FEHILY TIMONEY

DESIGNING AND DELIVERING
A SUSTAINABLE FUTURE

APPENDIX 6

BIODIVERSITY

Appendix 6.1 – Biosphere Environmental Services Bird Reports

Appendix 6.2 – Triturus Aquatic Reports

APPENDIX 6.1

Biosphere Environmental Services Bird Reports

BORD NA MONA
WINTER BIRD SURVEY, 2012-2013

LITTLETON BOG GROUP

FINAL REPORT

SEPTEMBER 2013

Deleted: ¶

Prepared for

Bord na Móna

by

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Figure 1. Distribution of Whooper Swans in study area and hinterland, winter 2012/13.

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EXECUTIVE SUMMARY

- A baseline study of wintering birds associated with the Bord na Móna Littleton Bog Group was carried out between December 2012 and March 2013. There are 14 sites within the group, covering an area of just over 5,000 ha. Most of the bogs in the Group are still in peat production to some degree, although in some instances production may be confined to localised areas. Some bogs have re-vegetated considerably, whereas some have peat reserves with depths in excess of 2 m at present.

- The study included a desk review and consultations with relevant agencies (namely National Parks & Wildlife Service (local management staff), BirdWatch Ireland, Irish Peatland Conservation Council). Field methods employed were a combination of transect surveys, vantage point watches and focused surveys for wetland birds. Four rounds of surveys were carried out during the winter period.

- While none of the bog sites are designated for conservation, there are 19 designated sites within a 15 km radius of the Group, comprising two SPAs, six SACs, two NHAs, and nine pNHAs.

- A review of past bird information relating to the immediate study area concluded that this is scant and generally of limited value in the context of the present study.

- A brief description of each of the 14 bog sites is followed by details of target species recorded, the potential for other target species, other species of note recorded and an overview of the value of the site for wintering birds. A map showing locations of sampling transects and vantage points, plus flight lines of target species where relevant, is presented, along with a photograph of the site.

- Target species were recorded as follows: Knockahaw (Golden Plover); Ballysorrell (Hen Harrier); Carrickhill (Whooper Swan); Bawnmore (Peregrine); Littleton (Whooper Swan, Hen Harrier, Golden Plover); Lanespark (Merlin); Derryvilla (Merlin – same individual); Killeen (Goshawk).

- At least two Amber listed species were recorded at all of the sites. The range of Amber listed species recorded was as follows: Little Grebe, Kestrel, Teal, Water Rail, Snipe, Stock Dove, Skylark, Starling and Linnet.

- From the perspective of wintering bird communities, the habitats or vegetation types within the sites can be broadly separated as follows: Bare or near bare peat; Cutaway bog dominated by open regenerating bog/heath vegetation, with perhaps scattered scrub; Cutaway bog dominated by scrub/low woodland; Remnant bog; Wetlands and open water; Conifer plantation.

- Summary species accounts are given for the various EU Birds Directive Annex I species and Birds of Conservation Concern (Red or Amber listed) (no. 15).

- Whooper Swan (Annex I species) winters in the wider area but there were only two on-site records, though up to four other sites have some potential to support swans. However, occurrences are likely to be occasional and involve small numbers of birds. Swans recorded on the bogs may be from one of the regular populations in the wider area, namely at Durrow (Curragh), the River Suir south of Thurles (Cabragh wetlands) or the River Suir north of Thurles. The study showed that there were no daily or flightlines or regular movements of swans over any of the sites.

- There were three records of Hen Harrier (Annex I species) at two of the sites and a winter roost is known within several kilometres of the bog group. It is likely that the species has a scattered distribution during winter within the wider area and hunting birds could be expected at any of the bog sites within the group. At least two sites (Ballysorrell & Littleton) have potential for winter night roosting.

- There were single records each of Merlin and Peregrine within the sites, with a further Peregrine record off-site. Both of these Annex I species could be expected to hunt over any of the cutaway bog sites though there is no evidence to show that birds are closely associated with any specific site.

- Golden Plover was recorded roosting on bare or recently burnt peat at two of the sites. While such usage of sites within the study area by Golden Plover is of interest, the numbers of birds involved (maximum 30) is only at the level of local importance.

- Fourteen of the 15 species are listed as Birds of Conservation Concern in Ireland, Amber list (i.e. Medium Conservation Concern). Four of these (Little Grebe, Goshawk, Water Rail & Stock Dove) were each recorded on one occasion only, while Teal was confined to three sites where suitable wetland habitats occur. Kestrel, Snipe, Skylark, Starling and Linnet occurred fairly widely and regularly on the sites.

- The cutaway bogs, either those with large areas of regenerating habitats or with marginal strips of remnant or regenerating cutover bog (as found on practically all sites), provide useful semi-natural habitat refuges for a wide diversity of birds. However, all of the recorded species of conservation interest could be expected in the wider countryside and none of the species are dependant solely on bog vegetation (though several are characteristic of bog habitats, such as Snipe and Skylark).

- The issue of rating of sites for ornithological importance is discussed. It is suggested that all sites in the group can be tentatively rated as having some Local importance due to the presence of Amber listed species using semi-natural habitats. This rating will be refined with further ornithological baseline information and such is likely to be fed into an overall ecological site rating following a standard methodology (such as the NRA system). The sites with extensive areas of semi-natural habitats useful to wintering birds are Knockahaw, Clonbuagh, Ballysorrell, Templetuohy, Bawnmore, Littleton and Derryvella. The Littleton bog is considered to have the highest value for wintering birds in the group (though still at Local level) as it is a large and varied site, with records of Whooper Swan, Hen Harrier and Golden Plover.

1.0 INTRODUCTION

1.1 Background to Project

Bord na Móna is considering using some of its bogs in the midlands for large scale wind farm development and has carried out some high level assessment of the suitability of various sites for this purpose. Farm layouts, however, have not yet been prepared to a significant level of detail at this stage.

As part of the planning work, Bord na Móna issued a request for a winter bird study, including consultation, on the avian species and populations either using, or likely to use, the various sites. This was considered a preliminary step in the approach to the bird studies that will be required should the development of a wind farm be progressed. A contract to carry out the required work was subsequently awarded to BioSphere Environmental Services in late November 2012.

The project comprised three bog groups for consideration as follows:

1. Ballydermot & Derrygreenagh Bog Group
2. Ballivor Bog Group
3. Littleton Bog Group

A further group, the Cul na Mona Bog Group, and also a single bog, Kilberry Bog, were added to the contract in December 2012.

Key requirements of the study were as follows:

- Consult with appropriate bodies, such as NPWS and BWI, regarding sightings and any existing information on the site or surrounding area and discuss / agree appropriate methodologies in the context of the scale and nature of the sites
- provide GIS maps of features and sightings of interest
- provide a detailed recommended methodology for future bird surveys should the project proceed to EIS
- provide a description of the suitability of the habitats present for key species not recorded but which could potentially occur
- provide a summary of likely constraints with regard to the known bird community.

The following mapping was supplied for each bog group by Bord na Móna

- Site Location Map (Discovery map base)
- Orthophoto View (from 2006)
- Land Use Map (prepared by BnaM)
- Biodiversity Value Map (prepared by BnaM; not complete coverage)

A copy of *Birds on Cutaway Peatlands: Baseline Breeding Bird Population Survey* (2011) by Dr. Alex Copland, BirdWatch Ireland (carried out for Bord na Móna) was supplied for reference.

The present report considers the Littleton Bog Group.

1.2 Overview of Study Area

The following general description is based on the information supplied by Bord na Móna in the tender documentation.

Littleton Group of Bogs

The Littleton Group of bogs is located on the border of counties Kilkenny, Tipperary and Laois. The Group consists of just over 5,000 hectares of bogland in open, flat, rural countryside surrounded by adjoining farmland. Human settlement is a combination of small villages and individual private dwellings along the peripheral regional and minor road network.

The bogs within the Group provide peat to the nearby briquette factory which is still in production. Most of the bogs in the Group are still in peat production to some degree, although in some instances production may be confined to localised areas. Some bogs have re-vegetated considerably, whereas some bogs have peat reserves with depths in excess of 2m at present.

Coillte forestry is located at various locations close to some of the bogs within the Group, and there are also a number of established on-site Coillte forests on some bogs. Varying degrees of on-site vegetation, ranging from light scrub to established trees exist on some bogs, depending on the level of production activity and how long production has ceased. Construction work is also underway on a 40MW Wind Farm at Bruckana, located on Templetuohy bog. There is an existing wind farm, Lisheen, in the area. Access to sites is generally good, with most bogs within the Group accessible via the peripheral regional and minor road network, and local access roads.

The study area is within the catchments of the Nore and Suir river systems.

2.0 SURVEY METHODS

2.1 Desk Review and Consultations

In addition to a perusal of the general ornithological literature on Ireland's birds, including the annual journal *Irish Birds*, the following key sources of information (written and/or electronic) were accessed for references to the study area:

Boland, H. & Crowe, O. (2012) *Irish Wetland Bird Survey: Waterbird Status and Distribution 2001/02 – 2008/09*. BirdWatch Ireland, Kilcoole, Co. Wicklow.

Crowe, O. (2005) *Ireland's Wetlands and their Waterbirds, Status and Distribution*. BirdWatch Ireland, Newcastle, Co. Wicklow.

Fox, A.D., Norriss, D.W., Stroud, D.A. & Wilson, H.J. (1994). *Greenland White-fronted Geese in Ireland and Britain, 1982/83-1993/94. The first twelve years of international conservation monitoring*. Greenland White-fronted Goose Study and National Parks & Wildlife Service, Dublin.

Hutchinson, C.D. (1979) *Ireland's Wetlands and their Birds*. Irish Wildbird Conservancy, Dublin.

Sheppard, R. (1993) *Ireland's Wetland Wealth*. Irish Wildbird Conservancy, Dublin.

www.birdwatchireland.ie - Distribution map of I-WeBS sites in Ireland

www.npws.ie - Distribution maps and associated information for sites designated for conservation by NPWS (i.e. SPAs, SACs, NHAs, pNHAs)

Consultations, mostly by email and/or telephone, took place with the following:

NPWS

Ms Aine Lynch, Conservation Ranger – Co. Tipperary, Tel.: 067 46325; email: Aine.Lynch@ahg.gov.ie

BirdWatch Ireland

Dr Alex Copland, Senior Conservation Officer Crank House, Banagher, Co. Offaly
Tel.: 057 9151676; email: acopland@birdwatchireland.ie

Dr Olivia Crowe & Ms Helen Boland (I-WeBS co-ordinators)
email: ocrowe@birdwatchireland.ie; hboland@birdwatchireland.ie

Irish Peatland Conservation Council

Dr Catherine O'Connell, CEO, IPCC, Tel.: 045 860 133; email: bogs@ipcc.ie

Mr Tadhg O Corcora, Conservation Officer, IPCC, Tel.: 045 860 133; email: bogs@ipcc.ie

2.2 Field Surveys

The tender documentation had noted the following points in respect of survey methodology:

- The Winter Bird Surveys should be undertaken between the months of October and March and should focus in particular on wintering waders, wildfowl - notably geese and swans, any winter Hen Harrier roosts, other raptors, Annex 1 species and birds of conservation interest.
- All sites should be visited a minimum of three times during the winter period, or more frequently as appropriate, with the approach and methodology varying depending on the target species.
- The survey should include all, or a selection of the following; focused wetlands surveys; transects; vantage point surveys; bog walks; roost watches; flight paths and migration studies; or other methodologies as appropriate.

The tender also noted that '*adherence to approved methodologies is a key requirement of the project. However, given the scale and fragmented nature of the area to be surveyed, and the nature of the studies to be undertaken, a pragmatic approach is required. This must balance the detail required to be acceptable for a planning application for a wind farm project of very significant scale with the fact that much of the area is still utilised for industrial scale peat extraction or peat extraction has ceased only recently*.'

Taking the above into account, the following approach was taken at the sites:

2.2.1 Number of site visits

With the contract commencing in late November, this allowed for four rounds of visits to all sites:

- December 2012
- January 2013
- February 2013
- March 2013

2.2.2 Survey methods

Use of the following methods was employed at the sites as relevant. However, transect surveys and vantage point watches were the main methods and a combination of these were used in virtually all sites.

Surveys were carried out largely in suitable weather conditions, with avoidance of persistent rain, mist/fog and winds in excess of F4-5.

Transects surveys

The use of transects to record birds within sites is a well established survey method (Bibby *et al.* 2000). The method is particularly useful for open habitats such as peatlands. The value of the method is that it is repeatable over time, which is particularly relevant to the Bord na Móna cutaway bogs where habitat conditions are somewhat transient and bird communities can be expected to change over time in response to vegetation types present.

The transects selected typically followed identifiable tracks (inc. rail tracks) which made coverage quicker and also safer compared to across open bog. Further, tracks are often slightly elevated which makes recording more efficient. The number of transects used at each site was determined by the size of the site and the diversity of habitats present.

Bird recording is normally within a zone 200-300 m wide either side of the transect though the flat nature of the sites made larger sized or obvious birds (such as Golden Plover flocks) at further distances easily visible. Birds were recorded by sight (with aid of binoculars) and sound.

Vantage point surveys

Vantage point surveys were carried out in general accordance with the methodology used for assessing impacts of wind farms on bird communities published by Scottish Natural Heritage (SNH 2005). The purpose of these surveys was mainly to detect birds of prey and passing waterbirds (swans, geese, duck, waders etc.), though all birds observed during watches were recorded. The main deviation from the SNH method was in the duration of the vantage point watches carried out, which varied from 30 minutes to in excess of 2 hours. For the purpose of the first winter of baseline survey, this survey effort was considered adequate for sites where there was no history of regular populations of target species and often there was little or no potential for such species to occur due to the habitats present.

At each site a representative number of vantage points were established to provide views over large areas of the site and adjoining lands, with focus on expanses of habitats of potential value to wintering birds. The vantage points were positioned on elevated ground where feasible – these range from naturally higher ground (hillocks etc) to roads/embankments and even milled peat piles. At a small number of sites, heavy growth of scrub and low woodland partly obscured the view from the vantage point.

When a target species was sighted during a watch, the flightline was plotted onto a field map along with estimated flight height, duration of observation and any other parameters such as age and gender of bird, behaviour of bird (e.g. hunting, flying, roosting) etc.

Focused surveys for wetland birds

At the commencement of the study, search was made in the areas surrounding the bog sites for potential wetland or grassland sites which could support wintering waterbirds. This was based on the desk review, map detail and general search. Particular emphasis was placed on search for feeding and/or roost sites for Whooper Swans (a key target species). The zone of search was generally within a 1-2 kilometre radius of the sites but was further where necessary.

Hen Harrier roost watches

Consultations confirmed the presence of one known winter roost in the area but this is not on the Bord na Móna sites. A roost watch was carried out at this location.

2.2.3 Target species

The winter surveys were focused on the potential presence of the following groups of birds or species:

- Waterfowl, especially Whooper Swan but also any geese or duck species

- Waders, especially flocks of Golden Plover, Lapwing or Curlew
- Hen Harriers, Merlin and other birds of prey
- Any other Annex 1 species of EU Birds Directive
- Any other Red or Amber listed species as given in Lynas *et al*. (2007)

2.3 Survey Limitations

It is considered that the combination of walk-over transect surveys, vantage point watches and focused surveys for wintering waterbirds provides a thorough baseline of wintering bird species associated with the sites.

All sites were surveyed four times during the period December 2012 to March 2013 using standard methodologies. While the absence of survey in the early winter period (September-November) is a limitation, this is not considered a major constraint for the baseline assessment and is unlikely to significantly alter the overall evaluation of the ornithological importance of the sites during the 2012/13 winter.

