sites with the All Hallows and St Patricks Campus have been identified as areas with a high diversity of plant species (Fig. 3). By allowing the grass and flowers within to grow, food and nesting resources for birds will also be available.



Figure 3 Areas highlighted in yellow are sites within St Patricks College (left) and All Hallows (right) where mowing should be reduced to once or twice a year.

Action 2: Introduce artificial solitary bee nests

Incorporate small numbers of solitary bee nest boxes into the local community for cavity nesting solitary bees. Research from the UK and Ireland shows that nest boxes can be occupied by small numbers of cavity nesting solitary bees ^{41,42}.

Action 3: Wildflower meadow management and introduction

The AIPP states that the most important action that can be taken on public land is to reduce the frequency of mowing to allow wildflowers to grow ³⁹. It is recommended that, grassy areas should only be mown once or twice annually. They should be cut in early September to allow wild plants to flower and set seed. If doing an early cut, mow in late spring after the first flush of dandelions (late April). Remove grass when cut in order to reduce coarse grasses and increase wildflower diversity. On a wildflower-rich site, where feasible, grass should be turned after cutting to allow seeds to fall. Research carried out in Scotland showed that patches planted with wildflower seed mix had x25 more flowers, x50 more bumblebees and x13 more hoverflies compared with plots where wildflower seed had not been sown ⁴³. The AIPP also recommends allowing grassy areas to grow and carry out an initial species survey to determine if a seed mix is required. Where appropriate, paths can be mown through wildflower meadows so that members of the DCU can visit and enjoy the resource.

DCU are committed to creating at least 5 meadows (one cut and lift per year). Figure 4 shows the six proposed sites. These sites already contain high species richness and no additional wildflower seed will be required for the sites.



Figure 4 Sites suitable as wildflower meadow management as per the AIPP guidelines

Sites managed as wildflower meadows will allow wildflowers to bloom throughout the pollinator season, provide undisturbed areas for nesting and food for a number of animals as well as reduce carbon emissions from fuel costs and enhance soil carbon sequestration. Under no circumstances will any pesticides (herbicides, fungicides or insecticides) be used in these areas. The 'Councils actions to help pollinators'⁴⁴ and the 'How-to-guide: creation and management of a wildflower meadow'⁴⁵ provide further details on wildflower management. Three of the key steps for wildflower meadow management are listed below:

- 1 Identify areas of grass that could be left uncut until late August-early September.

- 2 The annual cut in September should be removed to reduce soil fertility over time.
- 3 Cutting paths through the middle or keeping a short border at the edge will demonstrate that these meadows are being managed and allow the public to enjoy the resource.

Objective 2: Remove invasive plant species

Invasive species are non-native species that have been introduced by human intervention, outside their natural range and have the ability to threaten native wildlife and cause damage to environments, economies or human health ⁴⁶. Invasive species are one of the causes of biodiversity loss within Ireland ²⁷. DCU are committed to identifying all medium and high impact invasive plant species as per the National Biodiversity Data Centre's taxon designation group lists ⁴⁷ and removing of all invasive plant species. Both the identification and the removal of invasive species within the University grounds will contribute too DCC's Climate Action Plan.

Action 4: Identify all medium and high impact invasive plant species

A number of invasive plant species have been identified within the University Grounds; e.g. *Hyacinthoides hispanica* (Spanish bluebell), *Crocsmia x crocosmiiflora* (Monbretia), and one medium impact invasive species (*Acer pseudoplatanus*). Within the coming two years all invasive species within the campuses will be listed. Species lists in Section 5.3 and 5.4 will be crosschecked with the Invasive species list on the National Biodiversity Data Centre's Website (<http://www.biodiversityireland.ie/projects/invasive-species/species-lists/>). An Undergraduate (e.g. BSc. in Environmental Science) or Masters (e.g. MSc in Sustainable Development) project student could include an invasive species report within their final year project.

Action 5: Remove invasive species from 2 sites per year

Where applicable invasive species will be removed from each of the Campus's on an annually basis. This will be carried out by an external contractor or will be carried out by the University Grounds Staff. A risk assessment will be conducted prior to the removal of any invasive species to ensure no negative impacts on other biodiversity within the area (e.g. tree root damage).

Objective 3: Landscape management to maintain and enhance biodiversity

To maintain and enhance biodiversity DCU is committed to:

- Protecting what is there already
- Prioritising native plants in new planting schemes
- Altering the frequency of mowing maintain and enhance biodiversity

Action 6: Prioritising native plants in new planting schemes (at least 75% of plants to be pollinator friendly)

By only selecting plant species provided in Appendix Section 5.1.5 and / or the AIPP Planting code all new planting schemes will benefit biodiversity across the 4 campuses.

Action 7: Tree and hedge management for birds and pollinators

Good quality hedges can provide the four essential needs of birds and pollinators: Sources of pollen / nectar and fruit for food, places to breed, places to shelter and corridors and pathways to travel across the landscape. Cutting hedges back to the same point every year reduces their capacity to flower and fruit. Removing all ivy from trees, shrubs and structures is detrimental to wildlife. Establishing a balance is important ⁴⁹. The how to guide for managing existing hedges for pollinators includes many simple steps, five of which are listed below:

- 1 If hedges are to be trimmed, cut them on two or three year cycle in rotation. This will result in there being some areas producing flowers each year.
- 2 Where annual cutting is necessary try and cut a few centimetres further out each year this will leave a small amount of older wood on which the plant
- 3 Cutting hedges between November and January is likely to be less disruptive to pollinators.
- 4 Where ivy is a threat to the health or stability of trees control excessive levels on a rotational basis so that there is always some ivy available for wildlife.
- 5 Keep fertilisers, pesticides and herbicides well away from hedges and verges they are all detrimental to birds and pollinators.

Action 8: Reduction in mowing

Evidence from the USA showed that Dandelions and White Clover on lawns supported 37 species of bee. White Clover was important for bumblebees and honeybees, whereas solitary bees, honeybees and hoverflies predominated on Dandelion ⁵⁰.

On areas of grass, changing the frequency of mowing allows common wildflowers such as Bird's-foot-trefoil, Clovers, Dandelions, Daisy and Knapweed to naturally grow amongst the longer grass. This is the most cost-effective way to provide food for pollinators and other insects and provides nesting materials for birds. This also reduces carbon emissions by reducing the fuel consumption of lawn mowers. This is not a reduction in management effort, but a reallocation to provide additional benefits e.g. perennial planting schemes or invasive species removal. As per the AIPP guidelines, consulting with the DCU community and keeping them informed of plans can allay fears that changed mowing regimes are due to lack of management. Signage can also be used to identify areas as deliberate.

