

Westfields Wetlands Management Plan



“So good that we have a natural resource for the wildlife of our city. This encourages sympathy and empathy for our environment. It teaches children how to care for creatures within a safe environment with their families. Helps children to grow into caring and mature adults.”

Quote from a MyPoint survey response, 2020

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1.0 Introduction

Westfields Wetland in Limerick City covers c.25 hectares and is part of the Lower River Shannon Special Area of Conservation (SAC). It is bounded to the south by the embankment of the River Shannon and the Condell Road and, to the north, by private housing. Westfields is widely used as a local amenity and is host to a variety of wildlife, including migrating wildfowl that visit the area. This area is a regular feature in the annual Tidy Towns competition under the wildlife and natural amenities category and is an invaluable amenity resource for the city residents and refuge for wildlife.

Limerick City and County Council have employed environmental consultants FH Wetland Systems, in collaboration with JBA Consulting, to draw up this management plan for Westfields to assess the current state of ecological health of the area and to provide clear direction for the long term management of the wetland habitats.

There are some challenges for the area, from an amenity and biodiversity perspective, which are to be addressed in this plan. Over the years bulrush growth has encroached around the viewing platform at Westfields lake, making it more difficult to view duck, swans and other wildfowl. In addition to this, the lake water quality shows signs of enrichment, which reduces the wildlife value and the beauty of the lake. Also, there are non-native invasive species in a number of areas around the site, which require careful consideration and management.

There are also many opportunities for protecting and enhancing biodiversity; for strengthening local community input and involvement; and for building on this valuable natural amenity for the people of Limerick to visit and enjoy. Input from the public has been invaluable in creating a robust plan for the area, with as many different voices heard as possible.



*Fig 1.1 Westfield Wetland, Limerick
Photo: Sean Ryan (westfieldswetlands.com)*

1.1 Background

A Management Plan for the Westfields Wetlands was proposed by the Climate Action, Biodiversity and Environment Strategic Policy Committee of Limerick City and County Council in November 2019. In this context, the expressed aims of the Management Plan are to “explore opportunities for enhancement of the wetlands’ amenity and recreational value while taking into account the ecological requirements of the SAC site and maintaining and enhancing biodiversity as a key objective”.

Thus this plan finds a path that gives consideration to both the needs of nature for protected habitat space and the needs of people for a space to relax and enjoy the natural world.

Human needs that the area serves:

- Nature time.
- Place to bring children to feed the birds or watch them.
- Beautiful exercise route.
- Local park.
- Green area for games and other amenity.
- Place for meeting with others.
- Quiet outdoor place for socialising.
- Space to learn about nature.

Needs of nature that the area serves:

- Multiple habitats for birds, insects and other invertebrates, plants, mammals, reptiles fish; habitats include marsh, reed bed, lake, scrub, grassland, hedgerows, urban gardens, woodland and riparian; each of which provides shelter and/or food to a whole range of diverse flora and fauna.
- Core protected space to live, feed, grow, mate, nest and be without threat of excessive human disturbance.
- Part of a wider network of wetlands within Limerick city, forming a corridor for migrating birds and other fauna to move along the Shannon and other rivers and corridors within the city and country as a whole.

Wider global needs that the area serves – for both wildlife and people:

- Refuge for biodiversity as part of a global need for such wild space.
- Carbon sequestration for climate resilience. There is considerable potential for this in the tree planting, the wetland areas, and the meadow areas, pending management methodology adopted.
- Springboard to a greater appreciation of nature, and thus an invaluable learning opportunity to strengthen those practices and habits that are supportive of the wider world: including, for example, reduced plastic use and waste, action on climate breakdown, greater care about water quality and water saving measures etc.

1.2 Aims and Layout of the Plan

There were two overall objectives which steered the way in which this management plan was carried out: one was to assess the water quality and the ecological health of the area as measured by the habitats, flora and fauna in the area. Second was to use this information, and feedback from a process of public engagement, to provide clear direction on the long term management of Westfields.

The Management Plan is set out as follows:

- Chapter 1 - Introduction for overview and context.
- Chapter 2 - Stakeholder input and survey feedback to outline the priorities of those who visit or live in the area.
- Chapter 3 - Water quality section to outline the results of a 6-month monitoring programme in 2020.
- Chapter 4 - Water levels and flow dynamics section to explore long term solutions and actions.
- Chapter 5 - Reed management to provide an overview of the merits of different options and to outline a clear calendar for carrying out works in a protected habitat.
- Chapter 6 - Wildlife section exploring the habitats, flora and fauna of the site as well as examining the non-native invasive species that are present and whether and how these should be managed. A separate non-native invasive species plan has been developed to accompany this Management plan.
- Chapter 7 - Signage and education section to outline opportunities and recommendations based on feedback from the public and nature educators who already work to reveal the beauty and wonder of nature.
- Chapter 8 - Social aspects not covered by other sections, including challenging behaviour and possible solutions.
- Chapter 9 - Infrastructure measures proposed for Westfields based on the stakeholder engagement and on the recommendations of this plan.
- Chapter 10 - Action plan for achieving the recommendations set out throughout the plan so that the process is one of action and activity.

To end this introduction, the authors wish to thank all those involved in contributing to this process; to residents of Westfields and those from elsewhere in Limerick city who enjoy the access to nature at Westfields, particularly those who have helped to promote and manage the wetland area here for many years; to the nature conservation groups and educators who have worked at Westfields and elsewhere, highlighting the value of nature and how important it is for our enjoyment and survival; to those working for Limerick City and County Council, National Park and Wildlife Service, the Office of Public Works and other bodies who provided input and assistance throughout the process; and to all who contributed in any way to this Management Plan process or to the long term health and wellbeing of Westfields as an invaluable resource in the heart of Limerick City.

1.3 Historic Westfields Reports

The following reports have been commissioned by the Council over the years to ascertain the best management for the site:

1. *1989 (Report) CAAS* (Environmental Services). Report mentioned in the 1999 CAAS report, but not on file.
2. *1999, Environmental Survey of the Limerick Wetlands*. CAAS (Environmental Services). Summary: Maps and documents a variety of wetlands within Limerick, including Westfields. It sets out statutory protections and outline management proposals. Recommends introducing open water in the Western Wetland area to reverse successional plant encroachment here for improved bird habitat.
3. *2001, Westfields Management Plan*, Natura Environmental Consultants. Summary: Survey of wetland flora and bird species at Westfields. Recommended proposals for increasing the conservation value of the wetlands and maximising biodiversity, summarised as follows:
 - Create open water bodies in the central and western sections.
 - Excavate sediment from parts of the water body in the eastern section.
 - Replace the existing water intake from the river with a sluice system.
 - Open channels between the four sections of the wetland.
 - Remove non-native or stunted trees.
 - Remove Japanese knotweed.
 - Provide educational facilities.
 - Employ a manager/guide.
4. *2006, Westfields Wetland Maintenance Implementation Proposals*, FH Wetland Systems. Summary: Brief overview of recommendations, including bulrush removal, re-opening existing pipe from the Shannon, interconnection of water beneath the causeway, raising water levels and non-native invasive species control.
5. *2007, Limerick City Council – Westfields Wetlands Improvement Works Study*. White Young Green. Summary: Overview of improvement works options, summarised as follows:
 - Create more open water space
 - Increase water depth in the eastern wetland
 - Increase water circulation
 - Improve amenity value
6. *2018, Report on the Status of Reeds and Invasive Alien Species in the Westfields Wetland SA and a Proposed Management Programme*. Invas Biosecurity. Summary: Extensive outline of the plant cover on the site, particularly for bulrush and Alien Invasive Species. Outline of removal options with recommendations for spraying both of these species as a control method.

7. 2019, *Westfields Lake and Wetland – Bulrush and Other Pond Plant Clearance Proposals*. FH Wetland Systems. Summary: recommends cutting vegetation below water surface with removal to strip lake nutrients over time. Recommends on-site composting of removed vegetation. Ongoing cutting necessary to prevent regrowth in early years. Thereafter the central areas will remain clear and only perimeter cutting will be necessary.
8. 2019, *Westfields Wetlands Consultation Workshop Report*. Doody Facilitation and Consulting Ltd. Summary: Gathered feedback on the priorities of stakeholders, local residents and others interested in the area. Primary areas of concern include encroachment by bulrush, water quality and water levels, biodiversity issues and the amenity and recreational value of the site.
9. 2020, *Reed Management in Westfields Wetland Complex, Condell road, Limerick – Natura Impact Statement January 2020*. Limerick City and County Council. Summary: Sets out the likely ecological impacts and measures needed to protect local wildlife during bulrush removal works.

Following is an overview of selected recommendations from historic reports. Not all of the items below are brought forward as recommendations in this report.

- Create open water bodies in the Central and Western Wetlands. (Chapter 4 and 5)
- Excavate sediment from parts of the water body in the eastern section. (Chapter 4 and 5)
- Replace the existing water intake from the river with a sluice system. (Chapter 4)
- Open channels between the four sections of the wetland. (Chapter 4)
- Remove non-native or stunted trees. (Chapter 6)
- Remove Japanese knotweed. (Chapter 6)
- Provide educational facilities. (Chapter 7)
- Employ a manager/guide. (Chapter 7)
- Create more open water space (Chapter 4 and 5)
- Increase water depth in the eastern wetland (Chapter 4)
- Increase water circulation (Chapter 4)
- Improve amenity value (Incorporated throughout)



*Fig 1.2 Swan with cygnets at Westfields Wetland.
Photo: Sean Ryan
(westfieldswetlands.com)*

2.0 Stakeholder Engagement

2.1 Stakeholder mapping and outline of engagement processes

For best results with any project, ownership of the project by all involved is the key to lasting success. Thus stakeholder consultation is crucial to the long term aims of creating a habitat and park space that is of best use for the local people using it and to wildlife that live in and visit it.

Ideally the vision for Westfields and the realisation of that vision would be as unified as possible, across as broad a spectrum of people as possible. Thus it was an expressed aim of this management plan to engage with people who care about the area and those who can contribute their expertise, time or even simply come to enjoy the area as a natural amenity.

To keep the engagement process as open and available for feedback as possible, the process sought to obtain feedback via direct and online engagement with both the general public and stakeholders as outlined below.

2.2 Public and stakeholder engagement

Engagement commenced at the earliest stage of the project, with a press release, posters on site and the launch of the feedback survey on LCCC's MyPoint interface. In tandem with raising public awareness of the process, key stakeholders were also approached at this early stage for consultation about their role in the management of Westfields. This group included local residents, birdwatchers, along with conservation organisations and state bodies with a responsibility for this area. In this way we allowed the maximum public participation input within the scope of the project timescale, for maximum public ownership of the overall project.

2.2.1 LCCC liaison process

Internal liaison within Limerick City and County Council has been carried out to ensure that previous work was incorporated into this Management Plan process and to include existing stakeholder engagement findings.

Previous reports prepared for Westfields have already looked at the flora and fauna; and have made recommendations for management of the bulrush to keep the lake water more open. This Plan takes these previous findings and recommendations as a baseline and has added new insights and updated findings to more fully describe the wetland dynamics at the site and to explore options for appropriate long term management.

2.2.2 Liaison with relevant national bodies

The two national bodies with responsibility for Westfields and the type of work being explored here are the National Parks and Wildlife Service (NPWS) and Office of Public Works (OPW).

NPWS

In the context of Westfields wetland, the NPWS are the body with responsibilities for impacts on flora and fauna and their habitats in Ireland and specifically in relation to works taking place within a protected areas of conservation value. Westfields is located within the Lower River Shannon Special Area of Conservation (SAC) and adjacent to the River Shannon and River Fergus Estuaries Special Protection Area (SPA). As such the NPWS have a responsibility to assess any proposals for works in the Westfields Wetland to assess possible impacts on the wildlife in the wetland.

OPW

The OPW has responsibilities for maintenance and oversight of the arterial drainage scheme in and around Limerick city, thus providing ongoing protection from flooding by high tides and accumulated surface water runoff from areas of low-lying land (much of it below high tide level). In consultation with the local Drainage Maintenance and Environment Sections of the OPW as part of this plan, it was determined that Westfields Wetlands are not part of the arterial drainage scheme maintained by the OPW. Any new weirs, if required, would fall within the responsibilities of the OPW. Feedback from the consultation process with the OPW is given in section 4.1.4.

Relevant NPWS and OPW sections:

National Parks and Wildlife Service, local ranger for the Limerick Area.

OPW Drainage Maintenance, Mungret, Co. Limerick.

OPW Environment Section, Mungret, Co. Limerick.

OPW Head of Environmental Section, Headford, Co. Galway.

2.2.3 Meeting with local residents

At the outset it was considered important to meet with local residents to seek their views and opinions on the site and to discuss the local priorities for the area. Some have been particularly active in the wetland area over the years, and have a lot of knowledge, passion and experience to contribute to this final plan. With this in mind there has been good communication with many local residents over the duration of the management plan process, with semi-regular conversations with residents who were out and about during the water sampling dates. There were also meetings arranged with certain members of the locality who were recommended by neighbours for their interest and involvement with the wetland area.

The feedback from local residents is included in part within the general MyPoint Survey information, and is an important element of the responses received, as summarised in the appendices.

2.2.4 Liaison with local and national conservation groups

The liaison process sought to gain insight and experience from national and local groups with an interest in wildlife and nature conservation. Groups contacted as part of this include the following:

- Birdwatch Ireland,
- Ramsar Ireland,
- Limerick Bat Group,
- Limerick Riverpath Volunteers,
- Thomondgate Nature Project
- Westfields Wetland Committee,
- Limerick Environmental Networks
- An Taisce's "Living Limerick" project

In general terms the feedback from these groups echoes the general sentiment that minimum intervention is the most desirable management route. Also that within this context, creation of more open water would benefit both local birdlife and the people who come to visit the area.

The views of these groups and/or their members are included in the overall feedback from the questionnaire process on the LCCC MyPoint website, summarised in the appendices.

2.2.5 Reaching out to local interest groups and education bodies

Local groups such as anglers, birdwatchers, photographers, walkers, Tidy Towns groups, environmental educators, schools and others with an interest in the area were informed about the MyPoint survey and asked for their input. Their feedback is included in the summary of survey results in the appendices.

Feedback received during conversations and email exchanges with birdwatchers and environmental educators has been particularly useful in helping to determine the most appropriate selection of actions needed to support wildlife and education opportunities at Westfields. These are outlined in the relevant chapters within the report.

2.2.6 Engaging with other stakeholders

It was considered important to engage with as many groups and individuals as possible, including those who may walk through the area on the way to work or visit for a birdwatching event only on an occasional basis.

To reach as many people as possible, information about the management plan process was circulated via press releases, newspaper articles, social media, online surveys and signage within the area. The online MyPoint Survey link was included where possible to maximise the number of contributions received. The summary of survey findings is presented in more detail at the end of this section.



Fig. 2.1 signage about the consultation process

2.2.7 Education and training events as a public outreach measure

During the course of the Management Plan process two free public walks were hosted as a wildlife educational measure. They were also designed to advertise the plan process and to invite public feedback. These events were limited in numbers due to Covid restrictions, but were well attended within those limits and were much enjoyed by participants.

The information shared included the existing flora and fauna of the wetland area as well as information about invasive species at Westfields.

Fig. 2.2 Public event to examine flora and fauna at Westfields



2.2.8 Westfields Wetland Survey

The survey was launched on the LCCC MyPoint website to gain feedback from people who may not be readily contacted by time on site and other direct communication. Over 200 responses were received, making it one of the most successful public consultation surveys on MyPoint to date. The full survey results are listed in the appendices.

Following is a summary of the feedback received, grouped under the general headings used in the survey form:

Who visits Westfields?

Most respondents were regular visitors to Westfields and as such have an active interest in the area. The primary use reported was walking, listed by c.170 people. “A bit of calm” and “time in nature” were each ticked by c.140 respondents. Next was birdwatching, listed by c.85 people, followed by dog walking, as listed by c.65 people. 25-30 people included each of cycling and a play area for children.

Other uses included sport, photography and videography, fishing, leading nature walks, feeding the ducks, wild food foraging, running and litter picking. One respondent visits the area as a carer for his disabled son. It is evident that the area is used by a wide variety of people for different reasons, all of whom find the area a sufficiently important part of their life to visit regularly.

Lawn management

The plan has sought to seek input not only on the wetland management, but on the wider park area around the wetland and west to Ted Russell Park. The survey sought feedback on the importance of lawn management; listing short mown lawn, short wildflower lawn and wildflower meadow as three options for consideration. For the most part short mown lawn was not listed as a priority (with >50% of respondents listing it as a relatively low priority), although this option was listed as a top priority for a significant minority (7.5%). These results were almost directly mirrored for the wildflower meadow option, listed as highest priority by over 40% of people and lowest priority by a significant minority of over 7.5% of people.

The short wildflower lawn also emerged as receiving predominantly favourable feedback although the results were spread more evenly across the scale of priority from 1-10.

Thus, it is clear that management for wildflowers (and by extension for the pollinators and support wildlife that they feed) is deemed to be important for most survey respondents, but that there are

those who also value the short lawn management. Aesthetics are often informed by fashions and by knowledge of the processes behind the appearances. As such it is possible that wildflower meadows or wildflower lawns could be introduced in tandem with some remaining short mown areas and with education displays to highlight the importance for nature of wildflowers and their habitats.

Bulrush management

A similar question was posed about the bulrush management. Respondents were asked to list in order of priority (from 1-10, in ascending order of priority) the importance of “open water across the lake”; “an open view from the platform, with bulrush at the margins”; and “careful management for wetland wildlife, which may entail more bulrush at the lakeshore and on islands in the lake”.

Open water across the lake was deemed highest priority by over 25% of respondents, but of lowest priority by the next greatest total of respondents, at just under 20%. Overall there was a very even split in opinion on this management option.

An open view from the platform with bulrush at the margins was also prioritised by 25% of respondents, with fewer people identifying this option as their lowest priority (c.7%). What is both interesting and encouraging from a wildlife conservation perspective is that the final option, namely careful management for wetland wildlife, received clear support. c.55% of respondents listed it as a top priority; and 78% of respondents listing it between 6 and 10 (high priority) as compared with c.10% listing it between 1 and 4 (low priority).

What is clear from this is that a majority of respondents to the survey want to see the area managed for wildlife, with a significant number of people also wanting some (or all) open water. While some reed or bulrush cover at the lake margins and on islands is important for wetland birds and other wildlife, there should be no conflict of interest in a management style that enlarges the area of open water within the lake and gives uninterrupted views from the platform out into the wide lake.

Knowledge of the protected status of Westfields

Westfields Wetland is located within the Lower River Shannon SAC¹, so any works that may occur within them will require assessment by the competent authority (whether that be LCCC or the NPWS). These measures are in place because it has been identified that the entirety of the Lower River Shannon SAC forms an extremely important mosaic of connected habitats for nature. The Habitats Directive, under which the Lower River Shannon SAC is designated, is designed to ensure that biodiversity is protected within the European Union. More information on the Habitats Directive is listed on the NPWS website (<https://www.npws.ie>).

Most survey respondents were aware of this (c.60%), indicating a relatively high level of awareness about the conservation value and importance of Westfields.

¹ NPWS (2013) ‘Site Synopsis: Lower River Shannon SAC 002165’.
<https://www.npws.ie/sites/default/files/protected-sites/synopsis/SY002165.pdf>

Non-Native Invasive Species

When asked about non-native invasive species in Ireland, almost 75% of respondents were aware of them as being an issue. When asked whether non-native invasive species were a problem at Westfields, a quarter of all respondents viewed them as being significant; half as being less significant; and one fifth as being extremely significant. A small minority did not answer this question.

This feedback has helped to steer the non-native invasive species training with LCCC Horticultural Section staff that was carried out in August 2020 as part of the overall management plan process.

Proposals for Westfields

The final survey question invited feedback about proposed changes that would enhance the area. 180 respondents left suggestions (as listed in the survey form shown in the appendix) and via personal communications during the preparation of the plan and follow-up emails. Of these, almost 400 separate points were put forward as suggestions, comments and ideas to improve the area.

The feedback from the stakeholder engagement process has made clear that there are many different views on how the wider Westfields Wetland area should be managed and developed. In general terms, the input from residents of the immediate area and wider city is that this is a special area that needs to be protected from undue interference and that any input must be carried out in a sensitive manner that protects wildlife and the natural feeling of the area.

2.2.9 Survey Results Summary

The main elements that were identified in the stakeholder engagement process are set out below (generally in order of importance as judged by the number of comments received). There is some overlap between categories, but the main themes were identified as follows:

- Management of bulrush / Creation of more open water
- Access to water and views of the lake and River Shannon
- Pathways, access and interconnectivity with wider walking routes
- Wildlife enhancement and protection
- Security / creating a feeling of safety / addressing antisocial behaviour and other social aspects of the site
- Signage and education
- Provision of seating
- Litter control and provision of bins
- Protection of water quality and enhancement of water flow dynamics
- Other infrastructural suggestions
- Pointers on long term management of the area.

These points have been tabulated and included in Appendix 2.1, along with the number of times each theme was identified in the feedback received. The stakeholder process has helped to steer the actions suggested for implementation, and to encourage greater public participation in the long-term management of Westfields.