Bird populations can, however, vary between years, mainly as a result of weather but also due to other factors such as breeding success, local disturbance at sites, etc. (see Crowe 2005). For instance, species such as Golden Plover and Lapwing are highly affected by cold weather. Cold weather usually results in large-scale movements, particularly from their preferred inland feeding areas to the relatively ice-free coastline. Under more severe conditions, they may vacate Ireland altogether, possibly for France and Iberia.

Whooper Swans may also be affected by severe cold weather and in the 2010 national census results were considered to be affected by the severe weather at the time, which resulted in flocks being widely dispersed and in locations where they had not previously been recorded as a result of the freezing-over of water bodies (Boland *et al*. 2010).

It is therefore preferable to have more than one season's data in evaluating the importance of sites so as to dampen annual fluctuations in numbers (Crowe 2005).

2.4 Criteria for Evaluation of Ornithological Importance of Sites

The importance of winter wetland bird populations is evaluated according to the standard 1% thresholds for national (all-Ireland) and international importance (see Crowe 2006, Boland & Crowe 2012, Delaney and Scott 2006).

Evaluation of sites may also be made on the basis of the presence of species listed in Annex I of the EU Birds Directive or species listed as 'Birds of Conservation Concern', either on the Red List (High conservation concern) or Amber List (Medium conservation concern) (after Lynas *et al*. 2007). As evaluating sites due to the presence of such is not quantitative, a subjective assessment may need to be made – for instance, the regular presence within the site of a breeding pair of Peregrines (Annex I species) would be of more significance than the occasional record of hunting birds.

For an overall ecological assessment of the importance of a site, taking into account not just ornithological interests but also habitats, flora and other fauna types etc., reference is made to the NRA *Guidelines for Assessment of Ecological Impacts of National Road Schemes* (NRA, 2009). Whilst the NRA guidelines were devised specifically for road schemes, they can be applied to general environmental impact assessment. The NRA system uses the following five-point scale:

- International Importance
- National Importance
- County Importance
- Local Importance (higher value)
- Local Importance (lower value)

3.0 RESULTS AND DISCUSSION

3.1 Sites Designated for Nature Conservation

The following designated sites are located within a distance of approximately 15 km of the study area. These comprise the following types of designations:

- Special Protection Areas - SPAs are designated under Council Directive 79/409/EEC on the conservation of wild birds (i.e. the Birds Directive).

- Special Areas of Conservation - SACs are designated under Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (i.e. the Habitats Directive).

- Natural Heritage Areas - NHAs are designated under the Wildlife Amendment Act 2000.

- proposed Natural Heritage Areas - pNHAs do not receive legal protection though the ecological value of pNHAs is recognised by Planning and Licencing Authorities.

Apart from SPAs, these sites do not necessarily have ornithological interests though many would support some birds of conservation interest. In the following list, a note is made on whether the site has known ornithological interest.

Slieve Bloom Mountains SPA (code 004160)

This large upland site is designated for a nationally important population of breeding Hen Harriers. The site is situated on the border between Counties Offaly and Laois and runs along a northeast/southwest aligned ridge for approximately 25 km. The SPA includes the majority of the Slieve Bloom uplands.

Along with Hen Harriers, the site supports breeding Merlin and Red Grouse.

The SPA is situated just over 10 km north of Knockahaw bog.

River Nore SPA (code 004233)

This large site consists of the freshwater stretches of the River Nore and its main tributaries, including the Delour, Erkina and Kings rivers.

The site is a SPA as it is of special importance of Kingfisher. A survey in 2010 recorded 22 pairs of Kingfishers within the SPA. Other species which occur include Mute Swan (35), Mallard (267), Cormorant (14), Snipe (17) and Sand Martin (1,029) – all figures are peak counts recorded during the 2010 survey.

The bogs in the northern part of the Littleton group are within the Nore catchment. Knockahaw and Clonbuagh bogs are located approximately 15 km from Boston Bridge, the upper limit of the SPA along the Erkina River, while Templetuohy bog is within 13 km of Boston Bridge (all straight line distances).

River Barrow and River Nore SAC (code 002162)

This large site consists of the freshwater stretches of the Barrow/Nore River catchments as far upstream as the Slieve Bloom Mountains. All the main tributary rivers form part of the site, included the Delour, Dinin, Erkina, Munster, Arrigle and King's River on the Nore. Overall, the site is of considerable conservation significance for the occurrence of good examples of a range of habitats and of populations of plant and animal species that are listed on Annexes I and II of the EU Habitats Directive respectively.

The NPWS site synopsis notes that the site is of ornithological importance for a number of E.U. Birds Directive Annex I species including Greenland White-fronted Goose, Whooper Swan, Bewick's Swan, Bar-tailed Godwit, Peregrine and Kingfisher. Nationally important numbers of Golden Plover and Bar-tailed Godwit are found during the winter. Wintering flocks of migratory birds are seen in Shanahoe Marsh and the Curragh and Goul Marsh, both in Co. Laois.

Much of the area of the Littleton bog group is drained by the Nore system.

Lower River Suir SAC (code 002137)

This large site consists of the freshwater stretches of the River Suir immediately south of Thurles. All the main tributary rivers form part of the site. Overall, the site is of considerable conservation significance for the occurrence of good examples of a range of habitats and of populations of plant and animal species that are listed on Annexes I and II of the EU Habitats Directive respectively.

The NPWS site synopsis notes that parts of the site are of ornithological importance for a number of E.U. Birds Directive Annex I species including Greenland White-fronted Goose (10), Golden Plover (1490), Whooper Swan (7) and Kingfisher (figures given in brackets are the average maximum counts from 4 count areas within the site for the three winters between 1994 and 1997). Wintering populations of migratory birds use the site. In Cabragh marshes there is abundant food for surface feeding wildfowl which total at 1,000 or so in winter. Widgeon, Teal and Mallard are numerous and the latter has a large breeding population - with up to 400 in summer. In addition, less frequent species like Shoveler and Pintail occur and there are records for both Whooper and Bewick's swans. Kingfisher, a species that is listed on Annex I of the EU Birds Directive, occurs along some of the many tributaries throughout the site.

The southern part of the Littleton bog group is drained by the Suir system.

The Loughans SAC (code 0407)

This site which comprises three lakes is a turlough situated in flat land about 3 km east of Urlingford, below the Slieve Ardagh Hills. The site contains a numbers of rare and scarce plant species. The Loughans is approximately 5 km east of Bawnmore and Inch bogs, approximately 8 km east-northeast of Pope's bog and over 9 km northeast of Littleton bog.

This site is not of known ornithological interest.

Spahill and Clomantagh Hill SAC (code 0849)

Spahill and the adjacent hills form part of an escarpment that links the Slieve Ardagh Hills with the Castlecomer Plateau. The area is mostly limestone and supports a rich flora,

including rare orchids.

The SAC site is located approximately 8 km northeast of Bawnmore and Inch bogs, and over 10 km northeast of Pope's bog and Littleton bog.

This site is not of known ornithological interest.

Cullahill Mountain SAC (code 0831)

This site lies on western outlier of the Castlecomer Plateau, 6 km northeast of Johnstown. The area is mostly limestone and supports a rich flora, including rare orchids.

The SAC site is located approximately 11 km northeast of Bawnmore and Inch bogs, and approximately 10 km east of Templetuohy bog.

This site is not of known ornithological interest.

Kilduff, Devilsbit Mountain SAC (code 0934)

This upland site is situated approximately 5 km northwest of Templemore. The site supports upland grassland, heath and woodland habitats.

The SAC site is located approximately 10 km west of Knockahaw and Ballysorrell bogs.

Peregrine breeds within the site.

Nore Valley Bogs NHA (code 001853)

The site is good example of a relatively intact raised bog. It is located approximately 5 km southeast of Roscrea and approximately 8 km north of Knockahaw Bog.

The NPWS site synopsis notes that Hen Harrier has been recorded on the site.

Monaincha Bog/Ballaghmore Bog NHA (code 00652)

This NHA is a good example of a relatively intact raised bog. It is located about 3 km east of Roscrea Longwood and approximately 4 km south of Ballivor Bog.

This site is not listed as being of ornithological interest.

Killough Hill pNHA (code 0959)

This site surrounds a limestone quarry approximately 6 km south-southwest of Thurles. It is of importance due to the presence of some limestone pavement, as well as calcareous grassland and woodland and scrub.

The site is located approximately 5 km west of Killeen and Ballybeg bogs.

The woodland at the site is noted as having a large bird population.

Cabragh Wetlands pNHA (code 01934)

This site is in two parts both situated close to the River Suir near Thurles. The largest section is the Cabragh marshes, located approximately 3 km southwest of the town. This is a

large reedbed, with fen and marsh. The other sector is located at Ardbaun, just north of the town. This is a spring fed marsh, with abundant Saw Sedge.

The southern part of the site is located approximately 10 km west of Littleton and Ballybeg bogs, while the northern part is located approximately 10 km west of the Popes bog.

The main Cabragh wetland is an important site for wetland birds, especially wildfowl (Teal, Wigeon, Mallard) but also Whooper Swans. The northern part supports small numbers of wetland birds.

Laffansbridge pNHA (code 00965)

This pNHA is a cluster of five separate areas of calcareous grassland located near Laffansbridge village to the west of Killenaule. The herb-rich sward supports the rare plant Green-winged Orchid.

This pNHA is located just over 1 km south of Killeen bog.

This site is not of known ornithological interest.

Kilcooly Abbey Lake pNHA (code 00958)

This pNHA is a small lake in the estate grounds of an old abbey. It is located about 6 km southeast of Urlingford. The lake has a varied aquatic flora.

The pNHA is located approximately 7 km east of Popes bog and Inch bog.

The lake supports wetland bird species such as Mallard, Moorhen, Coot and Grey Heron.

Aghsmear House pNHA (code 02060)

This pNHA is a nursery roost of the Natterer's bat. It is located in the grounds of Aghsmear House, four kilometres south of Roscrea.

This pNHA is located 5 km northwest of Knockahaw bog.

This site is not of known ornithological interest.

St Anne's (Sean Ross Abbey), Roscrea pNHA (code 0656)

This pNHA is a nursery roost of the Leisler's bat. It is located within a modern school building in Roscrea.

The pNHA is located approximately 9 km northwest of Knockahaw bog.

This site is not of known ornithological interest.

Sheehills Esker pNHA (code 0938)

This pNHA consists of a series of discrete sandy esker ridges. The ridges are mostly wooded but also support patches of grassland. A number of scarce plants have been recorded from the site.

The pNHA is located approximately 8 km northwest of Knockahaw bog.

This site is not of known ornithological interest.

The Curragh and Goul River Marsh pNHA (code 0420)

This site, which lies between the towns of Rathdowney and Durrow, comprises a 6 km stretch of wet meadow through which flows the River Erkina. It supports an excellent diversity of wetland vegetation types.

The pNHA is located approximately 15 km east of the northernmost sector of the Littleton bog group.

The site is noted as an important winter feeding site for Greenland White-fronted Geese.

Grantstown Wood and Lough pNHA (code 0417)

This state owned Nature Reserve is located some 8 km northwest of Durrow. The lough is completely surrounded by woodland and there is an excellent seral transition of wetland habitats.

The pNHA is located approximately 15 km east of the northernmost sector of the Littleton bog group.

The site is not listed as being of ornithological interest.

3.2 Review of Past Data for Study Area

Some information on wetland birds in the wider study area is available through the various national wetland surveys that have take place since the early 1970s, though coverage in the area has been generally poor. There have been three national surveys (with I-WeBS on-going) as follows:

Irish Wetlands Enquiry

In the *Irish Wetlands Enquiry* (winters 1971-72 to 1974-75), which was the first national census of wetland birds, the **Thurles Sugar Factory Lagoons** is the only site in the wider area of the Littleton Bog Group that was included. The site was listed as being important for duck (over 1,000 comprising Teal, Wigeon, Shoveler and Pintail), with Whooper Swans (40) and Bewick's Swans (120) also present (Hutchinson 1979).

Winter Wetlands Survey

A further national census of wetland birds, the *Winter Wetlands Survey***,** took place over the three winters 1984-85 to 1986-87 (Sheppard 1993). Information was presented for the following sites in the present study area:

Co. Tipperary

Thurles Sugar Factory Lagoons (23 counts over 3 seasons):

Species with Nationally Important numbers:
Teal 1,073; Mallard 1,133; Shoveler 61

Species with Regionally/Locally Important numbers:
Bewick's Swan 30; Whooper Swan 38; Wigeon 387; Pintail 19; Golden Plover 890; Lapwing 1,050; Curlew 500.

Sheppard noted that the recent closure of the factory and the drainage of the lagoons would seem to spell the end of the interest at this site.

Upper River Suir (23 counts over 3 seasons)

Sheppard wrote 'Although the main area of interest is between Lafnagh and Golden, this stretch of the river could be taken to include the whole distance between Brittas (north of Thurles) and Caher.'

Species with Regionally/Locally Important numbers:
Mute Swan 33; Bewick's Swan 43; Whooper Swan 60; Wigeon 123; Teal 29; Mallard 70; Golden Plover 872; Lapwing 1,053.

Co Laois

Cullahill (S3576) (5 counts over 2 seasons)

Species with Nationally Important numbers:
Golden Plover 1,375

Species with Regionally/Locally Important numbers:
White-fronted Goose 95; Lapwing 950; Curlew 70.

This site appears to be a river flood plain, with fluctuating number of birds.

Durrow Curragh (S3778) (4 counts over 2 seasons)

Species with Nationally Important numbers:
Golden Plover 1,075

Species with Regionally/Locally Important numbers:
Lapwing 400; Curlew 65.

Irish Wetland Bird Survey **(I-WeBS)**

The *Irish Wetland Bird Survey* was initiated in 1994/95 and continues to the present. All major wetlands in the country are covered each winter by this scheme. Annual reports have been published and the first major review was carried out for the period 1994/95 to 1999/2000 (Crowe 2005), with a further review (species based rather than site based) for the period 2001/02 to 2008/09 carried out by Boland and Crowe (2012).

The following sites which are relevant to the study area are listed in the review by Crowe

(2005) (see Appendix 2 for full details of recent available count data):

Co. Tipperary

Cabragh Wetlands

The Cabragh Wetlands is noted as of national importance for Shoveler, with an average mean of 44 for the winters 1996/97 to 2000/01. The site is described as consisting of a large reedbed, a permanent pond, and an extensive area of callows which flood each winter. The site is located on the River Suir approximately 4 km southwest of the town of Thurles. The site is situated adjacent to the former sugar factory which discharged into it through a number of holding lagoons (now removed). The site is owned and managed by the Cabragh Wetlands Trust.

Other species which occur in significant numbers (though below relevant national importance thresholds) include the following:

> Mute Swan 16; Whooper Swan 21; White-fronted Goose 10, Wigeon 590; Teal 670; Mallard 160; Pintail 20; Golden Plover 900; Lapwing 700; Snipe 55; Curlew 151; Black-headed Gull 200; Lesser Black-backed Gull 310.

I-WeBS data (mean average peaks) for the 5 winters 2007/08 to 2011/12 are as follows:

> Mute Swan 6; Whooper Swan 34; White-fronted Goose 9, Wigeon 186; Teal 436; Mallard 86; Pintail 7; Shoveler 16; Golden Plover 190; Lapwing 610; Snipe 20; Curlew 135; Black-headed Gull 58; Lesser Black-backed Gull 2.

River Suir Upper

This section of the Suir includes one section near Brittas, located approximately 3 km north of Thurles. The site occasionally supports nationally important numbers of Golden Plover and Lapwing, along with the following:

> Mute Swan 14; Bewick's Swan 13; Whooper Swan 42; Wigeon 96; Teal 56; Mallard 9; Snipe 20 (all counts below relevant national importance thresholds).