The Pollinator Council Guide includes many simple actions to help pollinators, five of which are listed below:

- 1 Identify at least 10 locations that are mown under a pollinator friendly regime (5 cut and lifts per year)
- 2 Don't mow until 15th April and then cut on a 6-weekly rotation.
- 3 Cuttings should be lifted.
- 4 These areas could be combined with pollinator friendly spring flowering bulb planting (e.g., Snowdrop, Crocus, Allium).

A cost benefit analysis of mowing regimes has been carried out by a large landscaping company in ROI (Table 3) ⁴⁴. Prices are based on flat ground accessible with ride on equipment and within a 40 km radius of Dublin.

Table 3 Cost benefit analysis of two different mowing regimes based on prices from a large landscaping company in ROI. Table adapted from the Councils actions to help pollinators guide ⁴⁴

Mowing Regime	Approximate cost per ha (2016)
22 Cuts per year, grass mulched back in	€2,464.00+vat Cost inclusive of equipment, labour and fuel
5 Cuts per year with cuttings lifted	€2,437.00+vat Cost inclusive of equipment, labour, fuel and waste disposal

Action 9: Reduce the use of pesticides

Insecticides pose the greatest direct hazard to insect pollinators ³⁹, however, herbicides are having a much greater negative impact on pollinators because they are so widely used ³⁹. Pesticides have negative biological and ecological impacts on a wide range of non-target organisms in terrestrial and aquatic habitats ^{51–54}. Pesticides should be used sparingly and only when absolutely necessary, for example in the treatment of invasive species like Japanese Knotweed. Four actions will be carried out to reduce the use of pesticides:

- 1 Identify areas where the use of herbicide fungicide and, insecticide can be eliminated.
- 2 Identify sites where pesticide use could be reduced to 10% of previous planned maintenance spraying regimes.
- 3 For spot treating on hard surfaces, and spraying edges of paths adopt a policy of not spraying until the 15th April. This allows dandelions and other wild plants to flower and provide a vital source of food in spring.
- 4 Have spraying buffer zones around important pollinator habitat. Signage should be used to identify these areas.

Action 10 Perennial planting scheme

Pollinator friendly perennial plants are excellent sources of pollen and nectar. They are more attractive to bees when planted in blocks rather than as single plants ³⁹. Having a pollinator

friendly perennial bed is an excellent way to provide food for pollinators across their lifecycle⁴⁴. Perennials can be used to great effect in traffic islands and public spaces, providing a strong visual impact and giving a good display of flowers over a long period. Pollinator friendly perennial planting should be designed to provide a food source from spring through to autumn and a list of plant species can be found in Appendix x or in the Council's actions to help pollinators guide⁴⁴. In addition, perennial planting schemes are: low maintenance easy to establish, have strong visual impact which contributes to the health and well-being of staff and students, less maintenance intensive than lawn mowing and provides habitat and nesting materials for birds and insects.

Objective 4: Contribute to Dublin City Council's Climate Action Plan

Nature based solutions (NBS) are critical in climate change adaptation; they can play an important role not only for biodiversity and ecosystems, flood prevention and carbon sequestration, but also in temperature regulation, water quality, erosion prevention, and filtering pollutants from the air and water. Monitoring the environment is part of nature-based solutions (NBS). DCU is currently leading research regarding environmental monitoring using sensors. Sustainable supply chains are also key elements concerning NBS. DCU is supporting a market garden within the University Grounds which provides staff and students with sustainably sourced, local produce. Dublin City Council's Climate Action Plan includes a detailed list of actions currently being carried out within Dublin regarding NBS. DCU is committed to contributing to Dublin City Council's Climate Action Plan, specifically, over the coming three years DCU is committed to:

1. Identify what the most appropriate tree species are to reduce run off and include list in the Biodiversity Action Plan 2022 – 2027 (DCC CCAP Action 17).
2. Identify plant species that are optimum for reducing glare and ameliorate temperature and humidity (DCC CCAP Action 17).
3. Support the current market garden and expand the land area dedicated to growing food (DCC CCAP Action 38).
4. Develop a Green Infrastructure Strategy (DCC CCAP Action 8).
5. Assess the feasibility of green walls (DCC CCAP Action 12).
6. Assess the feasibility of a wetland (Flood risk management Action 12).
7. Create and Promote a DCU Tree Trail (DCC CCAP Action 16).
8. Implement Dublin City Council Invasive Alien Species Action Plan (DCC CCAP Action 20).

Over the coming year 4 actions will be carried out within the University (Actions 11-14).

Action 11 & Action 12 Assess the feasibility of green walls and a wetland

This could be part of an Undergraduate (e.g. BSc. in Environmental Science) or Masters (e.g. MSc in Sustainable Development) project student's final report or could be conducted by a contractor managed by the Estates Office.

Action 13 Create and promote a DCU Tree Trail

This could be co-ordinated by the University Grounds staff and managed by the course co-ordinator and undergraduate students within the School of STEM Education.

Action 14 Implement Dublin City Council Invasive Alien Species Action Plan

This overlaps with Actions 4 and 5 associated with objective 2.

Objective 5: Monitor change and measure success

The facilities manager has committed to complete an annual review of the Biodiversity Action Plan. The Biodiversity Team will contribute their information to the annual review process. Each year the facilities manager will log existing and new 'Actions for Pollinators' on the mapping system (pollinators.ie) and email all staff and students to ensure all efforts are recognised.

Action 15 Develop a Biodiversity Team to contribute to annual progress report

The sustainability Manager is responsible co-ordinating a biodiversity team. To ensure the BAP is implemented the University Biodiversity Team will meet annually to discuss the progress report. The sustainability Manager will compose a terms of reference document for the Biodiversity Team outlining the specific role of each member. One member of the Biodiversity Team will be responsible for logging the actions for pollinators.

Action 16: Log existing and new 'Actions for Pollinators' at pollinators.ie

DCU are committed to logging at least one new action per year over the coming 3 years.

Objective 6: Raise awareness and encourage engagement

Three actions will be completed to raise awareness and encourage engagement over the coming three years. Additional possible awareness raising campaigns include:

1. Carry out a competition prior to the launch of the DCU Biodiversity Plan, e.g. The great DCU Bug hunt.
2. Organise a tree walk within DCU.

Action 17: Put up signage to identify pollinator friendly habitats.

Signage will be erected as soon as the University joins the AIPP. Signage will be provided by the National Biodiversity Data Centre.

Action 18: Facilitate or deliver training on biodiversity and how to take action to protect it.

The Sustainability Manager and the facilities manager will be responsible for delivering two training sessions over the coming three years.

Action 19: Identify interested people and set up at least one bumblebee monitoring scheme walk within a KBA.

In this scheme volunteers walk a fixed 1-2km route once a month between March and October and record the diversity and abundance of bumblebees that they see. The scheme is

run by the National Biodiversity Data Centre who provides full support and training. The scheme is vital in tracking what is happening with wild pollinators in the landscape, and can be used to assess the effectiveness of any pollinator friendly actions that are being taken locally. Email info@biodiversityireland.ie for more information.