3.0 Water Quality

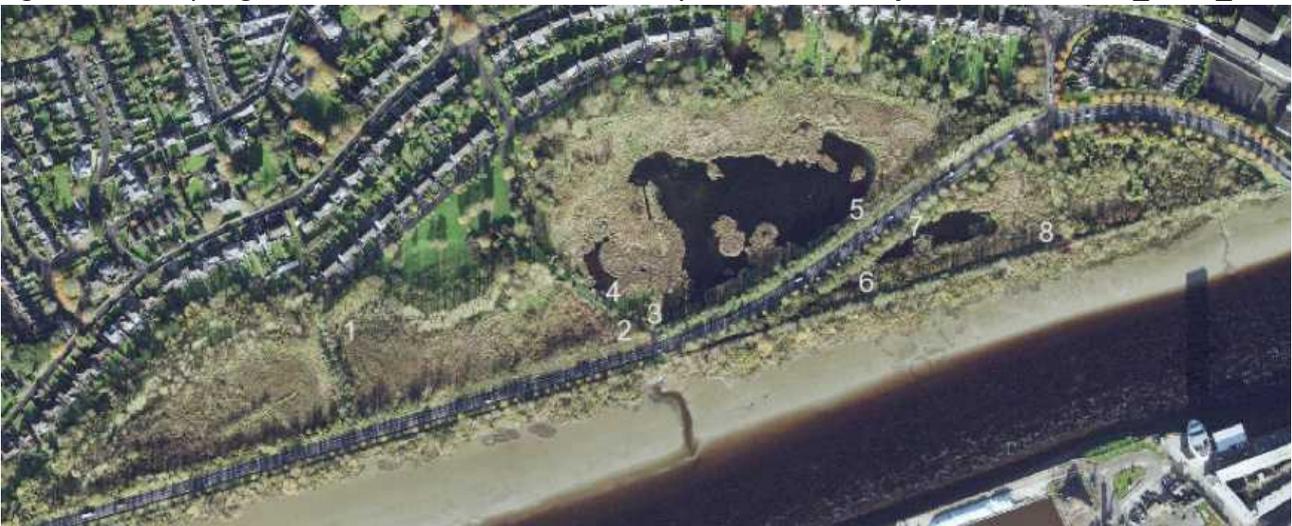
As an integral part of any wetland assessment, analysis of water quality is an important element of the research being conducted. As such, a significant portion of this management plan process has addressed water sampling and analysis to ascertain whether pollution is an issue and if so, to explore possible sources; as well as to assess the overall health of the wetland habitat.

In summary, this is a freshwater alkaline lake water body with generally good quality, yet with elevated nutrient levels, as discussed further below. There is some tidal influence via connecting pipes to the River Shannon, but no saline intrusion was found to be present. A spring within the lake was highlighted as part of the consultation process, but since it emerges under water and was identified only after the monitoring process was underway, no samples were taken.

3.1 Water sampling locations

A number of water samples were taken across the wetland so as to gain a good understanding of the water quality in the habitat. Ideal sampling locations for a lake habitat would typically include the inlet and outlet points and a central location, to allow comparisons and to assess possible impacts or influences on the waterbody. However, at the Westfields lake there are no consistent inlet points, although there is a clear overflow from the lake to the Shannon and reverse flow during high tide conditions. The sampling locations selected are shown in figure 3.1 below.

Figure 3.1 Sampling locations 1-8. ©Ordnance Survey Ireland/Govt. of Ireland 2021/OSi_NMA_141



- Location 1 – Western end of central wetland
- Location 2 – Inlet/outlet point from central wetland
- Location 3 – Inlet/outlet point from eastern wetland/lake
- Location 4 – Near viewing platform
- Location 5 – Eastern end of the eastern wetland/lake
- Location 6 – South Western side of the southern wetland
- Location 7 – Northern side of the southern wetland

Location 8 – Open drainage channels to the east end of the southern wetland. These locations were sampled on a three-weekly basis throughout the sampling period from June to November 2020 inclusive.

3.2 Results of water quality analysis

The water quality of Westfields Wetlands is relatively good with sufficient capacity to support abundant aquatic life. However, elevated levels of microbial contamination were found in some locations and the nutrient levels were relatively high. This elevation of nutrients provides ample fertiliser for growth of bulrush and other plants.

The averaged results for Westfields are shown for each location in Figs. 3.1 to 3.4. Note that nitrite, nitrate and ammonia are given as NO_2 , NO_3 and NH_4 respectively, rather than converted to mg/l N.

3.3 Overview of Water Quality by Location

Location 1 – Western End

This location is at the north west corner of the central wetland, within marsh and alder woodland habitat. While water levels vary with tides, it is relatively isolated from inflow and outflow. While the results are relatively consistent across the wetland area, there were differences found between the different sampling locations. Of the eight sample locations, Location 1 showed the most enrichment. Results here showed the highest average levels of BOD and lowest Dissolved Oxygen levels. It shares the highest concentrations for Ammonia, has the second highest average Suspended Solids levels and third highest average phosphate levels.

Location 2 – Exit from Central Wetland

This sampling location is at the inflow/outflow point from the central wetland marsh area. The direction of flow varied with the tides, and so the results show either the incoming water quality from the Shannon at high tide, or the outgoing marsh water quality on a falling tide. This location had amongst the lowest BOD and ammonia levels of any of the 8 sample locations, as well as being low in phosphate concentration. However the nitrate levels here were amongst the highest recorded across the wetland sample locations. Note that the tide levels have a direct bearing on water quality in this location, as outlined further in Appendix 3.3.

Location 3 – Exit from Eastern Wetland

This is the inflow/outflow point from the main lake, the Eastern Wetland. Note that during incoming tides, rather than duplicating the results of water entering from the same pipe as location 2, inflow from the gravel at the lake edge near the Condell Road was sampled instead. The water here, like with location 2, was relatively good quality, with low BOD and elevated oxygen saturation. Phosphate concentrations here were the highest for any of the locations sampled, as well as being elevated for nitrate.

Location 4 – Near viewing platform

This sample location was at the lakeshore, immediately south of the viewing platform on the main pedestrian causeway. This is an area where waterfowl previously gathered to eat bread thrown by visitors to the lake, but their numbers are currently lower than usual due to bulrush encroachment here. BOD levels here were low, with good high dissolved oxygen concentrations. Suspended solids levels were relatively high, possibly from bird activity in the water. Ammonia and phosphorus concentrations were amongst the lowest recorded, with comparatively high levels of nitrate and nitrite.

Location 5 – East point of the Eastern Wetland

This location borders the southern shore of the main lake, to the eastern end, beside the pathway. Waterfowl are regular visitors to this part of the lake. In line with the lake sample at location 4, above, location 5 also showed high DO and low BOD, indicating good water quality. Faecal coliforms and E.coli were also notably low here compared with other locations. Otherwise this location was mid-range for other parameters relative to other locations.

Location 6 – West point of the Southern Wetland

This location is at the interface between the open pond south of the Condell Road and the drainage channels to the west of the pond. The pond is becoming encroached with a floating mat of fen vegetation including bulrush and other species. Results here were average for physical and chemical data, but generally showed amongst the lowest Faecal Coliform and E.coli counts.

Location 7 – North side of the Southern Wetland

This sample location is overhung by a canopy of willow branches, shading out growth of wetland plants beneath. Water here was generally clear and clean looking. This is reflected in the low suspended solids results. Otherwise this location had generally average results compared with other locations.

Location 8 – Open drainage channels

This location was within the drainage channel running parallel to the Shannon. It was sometimes difficult to get a good clean sample in this location due to the prolific plant growth within the channel itself. Disturbance of the plants tended to cloud the water slightly, which may have led to elevated readings in the samples. As may be expected from this, compared with other samples, this location had amongst the highest of the suspended solids and BOD results returned. Ammonia, phosphate, organic carbon and all microbial analysis were also relatively high for this location compared with other sampling points. In general terms the water entering from the Shannon appeared less clean than the main wetland areas, so this may influence the drains and Southern Wetland area generally.

Overview

In general terms, the results were indicative of relatively good quality when viewed through the lens of the BOD and microbial analysis. Nonetheless, Surface Water Regulations (2019) seek mean ammonia results for good status waters of $\leq 0.065\text{mg/l}$ (N), which is somewhat lower than the range of mean values at Westfields, from 0.10mg/l (NH_4) at location 2, to 0.19mg/l (NH_4) at locations 1 and 8. For phosphorus, the regulations look for good status waters of $\leq 0.025\text{mg/l}$ P, compared with the mean values for total phosphorus at Westfields, ranging from 0.06mg/l P at

locations 2 and 4, to 1.06 mg/l P at location 8. Thus it is clear that even with the good oxygen status of the wetland, the nutrient levels are somewhat elevated.

The causes of elevated enrichment at location 1 are not immediately apparent, but might possibly include nearby grey water or old septic tank ingress; or may simply be due to a lack of flushing of accumulated plant debris. During sampling times, heavy quantities of black decaying leaf litter were consistently apparent in this location. To explore the possibility of a pipe ingress, it is proposed that when an excavator is on site for other work, that a trench be dug in this location to check for the presence of sewer pipes, if only to rule out this possibility.

Results for locations 2-7 provide a broad spread of feedback which is difficult to tease apart into clear delineations of overall water quality for each area, with a seemingly random spread of high and low results for different parameters. Further assessment would be needed to be able to explain more fully the reason behind this spread of results. To this end, there may be merit in carrying out DNA testing on the Coliforms, to take one parameter as an example, to assess whether they are of human or animal/avian origin. This would provide a clearer indication of whether they result from sewage pollution or from high bird numbers in the lake and wider wetland area, or from animal agriculture within the River Shannon.

3.4 Assessment of Likely Nutrient Sources and Solutions

Sources of nutrients or other inputs are often readily identifiable by careful examination of a site, and by seeking downstream of potential sources for changes in water quality or quantity. This is made somewhat complicated at Westfields by the fact that the main visible water input and output is via the same route, making upstream and downstream water quality assessments more challenging. It is possible that the spring has a greater bearing on water influx than the inlet/outlet weir, and further study is recommended to assess this.

To explore possible sources of nutrients or other inputs at Westfields, there was a careful walk-through of the site. This process checked for signs of visible piped inlets or overground flows, or for seepage or ingress without piped infrastructure, or other noticeable sources of possible pollution. Historic reports on the management of Westfields and the public consultation process were also used to seek insight into possible pollution sources.

Some possible sources of elevated nutrients or other inputs identified as part of this process include the following:

- Elevated waterfowl numbers due to feeding, as well as nutrients from uneaten food.
- Re-mobilisation of nutrients from sediments or plant decay.
- Stormwater from Condell Road, Westfields Park, or elsewhere north of the wetland.
- Main inflow from the Shannon on high tide.
- Possible sewage or grey water pollution.
- Possible ingress of contaminants from spring within the Eastern Wetland.
- Other land use factors.

These are discussed in more detail below, along with proposed solutions in each instance.

3.4.1 Feeding of water birds

Two different pollution issues arise from feeding water birds. Firstly, the elevated numbers of birds leads to increased defecation in the water, with consequent increases in nutrients, microorganisms and other contaminants. Nitrates and phosphates in particular will encourage the growth of algae within the water body, and of tall emergent wetland plants in shallower water. Secondly, uneaten bread will add nutrients to the water directly, and may attract rodents if left close to the shore.

The water fowl at Westfields are a central feature of the attractiveness and interest of the area. Thus, reducing bird numbers is not recommended as a method for reducing pollution inputs from this source. Instead, signage is recommended to encourage modest amounts of feeding; and annual bulrush removal is also proposed as a way to remove nutrients from the lake on an ongoing basis to compensate for inputs from the elevated number of birds.

The relative merits of feeding birds are discussed further in appendix 7.

Recommended Actions:

- Signage to limit (but not discourage) bird feeding.
- Annual bulrush removal to remove stored nutrients.

3.4.2 Remobilisation of nutrients, sediments and/or plant decay

Sediments were not assessed during the monitoring programme, but the condition of different sediments at different locations was compared visually during the regular sampling periods at the site. Sediment depths vary considerably, as does the composition and quality. In the Western End of the Central Wetland sampling location, for example, the sediments are deep and black, suggesting anoxic conditions (a sign of possible pollution presence), whereas the sediments at the Eastern End of the Eastern Wetland were shallow and brown in colour (indicative of healthy, oxygenated soils or waters), overlaying a stony lake shore.

Where plant material has shown heavy accumulation over the years, the nutrients within them will be released back into the water body as the plant material rots and decays. This is part of a natural process in any wetland, but we have the potential to interrupt this cycle and intervene to remove the nutrients should this be desirable. In a natural, undisturbed wetland ecosystem, such intervention is not necessary, nor desirable. However, where ongoing nutrient inputs occur and where addressing these at source may be difficult, then it can be beneficial to compensate by removing plants on an occasional or annual basis.

The same applies to sediments. Accumulation of sediments is a natural successional process whereby a lake becomes a fen and then a raised bog or woodland over a long period of time. Landscapes are always in flux, always changing and evolving. Nonetheless, where a specific management style is desired (in this case open water), or where artificial nutrient inputs

exacerbate the development of fen habitat, it may be desirable to remove sediments on an occasional basis or as part of a one-off maintenance event. Where sediment removal is adopted as a measure, it must be done over only a modest area to limit the damage done to the invisible habitat below the water surface. See Chapter 4 for details on this.

Recommended actions:

- Remove bulrush annually as part of an ongoing nutrient and biomass removal strategy.
- Analyse sediments for stored nutrients and sediment oxygen demand at a number of locations, to assess the merit of sediment removal as a nutrient removal measure.
- Remove sediments on a successional basis, taking care of ecological considerations. This will deepen the water in selected areas, whether or not there is an abundance of stored nutrients.

3.4.3 Stormwater inputs

Stormwater inputs can be observed along the southern shore of the lake and wider wetland area, entering from gullies on the Condell Road spaced at c.30m intervals. These leave an oily residue and elevated levels of accumulated silt where they appear (see fig. 3.5).



Fig 3.5. Storm drain entering the Central Wetland from Condell Road

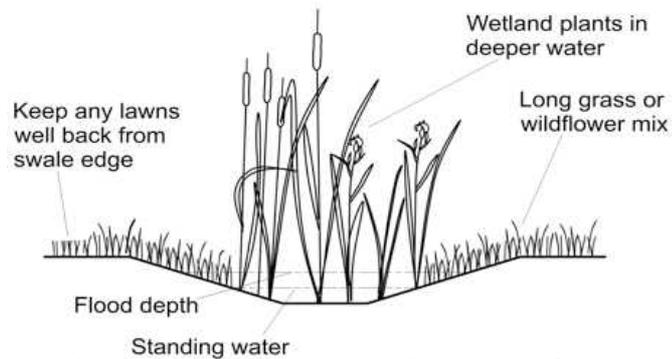
No such pipes were identified along the northern shores of the wetland, however the Western End of the Central Wetland sampling location has consistently shown higher contaminant levels than many other locations, so may potentially be experiencing contamination from stormwater inputs (or grey water inputs piped to storm drains).

A number of Sustainable Urban Drainage System (SUDS) approaches could be effective at reducing stormwater inputs from the Condell Road.

- Bio-retention areas could potentially be constructed within the road as a filter strip. These would filter water through plant roots and gravel *en route* to the storm drainage pipes. They would take a certain amount of space on the road, but could potentially be designed to act as a division between the cycle path and the main carriageway to serve multiple functions.
- Swales could be constructed on the lower side of the pipes, between the footpath and the lake shore. These would filter water through a narrow-planted wetland area en route to

the lake (fig. 3.6). This would help to limit the ingress of nutrients, hydrocarbons and silt from the road.

Fig 3.6. Cross section through typical planted swale



- One or more stormwater wetland basins could be created within the existing wetland, but hydrologically separate from them. The existing storm pipes would be connected to these wetland basins and the water would be filtered en route to the main wetland. This has the downside of reducing the area of clean water within the lake, but the upside of keeping the main lake water body cleaner than is currently the case. Ideally space would be found outside the main lake footprint area.

Recommended Actions:

- Conduct analysis of the stormwater inputs after a rainfall event (taking first flush runoff only to avoid excessive dilution of the sample). Assess for hydrocarbons, suspended solids, microplastics (from tyre wear) and selected heavy metals. This process will help to clarify the SUDS sizing and selection requirements.
- Select the SUDS type (or combination) that best fits the wider wetland design approach.
- Design accordingly (in coordination with other site works).
- Implement as and when appropriate in the context of other site works.

3.4.4 Main inflow from the Shannon

A single pipe connects the main wetland (central and eastern sections) with the River Shannon. This flows out of the wetland at low tide and, due to an open flap valve, into the wetland on high tide (fig 3.7). The water analysis suggests that the levels of suspended solids and nitrates are somewhat elevated entering the wetland as compared with leaving, suggesting that the Shannon may be a source of these parameters at Westfields.

Fig 3.7 Outflow from Central and Eastern Wetlands, showing permanently open non-return valve



The estuary shows High Status for nutrients based on 2020 results. However lake waters have lower limits and as such the ingress of water may still impact on Westfields. High sediment loads in the river during flood events also influence Westfields, as can be seen in fig. 3.8.



Fig. 3.8 Sediments entering Westfields from the Shannon via the inflow/outflow pipe during a flood event

Addressing the potential sources of nutrients within the Shannon is beyond the scope of this report, however it is possible that reducing the input of water into the wetland may be an effective way to protect it from elevated nutrients or suspended solids from the river. Thus, a simple low weir on the upper end of the pipe would retain water at high tide level. Water levels are discussed in more detail in the Chapter 4.

Recommended Actions:

- Assess the feasibility of raising the level of the outlet from locations 2 and 3 (the Central and Eastern Wetlands), to limit ingress from the Shannon on high tides. Any works resulting from this feasibility assessment can only be initiated after a flood risk assessment has been carried out and the works deemed to be safe. A trial process may be useful, using gravel as discussed in the Chapter 4, rather than constructing a more permanent concrete structure.
- Alternatively,
- In advance of weir works it is proposed that the freshwater spring be located and that the volume potential be estimated by a hydrogeological study to assess the potential for this as a source of water for the wetland. Physical and chemical analysis should also be carried out to assess the water quality of the spring prior to deciding on whether to rely on it even further by minimising river water ingress. Temporary reinstatement of the flap valve may yield valuable feedback about water flow dynamics in this context.
- Harvest bulrush on an annual basis as a way to remove nutrients from the lake. Although not addressing nutrient levels in the Shannon directly, this method of nutrient reduction will provide long term removal while at the same time achieving the objective desired by the local community or creating more open water space.

3.4.5 Possible sewage or grey water inputs

Although extensive works were carried out to connect up all sewage and grey water as part of the main drainage project, there is always the potential for residual inputs from old foul or grey water sewers from inappropriately piped inputs to storm drains. If washing machines or dish washers are connected to stormwater sewers rather than the main foul drainage system, pollution and

nutrient enrichment of adjacent aquatic habitats can occur. This can provide a fertiliser source for more plant growth or other forms of contamination to the habitat.

Historically sewage most likely leaked into Westfields via the old sewage pipes that flowed through the site en route to the river. Also, since the pipe entering/exiting the wetland is located close to the old sewer outfall (fig 3.9) sewage effluent was likely to have been pulled into the wetland at high tide. This outfall is no longer in use, since the main drainage project was completed in the early 2000s, but still forms a conduit to Westfields wetland during high tides and may draw nutrient rich waters in from there.



Fig 3.9 Old disused sewer pipe located near the Westfields inlet/outlet pipe

No direct inputs were observed from in-use sewer pipes. Sample location 1 suggests that there might possibly be grey water inputs from nearby houses, but this is difficult to confirm without bringing an excavator onto the site. It is recommended that this be carried out when a machine is on-site for other works and that test holes be dug in strategic locations to assess possible grey water ingress. A small wetland basin could be constructed at this location if needed to filter residual grey water inputs.

Recommended Actions:

- Explore the possible presence of greywater pipework at the Western Wetland sampling point when an excavator is on-site for other works.
- If there are unauthorised outflows from houses, home owners can be informed of findings in order to achieve reconnection to mains sewers. Often, incorrect grey water plumbing to sewers is easily amended to redirect to the mains sewer.
- Alternatively, if grey water inputs are present but the exact source is unclear, a small constructed wetland may be designed for filtering the water source prior to entry into the main wetland habitat.
- Assess the DNA of the water-bourn Coliforms to check whether they are of human or animal/avian origin, which may assist with the diagnosis of inputs at different locations.

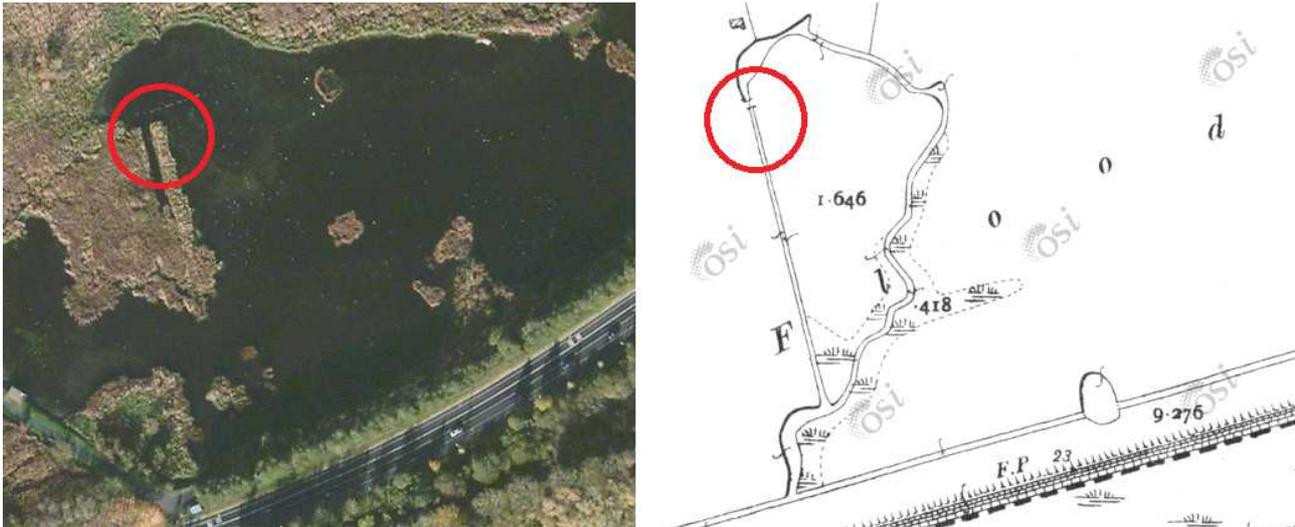
3.4.6 Possible ingress of contaminants from spring

There is a spring located in the Eastern Wetland, located at a point c.60m from the platform, and closer to the northern half of the lake (see fig 3.10). This is shown in historic maps of the site, and

is reported to have been used by the Cleve's Factory as their main water source. More recent aerial maps show an open channel persisting in this general location. Whether this is due to stream flow velocity or to water depth has not been ascertained.

The water quality and flow volume of this spring has not been assessed as part of this management plan process.

Fig. 3.10 Aerial photograph (2011-2013) alongside Historic 12" map (1888-1913), showing location of the stream in the older map and the area of open channel in the newer one.



Recommended Actions:

- Sample the spring water for the full suite of parameters and compare with the existing data for the lake water body.
- Carry out an estimate of the flow volumes entering the lake via the spring, to assess the potential for a raised stable lake level in the absence of River Shannon ingress on each high tide.