I-WeBS data (mean average peaks) for the 5 winters 2007/08 to 2011/12 are as follows:

> Mute Swan 6; Whooper Swan 25; Wigeon 8; Teal 26; Mallard 1; Golden Plover 100; Lapwing 103; Curlew 17; Black-headed Gull 60.

Co. Laois

Durrow Curragh

This site is located approximately 3 km west of Durrow and includes an area of lowland grassland through which the Erkina River and the River Goul flow. These rivers flood in most winters.

The site is noted as being important for both Bewick's and Whooper Swans and formerly supported significant numbers of Greenland White-fronted Geese. The following counts are given (all below relevant national importance thresholds):

> Mute Swan 11; Bewick's Swan 47; Whooper Swan 108; Wigeon 1,000; Mallard 50; Golden Plover 3,000; Lapwing 500; Curlew 100.

There are no recent I-WeBS data other than a count of 73 Whooper Swans in winter 2004/05. Also, it can be assumed that the site is no longer used by Bewick's Swans as this species has declined throughout the country (Boland *et al*. 2010).

Status of Greenland White-fronted Goose in area

Ruttledge & Ogilvie (1979,) identified 'The Curragh' (site no. 09) as a traditional site for Greenland White-fronted Geese. They note that this was formerly a considerable area of callows liable to flooding alongside the River Erkina south of Bellacolla. They wrote that the small and very mobile population moves among several sites in the complex and at times the geese are inexplicably absent for a considerable period. Monaincha Bog, just SE of Roscrea, was listed as being formerly a haunt of 50-60 birds but it had been largely deserted as a result of shooting.

In the Greenland White-fronted Goose Site Inventory (Norriss unpublished), the following sites are within the present study area:

- Monaincha S179 882
- Curragh S365 797
- Goul River marsh S349 755
- Grantstown Lough S335 800
- Cabragh, Thurles S115 558

Fox *et al*. (1994) list the River Nore, Co Kilkenny (site no. 27) as a traditional site for Greenland White-fronted Geese (equates to site no.9 in R & O). There are eight known feeding sites, all on improved grassland. There is one suitable roost, Shanahoe marsh (S4088), with an alternative at Grantstown Lough though latter is considered too enclosed and disturbed for regular usage. A mean annual peak of 52 is given for the period 1988/89 to 1993/94.

Since then, the size of the population has dwindled, with the following peaks recorded in recent winters (Fox et al. 2010, 2011, 2012):

Winter 2009/10	9
Winter 2010/11	9
Winter 2011/12	11

Bruckana Wind Farm – Environmental Impact Statement

A winter bird survey for the Bruckana Wind Farm site, which is within Templetouhy bog, was carried out in December 2009 and February 2010. Peregrine was the only species of conservation importance recorded (1 record) on site. Small flocks of Teal and Mallard were recorded on the southern ponds, while counts in excess of 20 Snipe were made on site.

The December survey confirmed that flocks of Lapwing (80+) and Golden Plover (200+) use fields immediately east of the proposed wind farm site. In addition, 17 Whooper Swans were recorded using wetlands approximately 3 km from the site (though none present in February 2010).

Other Sources of Information

NPWS

The local NPWS Conservation Ranger, Ms Aine Lynch, provided information on a local Hen Harrier winter roost in the wider area but was not aware of any particular bird interests

associated with the Bord na Móna bog sites.

Irish Peatland Conservation Council

The IPCC is not familiar with this group of bogs and is not aware of any peatland sites of significance in this particular area.

BirdWatch Ireland

Whilst BirdWatch Ireland carried out a bird survey of Littleton bog as part of a wider study (see Copland 2011) this was a breeding bird survey and no information was collated on wintering birds.

BirdWatch Ireland is not familiar with the other bog sites in the group.

Overall Appraisal of Available Information

Generally there is very little past information available on wintering birds for the Bord na Móna bogs in the study area. Internal Bord na Móna information has identified several sites (mainly Littleton and Bawnmore) as supporting small numbers of wetland birds but this information is generally derived from casual observations. While wintering Hen Harriers are known to occur sparsely through the area, winter roosts have not been recorded or suspected on Bord na Móna lands.

In the wider region, there are several wetland sites that support swans and other waterbirds and which have been reasonably well monitored by the I-WeBS scheme (and its predecessors) over the years. However, these are at distances of between 10 and 15 km (approximately) from any of the bog sites.

It is concluded that past bird information relating to the immediate study area is scant and generally of limited value in the context of the present study.

3.3 Site Descriptions

Sites are described in a standard format, as follows:

brief, general description of the site
outline details of the survey locations
target species recorded
potential for other target species
other species of note
overview

A map showing the survey locations and any target species recorded is presented for each site (some sites had no target species). A representative photograph(s) is also included.

Data for all bird surveys are compiled in an accompanying database.

Scientific names of bird species are given in Appendix 1.

SITE: KNOCKAHAW

Knockahaw bog is a medium sized site located just over seven kilometres northeast of Templemore town. This is an outlying site from the other sites in the Littleton Group. The main access points used for the site are from lanes or tracks off third class roads to the east and west. The site extends for approximately 2 km from north to south and for 2 km from east to west.

Knockahaw is dominated by remnant bog, the majority of which has had surface drains inserted (presumably in preparation for harvesting). The bog has been burnt extensively in the recent past.

The site is surrounded mainly by farmland. Further bog occurs to the northeast and there is some forestry to the east and south. There is a small patch of mixed woodland (oak and sycamore) on the north east boundary.

Survey locations

Transect 1 starts at vantage point 1 in the northwest of the site and runs southeast along the site boundary crossing drained remnant bog and sod peat production. It then follows the boundary lane southeast along the edge of the site through birch woodland.

Transect 2 starts at the site access point in the east of the site and comprises a loop across drained remnant bog.

Vantage Point 1 is located at the start of transect 1 at the northwest boundary and looks southeast over the majority of site (drained remnant bog).

Target species recorded

Golden Plover
Small flocks of 17 and 30 birds were recorded resting on the bare peat in the eastern part of the site on 31st December 2012 and 19th January 2013 respectively.

Potential for other target species

Whooper Swan
There is no potential for swans to use this site and no flight lines were recorded.

Hen Harrier
The remnant bog habitat could attract hunting birds. However, there is no significant potential for winter roosting on site.

Merlin
The remnant bog habitats could attract hunting birds.

Other species of note

Buzzard – two were observed circling over tall woodland to east of site on 21st February 2013.

Snipe – up to three recorded during each survey.

Skylark – two on 9th February and five on 16th March.

Linnet – four on 19th January 2013.

Overview

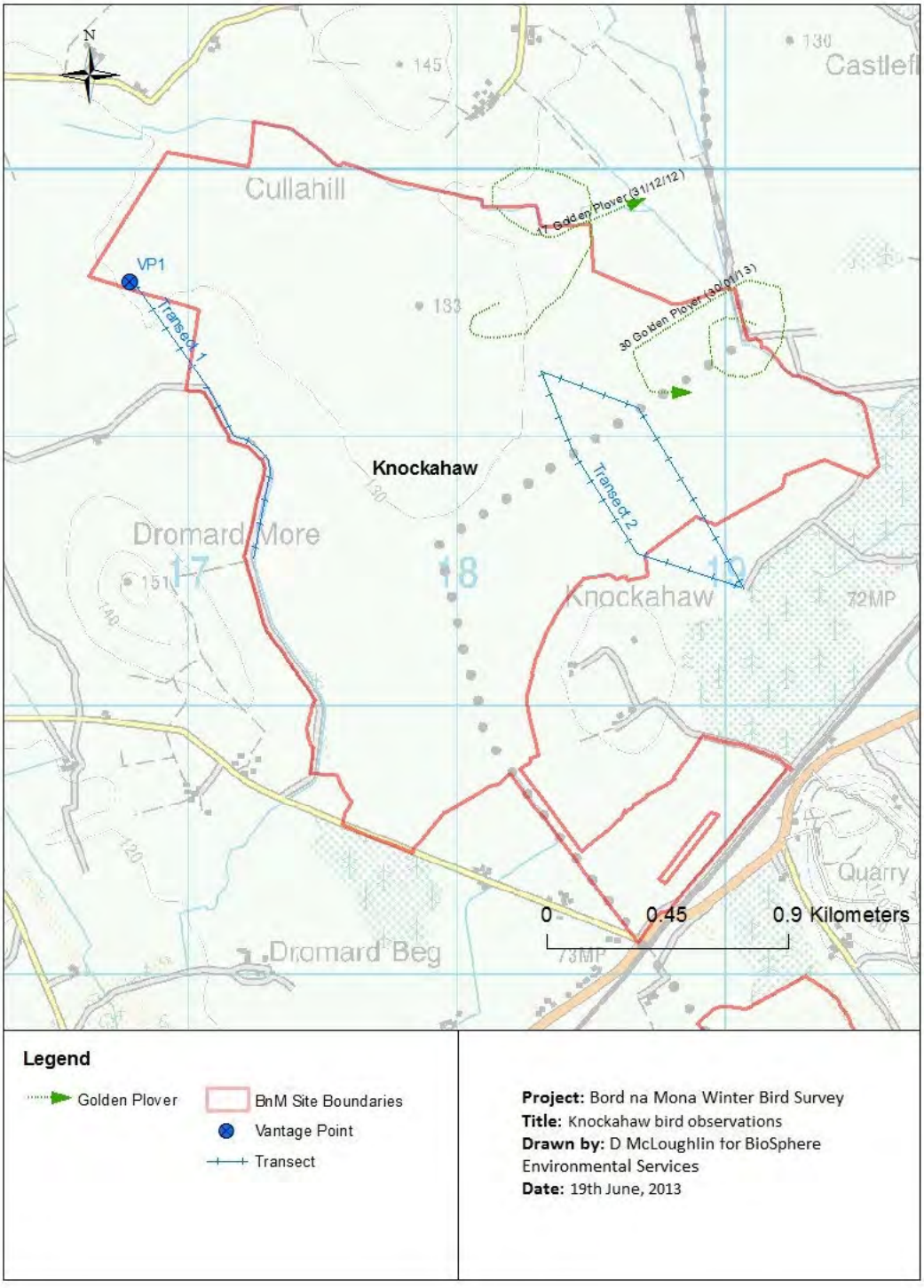
Knockahaw Bog has limited potential for wintering birds of conservation importance.

It does, however, comprise a substantial area of remnant bog and could attract Hen Harrier and Merlin for hunting purposes. The relatively sparse covering of heather due to recent burning probably attracted the Golden Plover recorded roosting in December and January. The remnant bog provides habitat for Snipe and Skylark, with Linnet occasional (Amber listed species).



Knockahaw bog, Plate 1: view of bog surface with drains.

Knockahaw: Map showing transect and vantage point locations, with records of target species.



SITE: CLONBUAGH (KNOCKAHAW)

Clonbuagh Bog is a small site located eight kilometres northeast of Templemore town. This is an outlying site from the other sites in the Littleton Group and is located approximately 1 km southeast of the main Knockahaw site. The access route used to the site is from a lane leading from a regional class road to the north. The site extends for c.700 m from north to south and c.500 m from east to west.

The site is a remnant bog with some drains but still largely intact and very wet. Birch woodland occurs along much of the margins.

The site is surrounded by farmland and forestry. A large quarry complex occurs to the northeast

Survey locations

Transect 1 starts at the southern end of the site where the bog road crosses a drain. It runs northwest over remnant bog to a clump of Scots pine trees.

Transect 2 starts at the clump of Scots pines and runs east to the southeast site boundary then turns south following the site boundary and back to the start of transect 1.

Vantage Point 1 is located at the clump of Scots pine trees in the bog and offers good views over the entire site (mainly remnant bog and birch woodland).

Target species recorded

No target species were recorded during the surveys.

Potential for other target species

Whooper Swan
There is no potential for swans to use this site and no flight lines were recorded.

Hen Harrier
The bog habitats could attract hunting birds and there is some potential for roosting.

Merlin
The bog habitats could attract hunting birds

Other species of note

Kestrel – singles on 31st December 2012 and on 19th January 2013.

Buzzard – one to two birds were observed in February and March soaring and circling over and adjacent to the site. Probably breeds nearby.

Snipe – eight flushed from bog on 31st December 2013, three on 19th January, four on 6th February and on 16th March 2013.

Skylark – one on 6th February, four on 16th March 2013.

Overview

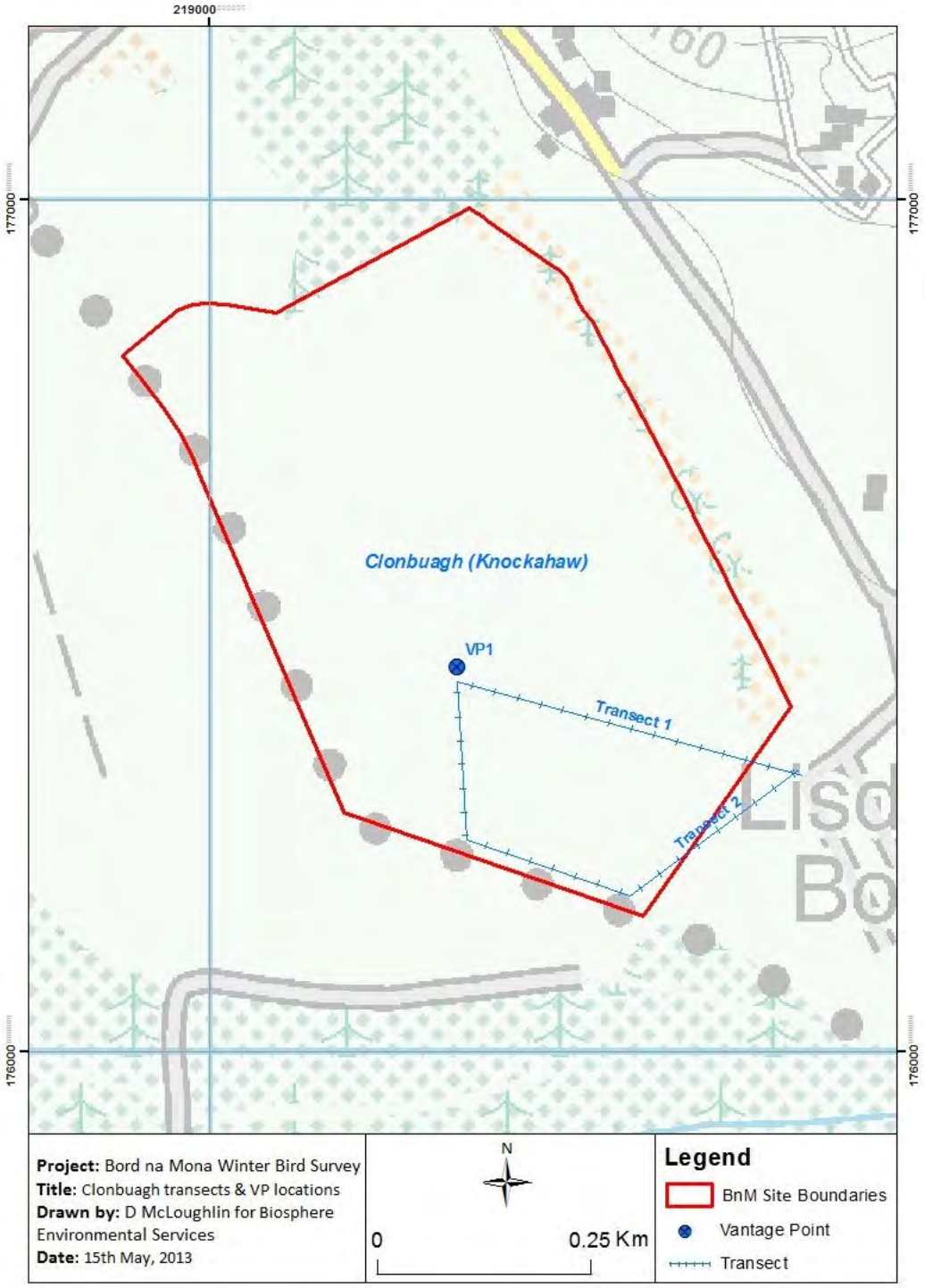
Clonbuagh bog has limited potential for wintering birds of conservation importance.