3. Resourcing recommendations and DCU's Biodiversity Action Plan 2022 -

We need to ensure that the activities of today do not compromise ecosystems tomorrow. This will in turn help to ameliorate the challenges presented by impending climate change.

Initial funding for the solitary bee boxes is expected to come from the Estates and Presidents Office. It is hoped that a Sustainability Fund (set up by the President's Office) will be established and any university member can apply to it. It is also hoped that student societies can donate money from proceeds from charity events. The money saved from a reduction in lawn and hedge management and the reduction in pesticides will be used to move the biodiversity action plan forward. The Grounds Estates budget will be used to lay some wildflower turf.

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5. Appendices

5.1 Management guidelines for contractors

5.1.1 Pesticides

Pesticides (herbicides, fungicides and insecticides) should be used sparingly and only when necessary, for example in the treatment of invasive species like Japanese Knotweed. When spraying is required, do not spray until after the 15th April and be sure to leave buffer zones around key biodiversity areas (Fig 2a-2d).

5.1.2 Grass cutting

Collect clippings after cutting. The first cut should take place in April after the first flush of dandelions.

5.1.3 Hedge cutting

Hedge cutting is only permitted between the September 1st and February 31st.

5.1.4 Tree management

Tree felling and maintenance should be planned in advance and is only permitted between September 1st and February 31st.

5.1.5 Plants for Pollinators

The following section includes plant lists for various planting scenarios. For all future planting schemes within DCU at least 75% of the purchased plants will come from these lists (Table 4 and 5).

Table 4 List of plants for pollinators and birds and associated flowering month is highlighted in purple.

Common Name	Latin name	January	February	March	April	May	June	July	August	September	October	November	December
Street Trees													
Juneberry Tree	Amelanchier x grandiflora 'Robin Hill'												
Upright Hawthorn	Crataegus monogyna 'Stricta'												
Pillar crab*	Malus tschonoskii												
Callery pear*	Pyrus calleryana 'Chanticleer'												
Rowan	Sorbus acuparia varieties												
Lime	Tilia cordata 'Greenspire';												
Lime	Tilia x europaea 'Euchlora'												
Open space trees													
Horse Chestnut	Horse Chestnut												
Juneberry	Amelanchier species (not A. lamarckii which may be invasive)												
Indian bean tree	Catalpa bignonioides												
Hawthorn	Crataegus species												

Apple	Malus species/cultivars												
Foxglove tree	Paulownia tomentosa												
Wild Cherry	Prunus avium												
Bird Cherry*	Prunus padus												
Pear	Pyrus species and cultivars												
Rowan	Sorbus species/cultivars												
Willow	Salix aegyptiaca												
Willow	Salix alba												
Willow	Salix alba 'Liempde'												
Willow	Salix alba var. vitellina												
Lime	Tilia americana 'Redmond'												
Lime	Tilia cordata												
Lime	Tilia x europea												
Lime	Tilia platyphyllos												
Lime	Tilia tomentosa												
Native trees													
Hazel	Corylus avellana												
Willow	Salix spp.												
Blackthorn	Prunus spinosa												
Hawthorn	Crataegus monogyna												

Broom	<i>Cytisus scoparius</i>												
Wild cherry	<i>Prunus avium</i>												
Bramble	<i>Rubus fruticosus</i> agg.												
Wild privet	<i>Ligustrum vulgare</i>												
Crab apple	<i>Malus sylvestris</i>												
Elder	<i>Sambucus nigra</i>												
Whitebeam	<i>Sorbus aria</i>												
Rowan	<i>Sorbus aucuparia</i>												
Other													
Guelder rose	<i>Viburnum opulus</i>												
Ivy	<i>Ilex aquifolium</i>												
Gorse	<i>Ulex europaeus</i>												
Wild rose	<i>Rosa</i> spp.												
Honeysuckle	<i>Lonicera periclymenum</i>												

Table 5 List of plants for pollinators and birds and associated flowering season. Ref: AIPP Planting Code

Common Name	Latin name	Autumn	Winter	Spring	Summer
Strawberry tree	Arbutus unedo				
Ebbinge's silverberry	Elaeagnus × ebbingei				
Silverthorn	Elaeagnus pungens				
Japanese aralia	Fatsia japonica				
Sage, autumn flowering	Salvia species				
Carmichael's monk's hood	Aconitum carmichaelii				
Simple-stemmed bugbane	Actaea simplex				
Michaelmas daisy	Aster species and hybrids				
Trailing bellflower	Campanula poscharskyana				
Dahlia	Dahlia species & hybrids				
Tree ivy	× Fatshedera lizei				
Purpus honeysuckle	Lonicera × purpusii				
Oregon grape	Mahonia species				
Musk willow	Salix aegyptiaca				
Sweet box	Sarcococca confusa				
Sarcococca hookeriana	Sarcococca hookeriana				
Laurustinus	Viburnum tinus				
Crocus, winter-flowering	Crocus species				
Winter aconite	Eranthis hyemalis				
Common snowdrop	Galanthus nivalis				
Hellebore, winter flowering	Helleborus species and hybrids				
Crocus, spring-flowering	Crocus species				
Armenian grape hyacinth	Muscari armeniacum				
Common star of Bethlehem	Ornithogalum umbellatum				
Wallflower	Erysimum species Wallflower				
Honesty	Lunaria annua				
Mediterranean spurge	Euphorbia characias				
Darwin's barberry	Berberis darwinii				
Japanese quince	Chaenomeles species				
Cornelian cherry	Cornus mas				
Dwarf Russian almond	Prunus tenella				
Allium ornamental	Allium species				
Snapdragon	Antirrhinum majus				
Crested poppy	Argemone platyceras				
Borage	Borago officinalis				
Canterbury bells	Campanula medium				

Sweet william	Dianthus barbatus				
Foxglove	Digitalis species				
Lesser calamint	Calamintha nepeta				
Macedonian scabious	Knautia macedonica				
Purple knapweed	Centaurea atropurpurea				
Rosemary	Rosmarinus officinalis				
Lavender	Lavandula species				

5.2 Habitats in DCU

Cultivated and Built Land

Buildings and artificial surfaces (BL3) cover approximately 21 ha of the surveyed area and is one of the habitats of least value to wildlife. However, this habitat does support some biodiversity. Plants recorded here include Buddleja (*Buddleja davidii*), Cat's Ear (*Hypochaeris radicata*) and Dandelions (*Taraxacum spp.*). The humid areas of concrete and tarmac harbour some infrequently recorded bryophytes and are of local importance for bryophytes. The rest of this habitat has generally been assessed as having negligible importance for biodiversity and atmospheric carbon sequestration.