3.4.7 Other landuse factors

Other contributory factors that may be impacting on the quality of the water at Westfields include landuse factors such as biocide spraying and dumping of compostable garden clippings and woodchips into the lake margins.

Spraying of herbicide adjacent to the marsh area of the central wetland (as shown in fig. 3.11) may have the potential to introduce residues into the water.



Fig 3.11 Spraying alongside edge of Central Wetland

Garden clippings were observed in the lake margins, which will rot down over time and contribute to the levels of nutrients within the waterbody. Woodchips have also been disposed of in a similar fashion from tree felling works, and have the potential to introduce nutrients in the same way over time.

Recommended Actions:

- It is recommended that biocide spraying be ceased for all areas of the Westfields wetland area and adjoining park. Long grasses and wildflowers can be allowed to grow around trees, along borders with walls and along the interface between grassed areas and the wetland marsh areas. Cease all use of biocides within the park area unless as part of non-native invasive species control measures, preferably only as part of a catchment-wide programme.
- Review the spray protocols within the wider city, so that herbicide use is limited or reduced within the wider stormwater catchment of Westfields (namely along Condell Road and within Westfields Park).
- Engage with local home owners through local events (or directly approach residents with gardens bordering the wetland) and highlight the need for careful management of garden clippings/mowings so that they do not impact on the wetland. E.g. setting all composting activities >10 m from high flood level. This process should actively encourage home owners to compost garden clippings in their own gardens (>10m to water) or place such clippings in green waste bins for collection for municipal composting.
- Ensure that contractors carrying out tree felling works export all chips from the area or use them as a mulch around trees at least 10m away from high flood level of the water's edge.

4.0 Water Flows and Levels

The issue most frequently cited by regular visitors and local residents as a proposal for the area is to increase the area of open water, particularly within the lake of the Eastern Wetland. This lake is the focal point within the wider site, and the encroachment of reeds and bulrush over the years has diminished the enjoyment of the area for some local residents and visitors. Encroachment of tall wetland plants along pathways and at the platform has reduced the visibility of the birds in the wetland, as well as making it more difficult for birds to swim to the platform.

Thus, a key local desire regarding the amenity and recreational value of the area is to create more open water areas, while taking care that any works are carried out in a sensitive manner and do not negatively impact on the wildlife of the area.

There are also opportunities for creating greater access to the water edge and enhancing viewing points over the water at the lake and over the Shannon. These are discussed in more detail in the Chapter 9. The current chapter explores the achievement of greater open water cover in the context of water flow and levels.

4.1 Water flow dynamics at Westfields Wetland

The main flow into the wetland area appears to be via a pipe from the River Shannon on high tide, which splits beneath the pedestrian causeway to enter both the Central Wetland and Eastern Wetland waterbodies. There is also a spring reported to have been used historically by the Cleeve's factory, located within the lake in the Eastern Wetland. This is reported to have been capped at some point after the factory closed. However, observation of aerial photographs of this area suggest that the spring it is still flowing (see fig. 3.10). It was also mentioned in the 2007 White Young Green report as the source of water at Westfields. It is proposed that an assessment of the spring be carried out to assess the volumetric inputs to the wetland.

There are at least three distinct outlet points visible from aerial photographs of the wetland. These are shown as a rutting of the estuary silt on the banks of the Shannon at low tide (fig. 4.1 and 4.2). One of these is the formal entry/exit point described above, from the connecting pipe leaving the central and eastern wetland waterbodies. The other two appear to be well established conduits beneath the Condell Road and through the flood bund. These are located at the western and eastern extremities of the area: near Barrington's Pier and at Shannon Bridge respectively.

Other ingress/egress seepage points are likely to also be present; and one of these is visible at high tide entering the Central Wetland through the bank at the side of the lake c.20m east of the piped inlet point.

Fig 4.1 - Exit from the Western Wetland near Barrington's Pier



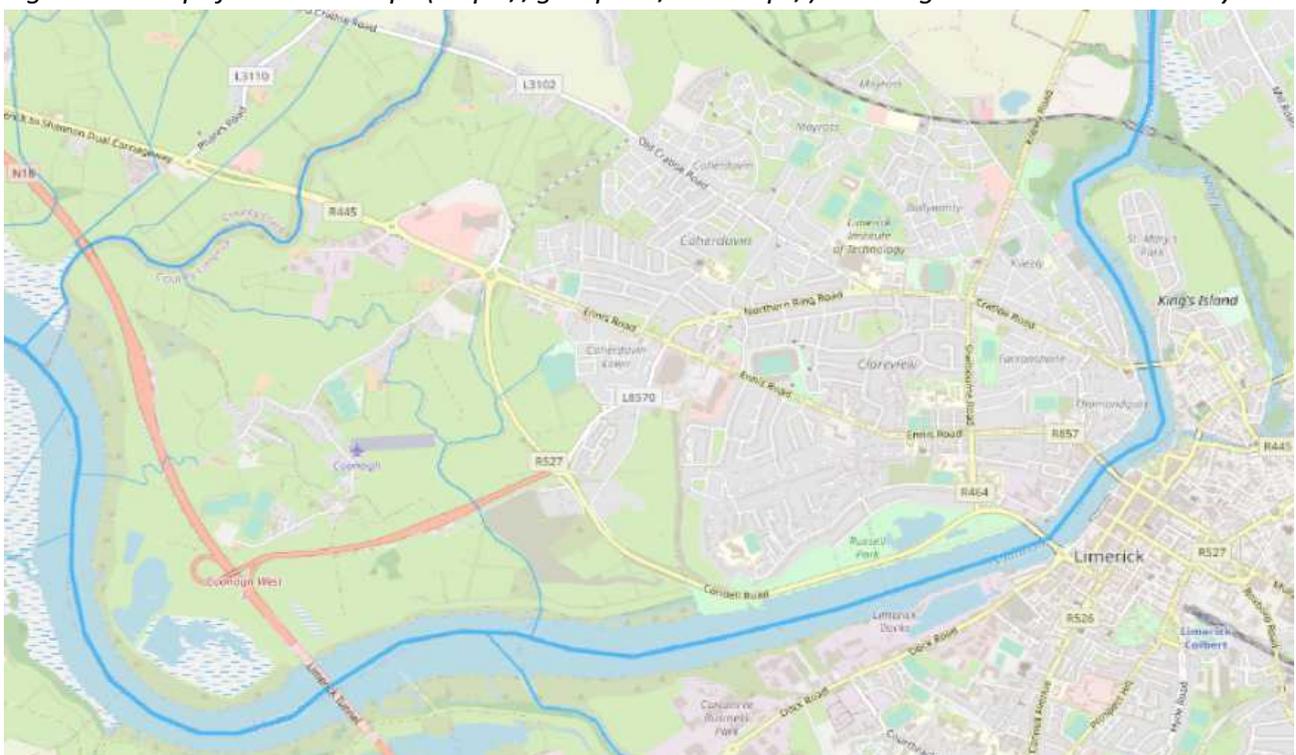
Figure 4.2 – Aerial photograph of outfalls from Westfields Wetland.



4.1.1 Other Potential Ingress Sources

As regards potential upstream flows into the wetland, Westfields is within a very small catchment. The EPA Map (with the River Networks layer active, fig. 4.3) shows that there are no streams recognised as flowing through Westfields, with most of the city catchment flowing through storm sewers rather than streams per se.

Fig. 4.3. Excerpt from EPA Maps (<https://gis.epa.ie/EPAMaps/>) showing the River Networks layer.



There is ingress from the Condell Road via storm drains and there may potentially be some stray storm or grey water drains entering from residential development north of the wetland. Grey water ingress was not confirmed during the research for the management plan and while it is not uncommon for such an occurrence in urban areas, it may or may not be an issue in this case. Foul and storm sewers in the area were collected as part of the main drainage works in the 2000s and piped to the sewage treatment plant on the Dock Road. An excerpt of the Limerick City drainage map is shown in the appendices.

In summary, the primary flows through the wetlands appear to be from input and output from the Shannon on incoming and outgoing high tides. However, a volumetric appraisal of the spring within the Central Wetland should be assessed to ascertain the inflow from that source.

4.1.2 Water Throughput Between the Eastern Wetland and the Shannon

A reduction in water throughput in the lake of the Eastern Wetland has been cited by local residents as a reason for bulrush encroachment (see appendix 4.3). While this assertion is not the conclusion reached in this report there is scope for further study of the hydrodynamics of the wetland.

Given the concern that changes to the wetland hydrodynamics have led to bulrush encroachment, it is worth considering other, potentially more likely, causes here:

1. Steady encroachment by bulrush and willow scrub into a lake waterbody is part of a natural successional process, and at Westfields it may be more of a factor than any changes to the water flows *per se* in the process of encroaching plant cover. Bulrush is a natural fen-builder, even to the point of encroaching into open water to form floating stands of plants which in time become a layer of fen peat and eventually raised bog as the lake below fills with plant material.
2. In addition to natural succession, the inherent proliferation of bulrush is probably exacerbated by nutrient inputs from external sources (as outlined in chapter 3). Nutrient inputs serve to speed up the rate at which plants grow naturally and spread across a wetland or lake margin.
3. Lab analysis and the nature of hydrodynamics both suggest that there may be a larger amount of suspended solids entering from the River Shannon than leaving the wetland. The moving water of the Shannon will hold a larger sediment load than the still water of the wetland. As such incoming water to the wetland will deposit this load within the wetland before retreating, leaving a residue of solids on the wetland base with each tide.
4. The construction of the Condell Road has created a greater length of overall shoreline of shallow water, given that it cut through an existing wetland/tidal lagoon habitat. This greater shoreline would have assisted with the spread of bulrush and other wetland plants along the wetland margins, leading to greater speed of encroachment into the open water than would have occurred in a larger waterbody.

It is suggested that increases in the throughput of water in and out of the wetland would be unlikely to restore open water. Conversely, by allowing the water to rise and fall more (as would occur if a larger diameter pipe were set at a lower level, as proposed by some), then low water

levels would drop below the existing low point - thus further encouraging bulrush to encroach into the shallower areas created at low tide.

Also, water quality data suggests that there may be somewhat elevated levels of both silt and nitrate from the Shannon on a rising tide. If there is an increase in the flow into and out of the wetland this would most likely exacerbate the accumulation of silt and of biomass from additional plant growth. While greater flows in and out of the wetland may help to flush out some of those nutrients and silt on an outgoing tide, they would certainly encourage greater inputs on each incoming tide; probably with a net acceleration of silt accumulation in the wetland.

4.1.2 Water Ingress from the Spring

Water ingress from the spring in the Eastern Wetland was not within the scope of this report. However, as outlined in section 5.5.6 this is worth further dedicated study, to ascertain the volumes of the spring flow and to assess whether the velocities would be sufficient to keep a channel open between the spring and the inlet/outlet pipe. If self-cleansing velocities are sufficient to keep a channel clear, then it may limit bulrush re-encroachment after a focused removal process, thus helping to maintain open water, in combination with reduced physical removal.

4.1.3 Water Movement Between Wetland Areas

Past management reports have proposed opening channels between the different waterbodies within area north of the Condell Road. The intention was to improve water throughput between the three relatively isolated basins to permit greater flow rates and improve movement of aquatic fauna within the wetland.

The benefits of such a measure may not merit the resource input and expense involved in carrying out the excavation and piping needed. It is recommended that dedicated hydrological and ecological assessments be carried out on this specific issue before any specific recommendations can be made.

4.1.4 OPW Feedback Regarding Water Flows

The OPW have indicated during the consultation phase for this plan, that the Westfields Wetlands are probably their own polder so changing the water level here may not have an effect on the operation of the OPW drainage scheme. That said, any change to a culvert or bridge (specifically the current main conduit to and from the Shannon) generally requires a Section 50 and/or Section 47 license from the OPW (Section 50 and Section 47 of the Arterial Drainage Act 1945). Such works would typically include attaching a weir, flap-valve or altering an opening to maintain higher water levels, such as have been considered in this plan. Given that an existing sluice and water level control are currently in place alterations to this may not necessarily require a formal Section 50, pending final designs and a further consultation with the OPW, but that a Section 47 would be needed to seek permission for such works. Planning permission may also be required from LCCC, and NPWS approval will also be needed for works in the SAC..

In order to assess the impact on any changes on water levels, a flood risk assessment would need to be carried out in conjunction with any weir proposals. Such a study would assess the properties potentially at risk, determining their finished floor levels.

There are already properties around the Westfields area shown to be at risk from coastal flooding (www.floodinfo.ie), but the OPW have proposed that while this may give an indication of the level of flood risk, it couldn't be relied upon to provide a sufficient level of detail and that a site specific assessment should be undertaken in conjunction with any proposed water level changes.

4.2 Water Levels

Water levels are examined here to explore the most beneficial water level for wildlife and for long term management of the wetland; specifically from the perspective of maintaining open water in the lake.

Observations made during the water sampling dates indicate that the water level in the Eastern and Central Wetland areas fluctuates by c.300mm with the tides. This creates variation in habitat around the outer perimeter of the lake and wider wetland marsh areas and also provides interchange between the wetland and the Shannon. The water levels in the Eastern Wetland can be measured using the graduations on the base of the platform (fig 4.4).



Fig 4.4. Graduations on the base of the platform allow for easy measurement of the lake water levels.

Raising of the wetland water levels is considered here as a way to create more open water, most notably by deepening the water with the aim expressed of limiting bulrush encroachment. Raising the levels would have two notable impacts. It would reduce the inflow and outflow between the wetland and the Shannon, but it would deepen the water on a permanent basis and thus help to limit the spread of bulrush to some extent.

There are a number of considerations which need to be taken into account:

1. Primary amongst these is that prior to any changes in water levels it would be necessary to carry out a flood assessment study on the wetland to ensure that the works do not pose a flood risk to local houses.
2. A permanent fixed water level would reduce the rise and fall of the water along the wetland shoreline, often the most biologically diverse area of aquatic habitats. Having carried out an ecological survey of the wetland it is concluded that raising the water level would not detrimentally impact on the value of the habitat for waterfowl.

3. By raising the outlet level and deepening the lake, there would be the likelihood that the inlet/outlet stream to the south of the causeway would cease to exist. At present it provides an attractive stony stream habitat. By raising the water levels this stream would become part of the wider lakeshore, without the same degree of swift shallow water movement, and thus lose this habitat type. However, to ameliorate this drawback, a raised perimeter of gravel chips could be used instead of a weir, thus allowing the stream to remain, albeit at a higher level.
4. In considering any proposal for amending the depths, a balance is required between deep and shallow zones in a pond or wetland. If the pond depth exceeds 2m there may be a risk of stratification and anoxic conditions. Keeping the permanent water shallow (c.1.2-1.5m max.) allows oxygen to reach the bottom of the pond, enabling natural biodegradation processes to occur. However, the shallower the pond the greater the potential for algal blooms in the warm, well-lit water, or encroachment by tall wetland plants. Safety is also a consideration in any pond, so water depth and bank slope should be considered with care. Likewise drying of the pond may be an issue if it is shallow and/or unlined.

Taking the above factors into consideration it is proposed that the perimeter area around the existing outlet point (Fig 4.5) be raised by c.300mm with limestone chips over an area of c. 10m from the outlet point. This will have the effect of raising the overall water level in the Eastern Wetland while also preserving the flowing water of the stream on each incoming and outgoing tide. It will help to retain water within the wetland and thus help to limit the spread of bulrush by deepening the lake. A flood studies report will be needed prior to any such works.



Fig. 4.5. Outlet point from the Eastern Wetland showing the stony base and stream.

In addition to preserving the stream bed habitat, the creation of a new stream bed will help to reinstate some of the variability in water level currently taking place, albeit at a higher level and with less pronounced variability than is currently the case.

Note that while raising the water levels will help to slow down the encroachment of bulrush by deepening the water, it will not deal with existing growth. Thus, the preferred option for keeping the lake area open is consistent annual bulrush harvesting. This will serve to remove accumulated nutrients within the plant biomass, and also to slowly reverse the natural successional process of

bulrush encroachment. See Chapter 5 for details. Deepening of the main lake sediments is also examined in Chapter 5.

Prior to any proposal to amend the water levels or flows, raising the level of the stream bed, a further assessment of the contributions from the spring is required. A flood study is also needed to ensure that any changes do not reduce the flood water storage capacity of the wetland to the point where it poses a safety risk for adjacent housing.

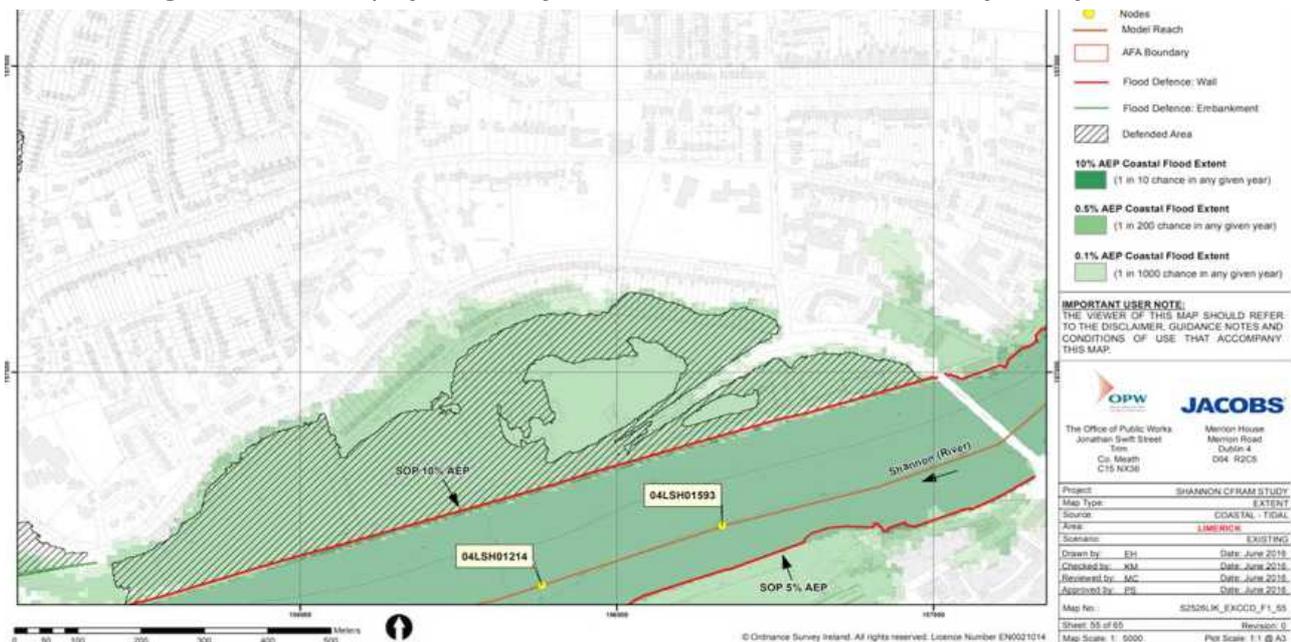
4.3 Flood Risk Considerations

The OPW maintenance maps show that the small catchment of Westfields Wetland is isolated from any nearby watercourses maintained by that body. (See appendix 4). As such, Westfields is unlikely to suffer from flooding based on its own catchment area. However, coastal flooding is identified as a possible issue by the flood maps for the area. Westfields Wetland and some of the perimeter housing in Westfields Park is cited as being situated at below high tide level during flood conditions. The housing is cited as being potentially at a 0.1% risk of flooding. The flood map for the area (fig. 4.6) shows the extent of coastal flooding for storms with a 10% likelihood of occurring in a given year, a 0.5% likelihood and a 0.1% likelihood.

Thus, any adjustment of the water levels within Westfields is unlikely to cause any flooding issue from the perspective of the Westfields catchment area itself; but it may interfere with the available storage capacity for a high tide event.

As such any adjustment to levels in the lake or wider wetland area should be considered in the context of a more complete flood studies report, which is outside the scope of this Plan.

Fig. 4.6. Flood map of the Westfields area. Source: www.floodinfo.ie/



4.4 Recommended Actions

Achievement of a greater area of open water may be achieved primarily by either bulrush removal (covered in the next chapter) or increasing water depth across the wetland. The recommendations below refer to the latter.

The first question to consider is whether raising water levels is a good idea or not. Thus the recommendations below include the work needed to fully assess this question.

Infrastructure and further study:

- Before deciding whether to raise the water levels or not, an assessment of the volumetric contributions of the spring is required. This will then help to ascertain whether or not the spring may be used as the primary source of water in the wetland.
- A straightforward way to assess the volume of spring water ingress may be to reinstate the flap valve on the inflow/outflow to the river on a temporary basis. If the flap valve is reinstated for a few days and the water flows monitored closely for that time it may be possible to assess the relative volumes entering vs. exiting, and thus give an indication of the influence of the spring on overall water movement. Note that seepage through the embankment is also a factor to be accounted for in this context, which may add an element of uncertainty into the results.
- Note that if water level changes are to be carried out in the wetland area north of the Condell Road, then a flood risk assessment will be required to ensure that works do not pose a risk to nearby housing. This is needed even for a modest change, for example to assess the potential for raising the water level by c.300mm.
- Raise the level of the outlet stream between the main lake and the inlet/outlet point at the Eastern Wetland upon completion of a flood risk assessment and if found to be appropriate to do so without risk of flooding.
- Confirm the presence of a steel plate reported to cover the spring since the 1950s; and assess the potential for removal of same as a way to increase water ingress from this source; if clean and hydrologically appropriate to do so.
- Refer to Chapter 5 for measures relating to sediment removal or dredging.

Maintenance:

- Refer to Chapter 5 for measures relating to annual bulrush removal.

5.0 Bulrush Encroachment and Clearing

The lake at Westfields wetland occupies the Eastern Wetland area, located between Westfields Park housing estate to the north and Condell Road to the south, with the central causeway as the western boundary to the lake. Prior to the construction of Condell Road, this area was tidal, fed via a large pipe with a non-return valve which exited via the flood bund along the River Shannon. The flood bund formed a promenade which was historically a popular walking route for the city residents.

Over the past couple of hundred years the land use within this area was changed from farmland, subjected to flooding during spring tides, to the current lake that is present today. With the construction of Condell Road in the 1980s, the pipe beneath the flood bund was made smaller and the flow into and out of the lake became reduced.