It is, however, a relatively intact raised bog and provides potential for birds of prey species including Hen Harrier and Merlin. The bog provides habitat for Kestrel, Snipe and Skylark (Amber listed species).



Clonbuagh bog, Plate 1: view of relatively intact bog surface.

Clonbuagh: Map showing transect and vantage point locations.



SITE: BALLYSORRELL

Ballysorrell Bog is a small sized site located approximately five kilometres east of Templemore town and about two kilometres northwest of Templetoughy village. This is an outlying site, being 3 km east of the next bog site in the group (Templetouhy). The main access to the site is from a (gated) lane leading from a regional class road to the south. The site extends for less than 2 km from north to south and c.1 km from east to west.

Ballysorrell is largely remnant and regenerating cutover bog. Birch woodland and gorse scrub occur in the marginal areas of the site.

The site is mostly surrounded by farmland, with commercial forestry to the north.

Survey locations

Transect 1 starts at the site access point in the southeast and runs northwest crossing remnant bog. The transect then turns north towards the centre of the site (an abandoned tractor and draining machine occurs here). On the return loop the transect passes through gorse scrub.

Vantage Point 1 is located at the heather cutting machines near the track and looks west and northwest over the entire southern sector of the site (scrub and remnant bog).

Vantage Point 2 is located at the abandoned tractor; it offers views all round the central and northern parts of the site.

Target species recorded

Hen Harrier
One male was recorded (two separate sightings) on 17th January 2013 possibly roosting on the site.

Potential for other target species

Whooper Swan
There is no potential for swans to use this site and no flight lines were recorded.

Merlin
The remnant and cutover bog habitats could attract hunting birds.

Other species of note

Kestrel – singles on 27th December 2012 and on 17th January and 12th March 2013.

Buzzard – two Buzzards (probable breeding pair) were observed circling over tall woodland at south of site on 12th March 2013.

Sparrowhawk – one on 6th February 2013.

Snipe – several birds (up to 4) were flushed from the bog in each of the winter surveys.

Skylark – three on 12th March 2013.

Starling – c.50 on 6th February 2013.

Linnet – six on 27th December.

Overview

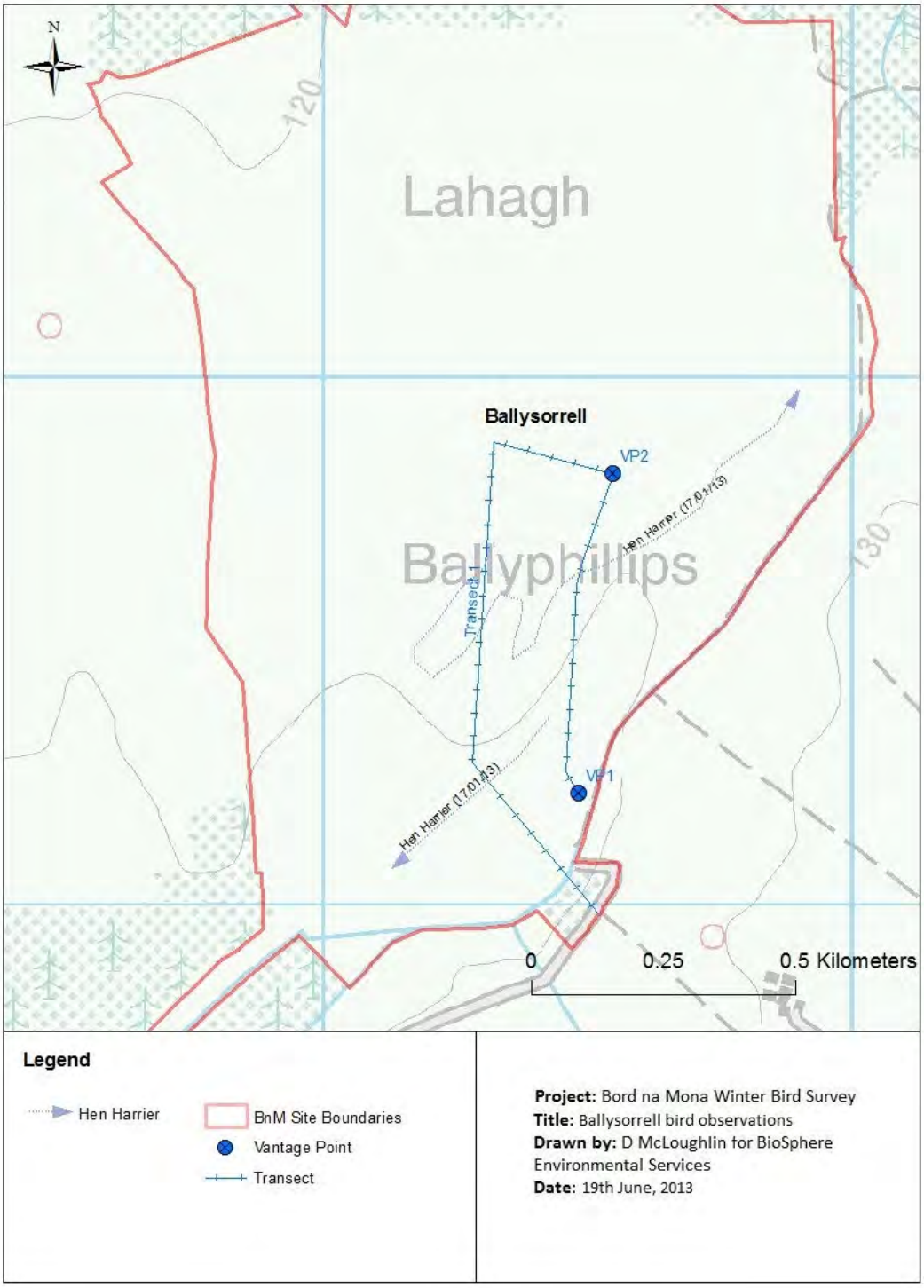
Ballysorrell Bog is of some conservation importance for wintering birds due to the presence of a Hen Harrier on site (and with some potential for a roost).

The site provides habitat for amber listed species such as Kestrel, Snipe, Skylark and Linnet.



Ballysorrell bog, Plate 1: view of bog surface.

Ballysorrell: Map showing transect and vantage point locations, with records of target species.



SITE: TEMPLETUOHY

Templetuohy bog is a medium sized site located approximately 2 kilometres east of Templetuohy village and 11 kilometres northeast of Thurles town. The site adjoins Derryville bog to the south. The main access used for the survey is from a lane off a regional class road mid west of the site. The site extends for c. 4 km from north to south and for up to 2 km from east to west.

Roughly half the site is bare peat with commercial production still in progress. The remainder is regenerating cutover, remnant bog and some open water.

Templetouhy bog is mostly surrounded by farmland but with stands of mixed coniferous forestry to the east, south and west.

Survey locations

Transect 1 is a long, rectangular loop which passes over the main part of the site and through the principal habitats on site.

Vantage Point 1 is located at the end of the bog road in the mid west of the site and looks over the remnant bog and bare peat, offering good views over large areas of the central and southern parts.

Vantage Point 2 is located along a third class road at the northernmost point of the site and looks south over remnant cutover bog and bare peat in the northern half of the site.

Target species recorded

No target species were recorded during the surveys.

Potential for other target species

Whooper Swan
Swans could potentially use the site as there are some areas of open water. However, no flight lines were recorded. The nearest known swan activity is at Thurles (c. 10km to west).

Hen Harrier
The remnant and cutover bog habitats could attract hunting birds and there is some potential for winter roosting.

Merlin
The remnant and cutover bog habitats could attract hunting birds

Other species of note

Kestrel – singles recorded on 24th February and 12th March 2013.

Teal – small numbers (< 10) regular on wetland areas.

Snipe – two flushed from bog on 18th December 2012 and 15th January. Four on 12th March 2013.

Skylark – one on 15th January and five on 12th March 2013.

Linnet – 12 on 18th December 2012.

Overview

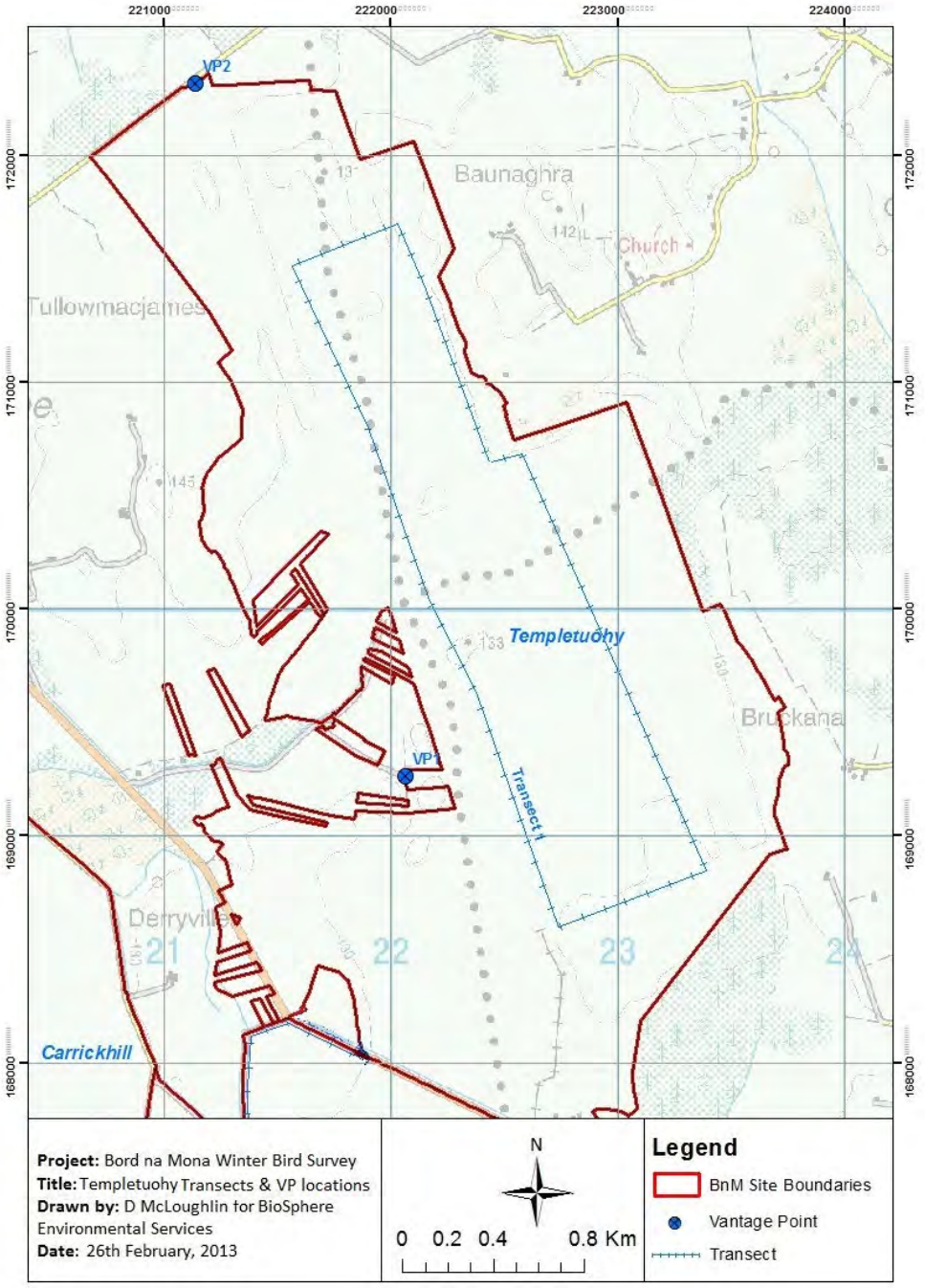
While no target species were recorded during the surveys, Templetouhy bog has potential to support Hen Harrier and Merlin and possibly Whooper Swans.

Several Amber listed species were recorded, including Kestrel, Snipe, Skylark and Linnet.



Templetuohy bog, Plate 1: view of wetland habitat within site.

Templetuohy: Map showing transect and vantage point locations.



SITE: DERRYVILLE

Derryville bog is a small to medium sized site located ten kilometres northeast of Thurles town. It adjoins Templetuohy to the north, Carrickhill to the west and Bawnmore to the south. The main accesses used are from a second class road at the north of the site and a third class road at the south. The site extends for up to 1 km from north to south and for approximately 2.5 km from east to west.

Derryville is largely bare peat with production still in progress over much of the area. There are some small areas of regenerating cutover bog along the margins and a small area of mature coniferous forestry in the southwest corner.

As noted, Derryville adjoins three other bog sites, with areas of farmland and forestry to the east and north. The Lisheen mines complex occurs to the south of the site.

Survey locations

Transect 1 starts at the road at the southern boundary of the site and runs north following the track on eastern side of the railway line, with forestry and remnant bog on the eastern side and bare peat to the west.

Transect 2 starts at the road at the north end of the site and follows the boundary at the northwest corner, finishing at the site buildings. It runs through an area of cutover and looks over bare peat to the east and south

Vantage Point 1 is located at the north end of transect 1 and covers the eastern sector of the site (predominantly bare peat).

Vantage Point 2 is located at the eastern end of transect 2 (at the site buildings) and looks out over the central area of the site (predominately bare peat).

Vantage Point 3 is located at the western end of transect 2 and looks out over the western area of the site.

Target species recorded

No target species were recorded during the winter surveys.

Potential for other target species

Whooper Swan
There is no potential for swans to use this site and no flight lines were recorded.

Hen Harrier
The marginal remnant and cutover bog habitats could attract hunting birds. However, there is no potential for winter roosting.

Merlin
The marginal remnant and cutover bog habitats could attract hunting birds

Other species of note

Snipe – singles in December, February and March.

Skylark – two on 13th March 2013.

Starling – flock of c.30 on 17th December 2012.

Linnet – eight on 15th January 2013.

Overview

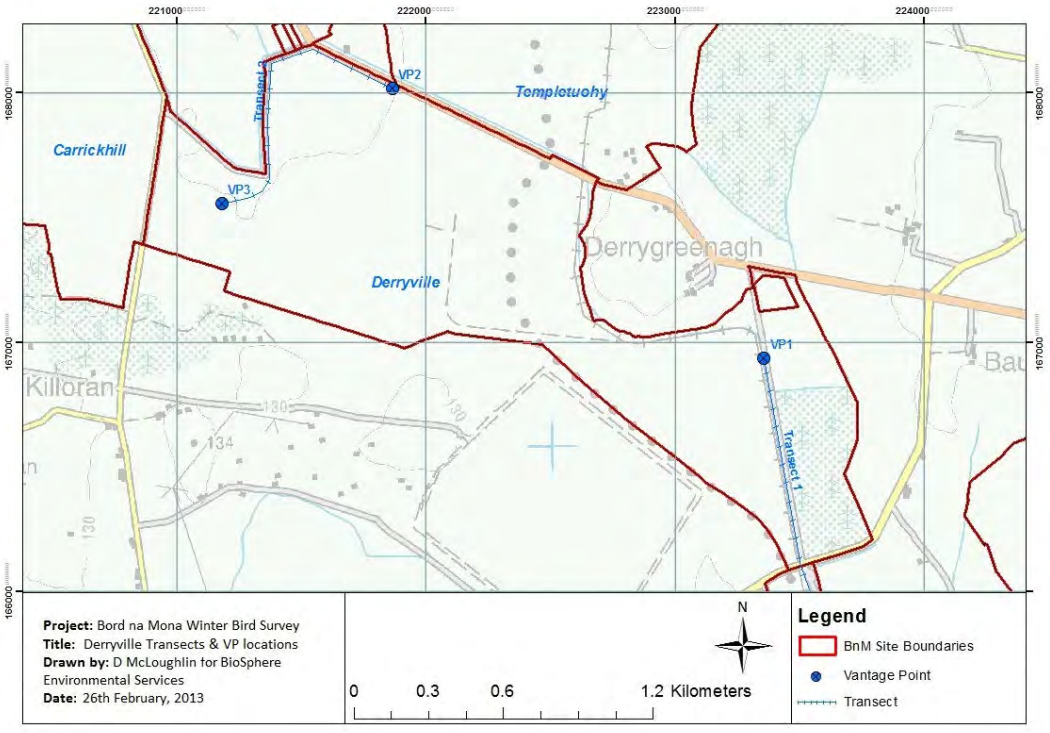
Derryville Bog has limited potential for wintering birds of conservation importance.