Flower Beds and Borders (BC4) consist of roughly 0.7ha. This habitat type can occur in a mosaic with Scattered Trees and Parkland (WD5)³³. The species in this habitat are largely non-native, ornamental species and this habitat type has previously been assessed as having low importance for biodiversity, however there are a number of plant species within this habitat that are important food sources for pollinators and birds. This habitat offers no significant atmospheric carbon sequestration.

Roughly 2 acres of horticultural land (BC2) exists on the Glasnevin Campus. The species within this category are mainly, vegetables, fruit crops, culinary and aromatic herbs, native trees and wildflowers and other ornamental plants. The site is used as a market garden and has 2 polytunnels, 40 apple trees and 80 current bushes. Some of the common wildflowers found here include charlock (*Sinapis arvensis*), dead-nettles (*Lamium spp.*), common chickweed (*Stellaria media*) and fumitory (*Fumaria spp.*). This habitat offers medium biodiversity value and low atmospheric carbon sequestration value due to the diversity of species located here and the current management practices i.e. organic growing with little disturbance to the soil. There are also a number of nesting sites for birds located here.

Grassland and Marsh

Amenity Grassland (GA2) occurs throughout all surveyed campuses and comprises roughly 5.3 ha in area. It occurs both in small pockets together with ornamental borders and single trees among buildings and car parks as well as covering larger areas such as sports pitches. This habitat is dominated by grasses such as Rye Grass (*Lolium spp.*) and Yorkshire Fog (*Holcus lanatus*) and commonly includes native wildflowers such as Daisy (*Bellis perennis*), Dandelion (*Taraxacum spp.*) clover (*Trifolium spp.*) and plantain (*Plantago spp.*). Due to current management practices which maintain the sward very tight this habitat is currently of limited biodiversity value and has generally been assessed as having low importance for biodiversity. The frequency of mowing of this habitat type allows for a net carbon outflux. If mowing was reduced on some sites containing this habitat, carbon emissions from grass cutting would be reduced and food and nesting resources for pollinators, birds and other insects would be increased.

Woodland & Scrub

Planted Broadleaved Woodland (WD1) occurs within the St Patricks and All Hallows Campuses covering approximately 1.3 ha. The woodland located in St Pats is largely dominated by natives such as Alder, Ash, Hawthorn and Oak. Non-natives are also found here including *Acer spp.*, Horse Chestnut (*Aesculus hippocastanum*), *Prunus spp.*, and one invasive species Spanish bluebell (*Hyacinthoides hispanica*). This habitat has generally been assessed as having moderate importance for biodiversity and carbon sequestration.

Scattered trees and parkland (WD5) classifies habitats where scattered trees, standing alone or in small clusters, cover less than 30% of the total area under consideration but are a prominent of structural or visual feature the habitat ³³. This habitat type is located on each of the University's Campuses and comprises 3.1 ha.

Roughly 1 km of treelines (WL2) was recorded within the four DCU Campuses and they vary from young, recently planted treelines to lines of mature trees functioning as field boundaries. They include native species such as Alder (*Alnus glutinosa*) and Oak (*Quercus robur*) but are largely non-native species such as Leylandii (*Cupressus Leylandii*) Sycamore (*Acer pseudoplatanus*), Largeleaved Lime (*Tilia platyphyllos*), London Plane (*Platanus x acerifolia*), Common Lime (*Tilia x europaea*) and Beech (*Fagus sylvatica*). The biodiversity value varies from moderate to high value, depending on the particular treeline.

Lakes and Ponds

Roughly 3m² of category "Other artificial lakes and ponds" (FL8) is located in the community garden. A man made pond was created to alleviate flooding on the site. The nutrient status of this pond plants found here includes *Iris spp.*, pondweeds (*Potamogeton spp.*) and duckweeds (*Lemna spp.*) This category is of moderate biodiversity value as is it the only open water within the University Grounds.

5.3 Plant lists

Table 6 List of plant species currently growing within the four University Campuses and the date of the most recent record.

Species name	Common name	Most recent record
<i>Acer campestre</i>	Field maple	2018
<i>Acer molis</i>	Canadian maple	2018
<i>Acer palmatum</i>	Smooth Japanese-maple	2019
<i>Acer pseudoplatanus</i>	Sycamore	2019
<i>Acer saccharinum</i>	Silver maple	2018
<i>Aesculus x carnea</i>	Red horse-chestnut	2018
<i>Aesculus hippocastanum</i>	Horse-chestnut	2019
<i>Alchemilla vulgaris</i> agg.	Lady's-mantle	2014

<i>Alliaria petiolata</i>	Garlic Mustard	2014
<i>Allium cepa</i>	Onion	2014
<i>Allium giganteum</i>	Giant onion	2014
<i>Allium sativum</i>	Garlic	2014
<i>Allium schoenoprasum</i>	Chives	2014
<i>Allium triquetrum</i>	Three cornered garlic	2018
<i>Alnus glutinosa</i>	Alder	2019
<i>Anemone nemorosa</i>	Wood Anemone	2014
<i>Anthoxanthum odoratum</i>	Sweet Vernal-grass	2014
<i>Anthriscus caucalis</i>	Bur Chervil	2014
<i>Anthriscus sylvestris</i>	Cow Parsley	2014
<i>Aphanes arvensis</i> agg.	Parsley Piert	2014
<i>Arbutus unedo</i>	Strawberry-tree	2014
<i>Arctium minus</i>	Lesser Burdock	2014
<i>Armeria maritima</i>	Thrift	2014
<i>Arum italicum</i>	Italian arum	2019
<i>Arum maculatum</i>	Lords-and-Ladies	2014
<i>Astilbe</i>	False goat's beard	2014
<i>Aubrieta deltoidea</i>	Aubretia	2014
<i>Aucuba japonica</i>	Spotted-laurel	2014
<i>Ballota nigra</i>	Black Horehound	2014
<i>Begonia grandis</i>	Hardy Begonia	2014
<i>Bellis perennis</i>	Daisy	2014
<i>Berberis thunbergii</i>	Thunberg's Barberry	2014
<i>Berberis vulgaris</i>	Barberry	2014
<i>Betula pendula</i>	Silver Birch	2019
<i>Betula pubescens</i>	Downy Birch	2019
<i>Betula utilis</i>	Himalayan Birch	2014
<i>Brachythecium rutabulum</i>	Rough-stalked Feather-moss	2014
<i>Brassica napus</i>	Rape	2014
<i>Brassica oleracea</i>	Wild Cabbage	2014
<i>Buddleja davidii</i>	Butterfly-bush	2014
<i>Buxus sempervirens</i>	Box	2014
<i>Calendula officinalis</i>	Pot Marigold	2014
<i>Calla palustris</i>	Bog Arum	2014
<i>Calluna vulgaris</i>	Heather	2014
<i>Calystegia sepium</i>	Bindweed	2014
<i>Camellia japonica</i>	Common camellia	2014
<i>Campanula rotundifolia</i>	Harebell	2014
<i>Capsella bursa-pastoris</i>	Shepherd's-purse	2014
<i>Cardamine pratensis</i>	Cuckooflower	2014
<i>Carex divulsa</i> subsp. <i>divulsa</i>	Grey Sedge	2014
<i>Carex nigra</i>	Common Sedge	2014
<i>Carex vesicaria</i>	Bladder-sedge	2014