Since that time, the lake has become very overgrown with tall emergent plants around the outer perimeter, with considerable encroachment into more central areas also. This is part of a natural process of succession from lake to fen to raised bog; but the rate of plant encroachment is exacerbated by nutrient inputs from a variety of sources including road runoff, inputs from the River Shannon, dumped garden and landscaping clippings, possible historic plumbing of both grey water and sewage and potential elevation of bird numbers by feeding and possibly the spring into the Eastern Wetland.

The dominant tall emergent plant species present at Westfields is bulrush (*Typha latifolia*). Bulrush establishes well in shallow water and can survive in areas of over 1m deep. This has occurred here and is a source of concern for many local residents and regular visitors to the park. The main problem reported is that it reduces the visible open water across the lake, as well as reducing the ease of movement of waterfowl across the lake surface. In deeper sections of the lake submerged aquatic species are adding to the encroachment of plant biomass and can make it visibly difficult for water fowl to swim across the lake surface.

Removal of plant encroachment has been a high priority for participants in past public consultation processes and has been repeated in the public consultation carried out as part of this plan. Thus, this plan seeks to explore ways to reduce encroachment by minimising nutrient inputs; and to actively reverse the successional process by removing plant material and expanding the body of open water that is present.

It is important that any works that are carried out are done in a manner that will actively improve the wildlife and biodiversity value of the area. Thus, it is proposed that any work be carried out incrementally, to ensure that a variety of habitats and successional stages are present at any given time.

From an amenity perspective, it is important to recognise that aesthetic sensibilities change over time. As we increasingly recognise the value of nature in our lives and the value of biodiversity for our collective survival in the world, we are shifting our definition of what a beautiful landscape

looks like. Thus, while part of the work needed at Westfields may be to clear some of the lake area to create more open water, another part is to provide a steady process of education about natural processes and how they benefit both nature and ourselves.

This section of the plan outlines measures for removal of excessive bulrush growth; prioritising the areas where work would be most valuable, and identifying ecologically sensitive ways to carry out that work. In addition to opening up the water surface for visual amenity and wildlife value, the removal of plants will have the added benefit of removing the nutrients that they contain, reducing the overall nutrient content of the water body.

5.1 Priority areas for bulrush removal

The growth and encroachment of bulrush in Westfields is part of a natural process of succession from lake to fen to raised bog. It is most likely exacerbated by high nutrient inputs from the Shannon and the surrounding landscape, but is nonetheless a natural process. However, artificially retaining open water offers benefits for wildlife and for local amenity use, so there is general consensus that it is worth putting in the time and resources to keep the natural process of fen development in check.

To gain a clearer understanding of the encroachment in recent years it is worth examining aerial photographs over time. The photographs outlined in Appendix 5 show a clear pattern of encroachment over the past decade.

The main priority area of concern for local residents and visitors is generally around the viewing platform on the causeway along the western boundary of the lake. There is a general desire for this area to be retained as an area of open water. In recent years bulrush growth has thickened up extensively in this area and has cut off visual sightlines from the platform to the lake. It also limits the extent to which water fowl can swim up to the platform. Since feeding ducks and swans was an activity that was enjoyed by visitors to the wetlands, this change has been a cause for concern.

Thus, the restoration of open water around the platform, with a generous sight line into the larger body of the lake, is deemed to be a clear priority area for bulrush removal. Secondary to this, it is proposed that further plant removal be carried out around the wider lake area to reverse the natural successional growth of bulrush. This may be accompanied by excavation in certain areas should budgets permit.

The best management for wildlife is to allow or create a diversity of different habitat types and successional stages. As such, it is important not to remove too much emergent bulrush at any one time. For reed harvesting, the Natura Impact Statement carried out by LCCC in January 2020 stated that not more than one third of the total area should be worked on at any one time. For any excavation works, the Wetland Restoration Manual² suggests that a limit of not more than 1m³ of material should be removed from lakes or ponds for every 100m² of surface area in any given year.

² The Wildlife Trusts' Water Policy Team (2001) *Wetland Restoration Manual*. The Wildlife Trusts, Nottinghamshire, UK.

Wetland plant removal needs to be done with care to ensure that local wildlife is not adversely affected during the works, or thereafter. One way to ensure this is to work on a gradual phased basis rather than making large changes in any one year. It is thus suggested that the limits given in the NIS and Wetland Restoration Manual be treated as generous upper limits, and that the most appropriate management type would have relatively minor impacts on the overall habitat in any given harvesting time, but be carried out annually so that a steady process of reversing bulrush encroachment would take place over time.

It is worth examining the prioritisation of bulrush removal under three separate headings; namely removal around the platform; removal around the wider lake area; and possible excavation works.

Priority 1 – removal of bulrush around the platform

Since this is the area that is most in the public eye and the focus of most concern when encroachment occurs, it is proposed that the main priority area centres around the platform and out into the lake. The water depth is c.0.9-1.4m deep at the platform end of the lake, so there should be ample opportunity for successfully controlling bulrush there by annual cutting, given that it is both accessible in a wetsuit for cutting or root removal and also deep enough to harvest with a floating harvester if needed, and also to limit regrowth if cut at the correct time of year.

Figure 5.1 shows area A in pink, close to the platform. It is proposed that this area be the only area to be cut in year 1, and that it be revisited in each subsequent maintenance year to remove regrowth and potentially to widen the lake at this location over time. The shaded area is c.0.5ha, which is well below one third of the current bulrush cover across the eastern wetland.

Figure 5.1. Priority areas for harvesting or root removal works



The green outline is the outer perimeter of the wetland area.
The yellow line is the area of open lake from 2011-2013 aerial photos.
The blue line is the reduced area of open lake from 2013-2018 aerial photos.
Image: ©Ordnance Survey Ireland/Govt. of Ireland 2021/OSi_NMA_141

Priority 2 – removal of bulrush from the lake perimeter

Figure 5.12.4 shows three further proposed plant removal areas around the perimeter of the lake. Area B is c.0.25ha (green); area C is c.0.1ha (purple) and area D is c.0.2 ha (orange). These are all areas which have encroached in the past 6-8 years. It is proposed that these areas be harvested by cutting or root removal on a phased basis, with only one of each of areas B, C, or D worked on in any given year.

Options for excavation works

Excavation may also be considered a suitable method if a budget were made available. The location for excavation works will be different from those selected for clearing by harvesting or root removal. This is a relatively costly and ecologically invasive measure, but is worth considering as a possible option. Section App 5.2 in the appendices proposes suitable locations for dredging works; removing both sediments and roots at the same time.

5.2 Phasing of works

If clearing is by root removal and/or harvesting by hand or by machine without excavation, then the phasing should be carried out as follows:

- Year 1 – area A only (around platform, and out to connect with the open water of the lake)
- Year 2 – Area B with repeat cutting in area A to remove any regrowth
- Year 3 – Area C with repeat cutting in area A
- Year 4 – Area D with repeat cutting in area A
- Year 5 onwards – repeat as per year 2 onwards, but with a reduced time input due to the reduced volumes of plant material that will need to be removed each time. It is possible that over time work could be carried out every 2-3 years; but note that recovery of plants is part of the natural process of marsh development, so to keep the open water present, regular works will be needed into the long term.

If excavation is being carried out, then excavate Area A in year 1 and Area B in year 2 (fig.5.1); or consider that both areas could be excavated in any given year since the total surface area is less than one third of the total habitat area, and it may be easier to allocate funding once rather than in two successive years for this work. Areas C and D are not so much of a priority that excavation is proposed for these more peripheral locations.

Note that in the year(s) following excavation, cutting or root removal of bulrush will still be needed to ensure that stragglers are removed. Otherwise, there is a risk that these will spread and re-encroach again across a wide area, even with the lower bed level after excavation. Thus, the cyclical bulrush cutting cycle programme should be adopted regardless of whether excavation is carried out or not. Input in each subsequent year is likely to be greatly reduced however.

Over the course of 5-10 years the extent of input for annual cutting required will become apparent. It is recommended that excessive widening of the area of open water should be avoided. Thus, it is proposed that bulrush cutting be avoided in areas where it was well established in 2011-2013 maps (Figure 5.1) unless specifically approved by NPWS.

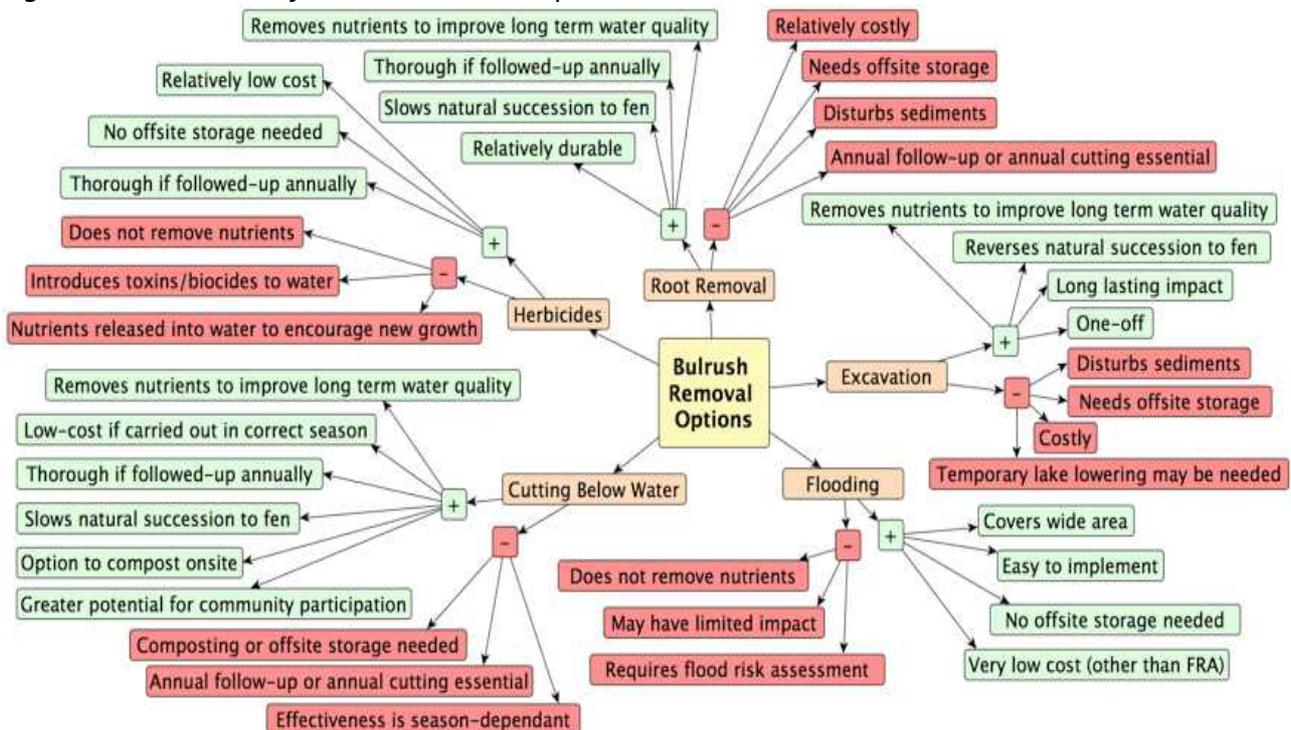
5.3 Exploration of bulrush removal and disposal methods

There are a variety of methods which may be adopted for bulrush removal from the lake at Westfields. These vary in cost, ease of implementation, ecological impact, wider disturbance (such as the impact of flooding on pathways or risk factor for nearby houses).

The main methods of bulrush removal include the following, as shown in Figure 5.2:

- Excavation
- Root removal
- Plant cutting
- Herbicide application (listed but not recommended)
- Flooding

Figure 5.2. Overview of Bulrush Removal Options



Each method is described below in more detail, and for a summary table see Appendix 5.

5.3.1 Excavation

Excavation is potentially the most effective method for bulrush removal, since it lowers the soil level within the lake along with removal of the bulrush rootstock. Thus, it is likely to have the most lasting impact as a removal method. This approach temporarily reverses the natural succession from lake to fen, slowing the overall progression from open water to full plant cover across the wetland.

However, it is also an expensive approach, given that it requires extensive earthworks to remove the roots, lake sediments and subsoil. It may also require temporary draining of the lake to permit machine access; unless a floating barge is used or works are restricted to perimeter areas. Removal of excavated material from the area would be needed, preferably after dewatering on site to limit the weight of water present.

Even though excavation would be a very thorough method of root removal, cutting in the year or two following excavations would be recommended to drown any regrowth that may occur. A Natura Impact Statement (NIS) is required for works within an SAC to ensure that local biodiversity is adequately protected. For any excavation follow the Wetland Restoration Manual³ guidelines and considerations (from Section 5.1). Specifically, the upper limit of 1m³ of excavated material per 100m² of habitat surface area.

5.3.2 Root removal

Root removal by direct hand removal can be an effective, durable method as long as follow-up cutting is repeated consistently in subsequent years. As with excavation, and cutting, root removal will remove nutrients from the lake, thus limiting the rate of further regrowth, slowing the natural succession from lake to fen by removing biomass.

This can be a relatively costly method. Offsite storage of material is needed. Sediments are disturbed, which may contribute to siltation and temporary nutrient enrichment of the water body. Annual follow-up with repeat removal or cutting well below water level is essential to ensure the long-term success of the process, however repeat cutting may be considerably less costly than the initial work since the bulk of the impact occurs in the first round of clearing. An NIS would be required and approval procured from NPWS prior to commencement.

Root removal of bulrush was carried out by hand pulling in 2008 across some of the lake, in the vicinity of the platform. Note that while this cleared the area effectively the bulrush regrew again from remaining root fragments and re-encroached from the outer edge of the cleared area. Thus, any work needs to be part of a wider review and consistent process going forward.

5.3.3 Plant cutting below water

Plant cutting involves the removal of bulrush stems and leaves at a good depth below the water surface; preferably cutting as close to base sediment level as possible. Cutting during the appropriate season drowns the roots and thus limits regrowth. It also removes the vegetation, and the nutrients that they contain, from the lake. This has the long-term effect of lowering the overall nutrient content of the lake, thus reducing regrowth across the wetland. This method has the twin benefits of being relatively low cost compared with dredging or root harvesting and potentially very effective if carried out as part of a regular maintenance programme. Cutting may be with a mechanical harvester or hand cutting with a short bladed scythe. Note that while cutting has been demonstrated to have good results in cold climates (Great Lakes of North America), results in warmer climates may not be as reliable. It is proposed that a trial of different harvesting methods

³ The Wildlife Trusts' Water Policy Team (2001) Wetland Restoration Manual. The Wildlife Trusts. Nottinghamshire, UK.

be carried out in conjunction with the main selected removal methodology to assess the effectiveness of each approach. This will help to steer the long term management at the site.

Annual follow-up is essential if the process is to be effective. Research suggests that the effectiveness of this method is very dependent on the season selected for carrying out the work. Section 4.2.3 outlines the seasonal factors in more detail.

Since works are carried out for a local authority, they can proceed under the Second Schedule of the Habitat Regulations and that it is therefore up to the local authority to screen the project and assess whether a full Appropriate Assessment is needed or not. (An AA would require consent from An Bord Pleanála and NPWS). Winter cutting has been screened by LCCC already and an AA is not needed. However cutting earlier in the season may need to be screened separately to assess the potential ecological impacts. Cutting during the nesting season from 1 March to 30 August has been ruled out by the NPWS.

5.3.4 Herbicide application

This method can be effective if suitable follow-up in the form of further applications of herbicide or cutting etc. are put in place to prevent regrowth of treated areas. It is also relatively low cost, and requires no removal of material off site. Herbicide application was used as a bulrush control measure at Westfields lake in the past (c. late 1990s). The method used was direct sponge application to each leaf to minimise the contamination of the lake with biocide toxins. Blanket spraying is not being considered as a viable option.

However, it should be noted that the safety of glyphosate-based herbicides is currently under review in the EU and elsewhere, and in recent years has been classified a probable carcinogen by the WHO. A number of countries have taken steps to have it banned. For these reasons it is best avoided, particularly in public areas. Additionally, while herbicide application can clear the water of plant growth, it allows the nutrients to become reintroduced into the water body, essentially providing fertiliser for new plant growth to emerge. Also, herbicide applications outside of the nesting season may not be effective; and applications within the nesting season may not be permitted. Overall this is not considered a viable method for use at Westfields.

5.3.5 Flooding

Flooding by raising the lake water level is another possible option for bulrush removal. It would have the benefits of covering a wide area of the lake, being low cost and easy to implement. It would also avoid generating material for removal and municipal composting.

However, flooding alone in this situation is not likely to be sufficient, given that the bulrush is already well established and the potential for raising water levels is limited by existing path levels and may also be limited by nearby dwellings (pending a flood risk assessment). Neither will flooding remove the nutrients in the bulrush biomass, so it won't provide a nutrient removal pathway from the habitat for water quality improvement.

Flooding may however be employed as a partial measure hand in hand with other clearing methods. The overflow from Westfields lake is located at the southern corner of the lake, where

the causeway nears Condell Road. A modest structure at this location could be used to raise the water level by 300mm or more. A flood risk assessment would be needed prior to any weir works to ensure that adjacent housing would not be at risk of flooding. Also, for any weir installation a section 47⁴ permission will be required from the OPW.

5.3.6 Disposal of removed material

Removal to Mungret Recycling Centre for municipal composting is recommended. Note that root removal to other sites is not advised due to the discovery of non-native invasive aquatic species in Westfields.

5.4 Scheduling bulrush removal and disposal works

The primary factors influencing the time of bulrush removal are the legal and ecological restrictions on habitat disturbance during the nesting season. Depending on the removal method used, the growth season of bulrush is another critical factor. These sometimes conflicting factors are explored below.

There are a number of legal processes that help to protect habitats in Ireland. The main legal instruments which need to be considered in the context of bulrush removal are the Wildlife Act⁵ and the Habitats Directive⁶. Among other things, the legislation sets out the season within which works are prohibited due, mainly, to the nesting of birds. Thus, working outside the nesting season (March 1st to August 31st) is an ecologically safer and easier process than working within it, even where regrowth of bulrush may be sparse.

Regardless of the time of year selected for works, liaison with the National Parks and Wildlife Service (NPWS) is needed for any works within an SAC or close enough to one in order to have an impact on the wildlife there. In certain circumstances an Appropriate Assessment (AA) or Natura Impact Statement (NIS) will be needed before any works are carried out to assess whether permission will be granted or not.

LCCC has carried out an NIS for bulrush cutting by boat or floating harvester at Westfields and cutting during the nesting season has been expressly ruled out by the NPWS, even for small trial areas. Thus, any works on bulrush removal will need to be carried out outside the nesting season.

In parallel with the ecological and legal factors determining when work can safely and legally be carried out, there is a very practical element to be considered vis a vis the cycle of bulrush growth itself. Cutting in the middle of winter, when the bulrush are dormant, will be considerably less useful at removing nutrients and biomass and may similarly be limited in terms of restricting the proliferation of bulrush growth (unless combined with spring flooding).

⁴ Arterial Drainage Act, 1945

⁵ Wildlife Act, 1976, <http://www.irishstatutebook.ie/eli/1976/act/39/enacted/en/print>

⁶ Habitats Directive (92/43/EEC) <https://www.npws.ie/legislation/eu-directives>

Cutting in late spring can exacerbate the proliferation of shoot development and be counter-productive, unless followed up with subsequent summer cuts to exhaust the roots – which as been ruled out due to the nature of the habitat for nesting birds. Research suggests that the best time of year for cutting is from late summer into the autumn.

Looking at these two conflicting pressures of ecological impact vs effective removal time we can build a picture of possible effective harvesting times as set out in Figure 5.3. A Natura Impact Statement was prepared by LCCC for bulrush clearance in spring 2020 and uses breeding bird times taken from Ferguson-Lees et al (2011). This table has been adapted and set out here as a calendar format to give a graphic representation of the vulnerable times of year for waterfowl in Westfields. Also included on the table are the Irish legal nesting season from March to August inclusive; and the recommended bulrush harvest periods from a number of different sources (all North American).

Figure 5.3. Calendar of factors influencing the timing of bulrush removal works.

| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Legal nesting season | | | | | | | | | | | | |
| Coot (nesting) (with young) | | | | | | | | | | | | |
| Tufted Duck (nesting) (with young) | | | | | | | | | | | | |
| Mallard (nesting) (with young) | | | | | | | | | | | | |
| Teal (nesting) (with young) | | | | | | | | | | | | |
| Mute Swan (nesting) (with young) | | | | | | | | | | | | |
| Moorhen (nesting) (with young) | | | | | | | | | | | | |
| Reed bunting (nesting) (with young) | | | | | | | | | | | | |
| Sedge warbler (nesting) (with young) | | | | | | | | | | | | |
| Gadwall (nesting) (with young) | | | | | | | | | | | | |
| Lishawa et al. '17&'19 | | | | | | | | | | | | |
| Ochterski, 2003 | | | | | | | | | | | | |
| Hand cutting months | | | | | | | | | | | | |
| Mechanical cutting | | | | | | | | | | | | |
| Root removal months | | | | | | | | | | | | |
| Excavation months | | | | | | | | | | | | |
| Water level change | | | | | | | | | | | | |

Notes:

Lishawa et al., 2017⁷ and Lishawa et al., 2019⁸: Mechanical cutting and/or root removal in August showed good results.

⁷ Shane C Lishawa, Brendan D Carson, Jodi S Brandt, Jason M Tallant, Nicholas J Reo, Dennis A Albert, Andrew M Monks Joseph M Lautenback and Eric Clark. *Mechanical harvesting effectively controls young Typha spp. Invasion and unmanned aerial vehicle data enhances post-treatment monitoring.* Frontiers in Plant Science. 2017; 8:619.) <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5403916/>

⁸ Shane C Lishawa, Beth A Lawrence, Dennis A Albert, Daniel J Larkin and Nancy C Tuchman (2019) *Invasive species removal increases species and phylogenetic diversity of wetland plant communities.* Ecological Evolution 9(11): 6231-6244. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6580430/> Open Access License CC/BY/4.0

Ochterski, 2003⁹: May cut promotes shoot growth.; so must be followed up with summer cuts also. However a single cut in late summer can be effective.

The lower section of the chart shows the recommended months for different control methods. Cutting is not to be carried out outside of these recommended times.