The most useful areas of habitat are the small areas remnant/cutover bog on the eastern boundary which could attract species such as Hen Harrier and Merlin. Supports several amber listed species, including Snipe and Linnet.



Derryville bog, Plate 1: view of typical habitats within site.

Derryville: Map showing transect and vantage point locations.



SITE: CARRICKHILL

Carrickhill bog is a small site located ten kilometres northeast of Thurles town. It adjoins Derryville to the east. The main access to the site is from a third class road on the northeastern boundary. The site extends for up to 2 km from north to south and for up to 1 km from east to west.

Carrickhill is largely bare peat with production still in progress over much of the area. There are small areas of regenerating and remnant bog along the northern and western margins of the site. There was a small body of open water on the northern boundary but this was drained during the winter survey period.

The site is surrounded by farmland and mature coniferous forestry.

Survey locations

Transect 1 starts at the roadside on the northern boundary. It runs west along the railway line for about three hundred metres then turns south and runs around a small area of regenerating cutover.

Vantage Point 1 is located at the start of transect 1 and gives a good view over the majority of the site (predominantly bare peat).

Target species recorded

Whooper Swan
Three were recorded on 27th December 2012 on the small body of open water on the northern boundary (which was later drained during the survey period). The swans flew in a westerly direction.

Potential for other target species

Hen Harrier
The marginal remnant and cutover bog habitats could attract hunting birds. However, there is no significant potential for winter roosting.

Merlin
The marginal remnant and cutover bog habitats could attract hunting birds

Other species of note

Kestrel – singles on 27th December 2012 and 24th February 2013.

Snipe – two flushed on 17th January, three on 24th February, two on 12th March 2013.

Jack Snipe – one flushed on 17th January 2013.

Overview

Carrickhill Bog has limited potential for wintering birds of conservation importance.

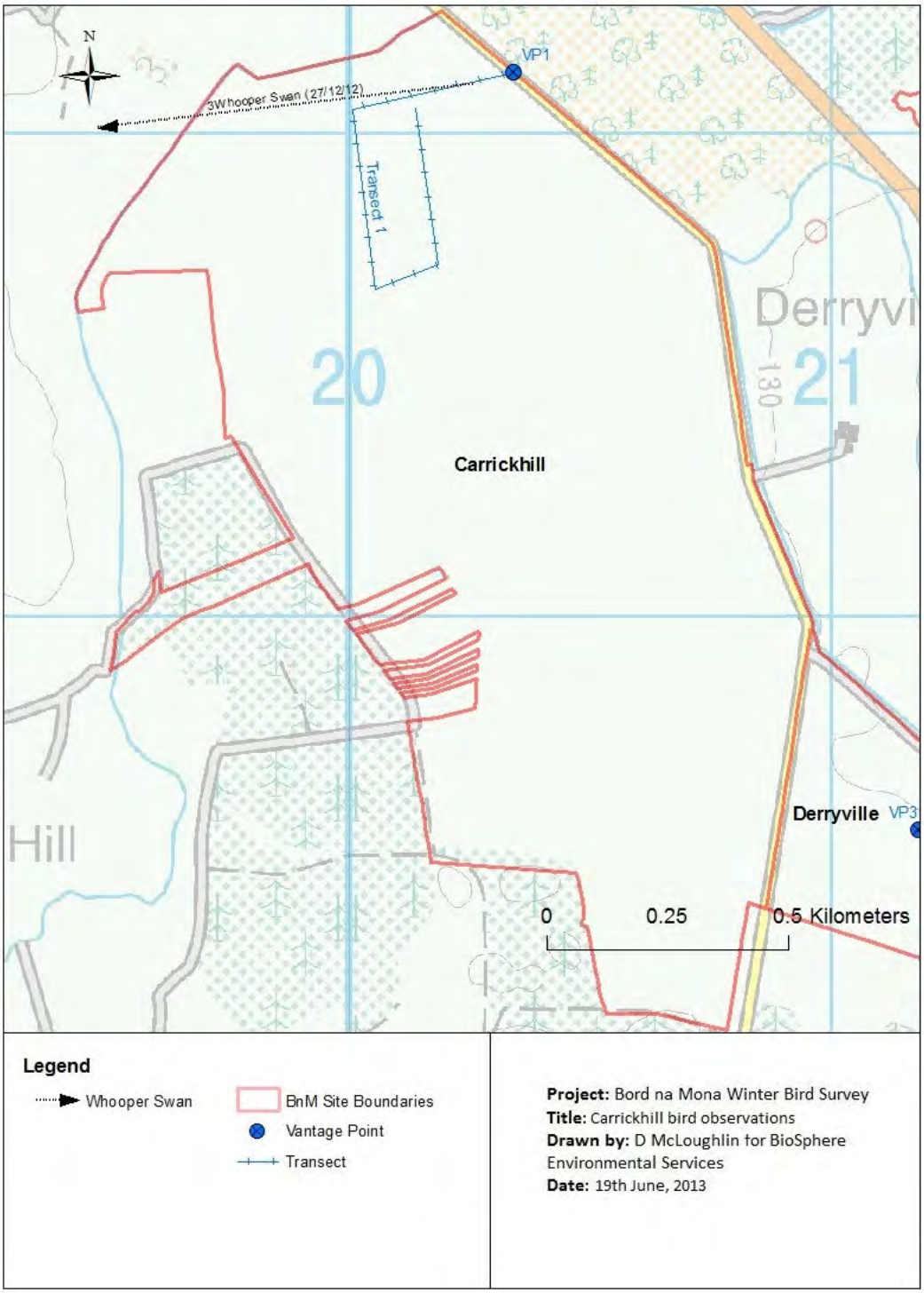
While there was a record of Whooper Swans, the pond being used was small and was later drained. There is no suitable habitat for swans elsewhere on site.

The small areas of remnant/cutover bog along the northwestern boundary support small numbers of Snipe and Jack Snipe and could attract species such as Hen Harrier and Merlin.



Carrickhill bog, Plate 1: view of typical habitats within site, looking towards Lisheen wind farm.

Carrickhill: Map showing transect and vantage point locations, with records of target species.



SITE: BAWNMORE

Bawnmore bog is a medium sized site located almost ten kilometres northeast of Thurles town and just over 2 kilometres west-northwest of Urlingford. Bawnmore adjoins Derryville bog to the northwest and Inch to the south. The main access to the site is from a third class road at the north end of the site. The site extends for up to 2.5 km from north to south and for just over 2 km from east to west. A small outlier of remnant bog occurs to the west of the main site.

Bawnmore is largely bare peat with production still in progress over much of the area Regenerating cutover bog occurs in the southwestern quarter and along the western margin. There are some small areas of remnant bog along the northeast margin of the site, including a small patch of reeds (*Phragmites australis*).

The site is surrounded mostly by farmland, though there is an extensive area of mature coniferous forestry to the east.

Survey locations

Transect 1 starts at the railway line in the southern end of the site and runs north through an area of cutover bog.

Transect 2 starts at the road at the north of the site and runs southeast for over 1.5 km. It then turns northwest at the railway following it for 500 m and then turning north-northwest over bare peat to an area of remnant bog.

Vantage Point 1 is located at the north end of transect 1 and covers the southern sector of the site.

Vantage Point 2 is located at the end of transect 2 and covers the northern sector of the site (remnant and bare peat).

Vantage Point 3 overlooks the outlier area of remnant bog to the west and also gives views over the northwest sector of the main site.

Target species recorded

Peregrine
A single bird was recorded soaring (rising to c.200 m) over the northwestern sector of the site on 27th February 2013.

Potential for other target species

Whooper Swan
Swans could potentially use the site as there are small areas of open water in the southwest sector of the bog. However, no flight lines were recorded. The nearest known swan activity is at Thurles (c.8 km to NW).

Hen Harrier
The marginal remnant and cutover bog habitats could attract hunting birds and there is some

potential for winter roosting.

Merlin
The marginal remnant and cutover bog habitats could attract hunting birds

Other species of note

Kestrel – singles recorded 27th February and 13th March 2013.

Sparrowhawk – one on 27th February 2013.

Teal – 12 on 12th January, two on 11th March 2013.

Lapwing – seven on 27th February 2013.

Snipe – two on 17th December, seven on 15th January, three on 9th February, two on 11th March.

Skylark – one on 17th December 2012, three on 9th February and five on 11th March 2013.

Starling – c.100 on 15th January 2013.

Linnet – four on 9th February, 12 on 13th March 2013.

Overview

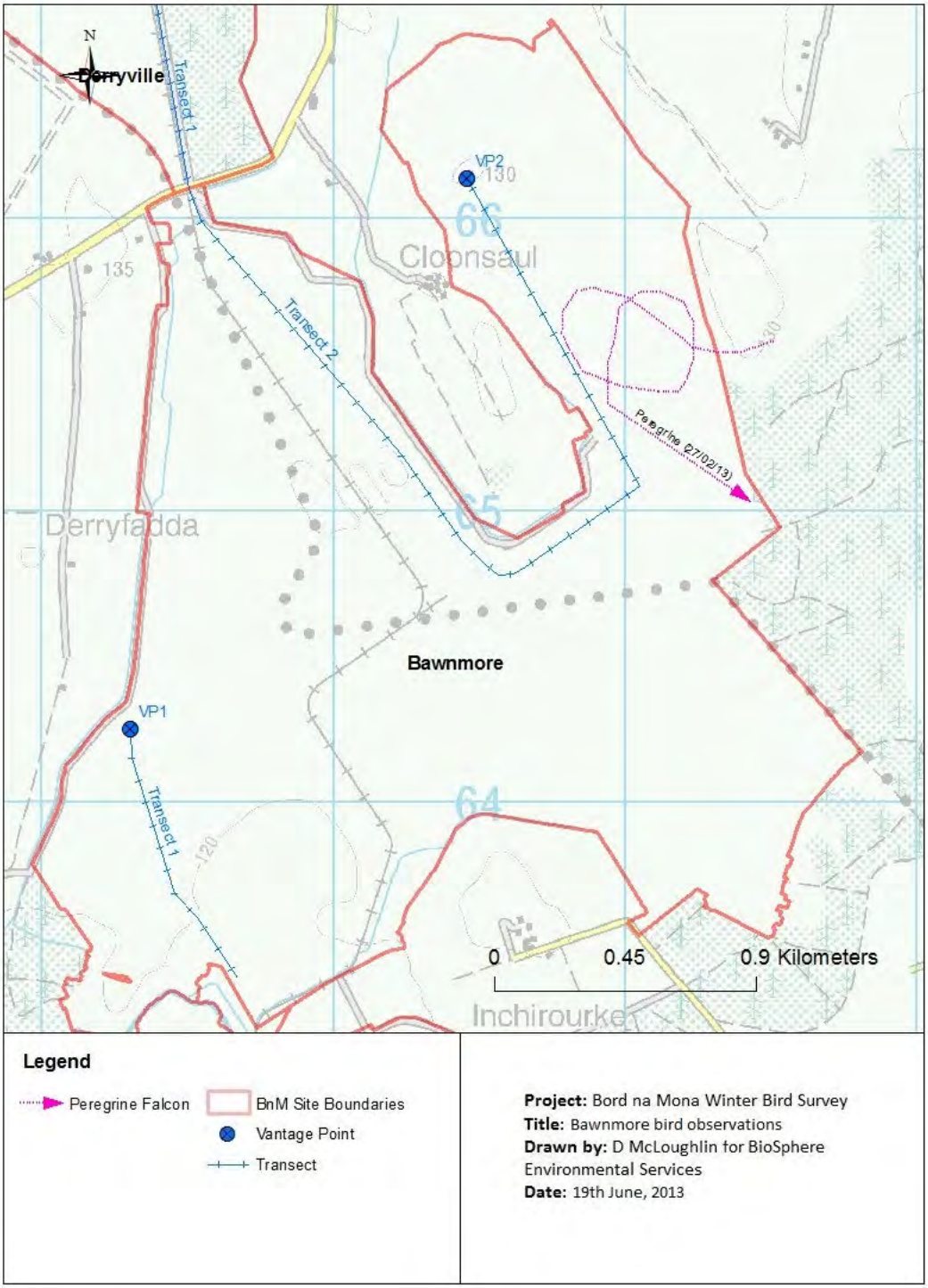
Bawnmore bog has limited potential for wintering birds of conservation importance.

However, the remnant bog in the northeast and the regenerating cutover in the southwestern quarter could attract species such as Hen Harrier and Merlin and there is some potential, albeit limited, for Whooper Swans. A number of Amber listed species were recorded, including Kestrel, Teal, Snipe, Skylark and Linnet.



Bawnmore bog, Plate 1: view of regenerating cutover bog with ponds in southwest sector.

Bawnmore: Map showing transect and vantage point locations, with records of target species.



SITE: INCH

Inch bog is a small site located approximately ten kilometres east-northeast of Thurles town and just over two kilometres west of Urlingford. Inch adjoins Bawnmore to the north and is connected to Popes Bog to the southwest (via a rail line corridor). The main access to the site is from a third class road at the southwest corner of the site. The site extends for up to 1 km from north to south and for just over 1 km from east to west.

Inch is largely bare peat with production still in progress over much of the area. There are strips of regenerating cutover bog and remnant bog along the boundaries of the site. A large dyke runs along the northwestern side of the site.

Inch is surrounded largely by farmland, with mature coniferous forestry to the west.

Survey locations

Transect 1 starts at the southwest corner of the site and runs along the railway line and ends where it joins Bawnmore bog.

Target species recorded

No target species were recorded during the surveys.

Potential for other target species

Whooper Swan
There is no potential for swans to use this site and no flight lines were recorded.

Hen Harrier
The marginal strips of remnant and cutover bog habitats could attract hunting birds. However, there is no significant potential for winter roosting.

Merlin
The marginal strips of remnant and cutover bog habitats could attract hunting birds.

Other species of note

Starling – c.60 on 12th January 2013.

Linnet – two on 9th February, five on 11th March 2013.