<i>Carpinus betulus</i>	Hornbeam	2014
<i>Castanea sativa</i>	Sweet Chestnut	2014
<i>Castanea sativa</i>	Sweet Chestnut	2014
<i>Cedrus atlantica</i> 'Glauca'	Blue atlas cedar	2018
<i>Cedrus deodora</i>	Deodor cedrus	2018
<i>Centaurea nigra</i>	Common Knapweed	2014
<i>Cephalaria gigantea</i>	Giant Scabious	2014
<i>Cerastium fontanum</i>	Common Mouse-ear	2014
<i>Chamaecyparis lawsoniana</i>	Lawson cypress	2018
<i>Chamerion angustifolium</i>	Rosebay Willowherb	2014
<i>Chrysanthemum segatum</i>	Corn marigold	2017
<i>Cirsium arvense</i>	Creeping Thistle	2014
<i>Cirsium vulgare</i>	Spear Thistle	2014
<i>Clematis armandii</i>	Armand clematis	2014
<i>Clematis vitalba</i>	Traveller's-joy	2014
<i>Convolvulus arvensis</i>	Field Bindweed	2014
<i>Cornus alba</i>	White dogwood	2014
<i>Cortaderia selloana</i>	Pampas-grass	2014
<i>Corylus avellana</i>	Hazel	2019
<i>Cotoneaster simonsii</i>	Himalayan Cotoneaster	2014
<i>Crataegus monogyna</i>	Hawthorn	2019
<i>Crataegus x media</i> 'Paul's Scarlet'	Midland Hawthorn	2014
<i>Crocsmia x crocosmiiflora</i>	Montbretia	2014
<i>Crocus tommasinianus</i>	Early Crocus	2014
<i>Cupressus macrocarpa</i>	Monterey cypress	2016
<i>Cyclamen</i>	Cyclamen	2014
<i>Cynara cardunculus</i>	Globe Artichoke	2014
<i>Deschampsia cespitosa</i>	Tufted Hair-grass	2014
<i>Dianthus caryophyllus</i>	Clove Pink	2014
<i>Dicksonia antarctica</i>	Australian Tree-fern	2014
<i>Digitalis purpurea</i>	Foxglove	2014
<i>Dryopteris filix-mas</i>	Male-fern	2014
<i>Echium vulgare</i>	Viper's-bugloss	2014
<i>Elytrigia repens</i>	Common Couch	2014
<i>Epilobium hirsutum</i>	Great Willowherb	2014
<i>Epimedium x versicolor</i>	Bishop's hat	2014
<i>Equisetum arvense</i>	Field Horsetail	2014
<i>Eucalyptus</i>	Eucalyptus	2018
<i>Euonymus europaeus</i>	Spindle	2014
<i>Euphorbia amygdaloides</i>	Wood Spurge	2014
<i>Euphorbia helioscopia</i>	Sun Spurge	2014
<i>Eurhynchium praelongum</i>	Common Feather-moss	2014
<i>Fagus sylvatica</i> 'Purpurea'	Beech	2014
<i>Fatsia japonica</i> 'Variagata'	Japanese aralia	2019

<i>Festuca pratensis</i>	Meadow Fescue	2014
<i>Ficus carica</i>	Fig	2014
<i>Fragaria ananassa</i>	Garden Strawberry	2014
<i>Frangula alnus</i>	Alder Buckthorn	2014
<i>Fraxinus excelsior</i>	Ash	2014
<i>Fuchsia magellanica</i>	Fuchsia	2014
<i>Fumaria officinalis</i>	Common Fumitory	2014
<i>Galanthus nivalis</i>	Snowdrop	2014
<i>Galium aparine</i>	Cleavers	2014
<i>Geranium dalmaticum</i>	Geranium	2014
<i>Geranium endressii</i>	French Crane's-bill	2014
<i>Geranium robertianum</i>	Herb-Robert	2014
<i>Glebionis segetum</i>	Corn marigold	2014
<i>Glechoma hederacea</i>	Ground Ivy	2017
<i>Griselinia littoralis</i>	New Zealand Broadleaf	2014
<i>Gunnera tinctoria</i>	Giant-rhubarb	2014
<i>Hebe pinguifolia</i>	Hebe	2014
<i>Hebe speciosa</i>	Hebe	2014
<i>Hedera helix</i>	Ivy	2014
<i>Helleborus niger</i>	Christmas rose	2014
<i>Helleborus orientalis</i>	Lenten-rose	2014
<i>Hemerocallis fulva</i>	Day lily	2019
<i>Heracleum sphondylium</i>	Cow parsnip	2014
<i>Hesperis matronalis</i>	Dame's-violet	2014
<i>Heuchera</i>	Coral bells	2014
<i>Hosta</i>	Plantain lilies	2014
<i>Hyacinthoides hispanica</i>	Spanish Bluebell	2014
<i>Hyacinthoides non-scripta</i>	Bluebell	2014
<i>Hyacinthus orientalis</i>	Hyacinth	2014
<i>Hydrangea macrophylla</i>	Hydrangea	2014
<i>Hypericum androsaemum</i>	Tutsan	2014
<i>Hypericum 'Hidcote'</i>	St John's Wort	2014
<i>Hypnum cupressiforme</i> var. <i>resupinatum</i>	Supine Plait-moss	2014
<i>Hypochaeris radicata</i>	Cat's-ear	2014
<i>Ilex aquifolium</i>	Holly	2014
<i>Ilex aquifolium 'Variagatum'</i>	Holly	2014
<i>Iris pseudacorus</i>	Yellow Iris	2014
<i>Iris</i> sp. cultivar	Iris	2014
<i>Juglans regia</i>	Walnut	2018
<i>Knautia arvensis</i>	Field Scabious	2014
<i>Lactuca sativa</i>	Garden Lettuce	2014
<i>Lamium hybridum</i>	Cut-leaved Dead-nettle	2014
<i>Lamium purpureum</i>	Red Dead-nettle	2014
<i>Lapsana communis</i>	Nipplewort	2014