What can be seen from this calendar is that the most effective time of year for cutting that is also legally permitted is in September, probably extending into autumn. The Wisconsin Wetlands Association recommends cutting followed by flooding, preferably with water levels controlled on site¹⁰. WWA suggest winter cutting followed by spring flooding, and this presumably refers to working in the drier frozen winter conditions followed by a reliable flood of meltwater in spring, so may be more about the hydrology of the region than a seasonal issue for *Typha per se*, so a winter cut is not included above.

It is possible that harvesting plant material in the autumn may be less effective than in the summer (as was the case in this example) since the stored carbohydrate in the *Typha* rhizome will provide food for regrowth the following spring (unless the root drowns over the winter, as suggested by the Wisconsin Wetland Association).

Hand cutting has an earlier window than mechanical harvesting since it is likely to be less impacting on birds with young. Root removal is likely to be more effective (when followed by either further root removal or cutting in subsequent years) over a longer window than harvesting. Hence it is proposed as an option for any month outside the nesting season. Excavation can also legally be carried out in any month outside of the nesting season, but has been pushed out to October to allow more space for waterfowl with young for all of September. Changes in water level management must not take place within the nesting season, to avoid disturbance to birds.

In summary, spring cutting can exacerbate the issue by promoting a proliferation of new shoots. Summer work is often the most effective, but is in the middle of the nesting season and as such has been ruled out by NPWS. Early autumn (ideally in the first week of September) is probably the time that best balances effectiveness with local birdlife needs. In this way, the plants are cut close to the base coming into the winter season and as such will remain inundated by water and thus drown out the roots. This is also close enough to summer growth when the volume of green biomass is at its greatest and thus most conducive to removal of nitrates and phosphates with the leaf litter.

Note that a cut in early winter may be better for local birdlife (outside of the time when swans, coot and moorhen are still rearing their young), but may not be as effective for long term clearance and may thus require a greater amount of follow-up.

It is suggested that a series of carefully prepared trials are carried out to ascertain the most effective time for cutting, and to explore the effectiveness of winter cutting as compared to early

⁹ Ochterski (2003) *Controlling Cattails How to Control Cattails in a Farm Pond*. Cornell Cooperative Extension). <http://allegany.cce.cornell.edu/natural-resources-environment/ponds/controlling-cattails>

¹⁰ Wisconsin Wetlands Association, 26 April 2017, Invasive plant profile: Cattails [*Typha sp.*] WWA. <https://www.wisconsinwetlands.org/updates/invasive-plant-profile-cattails/>.

autumn cutting. This research will help to steer a more cost-effective course of action for bulrush management in the years to come at Westfields.

5.5 Long term management requirements

It is clear from the experience at Westfields to date, and from research in the area of bulrush removal, that ongoing maintenance input will be needed if the encroachment is to be kept in check and the lake area kept open. The nature and extent of the ongoing management will vary to some extent with the maintenance methods selected, but in summary it is likely that some annual cutting of emergent growth will be needed.

The following graph (fig. 5.4) is an excerpt from research by Shane C Lishawa *et al.* 2019¹¹. It shows the relative effectiveness of various bulrush removal methods over a 2-yr period.

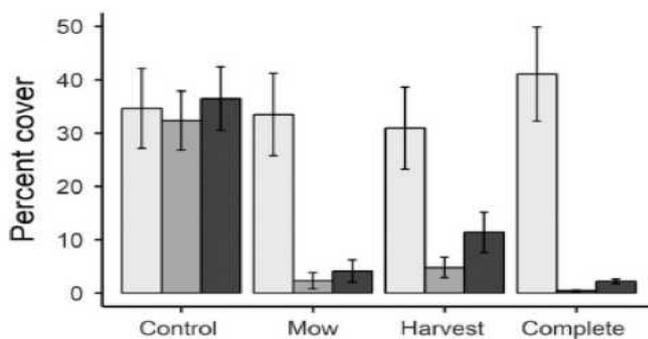


Figure 5.4. Comparison of Typha harvesting methods from Lishawa *et al.*, 2019.

The three bars in each category show pre-intervention (pale grey); 1-yr after intervention (grey) and 2-yr after intervention (dark grey). “Control” had no intervention. “Mow” involved mechanical cutting of bulrush at the sediment surface in August, leaving debris in situ; “Harvest” involved mowing plus removal of debris; “Complete” involved removal of root material as well as above ground material.

Note that in all cases, after 2 years some regrowth had occurred, indicating that for any regime adopted at Westfields, ongoing maintenance will be a necessary part of the management regime.

Regardless of the removal method selected the following annual maintenance regime is proposed:

- Cutting by machine or by hand (or root removal by hand) should be carried out each year.
- Cutting should be carried out as low in the water as possible, and all cut material removed for composting at Mungret Recycling Centre (or as agreed with LCCC).
- The preferred time for such works is September, extending into the winter months if trials demonstrate that this is a viable method of plant control.
- Due to the presence of waterfowl and their young, work is to take place in only a limited portion of the lake in any given year unless approved by NPWS in advance.

¹¹ Shane C Lishawa, Beth A Lawrence, Dennis A Albert, Daniel J Larkin and Nancy C Tuchman (2019) *Invasive species removal increases species and phylogenetic diversity of wetland plant communities*. Ecological Evolution 9(11): 6231-6244. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6580430/> Open Access License CC/BY/4.0]

- In order to limit the disturbance to the overall habitat, an area of up to 1000m² should be harvested each year. Within this limit, only up to 20% of the total bulrush area may be removed in any given year. This will permit multiple successional stages to co-exist in different parts of the wetland area.
- Only up to 50% of the Eastern Wetland may be exposed by such works to create open water. This is to avoid excessive long term encroachment into the marsh edge habitat.
- These guidelines and percentage areas should be reviewed annually to ensure that the habitat is protected alongside assessing the effectiveness of the methods used and aesthetic value achieved.

6.0 Biodiversity and Invasive Species

6.1 Introductions

This Biodiversity section examines the habitats and species present in the Westfields Wetland. Areas, habitats and species of ecological significance are noted based on the results from a desktop review of data available and site visit.

The aim of the Westfields Wetland Management plan is to “explore opportunities for enhancement of the wetlands’ amenity and recreational value while taking into account the ecological requirements of the SAC site and maintaining and enhancing biodiversity as a key objective”. Using information collated on the biodiversity and wildlife of the Wetlands, management actions are considered and recommended in Appendix 10.

The Wetlands are located within the Lower River Shannon Special Area of Conservation and at all times this, along with key objective of this Management Plan, is kept in consideration when making recommendations.

6.1.1 Methodology

Background data

The information gathered is used to identify and explore opportunities for enhancement of the wetlands amenity and recreational value, while taking into account the requirements of the ecological sensitivities of the site, most notably the Lower River Shannon Special Area of Conservation within which the Wetlands are located.

A desk-based assessment was carried out to collate information regarding protected/notable species and statutorily designated nature conservation sites in, or within close proximity to, the study area. This included a data search for protected and notable species, conducted using the National Biodiversity Data Centre Mapping System (NBDC 2020¹²).

Information for statutorily designated sites including Special Protection Areas (SPAs), Special Areas of Conservation (SACs), Ramsar Sites, Natural Heritage Areas (NHAs) and proposed NHAs (pNHA) was collected from the online resources provided by the National Parks and Wildlife Service (NPWS 2020).

Additionally, long term wintering bird data was supplied by the local branch of Birdwatch Ireland. Bat data from a survey carried out by JBA near the wetlands has also been supplied.

Ecological Survey

A field survey was carried out on 17th July 2020 JBA Consulting to inform the ecological baseline of the site.

¹² <https://maps.biodiversityireland.ie/Map>

The Survey methods were in general accordance with those outlined in the following documents:

- Best Practice Guidance for Habitat Survey and Mapping¹³.

Aerial photographs and site maps assisted the habitat survey. Habitats have been named and described following *A Guide to Habitats in Ireland*¹⁴ (Fossitt 2000). Nomenclature for higher plants principally follows that given in *Webb's An Irish Flora*¹⁵ and *New Flora of the British Isles 4th Edition* by Stace (Clive Stace 2019¹⁶).

Signs of mammals and birds were also observed and noted during the survey, and all invasive non-native species were recorded and their location noted through JBA mapping software GISmapp.

The key objective of the Management Plan, namely the preservation and enhancement of biodiversity, is at all times considered when making recommendations. The below sections are broken into three parts. The initial detailed biodiversity results from the desktop review and ecological survey; guidance for future management measures; and the recommended projects for biodiversity recording and enhancement.

Limitations and Constraints

The data collated for this plan necessarily relies on some assumptions and is inevitably subject to some limitations. The following points should be noted to ensure the basis of the assessment is clear:

1. The site visit was carried out in July 2020 and the data does not reflect the whole ecology of the site throughout the year. The precautionary principle is used at all times when determining potential ecological sensitivity of the site.
2. The timescale of this project (six months) meant there was no scope for carrying out wintering bird surveys, however long-term data from Birdwatch Ireland volunteers was supplied for this management plan.
3. A request for wintering bird data through IWeBS for the Westfields Wetland could not be fulfilled, as IWeBS records were unavailable at the time of request.
4. The scope of this survey did not extend to an assessment of aquatic macroinvertebrates or fish.

6.2 Ecological baseline, survey and mapping

6.2.1 Protected areas

The Westfields Wetland are protected under international and national law, under the following conservation areas:

¹³ Smith, G.F., O'Donoghue, P., O'Hora, K., Delaney, E. (2011) *Best practice guidance for habitat survey and mapping. The Heritage Council: Ireland.*

¹⁴ Fossitt, J.A. (2000) *A Guide to Habitats in Ireland*, Heritage Council of Ireland series, Heritage Council/Chomhairle Oidhreachta: Kilkenny.

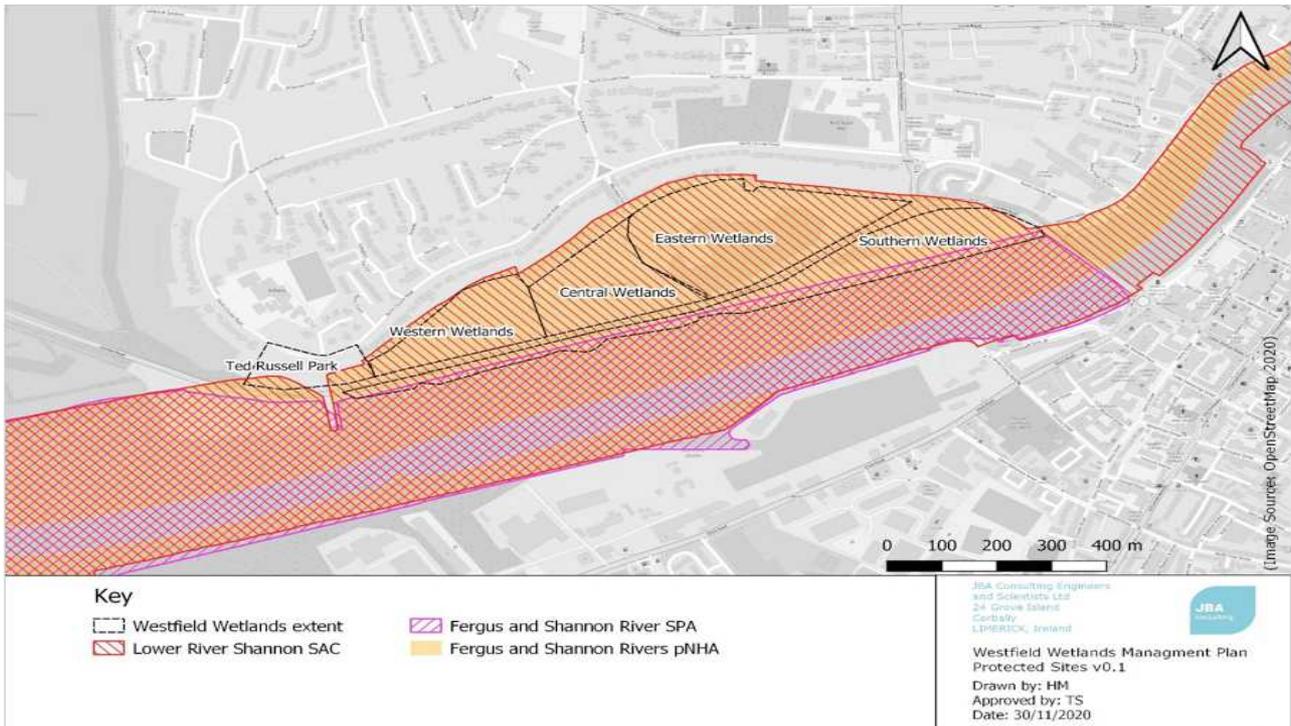
¹⁵ Parnell, J., Curtis, T. (2012) *Webb's An Irish Flora* [online], 8th ed, Trinity College Dublin.

¹⁶ Clive Stace (2019) *New Flora of the British Isles*, 4th ed, C&M Floristics.

- Lower River Shannon Special Area of Conservation (SAC)
- River Shannon and River Fergus Estuaries Special Protection Area
- Fergus Estuary and Inner Shannon, North Shore Proposed Natural Heritage Areas (pNHA).

The background to these designated areas is outlined in Appendix 6. Conservation designations are mapped in Fig. 6.1.

Figure 6.1 Conservation designations at Westfields¹⁷.



6.2.2 Habitat survey

The following habitats were identified during the survey and included in Table 6.1 and are further described in the sections below. Habitats that are linked to the Annex I habitats (protected under EU habitats directive) are also outlined in this table. Areas of these habitats are detailed in Fig. 6.2 overleaf.

Figure 6.2 Habitat map of Westfields Wetland

| Fossitt Code | Habitat | Links to Annex I habitat |
|--------------|---------------------------------|--|
| CW2/SS3 | Tidal River/ Infralittoral muds | This habitat type is linked to the EU Annex I 'estuaries (1130)'. This habitat in the River Shannon both an SPA and SAC |
| FS1 | Reed and large sedge swamps | None |
| FS2 | Tall-herb swamps | This habitat type is linked to the EU Annex I habitat Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels (6430) |

¹⁷ NPWS (2020) National Parks and Wildlife Service Map Viewer. <https://www.npws.ie/maps-and-data>.

| | | |
|---------|-------------------------------|---|
| FL5 | Eutrophic lakes | None, but these waterbodies often contain birds species protected under the River Shannon SPA |
| GA2 | Amenity grassland (improved) | None |
| GS2 | Dry meadows and grassy verges | None |
| WD1 | (Mixed) Broadleaf woodland | None |
| WD5 | Scattered trees and parkland | None |
| WL2 | Treelines | None |
| WN5 | Riparian woodland | This habitat type is linked to the EU Annex I habitat 'Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i> , <i>Alnion incanae</i> , <i>Salicion albae</i>) 91E0' which is a Qualifying Interest of the Lower River Shannon SAC. Further investigation is required to determine if Riparian Woodland at this location corresponds to Alluvial Forest 91E0. |
| WN6 | Wet willow-alder-ash woodland | None |
| WS1/WS3 | Scrub/ Ornamental shrubs | None |
| WS2 | Immature woodland | None |

These habitats are further described as follows:

CW2/SS3 Tidal River/ Infralittoral muds

The River Shannon is an estuarine river up to Limerick City centre. Beside the extent of the Westfields park area, the river is brackish with muddy deposits exposed at low tide. The river frequently inundates the woodland growing between the edge of the muds and the old embankment stone walls. This habitat type is linked to the EU Annex I 'estuaries (1130)'.

FS1 Reed and large sedge swamps

This habitat is primarily composed of bulrush *Typha latifolia* and common reed *Phragmites australis*, and smaller extent of common club-rush *Schoenoplectus lacustris*.

This habitat is also found within the brackish water of the edge of the River Shannon, which is dominated by sea club-rush (*Bolboschoenus maritimus*).

In areas where there is a higher number of broadleaf species, it can be considered a mosaic with FS2 Tall-herb swamps. In the main lake (Eastern wetlands), this habitat can be found on the lake shore, with a good diversity of species such as purple loosestrife *Lythrum salicaria*, hemlock water-dropwort *Oenanthe crocata*, water mint *Mentha aquatica*, water plantain *Alisma plantago-aquatica*, Gypsywort *Lycopus europaeus*, common valerian *Valeriana officinalis* and marsh ragwort *Senecio aquaticus*.

Figure 6.3 The main lake in Westfields Wetland, fringed by lakeshore plants



FL5 Eutrophic lakes

The eastern wetlands contain a large lake, which is fringed by extensive cover of Bulrush. Aquatic plant species including minute duckweed *Lemna minuta*, Ivy-leaved duckweed *Lemna trisulca* greater duckweed *Spirodela polyrhiza*, spiked water-milfoil *Myriophyllum spicatum* and whorl-leaved milfoil *Myriophyllum verticillatum*. Two non-native species of aquatic plants were also identified: Lesser duckweed *Lemna minor* and Nuttall's pondweed *Elodea nuttallii*. Green algal growth was also found in the lake, a sign of phosphate and nitrate enrichment.

This lake is the main amenity attraction of the park, and hosts many bird species year-round, such as mute swan, mallard, blackheaded gull, coots, and moorhen, all of which were observed on the day of the survey. Tufted duck is also regularly sighted on this lake. It is also an important site for migratory birds to flock to during the winter months.

Another eutrophic lake is situated between the stone embankment and the Condell Road in the southern wetlands. This lake is also being encroached by vegetation but is not easily accessed by the public as there is no path. No birds were seen on this lake, and it appears to have become overgrown with duckweeds also.

Figure 6.4 Main lake in Westfields Wetland is being encroached by Bulrushes.



Figure 6.5 Eutrophic lake in the Southern Wetlands.

GA2 Amenity grassland (improved)

Most grassy areas in the park are intensively managed and cut regularly with very little diversity of plant species in this grassland. While it is important that grassy areas beside paths are cut regularly for people to enjoy the park, there is scope in the Central Wetlands and Ted Russell Park for a reduced mowing regime, in line with the actions devised by the All-Ireland Pollinator Plan. These actions are further detailed in Appendix 10.

Figure 6.6 Amenity grassland beside the pathways is regularly cut



Figure 6.7 Scope for reduced mowing in large grassy areas away from the paths

GS2 Dry meadows and grassy verges

This linear habitat is found bordering the Condell road along a verge with a planted oak treeline. This grassland has been left uncut and contains species such as yarrow *Achillea millefolium*, birds-foot trefoil *Lotus corniculatus* and common knapweed *Centaurea nigra*. A sign has been placed in this area to indicate it has been left to grow to encourage pollinators in the area.



Figure 6.8 Grassy verge managed as meadow to increase biodiversity; bordering Condell Road

WD1 (Mixed) Broadleaf woodland

This is a general category for woodland areas that includes 75-100% cover of broadleaved trees and cannot be classified as semi-natural. This category may contain both native and non-native tree species and can be applied to areas of Westfields, predominantly in the southern wetlands and Ted Russell Park. The understorey of these woodland areas is quite limited in light and is dominated by ivy *Hedera helix*. At Westfields there is evidence of high amount of dumping of garden waste in some of these woodlands, which may lead to the spread of invasive non-native species and run-off of nutrients into the lake.

One large area in the southern wetlands extends from the footpath down to a wet-willow-ash woodland, and it is clear the lower area floods often from rising water table. This area contains Himalayan balsam.

Trees such as birch *Betula sp.*, ash *Fraxinus excelsior*, oak *Quercus sp.* and sycamore *Acer pseudoplatanus* form a linear woodland along the embankment path in the southern wetlands, some of which are growing directly out of the old stone embankment structure. This area has a high amount of Japanese knotweed spreading alongside the path.

This woodland category also borders the north of the lake in the eastern wetlands, and the residential area and contains species such as sycamore, cherry laurel *Prunus laurocerasus*, rowan *Sorbus aucuparia*, red oak *Quercus rubra*, hawthorn *Crataegus monogyna* and mature willow *Salix sp.*, lime *Tilia cordata*, alder *Alnus glutinosa* and whitebeam *Sorbus sp.* trees.

This woodland area in Ted Russell Park contains species such as horse chestnut *Aesculus hippocastanum*, willows *Salix sp.*, cypress *Cupressus × leylandii*, oak, elm *Ulmus glabra*, sycamore, and cherry laurel.



Figure 6.9 Broadleaf woodland by Westfield Park road residential area.

Figure 6.10 There was a high amount of dumping of garden waste into the woodlands areas



WD5 Scattered trees and parkland

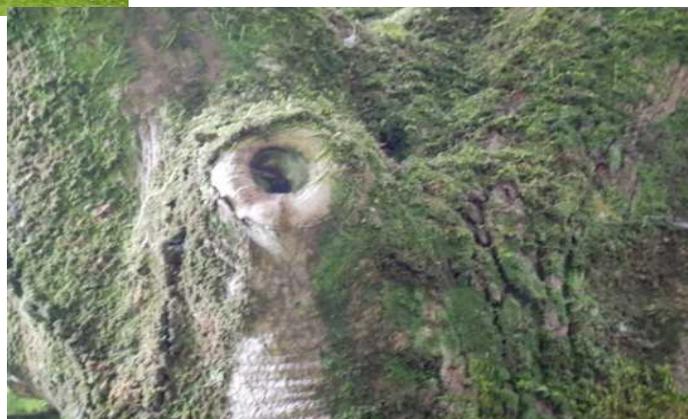
Much of the drier amenity area of the Central Wetland area contains planted trees; particularly beech *Fagus sylvatica*, as well as small-leaved lime, sycamore, hornbeam *Carpinus betulus*, oak, elm.

Ted Russell Park also contains this habitat type, with a number of trees that have bat roosting potential. Bats roost in holes and crevices in trees, among other places such as caves and buildings. As such the gnarled growth of several trees here has potential roosting capacity.



Figure 6.11 Scattered trees and parkland in Ted Russell Park

Figure 6.12 Potential roosting feature for bats in Ted Russell Park in a knot hole



WL2 Treelines

A treeline of white poplar *Populus alba* has been planted through the centre of the central wetlands. The border of the park with north side of Condell Road has been planted with a line of Italian alder *Alnus cordata*. There is also a planted treeline of oak along the southern side of the Condell Road.