Overview

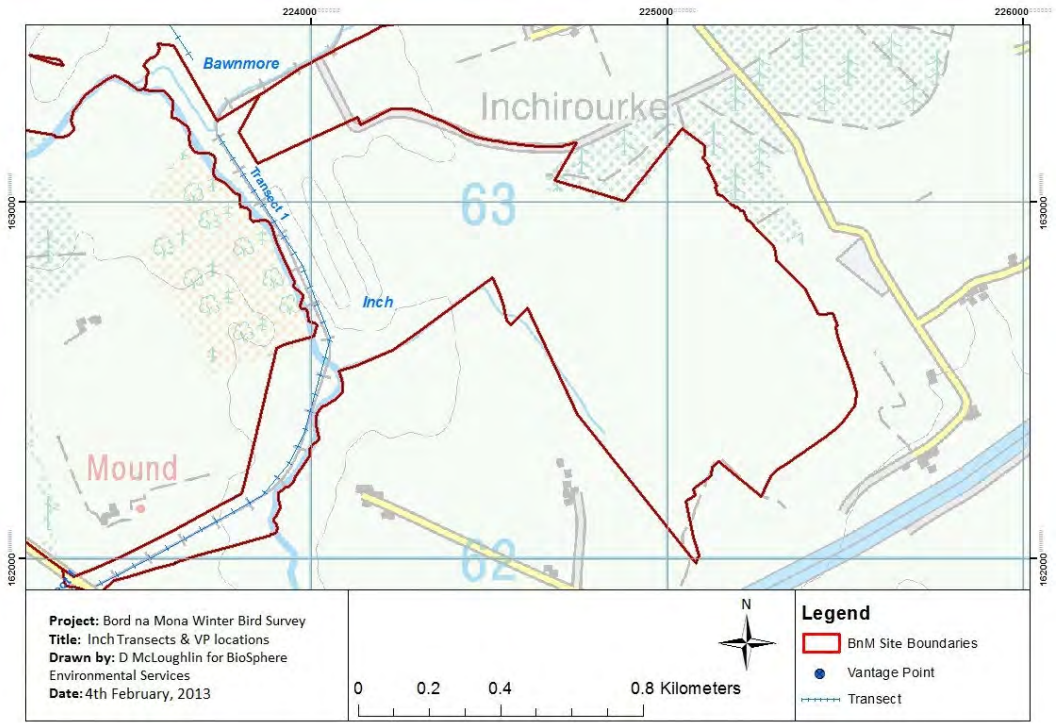
Inch bog has limited potential for wintering birds of conservation importance.

The most useful areas of habitat are the small areas of remnant/cutover bog on the boundaries which could attract species such as Hen Harrier and Merlin.



Inch bog, Plate 1: view of dyke along western end of site.

Inch: Map showing transect and vantage point locations.



SITE: LONGFORD PASS (POPES BOG)

Popes bog is a small to medium sized site located approximately eight kilometres east-northeast of Thurles town and just over 5 km southwest of Urlingford. The site adjoins Inch to the northeast (via a railway corridor) and is contiguous with Littleton to the south (though separated by a road). The main access to the site is from a third class road on the north boundary of the site, at the railway line. The site extends for c.2 km from north to south and for over 1 km from east to west.

Popes bog is largely bare peat with production still in progress over much of the area. There are strips of regenerating cutover bog and patches of remnant bog along the margins and a more extensive area of these habitats at the southern end of the site (though latter separated from main site by motorway).

The site is surrounded by farmland, with a stand of coniferous forest to the southwest.

Survey locations

Transect 1 starts at the railway line at the north end of the site. It runs south along the line and ends where the line turns west.

Vantage Point 1 is located at the south end of transect 1 and gives a view over much of the site.

Target species recorded

No target species were recorded during the surveys.

Potential for other target species

Whooper Swan
There is no potential for swans to use this site and no flight lines were recorded.

Hen Harrier
The marginal remnant and cutover bog habitats could attract hunting birds. However, there is no real potential for winter roosting.

Merlin
The marginal remnant and cutover bog habitats could attract hunting birds

Other species of note

Kestrel – singles recorded on 9th February and 11th March 2013.

Sparrowhawk – one on 9th February 2013.

Snipe – two on 18th December 2012, one on 12th January, three on 9th February, one on 11th March 2013.

Skylark – two on 9th February, three on 11th March 2013.

Starling – flock of c.20 on 18th December 2012.

Linnet – two on 9th February, six on 11th March 2013.

Overview

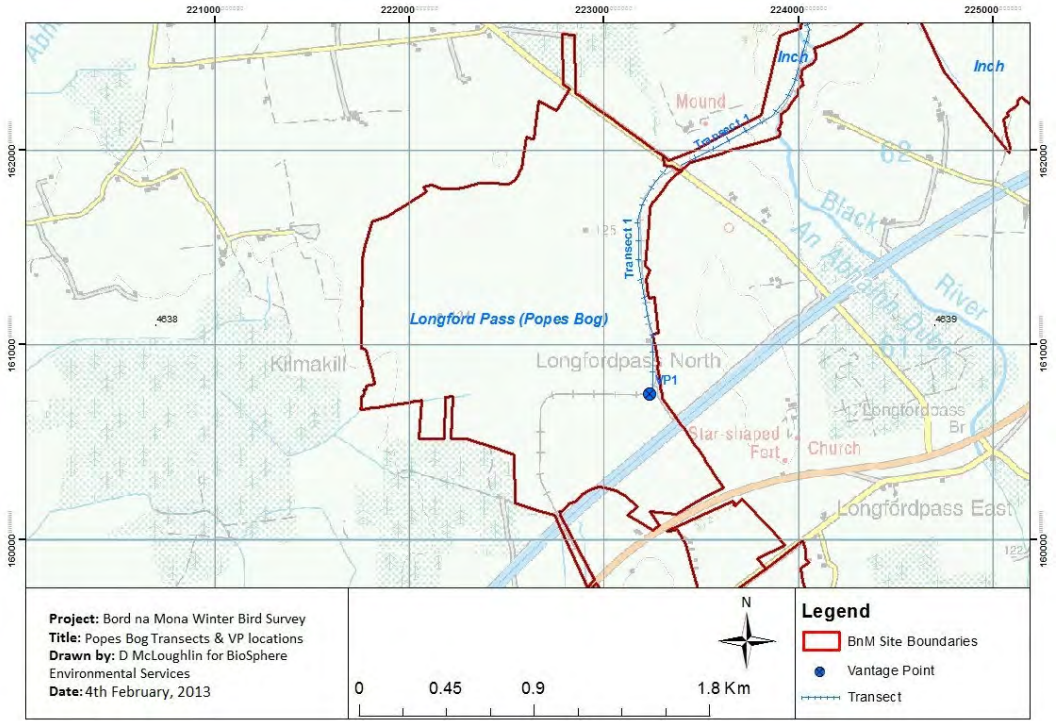
Popes bog has limited potential for wintering birds of conservation importance.

The various strips of remnant and cutover bog along the boundaries could attract species such as Hen Harrier and Merlin. Several amber listed species were recorded, including Kestrel, Snipe and Skylark.



Popes bog, Plate 1: general view of site.

Popes bog: Map showing transect and vantage point locations.



SITE: LITTLETON

Littleton Bog is a large site located 8.5 kilometres east-southeast of Thurles town. It adjoins Popes bog to the north and Lanespark to the south (latter via a rail corridor). The main site accesses are at the north and south ends of the bog adjacent to the railway line. The site extends for just over 5 km from north to south and from c.1 km (at north end) to 3 km (at south end) from east to west.

A high proportion of the site is regenerating cutover (heath, scrub, woodland) but includes open areas with large bodies of open water. Areas of remnant bog occur scattered along the boundaries. Commercial production is still in progress in other areas, mainly the north, of the site. A conifer plantation occurs in the southernmost part of the site.

Littleton is generally surrounded by farmland but there are extensive conifer plantations along the eastern and western boundaries.

Survey locations

Transect 1 starts at the southern corner of the site on the western side of the railway line and runs north-northeast. It turns west at the old railway line and follows the line to the edge of the site, then turns northwest and goes around a large lake and back to the old railway.

Transect 2 starts at the northern end of the site at the railway, following the rail line south where it turns west and runs to the northern end of a large lake. It then turns north and ends on the public road.

Transect 3 starts at the southwestern corner of the site and runs north and northwest over remnant and cutover bog. It ends at the railway line which runs north-south through the entire site.

Vantage Point 1 is located along transect 1 and covers the southern sector of the site (predominantly regenerating cutover bog).

Vantage Point 2 is at the northern end of the site on the public roadside (at S2269 5878) and covers the north sector of the site (cutover and bare peat)

Vantage Point 3 is located at the beginning of transect 3 and affords a view over the central sector of the site. On a clear day the wind turbines at Lisheen, 12 km away, can be seen.

Target species recorded

Whooper Swan

Ten Whooper Swans flew westwards from the southwestern lake on 9th January 2013. There were no other sightings within or over the site on subsequent visits.

Hen Harrier

Single males (possibly same individual) were present on 9th January and 2nd February 2013 in the southwest corner of the site. The bird in February was seen at dawn and it is considered possible or even likely that roosting occurred within the Bord na Móna site.

Golden Plover

A flock of about 20 birds was recorded on bare peat in the eastern part of the site on 12th January 2013.

Potential for other target species

Merlin
Merlin could potentially use the cutover and remnant bog habitats on the site (one was seen on the nearby Derryvella site).

Other species of note

Kestrel – two on 11th December 2012, singles on 5th and 11th March 2013.

Sparrowhawk – two on 9th January, one on 9th February 2013.

Teal – 98 on ponds on 9th January. 14 on ponds on 2nd and 30 on 9th February.

Mallard – 37 on ponds on 9th January. 35 on ponds on 2nd and 24 on 9th February. 10 on 5th March 2013.

Snipe – two on 11th December 2012, six on 9th January, nine on 2nd February, four on 11th March 2013.

Skylark – one on 9th January, three on 2nd February, five on 11th March 2013.

Starling – c.200 on 9th January and 2nd February 2013.

Linnet – two on 2nd February, 14 on 11th March 2013.

[Bord na Móna ecologist Mark McCorry reported c.100 duck comprising Mallard and Wigeon plus a few Teal in the southwest sector on 22nd February 2013]

Overview

Littleton bog contains some good habitat for wintering birds of conservation importance.

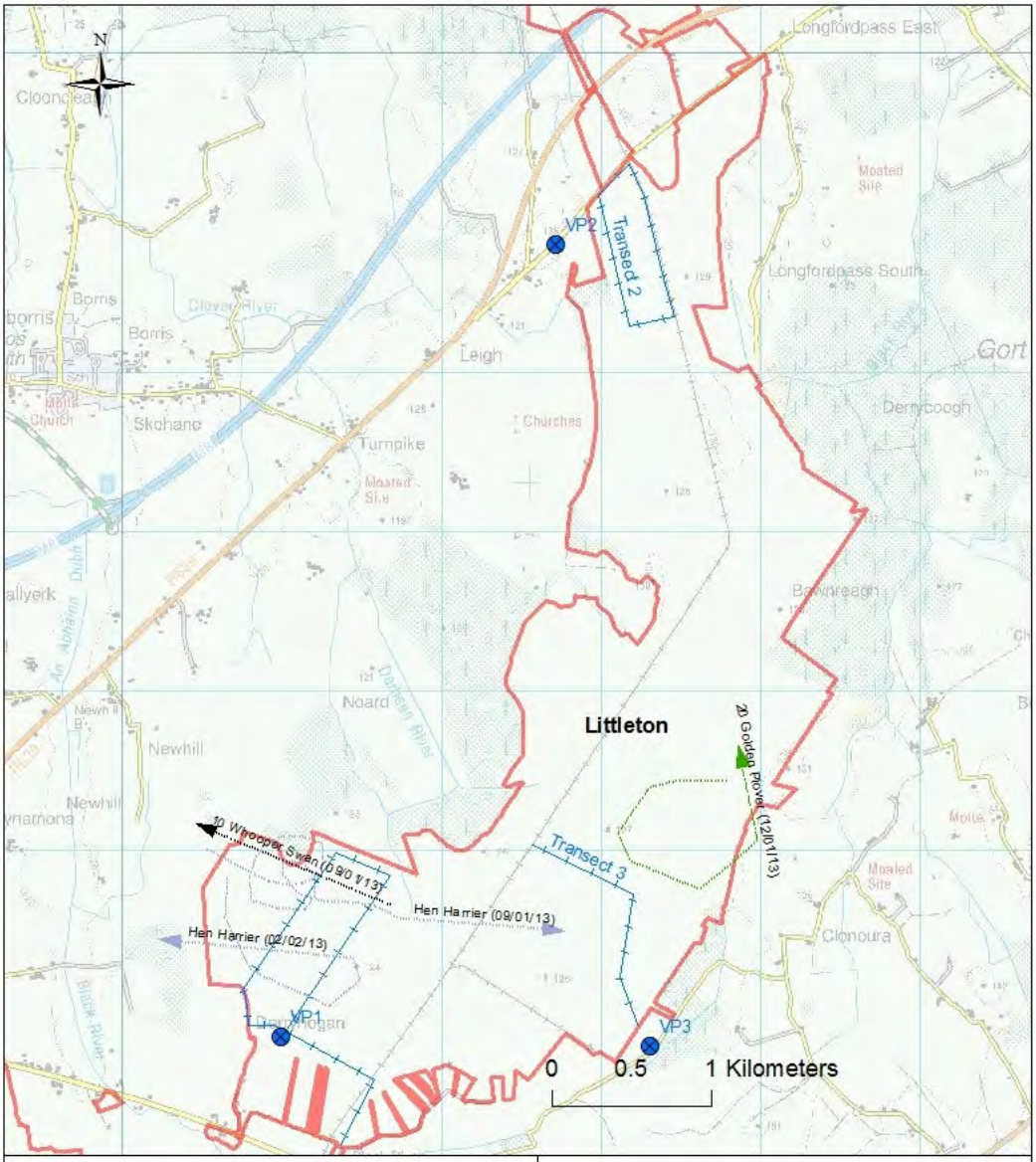
Of particular value are the areas of remnant/cutover bog and bodies of open water in the western and southeastern sectors. Whooper Swans were recorded here and a Hen Harrier was recorded foraging extensively and probably roosting on site. The site could support hunting Merlin. One of few sites in the group to support wintering duck on a regular basis.

Also supports a range of amber listed species, including Kestrel, Teal, Snipe, Starling and Linnet.



Littleton bog, Plate 1: view of regenerating cutover bog.

Littleton: Map showing transect and vantage point locations, with records of target species.



SITE: LANESPARK

Lanespark bog is a small to medium sized site located just over eight kilometres southeast of Thurles town. It is contiguous with Derryville bog to the east and is connected by rail corridors to Littleton to the north and Ballybeg to the northwest. The point used to access the site is from a third class road in the west end of the site. The site extends for up to 2 km from north to south and approximately 2 km from east to west.

Lanespark is largely bare peat with production still in progress over much of the area. There are strips of regenerating cutover bog and remnant bog along the margins.

The site is surrounded by farmland, with a conifer plantation to the north.

Survey locations

Transect 1 starts at the railway crossing at the western corner of the site and runs northeast following the railway line for 500m (through scrub and bare peat). It then turns east and finishes at the road between Lanespark and Derryvella.

Target species recorded

Merlin
A male bird flew west over the site on 10th December 2012 at c.2 m height from Derryvella and landed on peat windrow where it rested for about 10 minutes before flying away and out of sight.

Potential for other target species

Whooper Swan
There is no potential for swans to use this site and no flight lines were recorded.

Hen Harrier
The marginal remnant and cutover bog habitats could attract hunting birds. However, there is no significant potential for winter roosting.

Other species of note

Snipe – two on 10th December, singles in January and February, three on 5th March 2013.

Skylark – two on 12th February and 5th March 2013.

Linnet – two on 10th December 2012, 15 on 12th February 2013.