<i>Larix decidua</i>	Common larch	2018
<i>Laurus nobilis</i>	Bay	2014
<i>Lavandula angustifolia</i>	Garden Lavender	2014
<i>Leucanthemum vulgare</i>	Oxeye Daisy	2014
<i>Libertia formosa</i>	Chilean-iris	2014
<i>Ligustrum ovalifolium</i>	Garden Privet	2014
<i>Ligustrum ovalifolium</i>	Garden Privet	2014
<i>Lolium perenne</i>	Perennial Rye-grass	2014
<i>Lonicera nitida</i>	Wilson's honeysuckle	2017
<i>Lonicera periclymenum</i>	Honeysuckle	2014
<i>Luzula sylvatica</i>	Great Wood-rush	2014
<i>Magnolia</i>	Magnolia	2019
<i>Mahonia x media</i>	Hybrid mahonia	2014
<i>Malus domestica</i>	Domestic apple	2019
<i>Malus pumila</i>	Apple	2014
<i>Malva sylvestris</i>	Common Mallow	2014
<i>Matricaria recutita</i>	Scented Mayweed	2019
<i>Medicago lupulina</i>	Black Medick	2014
<i>Mentha x piperita</i>	Peppermint	2014
<i>Mentha spicata</i>	Spear Mint	2014
<i>Mentha suaveolens</i>	Round-leaved Mint	2014
<i>Mericalus annuus</i>	Annual mercury	2019
<i>Metasequoia glyptostroboides</i>	Dawn redwood	2019
<i>Molinia caerulea</i>	Purple Moor-grass	2014
<i>Molinia caerulea subsp. arundinacea</i>	Moor grass	2014
<i>Myosotis arvensis</i>	Field Forget-me-not	2014
<i>Narcissus agg.</i>	Daffodils	2014
<i>Nassella tenuissima</i>	Argentine Needle-grass	2014
<i>Orobanch</i>	Broomrapes	2014
<i>Orthotrichum affine</i>	Wood Bristle-moss	2014
<i>Papaver rhoeas</i>	Common Poppy	2014
<i>Parapholis strigosa</i>	Hard-grass	2014
<i>Parthenocissus henryana</i>	Chinese Virginia-creeper	2014
<i>Petasites fragrans</i>	Winter Heliotrope	2014
<i>Petroselinum crispum</i>	Garden Parsley	2014
<i>Philadelphus coronarius</i>	Mock-orange	2014
<i>Phlox paniculata</i>	Garden phlox	2014
<i>Phormium cookianum</i>	Lesser New Zealand Flax	2014
<i>Photinia x fraseri 'Red Robin'</i>	Red Tip Photinia	2019
<i>Phyllitis scolopendrium</i>	Hart's-tongue	2014
<i>Phyllostachys aurea</i>	Golden Bamboo	2017
<i>Pinus nigra</i>	Austrian pine	2018
<i>Pinus sylvestris</i>	Scots Pine	2014
<i>Pittosporum tenuifolium</i>	Kohuhu	2014

<i>Plagiomnium undulatum</i>	Hart's-tongue Thyme-moss	2014
<i>Plantago lanceolata</i>	Ribwort Plantain	2014
<i>Plantago major</i>	Greater Plantain	2014
<i>Platanus x hispanica</i>	Plane	2018
<i>Poa annua</i>	Annual Meadow-grass	2014
<i>Poa trivialis</i>	Rough Meadow-grass	2014
<i>Pogonatum urnigerum</i>	Urn Haircap	2014
<i>Polystichum setiferum</i>	Soft Shield-fern	2014
<i>Populus nigra</i>	Lombardy Poplar	2019
<i>Potentilla anglica</i>	Trailing Tormentil	2014
<i>Potentilla anserina</i>	Silverweed	2014
<i>Primula denticulata</i>	Drumstick Primrose	2014
<i>Primula veris</i>	Cowslip	2014
<i>Primula vulgaris</i>	Primrose	2014
<i>Prunella vulgaris</i>	Selfheal	2014
<i>Prunus avium</i>	Wild Cherry	2014
<i>Prunus laurocerasus</i>	Cherry Laurel	2014
<i>Prunus lusitanica</i>	Portugal Laurel	2014
<i>Prunus padus</i>	Bird Cherry	2014
<i>Prunus serrulata</i>	Japanese Cherry	2014
<i>Prunus spinosa</i>	Blackthorn	2014
<i>Pteridium aquilinum</i>	Bracken	2014
<i>Pyracantha</i>	Firethorn	2014
<i>Quercus ilex</i>	Evergreen Oak	2019
<i>Quercus petraea</i>	Sessile Oak	2014
<i>Quercus robur</i>	Pedunculate Oak	2014
<i>Ranunculus bulbosus</i>	Bulbous Buttercup	2014
<i>Ranunculus ficaria</i>	Lesser Celandine	2014
<i>Ranunculus repens</i>	Creeping Buttercup	2014
<i>Rheum x hybridum</i>	Rhubarb	2014
<i>Rhododendron</i>	Rhododendron	2014
<i>Ribes nigrum</i>	Black Currant	2014
<i>Ribes rubrum</i>	Red Currant	2014
<i>Ribes sanguineum</i>	Flowering Currant	2014
<i>Ribes uva-crispa</i>	Gooseberry	2014
<i>Rosa sp. cultivar</i>	Rose	2014
<i>Rosmarinus officinalis</i>	Rosemary	2014
<i>Rubus caesius</i>	Dewberry	2014
<i>Rubus fruticosus agg.</i>	Blackberry	2019
<i>Rubus idaeus</i>	Raspberry	2014
<i>Rudbeckia</i>	Black eyed susan	2014
<i>Rumex acetosa</i>	Common Sorrel	2014
<i>Rumex obtusifolius</i>	Broad-leaved Dock	2014
<i>Ruscus aculeatus</i>	Butcher's-broom	2014