Figure 6.13 Treeline of white poplar in the central wetlands



WN5 Riparian woodland

The woodland growing between the old embankment stone walls and the edge of the River Shannon is composed primarily of white willow (*Salix alba*), other willow species (*Salix spp.*), sycamore (*Acer pseudoplatanus*), and ash (*Fraxinus excelsior*). The woodland is frequently inundated by the river. The rare summer snowflake *Leucojum aestivum* was found growing through this woodland.

Alluvial forest is designated as part of the Lower Shannon SAC. The Riparian Woodland at this location may correspond to Annex I habitat Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*) 91E0, particularly the Gallery woodland type which is dominated by white willow (*Salix alba*). As a precautionary approach this habitat should be treated as Annex I habitat Alluvial Forests 91E0.



Figure 6.14 Riparian woodland with a high amount of river debris

WN6 Wet willow-alder-ash woodland

Areas of wet-willow-ash woodland occur in the southern wetlands to the east, where water is held on the surface. The woodland here is dense and overgrown and is composed primarily of willow, notably osier *Salix viminalis*, as well as sycamore and alder *Alnus glutinosa* and hawthorn *Crataegus monogyna*. The herb layer consists of wild angelica, meadowsweet, field horsetail *Equisetum arvense*, bindweed, and bramble. Japanese knotweed and Himalayan balsam were recorded at the edge of this woodland, and it is likely there are more of these invasive species in the dense areas of this woodland.



Figure 6.15 The southern wetlands are composed of dense willow areas

WS1/WS3 Scrub/ Ornamental & non-native shrub

In amenity areas of the park, some areas have been planted with ornamental shrubs, which may include species that can be considered ‘invasive’ such as butterfly-bush (*Buddleja davidii*), snowberry (*Symphoricarpos albus*), cotoneaster (*Cotoneaster spp.*), pheasant bush (*Leycesteria formosa*) and cherry laurel (*Prunus laurocerasus*).

WS2 Immature woodland

A small area of immature woodland has been planted on the bank between the Condell Road and the eastern wetlands. A stretch of the treeline composed of Italian alder was removed in 2018 for some works to take place, and replanted with ash and rowan. Unfortunately, these felling works have disturbed the ground and the area has been taken over by Japanese knotweed and winter heliotrope. The trees that were felled were chipped not far from the lake edge, beside the ramp up to the pedestrian crossing, and Japanese knotweed has spread to this area too.



Figure 6.16 Felled area has been replanted with saplings of ash and rowan.



Figure 6.17 Same area showing recolonisation by invasive species

6.2.3 Floral records and data

The plants recorded are listed in the habitat descriptions above, section 6.2.2. No protected plants were recorded during the survey carried out for this project. However, summer snowflake (fig. 6.18) *Leucojum aestivum* was found growing through the Riparian woodland bordering the River Shannon. This plant is described in Webb's *An Irish Flora* (Parnell and Curtis 2012)) as: "rare" and "Sometimes an escape from cultivation but native along the Shannon and South East. It is considered to be a characteristic species of the Shannon Estuary, particularly on the banks around Limerick City".

Figure 6.18 Seed pods of summer snowflake observed within the riparian woodland beside the River Shannon



Triangular club-rush *Schoenoplectus triqueter*, a nationally rare species has its stronghold along the Shannon banks of Limerick City and Ballinacurra. This plant was not recorded during the ecological walkover survey, but is likely growing along the banks of the River Shannon nearby to Westfields Wetland. A list of native plant species identified during the ecological walkover survey is included in Appendix 6.

There is an opportunity to introduce rare and protected Opposite leaved pondweed *Groenlandia densa* in collaboration with the King's Island Flood Relief Scheme works and to increase the population of this rare plant in Limerick City, which is the main stronghold in Ireland. Actions to

promote and enhance Westfields Wetland for this protected plant species have been detailed in Chapter 10.

6.2.4 Faunal records and data

The faunal background and survey data has been separated into the following headings: Birds, Bats, other mammals excluding bats, and invertebrates.

Birds

Waterbirds are an integral component to the amenity and biodiversity value of Westfields. No dedicated wintering bird survey was carried out for this plan due to the project timeframe. However, long term data was supplied by local member of Birdwatch Ireland Limerick Branch, Tom Tarpey. The list of birds in table 6.2 below shows data collated from 1988-2020, recorded at the main lake and along the River Shannon. Graphs showing the count and species of this data are shown in Appendix 6. Although it is not within the scope of this Plan to analyse the data extensively, these graphs show a trend in the decrease in the number of species present at Westfields Wetland (in line with national trends for many species), and the counts of these species. Those bird species recorded in Westfields Wetland that are Qualifying Interests of the River Shannon and River Fergus Estuaries SPA¹⁸ are listed in bold, and are protected under the SPA designation.

Actions to promote and enhance Westfields Wetland for bird species, both waterbirds and passerines, has been detailed in Appendix 10. These actions include:

- Installation of bird boxes throughout the wetlands
- Establishment/maintenance of winter bird feeding station in Westfields Wetland
- Monitoring of Mink population
- Clearing reeds from Central Wetlands
- Signage and interpretation showing importance of wetlands to waterfowl and other wildlife
- Promotion of Westfields Wetland for Bird Watching

Table 6.2 List of birds using Westfields Wetland from records supplied by local birdwatcher.

| Scientific name | Common name |
|-----------------------------------|--------------------------|
| Anas crecca | Teal |
| <i>Anas platyrhynchos</i> | Mallard |
| <i>Anas strepera</i> | Gadwall |
| <i>Ardea cinerea</i> | Grey heron |
| <i>Aythya collaris</i> | Ring necked duck |
| <i>Aythya ferina</i> | Pochard |
| <i>Aythya fuligula</i> | Tufted duck |
| <i>Bucephala clangula</i> | Goldeneye |
| Calidris alpina | Dunlin |
| Chroicocephalus ridibundus | Black-headed gull |

¹⁸ NPWS (2015) *Site Synopsis: River Shannon and River Fergus Estuaries SPA 004077*, available: <https://www.npws.ie/sites/default/files/protected-sites/synopsis/SY004077.pdf>.

| | |
|-----------------------------------|--------------------------|
| <i>Cygnus olor</i> | Mute swan |
| <i>Fulica atra</i> | Coot |
| <i>Gallinago gallinago</i> | Snipe |
| <i>Gallinula chloropus</i> | Moorhen |
| <i>Larus argentatus</i> | Herring gull |
| <i>Larus canus</i> | Common gull |
| <i>Larus delawarensis</i> | Ringed-bill gull |
| <i>Larus fuscus</i> | Lesser black-backed gull |
| <i>Netta rufina</i> | Red-crested pochard |
| <i>Phalacrocorax carbo</i> | Cormorant |
| <i>Phylloscopus trochilus</i> | Willow warbler |
| <i>Rallus aquaticus</i> | Water rail |
| <i>Spatula clypeata</i> | Shoveler |
| <i>Tachybaptus ruficollis</i> | Little grebe |
| <i>Tringa ochropus</i> | Green sandpiper |
| <i>Tringa totanus</i> | Redshank |
| <i>Vanellus vanellus</i> | Lapwing |

Bats

Many bat species have been recorded throughout Limerick City in the NBDC (National Biodiversity Data Centre¹⁹, <https://www.biodiversityireland.ie/>) database (See Appendix 6) and although these records don't specifically highlight Westfields, it is likely that bats occur in this area due to the presence of suitable feeding and commuting habitat, particularly tree cover and open water. Bat species that have been recorded in Limerick City according to NBDC records are:

- Common Pipistrelle
- Soprano Pipistrelle
- Leisler's Bat
- Brown long-eared bat
- Lesser Horseshoe bat
- Daubenton's bat

In 2017, JBA Ecologists carried out a Bat survey for a proposed development in Westfield Park. This involved one night of bat surveys at the north side of Westfields Wetland Park. Both common and soprano pipistrelle were recorded during this survey.

Limerick Bat Group have carried out numerous informal bat walks and surveys in Westfields Wetland. In an informal note from Limerick Bat Group, common pipistrelle and Leisler's bat were recorded by the group in previous surveys.

All bats are protected by the Wildlife Acts in Ireland. Bats face many threats including habitat loss of hedgerows, treelines, woodlands and species-rich grasslands, including loss or disturbance to habitual roosting or hibernation sites in caves, mines, trees and disused buildings. They are also impacted by the general decline of flying insects, which is their only source of food. This decline has come about due predominantly to increased use in pesticides and loss of habitat. Bats are particularly sensitive to light pollution, with some bat species more averse to night lighting than others.

¹⁹ <https://www.biodiversityireland.ie/>

Actions to promote and enhance Westfields Wetland for mammals have been detailed in Chapter 10. These actions include:

- Install bat boxes in multiple locations across Westfields Wetland.
- Organise bat walk with local community to raise awareness.
- Increase planting of native tree, shrubs and flowers to support insects and cover.
- Reduce or eliminate use of all pesticides and herbicides in the park.
- Consider impacts of lighting on nocturnal animals and minimise lighting if possible.
- Retain natural habitats for bats.

Mammals (excl. bats)

There was little evidence of any mammals observed during the ecological walkover survey. A hole was observed in Tim Russell Park, although no sign of any mammal (such as prints or scat) was found in the vicinity.

Figure 6.19 Possible mammal hole in Ted Russell Park



It is likely that the larger mammals such as Eurasian badger (*Meles meles*), red fox (*Vulpes vulpes*) and hedgehog (*Erinaceus europaeus*) are living in the boundary of Westfields Wetland as these animals have been recorded under NBDC (Appendix 6). Red fox was noted in 2015 to the north of the park, and hedgehog and badger were both recorded in 2017 under NBDC records²⁰ (<https://www.biodiversityireland.ie/>) in the Central Wetlands, by Westfield Park residential area (Appendix 6).

Otters are regularly observed along the River Shannon by city residents and in NBDC records, and they may occur in the riparian woodland growing along the Shannon embankment. Possible evidence of otters has been recorded by a local user of Westfields Wetland, who sent a photo of the remains of a pike found on the path beside the Eastern Wetland. Otter is a species of Qualifying Interest of the Lower River Shannon SAC, and is protected under EU Habitats Directive and the Wildlife Acts.

Smaller mammals such as pygmy shrew and wood mouse are likely to occur in the wetlands area. They are relatively ubiquitous, but are under recorded so do not often show up in NBDC records. Other native mammals such as red squirrel, stoat and pine marten are unlikely to occur in the

²⁰ (<https://www.biodiversityireland.ie/maps.html> , access by clicking on Reports and select the 2km grid in the Westfields area)

wetlands area as these mammals have not been recorded within Limerick City and are generally averse to urban areas.

Non-native mammal species such as greater white-toothed shrew, bank vole, brown rat, European rabbit etc. are likely to live in or visit Westfields, since these, like pygmy shrews and mice, are relatively ubiquitous.

Actions to promote and enhance Westfields Wetland for mammals have been detailed in Appendix 10. These Actions include:

- Remove litter to prevent harm to wildlife
- Signage on the mammals who live in Westfields Wetland
- Monitor populations of mammals
- Construct hedgehog houses/habitat

Fish

A fish survey was not carried out as part of this Plan and is not in the scope of a standard ecological survey of this nature. Access and egress is only via the interconnecting pipes between the lake and the river. Eels are on NBDC records for the lake, but no other fish are listed on the database.

Invertebrates

Very few invertebrates were recorded during the Ecological Walkover survey. Since the survey took place during an overcast day the chance for casual observance rates were lower. The records below are compiled from the records held by NBDC²¹ in recent years in Westfields Wetland. All species below have been recorded since 2014.

- Large red tailed bumble bee (*Bombus (Melanobombus) lapidarius*). In Ireland this is listed as a near-threatened species
- Orange-tip (*Anthocharis cardamines*)
- Hairy dragonfly (*Brachytron pratense*)
- Variable damselfly (*Coenagrion pulchellum*)
- *Bombus (Bombus) lucorum*
- *Bombus (Bombus) terrestris*
- Common carder bee (*Bombus (Thoracombus) pascuorum*)
- Small garden bumble bee (*Bombus (Megabombus) hortorum*)

As little is known about the invertebrates in Westfields Wetland, it is proposed that specific surveys be undertaken to record and monitor these populations. It is also proposed to follow the actions outlined for the All-Ireland Pollinator Plan, which will benefit many invertebrates, not just pollinators. The actions for AIPP are outlined in Appendix 10 along with further actions to help invertebrates within Westfields Wetland.

²¹ <https://www.biodiversityireland.ie/maps.html>

6.2.5 Invasive non-native species

An invasive non-native species (INNS) survey was carried out by JBA Ecologists during the ecological walkover survey in July 2020. Non-native species recorded during the ecological walkover survey are listed below:

- Japanese knotweed (*Reynoutria japonica*)
- Bohemian knotweed (*Fallopia x bohemica*)
- Himalayan honeysuckle (*Leycesteria Formosa*)
- Himalayan balsam (*Impatiens glandulifera*)
- Himalayan knotweed (*Persicaria wallichii*)
- Buddleja (*Buddleja davidii*)
- Nuttall's waterweed (*Elodea nuttallii*)
- Griselinia (*Griselinia littoralis*)
- Giant hogweed (*Heracleum mantegazzianum*)
- Montbretia (*Crocasmia x crocosmiiflora*)
- Snowberry (*Symphoricarpos alba*)
- Winter heliotrope (*Petasites fragrans*)

Neither zebra mussel (*Dreissena polymorpha*) or water fern (*Azolla filiculoides*) were observed during the ecological survey, but they are both highly invasive species in lakes and rivers, and infestations of both species have been recorded in Westfields Wetland in the past. The re-emergence of these species should be monitored.

Species that are particularly problematic in Westfields Wetland should be managed appropriately, particularly highly invasive species such as Japanese knotweed, giant hogweed, and Himalayan balsam. A separate Invasive Species Management Plan has been compiled on the appropriate way in which these and other species should be managed. This is a stand-alone document to accompany this plan.

6.3 Guidance for future management measures

The following guidance outlines general measures that may be taken into consideration by Limerick City and County Council staff members or by local residents managing the amenity areas of the site.

6.3.1 Appropriate tree planting and maintenance.

Trees and shrubs selected for planting in the future should be native and of local provenance where possible. Sources of information that may be used to inform the tree planting and maintenance scheme will include the *All-Ireland Pollinator Plan* (see actions outlined in Appendix 10), Clare County Council's publication *Buds of the Banner* (Fuller 2012) and The Heritage Council's *Conserving and Enhancing Wildlife in Towns and Villages*²².

²² The Heritage Council (2005) *Conserving and Enhancing Wildlife in Towns and Villages*. The Heritage Council, Dublin.

6.3.2 Retain habitat for wildlife

- Keep some areas wild and overgrown. It is important for birds and mammals to have spaces that are not interfered with by people. The whole of the Western Wetland and parts of the Southern Wetland serve this purpose currently, as the centre of these areas are generally inaccessible. Areas of habitat should be left for wildlife to be undisturbed. However, it is acknowledged that this also creates space for antisocial behaviour and dumping.
- Bats: Avoid felling mature trees particularly in parkland areas, as these offer roosting opportunities and habitat for feeding.
- Retaining dead wood across Westfields Wetland is also beneficial for wildlife. Dead wood provides a substrate for wood-rotting fungi and habitat for invertebrates. Standing and fallen dead wood should be left in situ where possible in order to maintain fungal and invertebrate diversity. Creating log piles is also beneficial to invertebrates that decompose dead wood.
- Where possible it is best to allow for natural regeneration rather than planting; this option should be taken into consideration throughout the Wetlands. The only situation where natural regeneration is not preferable is where invasive species are treated and managed, as they will leave bare substrate that will be prone to invasion by other non-native invasive species. In these situations, consideration should be given to planting as described.
- The growing field of rewilding is changing how we think about landscape management and natural ecological succession processes. Although the scale here is smaller than that needed for a full rewilding project, many of the principles may be useful in guiding management that will best support a wide range of floral, faunal and fungal species above and below the ground and water.

6.3.3 All-Ireland Pollinator Plan

Implementing actions from the *All-Ireland Pollinator Plan* is a simple way in which Limerick City and County Council and local communities can help make Westfields Wetland a pollinator-friendly place. Actions derived from the various guidance documents for the AIPP have been suggested in Appendix 10 and shown in Figure 6.21 below.

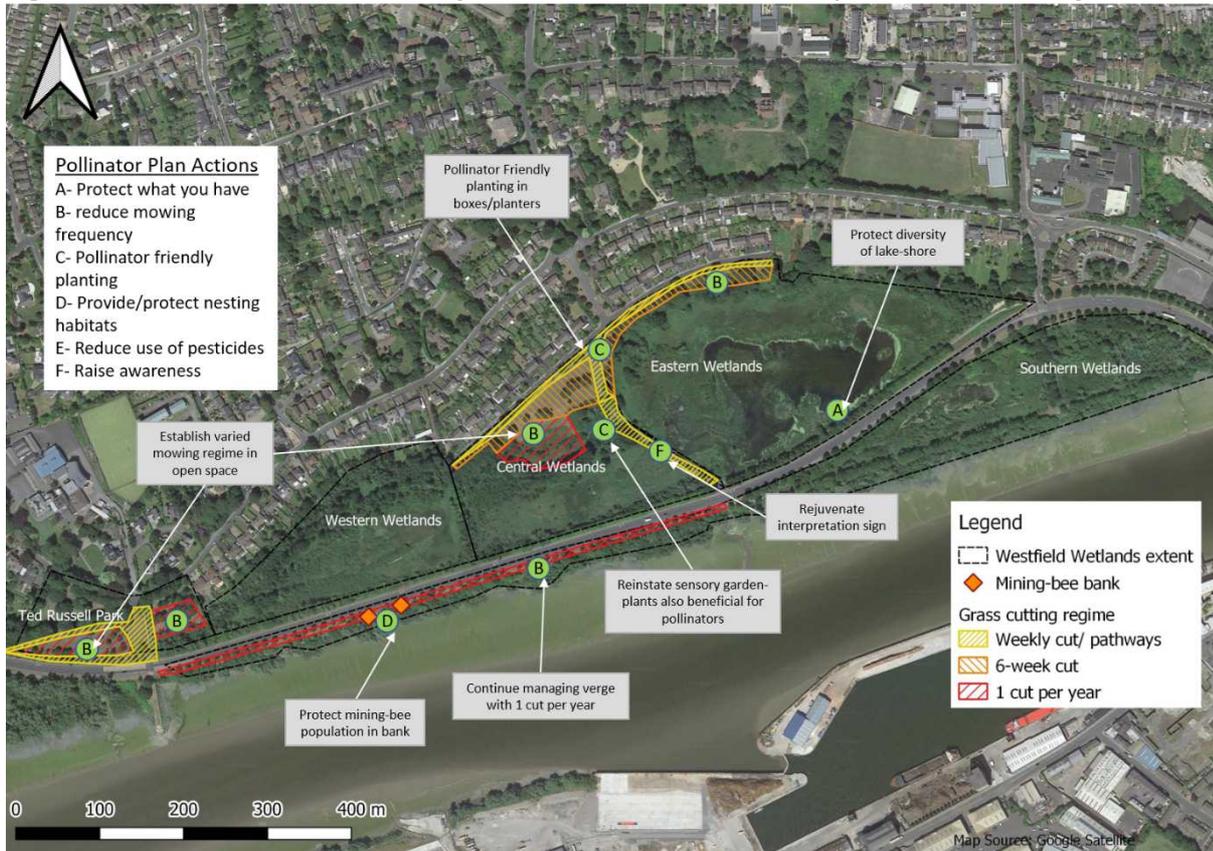
Guidance documents on some of the actions outlined in this section can be found in the *All-Ireland Pollinator Plan 2015-2020 Council: actions to help pollinators*²³ <https://www.biodiversityireland.ie/wordpress/wp-content/uploads/Pollinator-Council-Guide-FINAL.pdf>. Updated information for the All Ireland Pollinator Plan²⁴ can be found at AIPP 2021-2025 (<https://pollinators.ie/aipp-2021-2025/>).

Pollinator Plan Actions are shown overleaf on Fig. 6.20.

²³ <https://www.biodiversityireland.ie/wordpress/wp-content/uploads/Pollinator-Council-Guide-FINAL.pdf>

²⁴ FitzPatrick Ú and J Stout *et al.* (2015) *All Ireland Pollinator Plan*. The Heritage Council, Dublin.

Figure 6.20 Recommended actions from Pollinator Plan to be implemented in Westfields Wetland



Reduce or eliminate pesticide use

Every effort should be made by LCCC and community groups to reduce or eliminate the use of pesticides throughout Westfields Wetland. This is also an action of the *All-Ireland Pollinator Plan*. Herbicides should be used as a last-resort tool for treatment of problematic plant species such as non-native invasive species. See the Invasive Species Management Plan²⁵ for details.

Reducing or eliminating use of pesticides will benefit the local wildlife, in particular for pollinating insect species. It is also beneficial for bats, who feed primarily on flying insects, which are affected by pesticides and herbicides.

One way in which use of pesticides can be eliminated from the park is to cease spraying the bases of trees. This practice is unsightly and unnecessary for the health of the plant and an unnecessary cost on the Council. If tall grasses are allowed to grow instead, these will support pollinating insects as well as help to avoid damage to the bark of trees by close mowing (see fig. 6.21).

²⁵ JBA (2020) *Invasive Non-Native Species Management Plan for Westfields Wetlands*. JBA, Limerick.



Figure 6.21 Base of trees should not be sprayed; note damage to bark which may be from close mowing or strimming.

It may also be feasible to change the public's perceptions of 'weeds' through an awareness campaign, perhaps similar to one carried out in the UK called 'More than weeds', which aims to change the perception of urban plants growing on walls, pavement or tree pits. See fig. 6.22 for one idea for raising awareness of the plants in our neighbourhoods.



Figure 6.22 Connecting people to urban 'pavement' plants may decrease the need for pesticides

Other actions to support biodiversity

Other actions to protect or enhance natural and man-made habitats within Westfield Wetland have been outlined in Chapter 10. The actions and recommendations that directly overlap with biodiversity include the following:

- Management of reeds in main lake
- Encourage the adoption of home composting for garden clippings and mowings.
- Annual community litter pick/ Spring clean.
- Set up dog litter bags and stations and disposal bins
- Invasive species management
- Reduce use of pesticides and herbicides
- Implement actions outlined in the All-Ireland Pollinator Plan, including altered grass mowing regimes.
- Retain dead wood across Westfields Wetland
- Retain wilderness areas
- Monitor wildlife populations
- Run awareness-raising campaigns
- Improve signage

7.0 - Signage and education

The interrelated subjects of signage and education featured prominently in the public consultation process and provide a basis on which the proposals in this chapter are selected.