Overview

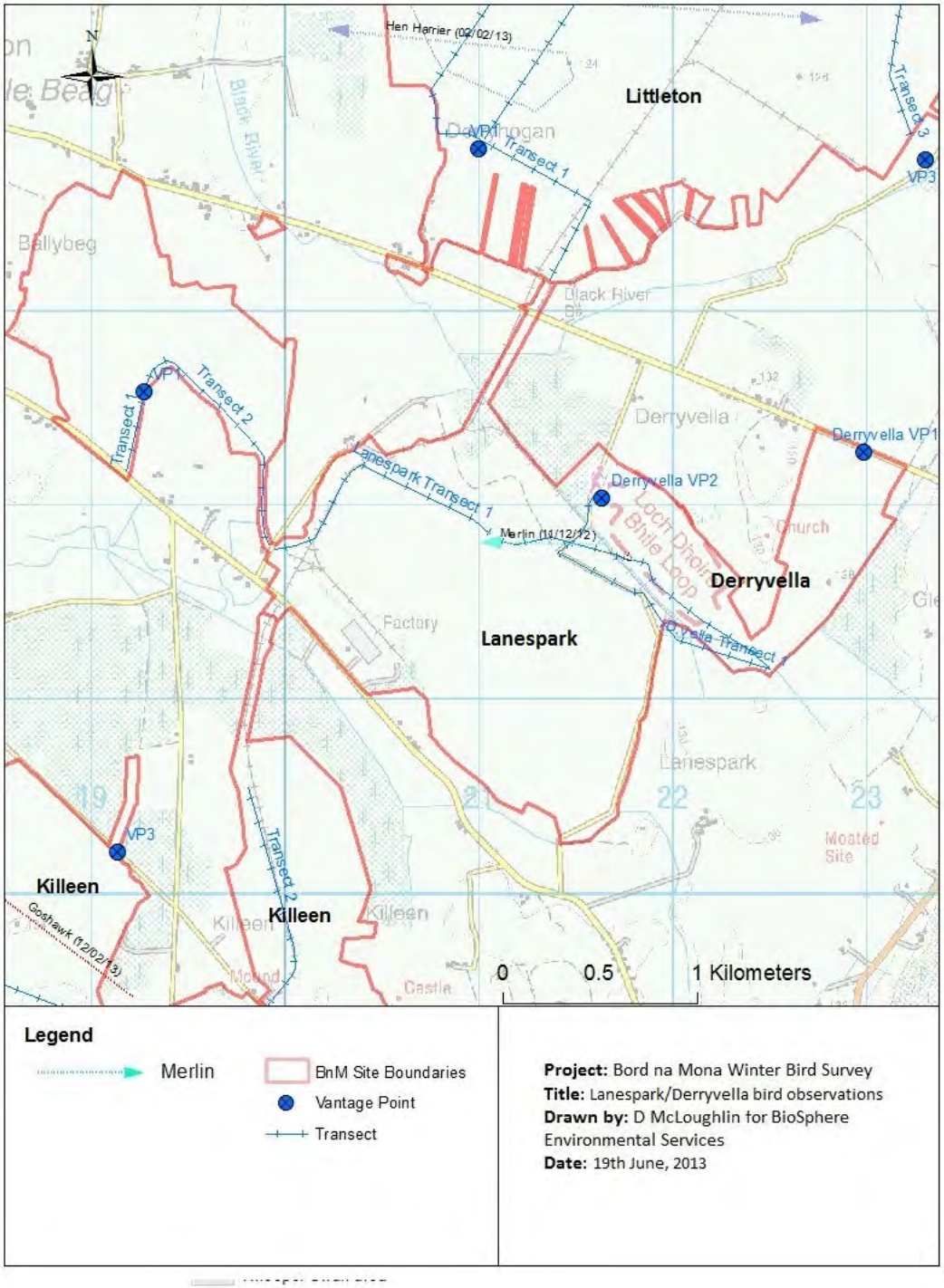
Lanespark bog has limited potential for wintering birds of conservation importance.

The most useful areas of habitat are the small areas remnant/cutover bog on the boundaries. Merlin was recorded and Hen Harrier could also be attracted. The site supports some Amber listed species, namely Snipe, Skylark and Linnet.



Lanespark bog, Plate 1: general view of site.

Lanespark bog: Map showing transect and vantage point locations, with records of target species.



SITE: DERRYVELLA

Derryvella bog is a small site located approximately nine kilometres southeast of Thurles town. It is contiguous with Lanespark to the west. The access to the site is from the Derryvella lakeside car park. The site extends for c.1 km from north to south and c.1 km from east to west.

The western half of the site is regenerating cutover (heath, scrub) surrounding a small lake, while the eastern half is largely bare peat with production still in progress over much of the area.

The site is surrounded largely by farmland, with a mature coniferous plantation to the east.

Survey locations

Transect 1 starts at VP2 (lakeside) and runs southwest along the road that bounds the site. It turns southeast with the road, leaving the road after 500 m and following the old railway line to the site boundary and back again along the visitor trail to the lakeside (VP2). The transect runs through cutover heath habitat.

Vantage Point 1 is located on the public road on the northeast boundary of the site and covers the entire eastern sector of the site (predominantly bare peat).

Vantage Point 2 is located at Derryvella lake and covers the open water and adjoining regenerating cutover.

Target species recorded

Merlin
A male bird flew west over site on 10th December 2012 at c.2 m height and landed on peat windrow on the Lanespark site where it rested for about 10 minutes before flying out of sight.

Potential for other target species

Whooper Swan
Swans could potentially use the site, as there are small areas of open water. However, no flight lines recorded. The nearest known swan activity is at Hollyford (c. 10km to NW).

Hen Harrier
The cutover bog habitats could attract hunting birds. However, there is no significant potential for roosting.

Other species of note

Little Grebe – pair recorded on the lake in March were considered likely to breed.

Mallard – 11 on lake on 9th January.

Kestrel – singles on 5th January and 5th March 2013.

Sparrowhawk – one on 5th January 2013.

Water Rail – one heard on 11th December 2013.

Snipe – singles on December and February and March surveys, three in January.

Stock Dove – three on 11th December 2012

Skylark – one on 12th February and four on 5th March 2013.

Linnet – two on 5th January.

Overview

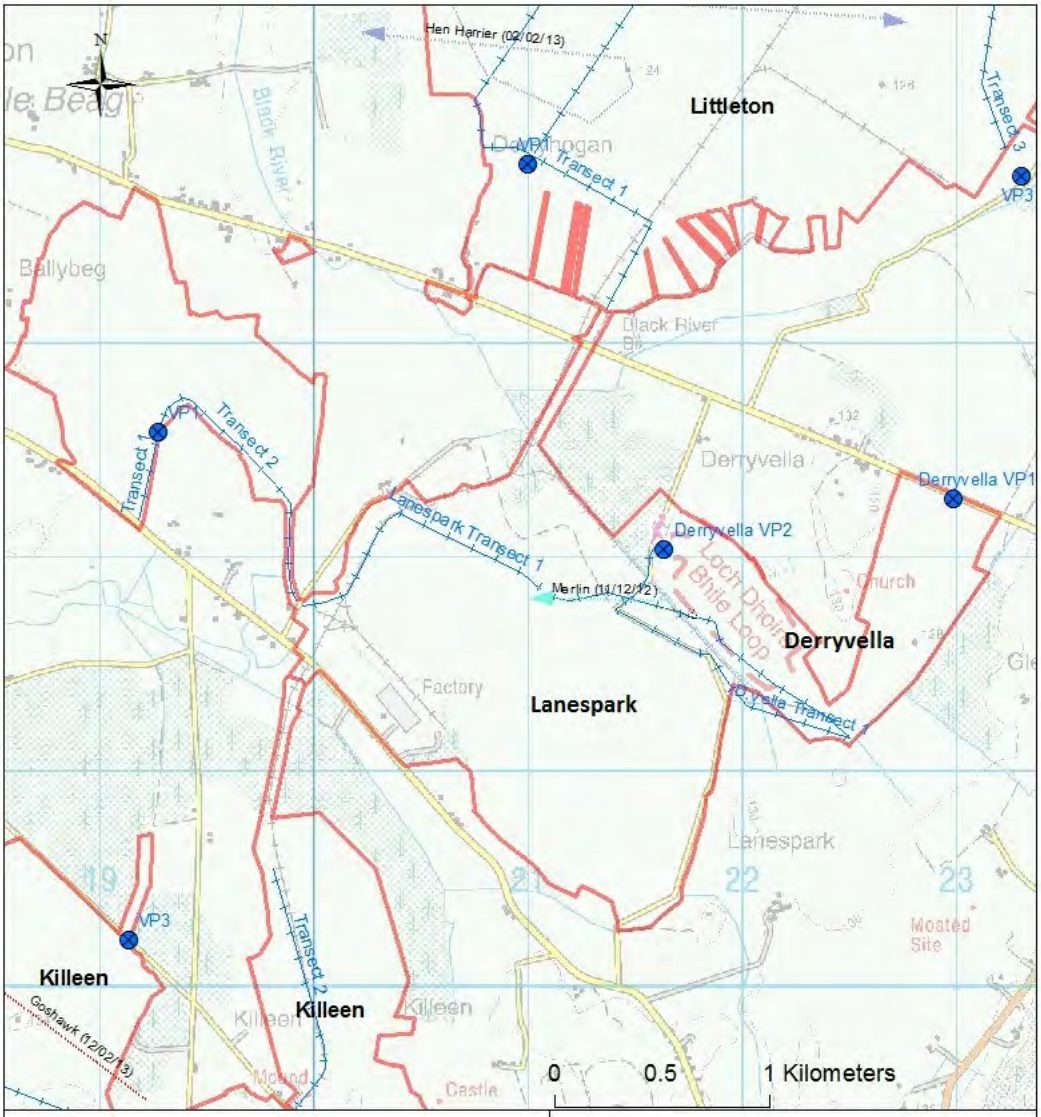
Derryvella Bog has some potential for wintering birds of conservation importance.

The remnant/cutover bog in the western sector provides useful foraging habitat for birds of prey, with Merlin, Kestrel and Sparrowhawk recorded, and potential for Hen Harrier. The lake could attract Whooper Swans though its potential is limited due to the small size. Supports several Amber listed species, including Little Grebe, Water Rail and Stock Dove.



Derryvella bog, Plate 1: view of western part of site with pond.

Derryvella: Map showing transect and vantage point locations, with records of target species.



SITE: BALLYBEG

Ballybeg bog is a small site located seven kilometres southeast of Thurles town. The site is located to the west of Lanespark and connected by a rail corridor. The main access to the site is from a third class road southeast of the site. The site extends for just over 1 km from north to south and for up to 1 km from east to west.

Ballybeg is largely bare peat with production still in progress over much of the area. There are strips of regenerating cutover bog and remnant bog along the margins of the site.

Ballybeg is entirely surrounded by farmland.

Survey locations

Transect 1 starts at VP1 and runs south to the road at the southern boundary through an area of regenerating cutover.

Transect 2 starts at the railway crossing at the southeast corner of the site and runs north and northwest towards VP1.

Vantage Point 1 is located at the north end of transect 2 and gives views over virtually the entire site.

Target species recorded

No target species were recorded during the winter surveys.

Potential for other target species

Whooper Swan
There is no potential for swans to use this site and no flight lines were recorded.

Hen Harrier
The marginal and cutover bog habitats could attract hunting birds. However, there is no significant potential for winter roosting.

Merlin
The marginal remnant and cutover bog habitats could attract hunting birds

Other species of note

Kestrel – singles on 10th December 2012 and 12th February 2013.

Snipe – two on 12th February 2013.

Skylark – one on 15th March 2013.

Linnet – 10+ on 5th January 2013.

Overview

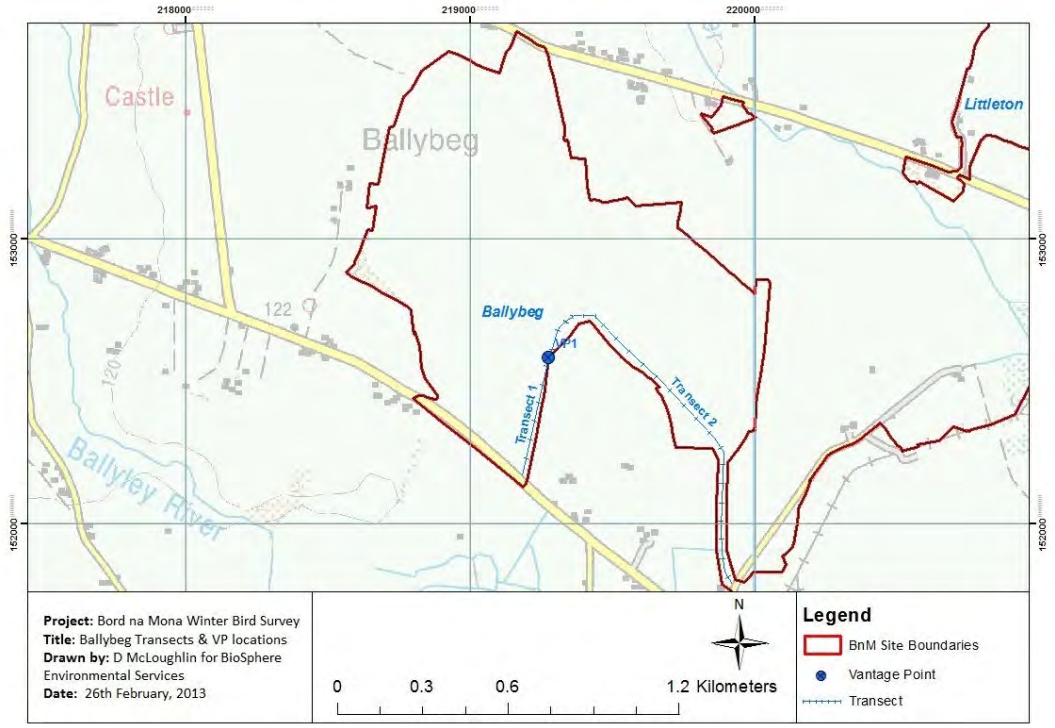
Ballybeg Bog has limited potential for wintering birds of conservation importance.

The marginal areas of regenerating cutover and remnant bog could attract species such as Hen Harrier and Merlin. Several Amber listed species were recorded, including Kestrel, Snipe and Linnet.



Ballybeg bog, Plate 1: view over main area of site.

Ballybeg: Map showing transect and vantage point locations.



SITE: KILLEEN

Killeen Bog is a medium to large sized site located just over seven kilometres southeast of Thurles town and approximately 1.5 km southeast of Horse and Jockey. It is situated at the southern end of the Littleton bog group and is connected to Lanespark by a rail corridor. Access to the site is easily available from two third class roads which traverse the site. The site extends for up to 3 km from north to south and for over 3 km from east to west.

The site is largely bare peat with production still in progress over much of the area. There are strips of regenerating cutover and small areas of remnant bog along the boundaries.

The site is surrounded mostly by farmland with some large conifer plantations to the northwest.

Survey locations

Transect 1 starts at the site buildings (situated 300 m west of the north/south road intersecting the site) and runs south around a small area of cutover bog and back to the buildings. It then follows the rail line west to Derrynaflan church through bare peat.

Transect 2 follows the NW/SW road intersecting the site passing through bare peat and cutover bog (open water, rushes and scrub). It turns north at the rail line following the line (bare peat to one side and remnant bog and scrub on the other) and finishing at the mature forestry

Vantage Point 1 is located at the western end of transect 1 and covers the northwest sector of the site (predominantly bare peat).

Vantage Point 2 is located along the north/south road intersecting the site and looks west and east over all of the central part of the site.

Vantage Point 3 is located on the small bridge over the road at the northern edge of the site and gives views of the northern sector of the site.

Target species recorded

Goshawk
One immature male flew over site on 12th February 2013 at c.10 m height and continued northwest to an area of mature forestry. Not seen subsequently despite prolonged watches.

Potential for other target species

Whooper Swan
Swans could potentially use the site as there are small areas of open water northwest of transect 2. However, no flight lines were recorded. The nearest known swan activity is at Hollyford (c. 10km to NW).