<i>Salix caprea</i>	Goat Willow	2019
<i>Salix cinerea</i>	Grey willow	2014
<i>Salix cinerea</i> subsp. <i>oleifolia</i>	Rusty Willow	2014
<i>Salix pentandra</i>	Bay Willow	2014
<i>Salix viminalis</i>	Osier	2014
<i>Salvia verbenaca</i>	Wild Clary	2014
<i>Sambucus nigra</i>	Elder	2014
<i>Sarcococca confusa</i>	Sweet box	2014
<i>Saxifraga x arendsii</i>	Saxifrage	2014
<i>Scilla verna</i>	Spring Squill	2014
<i>Senecio jacobaea</i>	Ragwort	2014
<i>Senecio vulgaris</i>	Groundsel	2014
<i>Sequoiadendron giganteum</i>	Giant redwood	2019
<i>Skimmia japonica</i>	apanese skimmia	2014
<i>Solanum crispum</i>	Chilean potato tree	2014
<i>Sonchus asper</i>	Prickly Sow-thistle	2014
<i>Sonchus oleraceus</i>	Smooth Sow-thistle	2014
<i>Sorbus aria</i>	Common Whitebeam	2014
<i>Sorbus aucuparia</i>	Rowan	2014
<i>Stachys byzantina</i>	Lamb's-ear	2014
<i>Stellaria media</i>	Common Chickweed	2014
<i>Stipa gigantea</i>	Giant feather grass	2014
<i>Succisa pratensis</i>	Devil's-bit scabious	2019
<i>Succisa pratensis</i>	Devil's-bit Scabious	2014
<i>Symphoricarpos albus</i>	Snowberry	2019
<i>Symphytum x uplandicum</i>	Russian Comfrey	2014
<i>Syringa vulgaris</i>	Lilac	2014
<i>Taraxacum officinale</i> agg.	Dandelion	2014
<i>Taxus baccata</i>	Yew	2014
<i>Thuja occidentalis</i>	Northern White-cedar	2014
<i>Thuja plicata</i>	Western Red-cedar	2014
<i>Tilia x europaea</i>	Lime	2014
<i>Torilis japonica</i>	Upright Hedge-parsley	2014
<i>Tortula muralis</i>	Wall Screw-moss	2014
<i>Trachycarpus fortunei</i>	Chusan Palm	2014
<i>Trifolium dubium</i>	Lesser Trefoil	2014
<i>Trifolium pratense</i>	Red Clover	2014
<i>Trifolium repens</i>	White Clover	2014
<i>Tulipa</i> sp	Tulip	2018
<i>Tussilago farfara</i>	Coltsfoot	2014
<i>Ulex europaeus</i>	Gorse	2014
<i>Ulmus glabra</i>	Wych Elm	2014
<i>Urtica dioica</i>	Common Nettle	2014
<i>Verbascum thapsus</i>	Great Mullein	2014

Verbena bonariensis	Argentinian Vervain	2014
Veronica chamaedrys	Germander Speedwell	2014
Veronica filiformis	Slender Speedwell	2014
Veronica persica	Common Field-speedwell	2014
Viburnum opulus	Guelder-rose	2014
Viburnum tinus	Laurustinus	2014
Viburnum x bodnantense	Arrowwood	2014
Vicia sepium	Bush Vetch	2014
Vinca major	Greater Periwinkle	2014
Viola tricolor	Wild Pansy	2014
Wisteria sinensis	Chinese Wisteria	2014
X Cuprocyparis leylandii	Leyland Cypress	2014

5.4 Other species

Table 7 Other Species recorded within the 4 DCU Campuses between 2014 and 2019.

Species name	Common name	Group	Most recent record
Pica pica	Black-billed Magpie	Bird	2017
Sylvia atricapilla	Blackcap	Bird	2014
Cyanistes caeruleus	Blue Tit	Bird	2019
Fringilla coelebs	Chaffinch	Bird	2014
Ficedula albicollis	Collard flycatcher	Bird	2017
Turdus merula	Common Blackbird	Bird	2017
Phasianus colchicus	Common Pheasant	Bird	2014
Sturnus vulgaris	Common Starling	Bird	2017
Columba palumbus	Common Wood Pigeon	Bird	2014
Streptopelia decaocto	Eurasian Collared Dove	Bird	2017
Corvus monedula	Eurasian Jackdaw	Bird	2017
Passer montanus	Eurasian Tree Sparrow	Bird	2014
Carduelis spinus	Eurasian siskin	Bird	2017
Carduelis chloris	European Greenfinch	Bird	2014
Erithacus rubecula	European Robin	Bird	2017
Regulus regulus	Goldcrest	Bird	2017
Carduelis carduelis	Goldfinch	Bird	2019
Parus major	Great Tit	Bird	2014
Prunella modularis	Hedge Accentor	Bird	2017
Larus argentatus	Herring Gull	Bird	2014
Corvus cornix	Hooded Crow	Bird	2017
Delichon urbicum	House Martin	Bird	2014
Larus fuscus	Lesser Black-backed Gull	Bird	2014
Aegithalos caudatus	Long-tailed Tit	Bird	2014

Anas sp.	Mallard duck	Bird	2019
Larus canus	Mew Gull	Bird	2017
Motacilla alba subsp. yarrellii	Pied Wagtail	Bird	2017
Ficedula parva	Red-brested flycatcher	Bird	2017
Corvus frugilegus	Rook	Bird	2017
Turdus philomelos	Song Thrush	Bird	2014
Troglodytes troglodytes	Winter Wren	Bird	2014
Troglodytes troglodytes	Winter Wren	Bird	2014
Dumontinia tuberosa	Dumontinia	Fungus	2017
Arthopyrenia punctiformis	N/A	Fungus	2014
Ascodichaena rugosa	N/A	Fungus	2014
Athelia arachnoidea	N/A	Fungus	2014
Marchandiomyces aurantiacus	N/A	Fungus	2014
Coccinella septempunctata	7-spot Ladybird	Insect	2019
Calliphora vomitoria	Blue bottle fly	Insect	2014
Hemerobius humulinus	Brown lacewing	Insect	2014
Bombus lucorum agg.	Bumble bee	Insect	2019
Bombus pascorum	Common carder bee	Insect	2019
Forficula auricularia	Common Earwig	Insect	2014
Anthocoris nemorum	Common Flower Bug	Insect	2014
Vespula vulgaris	Common Wasp	Insect	2014
Helophilus pendulus	European hoverfly	Insect	2014
Eristalis arbustorum	European hoverfly	Insect	2014
Bombus hypnorum	Garden bumble bee	Insect	2014
Palomena prasina	Green Shieldbug	Insect	2014
Bibio marci	Hawthorn Fly	Insect	2014
Celastrina argiolus subsp. britanna	Holly Blue	Insect	2014
Apis mellifera	Honey Bee	Insect	2019
Musca domestica	House-fly	Insect	2014
Fannia canicularis	Lesser house fly	Insect	2014
Culicoides	Midge	Insect	2014
Mesembrina meridiana	Noon fly	Insect	2014
Anthocharis cardamines	Orange-tip	Insect	2014
Ichneumonidae	Parasitoid wasp	Insect	2014
Bombus lapidarius	Red tailed bumble bee	Insect	2014
Lasius niger	Small Black Ant	Insect	2014
Aglais urticae	Small Tortoiseshell	Insect	2014
Pieris rapae	Small White	Insect	2014
Andricus kollari	Wasp	Insect	2014
Xanthoria parietina	Common Orange Lichen	Lichen	2014
Xanthoria parietina	Common Orange Lichen	Lichen	2014
Arthonia radiata	N/A	Lichen	2014
Lecanora albescens	N/A	Lichen	2014
Caloplaca saxicola	N/A	Lichen	2014