7.1 Signage

Signage in Westfields provides good information on the wildlife of the area, but there has been some vandalism and natural deterioration. Improved maintenance and repair is proposed to address this. It is also proposed that additional information is included to broaden the appreciation of the wildlife present.



Fig. 7.1 – Wildlife notice boards at Westfields



Fig. 7.2 Newer signage on the Condell Road highlights the wildlife friendly management along the road edge.



Fig. 7.3 Signage on posts was flagged in the stakeholder survey as being a good way to fit in sensitively with the surrounding area.



Fig. 7.4 Single issue signage such as this hogweed warning could also be used for maps of the area, information on the SAC or relating to feeding of waterfowl.

7.1.1 Proposed new signage

There are many ways to enhance the information displays and to build on the work done with the diverse signage that already exists. Signs or information elements within signage recommended at Westfields are as follows:

- Create a map of Westfields from Shannon Bridge to Barrington's Pier, showing the different wetland areas and pathways.
- Map the wetland habitats of Limerick City. This map can also double to show walking routes around the city that pass through the Westfields Wetland area.
- Map of Westfields showing the area within the Special Area of Conservation (Lower River Shannon SAC) and proposed Natural Heritage Area (Fergus Estuary and Inner Shannon, North Shore pNHA), and adjacent to the Special Protection Area (River Shannon and River Fergus SPA). Appendix 7.2 (fig. A7.5) gives an example from the EPA Map Viewer, but the final rendition would need greater clarity and explanation.
- More information on the trees, plants, fungi, animals and birds of Westfields.
- Interactive links to online educational resources on the LCCC Westfields page and to websites listing Irish nature identification such as:
 - Fungi: <https://irishlichens.ie/fungi.html>
 - Lichens: <http://www.irishlichens.ie/>
 - Birds: <https://birdwatchireland.ie/irelands-birds-birdwatch-ireland/list-of-irelands-birds/>
 - Flowering plants, trees, ferns, sedges etc.: <http://www.irishwildflowers.ie/>
 - Butterflies & moths: <http://www.irishbutterflies.com/> and <http://www.irishmoths.net/>
 - Mammals: <https://www.vincentwildlife.ie/species>
- Migration map, linking Westfields visually to the rest of the world (see appendix 7.5).
- Clear visuals on what to feed waterfowl and what not to feed them (see appendix 7.1)
- A noticeboard with seasonal information would be a valuable addition; including for example, seasonal wild food recipes, bird migration updates, local events and activities and volunteering opportunities.
- Care is needed to avoid introducing too many visually intrusive signs. The use of natural materials has already been used to good effect at Westfields, and the use of QR codes linking to online information may also be effective to convey information without undue visual obstruction/distraction.

- Sign on Condell Road highlighting the wetland habitat and river habitats beside the road and gently encouraging motorists to slow down so as not to disturb the wildlife.

Recommended infrastructure:

- Erect a sign at the platform and along the Condell Road path to highlight that feeding ducks and swans is welcome, but that the volumes must be modest and a varied diet as described above is important.
- Other additional signage as outlined in this section, keeping the size and placement sensitive to the natural feel of the area and not excessively intrusive or prominent.
- Overhaul the Westfields Website on limerick.ie to include educational resources and information about the wildlife and history of Westfields.

Maintenance:

- Clean signage and/or repair or replace as needed to keep the information readily accessible to visitors.
- If a biodiversity officer is employed by LCCC, gentle communication with members of the public about feeding water birds would fall within their remit; along with occasional removal of excess food if needed.

7.2 Other Educational Opportunities

Field trips and educational events are already popular with many local schools in the area. Both primary and secondary schools have used the area for pond dipping, bird watching and nature outings, providing local children with an appreciation of wildlife and an opportunity to develop a love of nature.

Further opportunities include development of events; engagement with local schools; provision of education infrastructure; and development of citizen science initiatives, as well as level education such as UL, MIC and TUS.

7.2.1 Events

Westfields is already used by the Limerick branch of Birdwatch Ireland for outings, as well as the Limerick Bat Group for bat walks and by local schools for nature outings. In line with stakeholder feedback it is proposed that these be further facilitated and encouraged.

Education events for adults and for children could take the form of a regular series of talks and/or walks led by invited experts (fig 7.5). Each event could have a specific single topic such as bats, plants, trees, local history, the River Shannon, birds, fungi, lichens, butterflies and other insects, aquatic macroinvertebrates (creepy crawlies that live in the water).

Bio blitz events are a great way to build local community and learn about wildlife at the same time. These are annual events organised by the National Biodiversity Data Centre (<https://BioBlitz.ie/about/>) which aim to record as many species in a given area as possible over a

24-hour period. Usually NBDC events are run as a competition between different national parks, but could equally be set up as an event across Limerick City to record species in the different parks or wetland habitats. A good summary of how to organise a bio blitz can be found here: <https://biomimicry.org/get-outside-explore-ten-steps-holding-BioBlitz/>. In order to have valuable information at the end of the day there will need to be a range of expert ecologists on hand to help with the process and with identification down to species level.

Alternatively, on a smaller scale, an annual Westfields Bio Blitz would help to build a record of species in the area and could be made available as a species list on the LCCC Westfields website. This could have more modest input from outside experts and not necessarily form part of the reporting to the NBDC, but rather be a fun day out in nature instead of solid scientific reporting *per se*.

Part of the process of education is the development of a new aesthetic in terms of the park management, particularly in relation to space for nature, reducing the use of chemical biocides and encouragement of wildlife by providing food and habitats in the form of deadwood, wildflower areas etc. It is possible that an education process may be used to engage with local residents in biodiversity measures such as adoption of chemical free or low-biocide gardening techniques in their own gardens for greater local biodiversity benefit.

Fig 7.5. A public event during 2020 exploring the wetland habitats at Westfields.



7.2.2 Engagement with local schools

There are many ways in which engagement with local schools could be encouraged. The area has a lot to offer for curriculum work, nature outings, outdoor education, volunteering opportunities and green flag endeavours for local children and young people.

The merits of the area were beautifully described by teachers in one of the local schools.: “It has SO much potential for teaching about the environment. There are so many opportunities.... plants, insects, wildflowers, trees, birds, ecosystems, water-bugs...” “I’m sure there are ways of keeping the natural aspects and being true to the environment while also motivating young children to respect and learn about caring for the world around us. A little research and a dollop of enthusiasm and creativity would go a long way. We might have more young people working towards improving such amenities in the future.”

Westfields has been reported as being “just the right size for school groups and tours because there is enough going on to be interesting, but it’s small enough that you can get to know the different species there and not become overwhelmed by the scale” (feedback respondent).

There is also a lot of scope for engagement with the local third level institutions for student projects. These would help to build on the existing growing database of information about the different species in Westfields, and encourage greater appreciation of the area throughout the city.

Listed in the appendices is a draft list of primary and secondary schools and third level institutions in Limerick and Clare that could make use of the resource here, and also a list of citizen science initiatives that could readily be adopted at Westfields by local schools and other groups.

7.2.3 Educational Infrastructure – pond dipping and art

Pond dipping has been proposed by some of the educators already using Westfields for visiting groups. Wooden or recycled plastic platforms are one effective way to create the required infrastructure, or a gravel shoreline at a key part of the lake may offer greater habitat diversity and access to the water for visitors in wellingtons to pond dip. Some examples of pond dipping facilities in UK sites are shown in fig 7.6:

A short boardwalk may also be appropriate, but this would need to avoid extending out into the lake for an excessive distance, or forming a loop around to the more secluded parts of the lake to avoid disturbing birds that are shyer of human company.



Fig. 7.6 Pond dipping platform for water access near picnic area in Britain. (Photo by Geoffrey Hunt, Biodiversity Consultant)

Note that a bird hide was considered as part of the plan, but ultimately omitted since most birdwatchers deemed it to be unnecessary. A further discussion of this is outlined in appendix 7.4.

Art can be an effective way to encourage greater participation in any area. A nature themed sculpture, art installation or trail may be used effectively to highlight the presence of wildlife and the importance of local biodiversity.

By teaming up with one or more of the Limerick art colleges or groups it is possible that such an initiative could attract wider interest in biodiversity, Westfields as a place to come and visit, and art itself. Possible partners may be drawn from some or all of the following:

- ArtLimerick, <https://www.artlimerick.com/>
- Limerick School of Art and Design, TUS, <https://lit.ie/lisad>
- MA/MSc in Art and Technology, UL, <http://www.artandtechnology.ul.ie/>
- Visual Arts office in UL, <https://ulsites.ul.ie/visualarts/>
- Limerick City Gallery of Art, <http://gallery.limerick.ie/TheGalleryLCGA/>

7.2.4 Citizen science initiatives

Citizen science is research or data collection carried out by members of the public, which can provide useful information as well as providing education, engagement, community building and opportunities for volunteering. One of the primary expressed desires in the feedback process was to increase the presence of people in the area was a way to limit vandalism and other challenging social behaviour. In this light, a comprehensive programme of citizen science activities could be adopted to bring in school groups, third level students and members of the public on a regular basis.

Any citizen science initiative needs to be properly coordinated so that the resulting data is usefully collected and communicated and so that those involved gain satisfaction and fulfilment from the process. A biodiversity officer would be the ideal person to coordinate such a process at Westfields.

Examples could include litter assessments; mapping of habitats, species or historic features; participation in BirdWatch Ireland's annual garden bird survey; biodiversity recording with the National Biodiversity Data Centre; hosting BioBlitz events or other initiatives. More details on Citizen Science initiatives are given in Appendix 7.5.

Education Recommendations:

- Explore the feasibility of employing a biodiversity officer with responsibilities which include the following:
 - co-ordinating regular walks, talks and other events, taking cognisance of the wildlife priorities and values inherent in this management plan.
 - engagement with local schools in hosting and organising events and personnel for tours and activities.
 - Liaison with local art schools or groups to explore the option for sculpture or art installations or trails.
 - coordination of citizen science initiatives and liaise with local art schools or groups to have permanent or temporary sculpture or art trails on the walkways here.

Infrastructure:

- Access for pond dipping, either as a wooden platform, short boardwalk or gravelled area to wade into.

8.0 Social Considerations

As with many urban green spaces, there is always potential for friction between different uses. Access to nature is a vital part of the social fabric of any city environment, and Westfields offers a wonderful resource in that respect. However challenging social behaviour needs to be recognised and sensitively addressed. The following challenges were flagged at Westfields as part of the public consultation process:

- Littering
- Graffiti
- Vandalism
- Drinking
- Drug use
- Disrespectful or aggressive behaviour
- Noisy music
- Gatherings of young people which can be intimidating to others
- Cyclists travelling too fast on pedestrian pathways
- Adjacent issues such as traffic speed on the Condell Road, development on nearby green areas and noise from dockyard activities.

Suggested feedback solutions submitted as part of stakeholder feedback can be grouped as set out below. Note that these are not necessarily recommendations of this plan, but are part of the discussion about feedback to the consultation process.

- More litter bins and dog litter bins (see: Infrastructure chapter)
- More police presence or other security on site (see this section)
- CCTV (see this section)
- More lighting (specifically not recommended however due to impact on bats, see section 8.1.3 and this section)
- Increase the activity in the area to reduce anti-social behaviour during the day and in the early mornings (see: Signage and Education chapter)
- Reduce seating and opportunities for people to congregate (see: Infrastructure chapter)
- Create dedicated cycle lanes to make it safer for walkers (see: Infrastructure chapter)
- Install traffic calming measures on the Condell Road (see: Infrastructure chapter)
- Extend habitat protections to the undeveloped lands beyond Barrington's pier to limit encroachment into the area by housing (see: Wildlife chapter)

8.1 Management plan discussion of social challenges

Many of the measures above are already addressed elsewhere in this Management Plan, with the remaining issues discussed below.

8.1.1 Police and/or security presence

Mayorstone Park Garda Station has indicated that although antisocial behaviour does occasionally occur, Westfields isn't a hotspot for undesirable activity and thus resources aren't available to devote additional patrol time to the area.

8.1.2 CCTV

There are pros and cons to ongoing computer monitoring, with security on one side and civil liberties encroachments on the other. A number of survey respondents suggested CCTV, and the path between the lake and Condell Road was particularly mentioned. This may be explored further by LCCC for feasibility and to select the correct course of action, but at this time it is not a recommendation of this management plan.

8.1.3 Lighting

Lighting in parks and particularly adjacent to habitat areas has a number of factors to consider. Certainly, lighting increases safety and/or the feeling of safety on dark afternoons and evenings. However, lighting can pose challenges for a variety of wildlife, particularly insects and bats. Both of these have suffered greatly from falling numbers in recent decades and in areas where they are present, measures should be taken to support them rather than further impact on their health and population numbers.

Lighting also causes light pollution, which diminishes the ability to see the stars at night. This may or may not be a problem for users of Westfields *per se*, but in general terms if measures such as capped street lights can be adopted at a city scale, then the overall light pollution from urban areas can be significantly reduced.

It is proposed that no new lighting be added at Westfields and that the lighting already in place be screened to limit light only to the pathways that it is intended to illuminate rather than shining upwards to contribute to light pollution, or sideways to diminish views across open water.

8.1.4 Summary of recommendations vis a vis Social Considerations

- No CCTV or new lighting recommended.
- Existing lighting to be assessed and capped if needed to limit night-time light pollution.

9.0 Infrastructure

This chapter covers infrastructural measures proposed as part of this management plan. The main infrastructure elements considered here can be grouped into the following categories:

1. Access to water and views of the lake and River Shannon
2. Pathways, access and interconnectivity with wider walking routes
3. Provision of seating
4. Litter control and provision of bins
5. Other infrastructural measures

9.1 Access to water and views of the lake and River Shannon

Hand in hand with creating more open water by removing bulrush encroachment, there is also potential for opening views of open water in other ways. Proposed measures are outlined below.

Infrastructure measures:

- Create views of open water in Eastern Wetland from the Condell Road Path. This will be achieved by removing bulrush cover along certain sections of the pathway. It is important that this measure be followed up with regular annual clearing in selected areas to keep the views and access to the water edge open into the future.
- Create a raised platform along this path. The most suitable location is at the opposite end of the lake from the existing platform, close to the eastern end of the path. It is proposed that this be simply a raised mound within the pathway, constructed as part of the improvement works to the path itself.
- Clear openings through the trees along the River Shannon to create views of open water. This can be done as a short term measure without waiting for further works on the wider flood bund. Any works would need to be done in collaboration with NPWS.
- Extend platforms out into River Shannon. The current Limerick City and Environs Flood Relief Scheme process is progressing, and will set out changes to the existing flood bund between the Shannon and the rest of the city. As part of this process Cleeve's Bank, the flood bund bordering Westfields, will undergo improvements for flood protection. As part of that process it is recommended that extended platforms or piers be considered for construction to enhance the view from this part of the Westfields area out over the River Shannon.

Maintenance:

- Keep bulrush clear in selected areas, in line with methods and timing outlined in the bulrush chapter.
- Keep view of open water clear of overhanging branches or growth of scrub or shrubs.

9.2 Pathways, access and interconnectivity with wider walking routes

9.2.1 Creation of looped walks within Westfields

To avoid disturbing wildlife, it is advised that no looped walks be introduced around the Eastern Wetland, but there are other areas where new walking routes may be enjoyed by walkers and/or cyclists without causing disturbance to either wildlife or local residents. One such route is a link walk from the causeway to Ted Russell Park, parallel to the Condell Road through the Central and Western Wetlands. The route could either run alongside the road, a continuation of the current pathway to the south of the lake [Route 1, fig.9.1], or could run through the wooded area to the north of the wetland area [Route 2, fig.9.1].

The northern route has the advantage of being through existing woodland and as such would not impact on the wetland nor reduce its size. It is currently shown on Google Maps as a walking route, but appears to have overgrown, if it even existed in any formal way. The main drawback of this route is the proximity to adjacent back gardens and the possible risk or fear of crime. Additionally, a walkway through this area would be very secluded and although beautiful and peaceful, it may not be a safe route for people to take alone.

An alternative to a path within the wetland is to create a path along the top of the existing wildflower margin to the north side of the Condell Road [Route 3, fig.9.1]. This would not be particularly quiet or peaceful due to the traffic noise, but it would create a walkway with views over the Central and Eastern Wetlands between the causeway and Ted Russell Park. This location would be visible from a security perspective, and would also form a loop walk at the western end of the project area to mirror the one closer to the city that loops around the southern wetland/pond. There may also be scope to have a footpath/walkway included in the Condell Road Active Travel measures.

Some options for small looped walks exist north of the central wetland, to the north of the wetland and into the lawn areas here, after conversion to wildflower meadow management [Route 4, fig.9.1]. However local experience with this area is that it can easily become a congregation area for antisocial behaviour. A balance needs to be found between creation of pleasant nature-spaces for people to visit and the challenges that can arise when some of the visitors behave in a manner that is difficult for others.

Consultation/design process:

- Carry out a consultation process with local residents and other stakeholders to explore the option of introducing looped walks to complement the existing pathways at Westfields.



Figure 9.1. Walking route options. Image: ©Ordnance Survey Ireland/Govt. of Ireland 2021/OSi_NMA_141

Infrastructure:

- Expand the walking routes at Westfields with a walkway to connect the platform with Ted Russell Park along one of the routes suggested above.
- Include perimeter walkways within the meadow habitat of the green area north of the Central Wetland.

Maintenance:

- Keep new and existing pathways well maintained to ensure that they can continue to be used safely and comfortably by walkers, cyclists, push chairs and buggies etc. Factors include encroachment of perimeter grass growth; encroachment of branches from shrubs and trees; and maintenance of path surfaces as needed.
- Renew perimeter pathways through meadow areas each year and keep these cut as part of the lawn mowing regime. The locations should be kept by contactors to ensure that the pathways are selected with care each year.

9.2.2 Improved access between the walkways at the wetland, and the flood bund walkway along the River Shannon

At present the Condell Road divides the Westfields Wetland in two. This limits the value area for biodiversity as well as for people using the wetland and surrounding walkways. The Condell Road currently has a single traffic lane in each direction, an inbound bus lane and a cycle lane in each direction. As such it is already relatively busy.

There are three locations where the pathways naturally cross the main road: at the eastern end of the Eastern Wetland; from the causeway to the flood bund; and from Ted Russell Park to

Barrington's Pier. All three locations currently have traffic lights, so pedestrian access is already facilitated, and yet there have been requests for improved access.

Options to improve access may include the following:

- Pedestrian and cyclist overpass in one or more locations
- Zebra crossings at one or both locations
- Raised zebra crossing to reduce traffic speed
- Traffic calming measures and/or road narrowing to slow traffic flow
- Pedestrian islands to facilitate easier crossing (conversely these have the potential to slow down crossing by pedestrians if separate sets of lights are used for each lane)

Consultation/design process:

- Explore options further with LCCC Roads Department taking account of best practice examples from cities with good, long-established cyclist and pedestrian routes, and taking into account the recommendations offered in the stakeholder feedback.

9.2.3 Upgrade of existing pathway surfaces and margins

A number of specific issues were present with the existing pathways. There were reports that pathways were uneven and narrow with overgrown edges that further reduce the width.

Improved pathway surfacing was carried out in early 2020, so this aspect of the Plan has already been carried out.

9.2.4 Cycleways

At present cyclists use the pathways within Westfields, which have the advantage of being off-road and thus more pleasant and safer for cyclists, but this can pose challenges for pedestrians, some of whom report that it is unsafe to walk when cyclists pass too quickly.

Dedicated cycleways would facilitate both easier cycling and safer, more comfortable walking. However, when examining the options for cycleway designs there is a balance to be found between dedicating sufficient space to all pathway users and avoiding encroachment into the wetland. Proposals are underway for provision of enhanced segregation for cyclists on the Condell Road.

One aspect of cycle-lane design that needs to be addressed is that of interconnectivity. Any cycle lane plans should take account of local schools in particular, and other local travel needs to ensure that they are not installed in isolation, or with dead ends or obstacles such as steps at the interface with the public roads. A safe and effective feed-in system is essential to move cyclists from dedicated pathways back onto their lane in the road network, preferably without leading to a loss in right-of-way. Where right of way is lost to traffic, many cyclists will opt to stay in the traffic lane rather than losing momentum and time by stopping unnecessarily to regain access from a cycle path to the road. This can be readily overcome by feed-in lanes which put the cyclist safely back in the flow of traffic, with the point of interface inserted behind a short run of bollards to

separate the traffic and the cyclist for several meters, after which the cyclist is back in the traffic lane.

Infrastructure:

- Include off-road cycle path infrastructure into the new flood bund works.
- Explore the potential for other off-road cycle routes around Westfields.

Maintenance:

- Keep the current pathways maintained so that cyclists can use them with ease and comfort and so that it is easy for a walker and a cyclist to pass safely with ease.

9.2.5 Integration of Westfields with wider walking routes

There is great potential for creation, facilitation and or designation of looped walks in the wider area by integrating with wider city walks and the flood bund pathway. Fig 9.2 shows a general compilation of suggestions received.

An existing walking route is already published as “Walkable Neighbourhood – Limerick City” (<https://www.limerick.ie/council/newsroom/news/new-limerick-walking-map-launched>). This map already includes Westfields and Barrington's Pier as shown in Appendix 9.1. While this map provides easy navigation to the main attractions in the city centre and immediate area around it, there is further potential available to show hidden byways, river paths and trails.

The Coonagh Recreational Framework Plan also outlines walks around Westfields, extending out to Coonagh Wetland (fig 9.2).