<i>Caloplaca holocarpa</i>	N/A	Lichen	2014
<i>Catillaria lenticularis</i>	N/A	Lichen	2014
<i>Amandinea punctata</i>	N/A	Lichen	2014
<i>Lecanora muralis</i>	N/A	Lichen	2014
<i>Ramalina fraxinea</i>	N/A	Lichen	2014
<i>Physcia caesia</i>	N/A	Lichen	2014
<i>Lecanora expallens</i>	N/A	Lichen	2014
<i>Lepraria incana</i>	N/A	Lichen	2014
<i>Lecanora conizaeoides</i>	N/A	Lichen	2014
<i>Parmelia sulcata</i>	N/A	Lichen	2014
<i>Phaeophyscia orbicularis</i>	N/A	Lichen	2014
<i>Punctelia subrudecta</i>	N/A	Lichen	2014
<i>Physcia adscendens</i>	N/A	Lichen	2014
<i>Candelariella reflexa</i>	N/A	Lichen	2014
<i>Candelaria concolor</i>	N/A	Lichen	2014
<i>Physcia tenella</i>	N/A	Lichen	2014
<i>Ramalina farinacea</i>	N/A	Lichen	2014
<i>Melanelia subaurifera</i>	N/A	Lichen	2014
<i>Hyperphyscia adglutinata</i>	N/A	Lichen	2014
<i>Lecanora chlarotera</i>	N/A	Lichen	2014
<i>Lecidella elaeochroma</i>	N/A	Lichen	2014
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<i>Sciurus carolinensis</i>	Eastern Grey Squirrel	Mammal	2014
<i>Meles meles</i>	Eurasian Badger	Mammal	2019
<i>Oryctolagus cuniculus</i>	European Rabbit	Mammal	2014
<i>Homo sapiens</i>	Man	Mammal	2014
<i>Rattus sp.</i>	Rat	Mammal	2018
<i>Vulpes vulpes</i>	Red Fox	Mammal	2014
<i>Pipistrellus pygmaeus</i>	Soprano Pipistrelle	Mammal	2014
<i>Apodemus sylvaticus</i>	Wood Mouse	Mammal	2014
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<i>Arion circumscriptus</i>	Brown-Banded Slug	Mollusc	2014
<i>Arion distinctus</i>	Common Garden Slug	Mollusc	2014
<i>Cornu aspersum</i>	Common Garden Snail	Mollusc	2014
<i>Cornu aspersum</i>	Common Garden Snail	Mollusc	2014
<i>Arianta arbustorum</i>	Copse Snail	Mollusc	2014
<i>Punctum pygmaeum</i>	Dwarf Snail	Mollusc	2014
<i>Arion ater</i>	Great Black Slug	Mollusc	2014
<i>Tandonia sowerbyi</i>	Keeled Slug	Mollusc	2014
<i>Hydrobia ulvae</i>	Laver Spire Shell	Mollusc	2014
<i>Limax flavus</i> agg.	Leopard Slug	Mollusc	2014
<i>Acicula fusca</i>	Point Snail	Mollusc	2014
<i>Cochlicella acuta</i>	Pointed Snail	Mollusc	2014
<i>Pyramidula pusilla</i>	Rock Snail	Mollusc	2014
<i>Zonitoides nitidus</i>	Shiny Glass Snail	Mollusc	2014
<i>Cochlicopa cf. lubrica</i>	Slippery Moss Snail	Mollusc	2014

Limax	Slug	Mollusc	2014
Vallonia pulchella	Smooth Grass Snail	Mollusc	2014
Cylindroiulus punctatus	Blunt-tailed Snake Millipede	Non-insect	2014
Lithobius forficatus	Brown centipede	Non-insect	2014
Lumbricus terrestris	Common Earthworm	Non-insect	2014
Armadillidium vulgare	Common Pill Woodlouse	Non-insect	2014
Porcellio scaber	Common Rough Woodlouse	Non-insect	2014
Oniscus asellus	Common Shiny Woodlouse	Non-insect	2014
Cecidophyopsis ribis	Eriophyid mite	Non-insect	2014
Cylindroiulus caeruleocinctus	Millipede	Non-insect	2014
Cylindroiulus londinensis	Millipede	Non-insect	2014
Lumbricus rubellus	Red Worm	Non-insect	2014
Lumbricus festivus	Ruddy Worm	Non-insect	2014
Ommatoiulus sabulosus	Striped Millipede	Non-insect	2014
Tachypodoiulus niger	White-legged Snake Millipede	Non-insect	2014

5.5 Biodiversity Action Plan Review Process

5.5.1 Annual report layout and check list

An annual report will be completed by the facilities managers from each of the four campuses. This report will be emailed to all staff and students and will include the following:

1. Information regarding future developments that may harm or benefit biodiversity and carbon sequestration.
2. The status and progress of each of the actions will be presented as: action complete, action in train or action not yet progressed.
3. The status of each action will be broken down by DCU's Biodiversity Action Plan's six objectives and will be presented as: actions will be presented as: action complete, action in train or action not yet progressed.

4. All information detailed here can be represented as an infographic used in press releases and for upload on the DCU website. For see '*All-Ireland Pollinator Plan All-Ireland Pollinator Plan Year 3 Review: At a Glance*'.

5.5.2 Biodiversity Action Plan 2022-

The Biodiversity Action Plan 2022 onwards should build upon DCU's Biodiversity Action Plan 2019-2022.

Changes to the BAP 2022- will include:

1. A list of the most appropriate tree species to reduce run off.
2. A list of plants that are optimum for reducing glare and ameliorate temperature and humidity.
3. A list of Invasive plant species and their specific location.

Using Criteria A to E below, KBA should be monitored and identified and offered levels of protection i.e. using the management guidelines in section 5.1.

Criteria A. Threatened biodiversity

Threatened species were evaluated based on the IUCN conservation status ⁵⁵.

- Three or more species listed on Annex 1 (30 points)
- Two or more species listed on Annex 1 (20 points)
- One or more species listed on Annex 1 (10 points)
- No species listed on annex (0 points)

Criteria B. Variety of species

- Number of species >30 (4 points)
- Number of species >20 but <30 (3 points)
- Number of Species >10 but <20 (2 points)
- Number of Species <10 (1 point)

Criteria C. Uniqueness of habitat

- Habitat not found anywhere else and undisturbed by human influence (4 points)
- Habitat found elsewhere and undisturbed by human influence (3)
- Habitat not found anywhere else and disturbed by human influence (2)
- Habitat found elsewhere and disturbed by human influence (1)

Criteria D: Number of native plant species

- Number of native species >15 (4 points)

- Number of native species >10 but <15 (3 points)
- Number of Species >5 but <10 (2 points)
- Number of Species <5 (1 point)

Criteria E. Potential carbon sink

- Tree dominated area (at least 10 m²) with limited human interference (4 points)
- Lawn or planted area (at least 10 m²) with limited human interference (4 points)
- Tree dominated area (at least 10 m²) with moderate human interference (3 points)
- Lawn or planted area (at least 10 m²) with moderate human interference (3 points)
- Area with high level of human interference and high vegetation cover (2 points)
- Area with high level of human interference and low vegetation cover (1 points)
- Area with high level of human interference and no vegetation (0 points)