Fig. 9.2 Walking routes excerpted from Coonagh Recreational Framework Plan



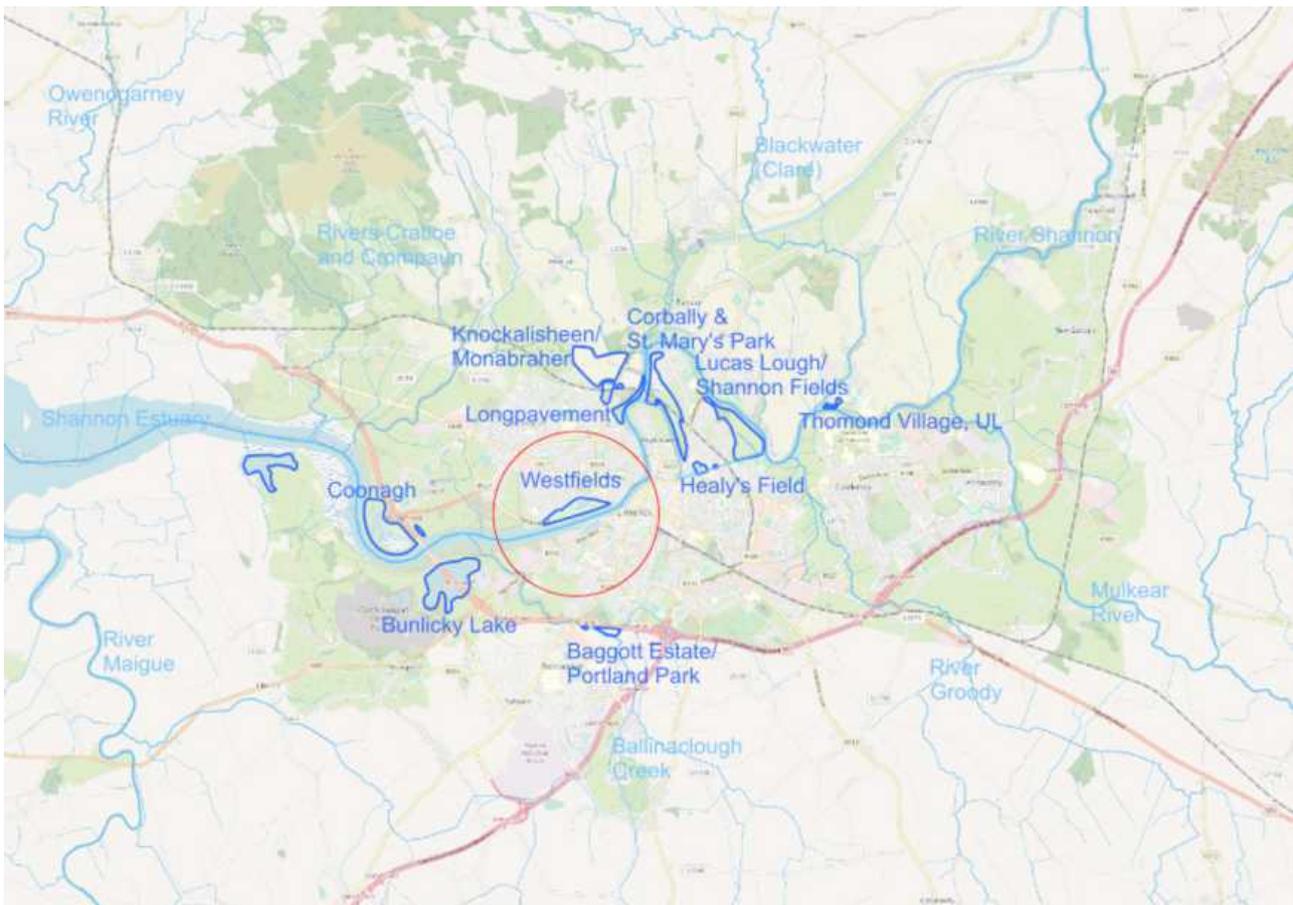
It is possible that a revised version of these maps could be produced, incorporating wider walking routes out to Coonagh Nature Reserve to the West; Corbally Baths to the North; the Living Bridge at UL to the East; and Baggott Estate Nature Park and Ballinacurra Creek walks to the South.

An extension of this idea is to create a Wild Waterways Network map along the route of rivers, streams and canals within Limerick city, with walking route interconnections and waterway navigation between the different wetland habitats that already exist. There is a growing appreciation of green ways and blue ways in Ireland as we recognise the importance of getting out into nature for our physical, mental and emotional health. There is already a great number of wetland habitats within Limerick city, and an abundance of rivers within and outside the city. Many of these already have good walking access and there are kayak and boating clubs already navigating the main river channel.

A Wild Waterways Network map would highlight the abundance of opportunities available for walkers, kayakers and nature lovers generally to get out into nature, even while right in the heart of the city. This type of initiative became all the more important with distance limits for travel under Covid restrictions.

Figure 9.3 shows the river corridors and wetlands of the city and environs, and offers a glimpse of the great potential for creating a network of nature walks and riverside walkways as well as a map of navigable areas for blueway amenities.

Figure 9.3. River Corridors and Wetlands of Limerick City and environs.



Recommended Works:

- Produce a map to complement the existing Walkable Neighbourhood map to show a larger area, linking to the main wetland areas around the extremities of the city as per fig 9.2 and fig A9.1 in the appendices. As part of this process, assess the routes set out in the Westfields MyPoint survey for accessibility. The map could be made available on the LCCC website or printed for distribution via tourist office, schools, sports clubs etc. Any work on such a route should also take due consideration of the wider city population and relevant stakeholders prior to creation and publication.
- Preparation of a detailed Wild Waterways Network map, based on fig 9.3. It is recommended that this map stick to off-road routes insofar as possible, and/or routes that

run parallel to canals, streams and rivers in and around the city; tying in with Limerick's draft Blue Green Infrastructure strategy. It is also envisaged that this would also show navigable rivers and streams for use by kayakers and other boat users.

9.3 Provision of seating

Many of the responses to the public survey expressed a desire for more seating. However there has been a certain history of antisocial behaviour in proximity to Westfields Park housing estate which has been centred around locations with seating. In the past, seating has been removed specifically to address this issue and thus there is a certain reluctance by local residents to reintroduce seating near them.

That said, there are ample opportunities for including seating at other areas around the wider Westfields area and along the flood bund walkway. It is recommended that no new seating be installed near to the houses at Westfields Park, but that other locations be used along the flood bund at key viewing points and along walkways at a remove from housing.

Design of new seating should be location specific. It is anticipated that the flood bund walkway will be improved as part of the Flood Relief Scheme, and thus any seating installed here should be possible to remove and use elsewhere in the city or in the same location after the main flood bund works are completed.

Seating along the south side of the lake could be combined with a widening of the path at selected locations, ideally raised areas to afford both seating opportunity and an observation area for water birds, while being set back slightly from the main thoroughfare to ensure that there is still space for people to pass even if a crowd gathers.

Infrastructure:

- Install 2 temporary benches at suitable locations on the Shannon flood bund, for removal once FRS works commence.
- Install 2 log benches or other benches along the path to the south of the lake, set back from the path, but with views over open water.
- Ensure that no new seating is installed in proximity to Westfields Park houses or the green area nearby.

Maintenance:

- Repair and/or cleaning of seating as needed.

9.4 Litter control and provision of bins

There is a limited number of bins within the project area. These are at Ted Russell Park, the causeway and on the Condell Road. More bins may make it easier for members of the public to pick up litter and bin it appropriately and may encourage those who currently litter to use a bin

instead, however this needs to be balanced with budgets and maintenance requirements. It is proposed to examine the installation of bins at key pedestrian junctions.

There is also dumping of garden clippings and mowings at a number of locations. Dumping of waste is illegal and as such should be discontinued, with encouragement and advice offered to local residents to compost in their own gardens. Dumping of garden material below the high-water line within private gardens should be moved to >10m from the edge of the maximum water level.

Recommendations:

- Examine merits of adding litter bins at key locations.
- Examine current bin locations with the intention of optimising locations and numbers.
- Checking of existing bins and emptying as needed.
- Arrange composting tutorials for residents to provide guidance and encouragement on home composting of garden clippings and mowings.

9.5 Other infrastructural suggestions

A number of survey respondents have been quite emphatic that a “do nothing” option is needed for Westfields; that it's perfect as it is. There is a similar sentiment from many more respondents that the bulrush should be cleared to some extent to create more open water, but that beyond that there should be little or no change to the area.

As such, beyond the infrastructure issues of seating, bins, pathways, platforms and signage, which are discussed above in more detail, other infrastructural elements are generally not recommended for implementation at Westfields. Thus, it is proposed that minimal intervention be adopted as a management approach for the site. Nonetheless two additional measures are outlined below relating to safety fencing and removal of the metal box to the south of the lake.

9.5.1 Safety Fencing

Two locations were cited by local residents as being potential risks for small children. One is the interface between the causeway and the traffic on the Condell Road. The other area adjacent to that is the entry/exit point for water in and out of the wetland. On high tides the water can be relatively deep and swift flowing here and has been raised as a concern by some.

Erection of a gate between the pathway and the Condell Road would limit free movement by walkers and cyclists and would not be consistent with the interface with the road at Ted Russell Park, Barrington's Pier or other access points to the Westfields area. However, it should be discussed with the LCCC Roads Section to assess the Health and Safety issues and determine a suitable course of action. Staggered gates that are navigable without opening and yet offer a visual barrier may be an appropriate measure here although this may give a false sense of security to parents of young children, offering a visual feeling of security while actually not limiting access to the public road.

The area of water at the inlet/outlet from both the Eastern and Central Wetland areas is a more straightforward situation, insofar as the presence of a barrier here would not impede access to the park or pathways. A modest railing could be erected at these points, of a similar design to the barriers at the easternmost entrance to the lake pathway near Shannon Bridge (see fig. 9.4). However, the necessity of this measure is open for further discussion since the entire area has either open water or a busy road, so the risks posed at this location may not be any more than elsewhere at Westfields.

Recommended Infrastructure and maintenance:

- Explore further the necessity of safety fencing at the inlet/outlet water points of the Central and Eastern Wetlands or measures to amend water depths at this location to reduce deep water flow velocities.
- Annual assessment of fencing and repair, cleaning or replacement as needed.

Fig. 9.4 Barrier at Condell Road, easternmost pedestrian entrance to Westfields.



9.5.2 Removal of metal box on path between Condell Road and Eastern Wetland

An initial investigation with both ESB and Soil Instruments Ltd (named on the unit) has been carried out to establish the ownership of the metal box on the path between the Condell Road and the Eastern Wetland (see fig 9.5), but confirmation of ownership was not established. This investigation is to ascertain if the box is currently in use, and if so, to assess if it could be either moved further up the embankment and out of main sight lines, or could be planted around with a low-growing native shrub such as holly as a visual screen.

If it is not in use it should be removed. Initial investigations suggest that it is not an ESB box, and that it may have been placed by Soil Instruments Limited. Further investigation is needed to assess whether the box is in use or can be removed.



Fig. 9.5. Metal box on path between Condell Road and Eastern Wetland.

Recommendations:

- Assessment of metal box and removal or moving as appropriate.

10.0 Action Summary

This Management Plan is intended to be a springboard to action. This chapter sets out the suggested measures proposed to make it as easy as possible to move from idea to implementation.

Bear in mind that a core element of the plan is to ensure that work is carried out in a way that protects and enhances the wildlife of the wetland habitat and the natural feel of the area for people visiting. In this context, the guiding principles and ethics of Permaculture design are included in the appendices (App 10.1) as a reference to help guide future work in a direction that is consistent with the values and intentions of protecting and enhancing nature.

10.1 Areas for action

Taking into account the findings of this Management Plan process, including, but not limited to, the stakeholder engagement process, the following areas are identified for action (arranged by chapter in this Plan):

1. Recommended water quality actions
2. Recommendations regarding water levels and flows
3. Bulrush clearing and open water
4. Recommendations to protect and enhance the area for wildlife
 - All-Ireland Pollinator Plan actions
 - Management actions for birds
 - Management actions for enhancement of bat populations
 - Management actions for mammals living in Westfields Wetland
 - Management actions for invertebrates
 - Management action to introduce opposite-leaved pondweed
5. Signage and education
6. Social aspects
7. Infrastructure
8. Ongoing management

The measures proposed for each of the above items are outlined in more detail each section throughout the Plan and are also summarised in tabular form in Appendix 10. While many of these will be centrally organised by LCCC, there are elements of each that may include, or can be broadened to beneficially include the local and wider city community.

Note that the main priority is the creation of open water, within the context of protecting the area for wildlife benefit. All other measures can be introduced on a phased basis as the resources become available.

10.2 Long term management of the area

Additional key points are recommended below for future management at Westfields. These will help to ensure that the measures are implemented in a way that protects nature while providing a space for visitors to the area.

- Host an annual Steering Committee meeting or regular working group meetings to assess the progress and direction of elements outlined within this Management Plan.
- Have a dedicated manager within LCCC (whether that be Parks or any other department) who has a brief and a budget for ongoing maintenance of Westfields to keep pathways safe and comfortable for walking and to ensure that plant clearing happens in the lake each autumn.
- Organise and/or facilitate volunteer input, whether for educational events or clean-ups etc.
- In addition to the above measures, it is proposed that the feasibility of employing a manager, biodiversity officer or guide be explored. The role would include, *inter alia*, the following:
 - litter clean-up and assessment of bins to ensure that they are emptied as needed,
 - organising of bulrush clearing at the correct time of year,
 - overseeing grassland maintenance and mowing times and locations so that the contractors are directed correctly for meadow, wildflower lawn and shorter lawn mowing requirements,
 - be a security presence on the site,
 - organise prompt clean-ups or repair/replacement of equipment or infrastructure if needed,
 - organisation and/or facilitation of regular ecological events at Westfields for children and adults alike.
- Alternatively or additionally, the above actions could be organised by existing LCCC staff, the local community, or existing ecological and environmental expertise that is already available within Limerick and familiar with Westfields.
- Take the aims and recommendations in this Management Plan and work towards their implementation in a manner that is sensitive to wildlife and to the invaluable natural feel of Westfields for visitors.

10.2.1 Steering Committee

One effective way to keep the area in focus and to ensure that work is carried out on a timely basis is to convene a steering committee with the expressed focus of facilitating implementation of actions. This should meet on a regular basis to keep the process current.

Suggested steering committee members may include representatives from some or all of the following groups or organisations:

- Limerick Council: Environment section
- Limerick Council: Parks department
- Limerick Council: Heritage and/or Wildlife officer

- Westfields Wetland Committee, Westfields Park
- Local Residents Association(s)
- Local wildlife representatives and enthusiasts
- Local conservation organisations
- Local river organisations
- Birdwatch Ireland, Limerick Branch
- National Parks and Wildlife Service, local ranger
- LAWPro (Local Authorities Waters Programme)
- Limerick Councillors with an interest in the project
- FH Wetland Systems, JBA and/or other ecological consultancy

10.2.2 Volunteering and Community Participation

During the consultation process it was clear that there was a modest but significant hunger for community participation. While many people wanted the Council to act on one issue or another, there was also enthusiasm for getting involved directly as a community or individuals on a voluntary basis.

Work that volunteers expressed an interest in, or were already doing, included litter picking, fruit tree planting, bulrush clearing, gardening, community education events, ecology training, hosting websites and writing articles about the area and generally keeping an eye out for the local community.

The potential for volunteering within the water and along the shores of the lake and River Shannon may be quite limited by insurance requirements. Safety issues include working around open water and also potentially elevated levels of *E. coli* in some areas of the wetland. However opportunities for community participation should be explored and engaged with in a proactive manner going forward, so that local participation in the ongoing management of Westfields becomes a shared endeavour insofar as possible. The two main sources of linking volunteers to projects in Ireland are <https://www.volunteer.ie/> and <https://www.i-vol.ie/>, with a local volunteering website at <http://volunteerlimerick.ie>.

10.3 Protection of habitats and biodiversity during works

With any change to a habitat there is the potential to cause a negative impact – sometimes even when the overall aim is to lead to a positive ecological outcome, as is the case for this management plan. Possible impacts in this context may include some or all of the following:

- Excavation or disturbance of ground
- Changes to water levels or flow dynamics
- Plant clearance and removal
- Glyphosate use, or use of other biocides
- Composting of garden materials too close to water level
- Construction or introduction of hard landscaping features or infrastructure

- Increasing access by people, or an increase in the areas currently accessible
- Changes to management regimes for lawns, trees, lake and lake margins etc.

Note that some of the measures in this Plan require Appropriate Assessment Screening, to be carried out as needed by LCCC. If there are potential impacts on the SAC there may be a requirement to carry out a Stage 2 Appropriate Assessment. Such proposals would require consent from An Bord Pleanála as well as liaison with NPWS.

The following works are the ones listed in this plan that are likely to require AA Screening (or Natura Impact Statement, NIS):

1. Bulrush/reed removal at any time of year and by any method. Note that the season and works method are project specific and a different NIS may be needed for changes or amendments
1. Lake deepening or dredging works
2. Construction of new pathways
3. Invasive species control measures
4. Erection of new platforms or raised viewing areas around the lake

Other measures such as erection of new bins, seating, amendments to mowing regimes etc. will not need an AA Screening process, but care is needed to ensure that these are done sensitively and in keeping with both ecological protection and preserving the natural feel of the area.

10.4 National and EU policies and frameworks

The relevant EU directives, policies and frameworks include, but are not necessarily limited to, the following:

1. EU Habitats Directive;
1. Water Framework Directive;
2. Climate action policy;
3. Biodiversity policies
4. UN global goals.
5. EU Birds Directive
6. Wildlife Act 1979 as amended.

10.4.1 Synergies with local, regional and national strategies

Projects at Westfields have ample scope to tie in with national strategies such as the All Ireland Pollinator Plan and other initiatives. The recommendations for wildflower meadow areas and general parks management areas are in line with guidance produced under the Pollinator Plan. There is also potential to contribute to national biodiversity monitoring strategies by contributing biological records from ecological surveys to the National Biodiversity Data Centre (NBDC).

As part of the stakeholder strategy we have engaged with local wildlife groups and community groups to ensure that we are cognisant of the aims and goals of such groups. There is also great potential to tie in with the Change X Neighbourhood Network initiative, The Positive City Exchange

programme (CxC), the government's Healthy Ireland strategy, the National Biodiversity Plan, and the wider UN global goals (shown below in fig 10.1 as nested goals prioritised by biosphere, society and economy in that order).

Figure 10.1. UN Global Goals image by Azote for Stockholm Resilience Centre.

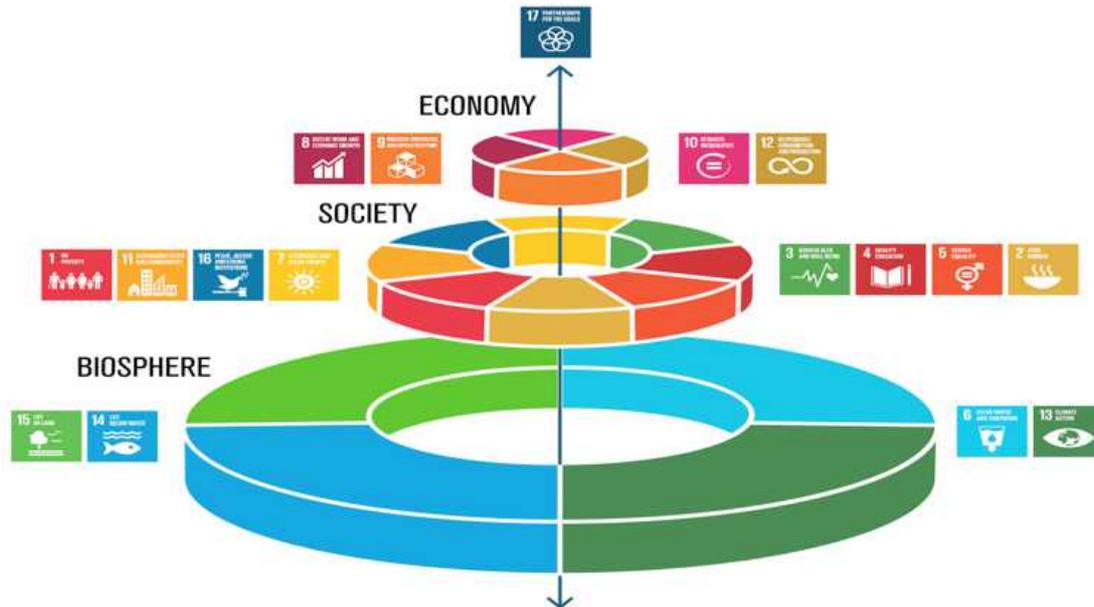


Image credit: Azote for Stockholm Resilience Centre.

<https://www.stockholmresilience.org/research/research-news/2016-06-14-how-food-connects-all-the-sdgs.html>

Ireland's National Skills Strategy 2025

As part of the community engagement process for this project, a number of people from Limerick City got involved with the specific aim of furthering their skill-set in a number of areas. The project intersects with the areas of ecology, landscape design, habitat management, environmental education, botany and zoology, parks maintenance and other diverse areas. The National Skills Strategy may help to offer funding or resources for incorporating educational opportunities into activities and endeavours at Westfields.

National Strategy for Higher Education 2030

There are ample opportunities to include third level institutions in activities and events at Westfields and the NSHE2030 has a specific community engagement element, which could be a good way to tie in activities here with the aims of the strategy.

National Development Plan 2018-2027 (Project Ireland 2040)

National Strategic Outcome 7 of Project Ireland 2040 relates to Enhanced Amenity and Heritage. Specific overlaps with Westfields may include areas such as nature conservation, biodiversity, wetland restoration, sustainable recreational tourism, enhancing public access to the natural environment, maintenance and protection of heritage assets.

National Biodiversity Action Plan 2017-2021

This plan sets out to improve biodiversity considerations across government decision making processes, strengthen the knowledge base underpinning biodiversity work, increase public awareness and participation, improve biodiversity conservation of the wider countryside and marine environment, expand and improve on the management of protected areas and species and contribute to international biodiversity issues.

Ireland's National Spatial Strategy 2002-2020

In the National Spatial Strategy local environmental value is highlighted in the Green Structure plans, designed to, inter alia, “conserve, and where appropriate and possible, enhance biodiversity”. Areas such as Westfields offer a valuable ecological zone within the city environs in this context.

10.5 Funding opportunities for long term management

Increasing funding is becoming available for supporting climate action, biodiversity, health promotion and outdoor educational initiatives. These have been explored as possible avenues for short term capital funding, funding for local community projects and/or for long term financial support and/or dedicated time input from an appointed ranger or area overseer at Westfields.

Different funding opportunities have different lead-in times and annual deadlines, so for a given project these should be assessed in light of the particular project or initiative being considered to find the funding source that best matches the project needs at the time.

There is a list of potential funding sources listed in the appendices under the categories of long term funding, capital works, smaller projects or events and other possible funding streams.