Hen Harrier
The marginal remnant and cutover bog habitats could attract hunting birds. However, there is no significant potential for winter roosting.

Merlin
The marginal remnant and cutover bog habitats could attract hunting birds

Other species of note

Kestrel – singles recorded on site from VP3 on the January and February site visits.

Snipe – 12 together flushed from a ditch on 4th January 2013. Otherwise up to four snipe flushed on the December, February and March visits.

Jack Snipe – one on 10th December 2013.

Skylark – two on 12th February and four on 15th March 2013.

Starling – 20 on 4th January and c.100 on 12th February 2013.

Linnet – seven on 12th February 2013.

Overview

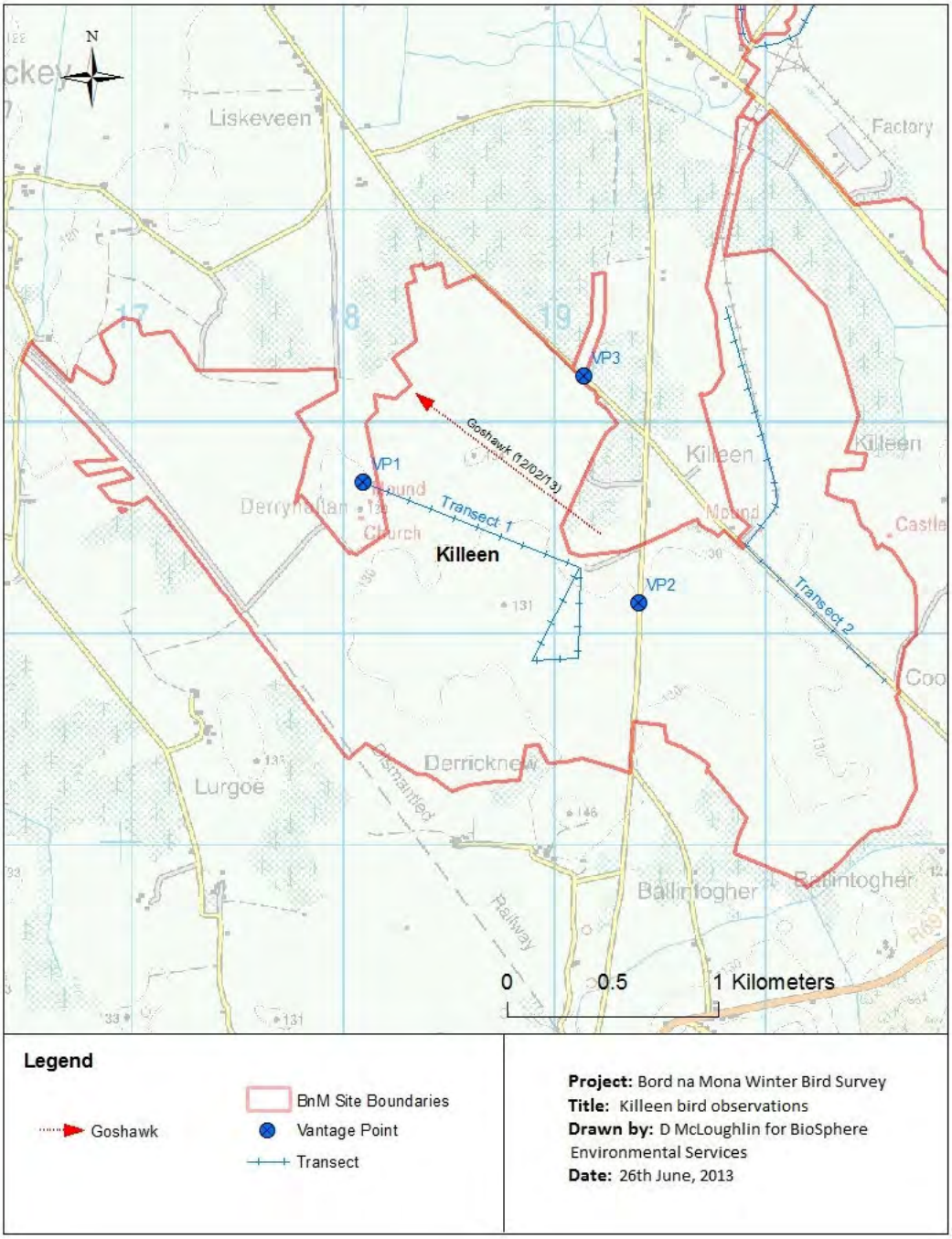
Killeen bog has limited potential for wintering birds of conservation importance.

The occurrence of Goshawk is of interest though this is likely to be a lone individual as Goshawk is an extremely rare species in Ireland. Species such as Hen Harrier and Merlin could be attracted to the small areas of remnant and cutover bog on the boundaries of the site. The site supports Snipe, along with other Amber list species such as Kestrel and Starling.



Killeen bog, Plate 1: view over main area of site.

Killeen: Map showing transect and vantage point locations, with records of target species.



3.4 Bird Communities of the Bog Sites

Within the sites, a number of principal wintering bird communities can be separated based on main habitat types. At all sites, however, there is a range of habitat types present and it is noted that most species will occur in more than one of the habitat types.

Bare or near bare peat

This habitat type includes peat fields in production and fields recently out of production, with at most sparse or patchy vegetation. It is the dominant habitat type at a number of sites, notably Carrickhill, Derryville, Inch, Popes bog, Ballybeg, Lanespark and Killeen.

This habitat presumably has low feeding potential for most birds, especially in winter when surface flies and other small invertebrates are largely absent. Nevertheless, species such as Snipe and Meadow Pipit were recorded at a few sites, as well as Reed Bunting, Pied Wagtail and Lesser Redpoll. Perhaps the most useful value of the habitat is that it provides a suitable roost site for Golden Plover (though in relatively low numbers) due to the open character.

Cutaway bog dominated by open regenerating bog/heath vegetation, with perhaps scattered scrub

This is a widespread habitat type on areas which have been out of production for some years. It can vary from dry, heath type habitat dominated by heather (*Calluna vulgaris*) to wetter areas of bog type vegetation often dominated by common bog cotton (*Eriophorum angustifolium*) and rushes (*Juncus* spp.). It is most useful where scrub has not developed to any great extent. The habitat is found locally in parts of the following sites: Ballysorrell, Templetouhy, Bawnmore, Littleton, Lanespark and Derryvella.

This habitat type supports a wide range of bird species, with bog or wetland species such as Snipe, Meadow Pipit, Skylark and Reed Bunting, as well as finches such as Linnet and Lesser Redpoll. Ubiquitous species such as Wren is also found here. This habitat type provides useful foraging habitat for birds of prey, including Hen Harrier and Kestrel.

Cutaway bog dominated by scrub/low woodland

This habitat occurs at those sites that have been out of production for the longest periods and could be considered as an early stage of woodland dominance. The habitat usually occurs in association with more open areas (i.e. previous category). The scrub is formed predominantly by birch and willow, with alder in wetter areas. Scrub is particularly well developed at Templetouhy and Littleton.

The bird species occurring are mostly widespread and common species that one finds in woodland, scrub and hedgerow habitats throughout Ireland. Species recorded widely include Blackbird, Robin, Wren, Chaffinch, Lesser Redpoll and the four common tit species. Sparrowhawk is a typical scrub species though other birds of prey often hunt over it and within openings.

Remnant bog

Areas of remnant bog occur at all the sites, typically in marginal areas. These comprise bog which has not been harvested commercially but which may have had surface drains inserted (i.e. peat dome remains in various stages of intactness). Where drains have been inserted,

the Sphagnum layer is often depleted.

Remnant bog, which has had surface drains inserted over much of the area, is dominant at Knockahaw and Ballysorrell. Clonbuagh is a good example of a largely undrained bog.

Remnant bog supports a relatively low bird diversity, with Meadow Pipit the most frequent species during winter. Skylarks occur sparsely, as do Snipe. Wrens and Reed Bunting may also be found. Birds of prey, mainly Kestrel but also Hen Harrier, often hunt over remnant bog areas.

Remnant bog could support Red Grouse, though there are no known recent occurrences in the Littleton group.

Wetlands and open water

The occurrence of areas of wetland habitat or open water is limited within the Littleton bog group, with the main sites being Templetouhy, Bawnmore and Littleton. An established pond (artificial in origin) occurs at Derryvella.

Wetland habitats increase the diversity of wintering birds and can support such species as Whooper Swans, various duck species, Little Grebe and Water Rail (latter two at Derryvella pond).

Conifer plantation

A substantial conifer plantation occurs in the southernmost part of Littleton bog, with a small stand in the easternmost sector of Derryville. In addition, conifer plantations are fairly widespread along the boundaries of the bogs in this group.

The plantations support a range of birds that one finds in conifers elsewhere, including Blackbird, Song Thrush, Chaffinch, Goldcrest, tit species, Siskin etc.

3.5 Birds of Conservation Importance – Species Accounts

There follows accounts of the various species of conservation importance recorded in the study area – species of importance are classified on the basis of the following criteria:

- EU Birds Directive, Annex I
- Birds of Conservation Concern Red List (High conservation concern) or Amber List (Medium conservation concern), after Lynas *et al*. (2007)

Little Grebe (Amber list)

Conservation status

- Amber list (Lynas *et al.* 2007)

Little Grebe is a species associated with still or slow moving waters and for a breeding site requires submerged and emergent vegetation. While widespread in Ireland, it has a localised distribution due to a scarcity of suitable habitat in some areas. Little Grebe is often resident,

breeding and wintering at the same location.

A (presumed) pair of Little Grebes was recorded in March at the small lake at Derryvella. This is a likely breeding site.

Whooper Swan

Conservation status

- Annex I EU Birds Directive
- Amber list (Lynas *et al.* 2007)

The Whooper Swans which occur in Ireland during the winter months (mainly October – March) belong to the Icelandic breeding population. The latest census of these swans in Ireland was carried out in January 2010 (Boland *et al.* 2010) and produced a total of 14,981 birds in 387 flocks. The Irish wintering swans represent 72.5% of the entire Icelandic population (20,900, Delany & Scott 2006) and are therefore of International Importance.

A flock of 210 or more Whooper Swans (1% or more of the total Icelandic population) is an Internationally Important flock, while a flock of 130 or more (1% or more of the total Irish wintering population) is a Nationally Important flock (Delany & Scott 2006, Boland & Crowe 2012).

Whooper Swans are widely distributed within Ireland, with most concentrations around major inland and coastal wetlands at low altitude. The traditional habitats are lakes, turloughs and callow grasslands along river corridors. Nowadays, however, improved grassland is a principal feeding habitat. At night, the swans require a safe roost site which is usually on water. The feeding and roost sites may be several kilometres apart.

Whooper Swans were recorded at two Bord na Móna bog sites during the study, as follows:

- Carrickhill - 3 on small pond (later drained) on 27th December
- Littleton – 10 roosting/loafing on pond, then flew west

Four further sites are considered to have some potential for Whooper Swans – Templetuohy, Bawnmore, Derryvella (artificial lake) and Killeen. The other sites in the group are unlikely to have potential in their present state, as they are dominated by bare peat and/or drier regenerating bog/heath vegetation and scrub and there are no significant areas of standing water with wetland vegetation to provide feeding or roost sites.

The recorded distribution concurs with information from the Bord na Móna ecology team, with reports from local staff of swans at Littleton bog and usage of the amenity wetland at Derryvella when it was constructed in the late 1990s. Otherwise, there does not appear to have been any previous records of Whooper Swans from the bog sites.

In the wider area, Whooper Swans were recorded as follows:

- River Suir north of Thurles (S 12 63): 42 on 4th December; 26 on 24th February 2013
- River Suir at Holycross (S 08 53): 21 on 12th February 2013

- Galmoy (S 282 708): 9 on grassland on 24th February 2013

- Erkina River at Durrow (S 377 772): 116 on 16th January 2013

Overview of Whooper Swans at the Littleton bogs

While Whooper Swans were recorded at two of the Littleton bogs (and a further four sites have potential for supporting swans), the numbers involved were not significant during the 2012/13 winter.

The group of bogs is located between three regular swan sites, as shown by the present survey and past data (see Figure 1) - these are as follows:

> Curragh or Durrow wetlands along the Erkina River (approximately 15 km east of the Littleton bogs) – held in excess of 100 in winters 1995/96 (108), 2011/12 (107) and 2012/13 (116)
>
> River Suir north of Thurles (approximately 9 km west of the Littleton bogs) – regularly holds in excess of 20 swans, with peaks of 42 in winter 2008/09 and 2012/13
>
> River Suir south of Thurles, Cabragh/Holycross area, and associated with the former Thurles Sugar Factory Lagoons (approximately 8 km west of the Littleton bogs) – regularly holds in excess of 20 swans, with peak of 85 in 2009/10

The swans recorded on the Bord na Móna bogs could be from any one of these populations or indeed could be from small flocks feeding on grassland anywhere in the wider region (such as the record of 9 feeding on grassland at Galmoy).

In summary, the winter study showed that the bogs in the Littleton group have relatively low potential to support feeding or roosting Whooper Swans. At most, a small number of the sites may support swans in small numbers on an occasional basis. Further, there is no evidence of regular flightlines over the bogs between feeding and roost sites in the wider area (and no such evidence was found during the winter bird surveys for the Bruckana EIA study). While there are three regular swan sites in the wider area, these are at distances of between 8 and 15 km (approximately) from the Littleton bogs and the available data show that the birds which winter at these sites are generally site faithful (i.e. the birds at Durrow are unlikely to be flying across to the Suir sites or vice versa).

Teal

Conservation status

- Amber list (Lynas *et al.* 2007)

Teal is a widespread wintering duck in Ireland, occurring in a range of coastal and inland wetland habitats, including small lakes and ponds, bogs, drainage channels and rivers.

Teal were recorded at three of the sites which have permanent water bodies, as follows:

> Templetoughy (< 10)
> Bawnmore (up to 12)

Littleton (peak of 98 on 9th January)

Littleton is the main site within the group and supported significant numbers of Teal, as well as Mallard (up to 37 recorded). However, numbers are well below the threshold for national importance (i.e. 450). Bawnmore is probably a regular site, albeit for low numbers, as the Bord na Móna ecology team note that there are anecdotal reports of flocks of duck using Bawnmore.

Hen Harrier

Conservation status

- Annex I EU Birds Directive
- Amber list (Lynas *et al.* 2007)

Hen Harriers are sparsely distributed but fairly widespread throughout Ireland during the non-breeding season. Birds usually occur singly or in pairs and will forage over a wide range of semi-natural and agricultural habitats.

Hen Harriers may roost each evening alone or communally. The basic requirements by a Hen Harrier for roosting are shelter and protection. Roosts are typically in well-developed bog, scrub, young forestry, reeds, etc.

The birds seen in winter may be from local breeding grounds or may be immigrants from Britain or elsewhere.

Overview of winter 2012/13

There were three records (involving single birds) of Hen Harriers during the 2012/13 winter surveys, as follows:

Ballysorrell: a male bird hunting over remnant bog on 17th January 2013. This bird was seen in late afternoon and may have roosted locally on site.

Littleton: single male birds were recorded over regenerating cutover on 9th January and 2nd February 2013. Both records may refer to the same individual. As the bird in February was recorded just after dawn, this suggests it was roosting nearby.

In addition, a known roost approximately 3 km south of Killeen was visited on 4th January 2013, with one male recorded at dusk (though up to 3 birds had been recorded here during the winter).

The study showed that at least two of the sites were used by hunting Hen Harriers and indeed may be used as local night roosts. [the Bord na Móna ecology team had also recorded a Hen Harrier at Littleton in late summer] Other sites in the group also have suitable habitat for foraging and may be visited at times. Generally, there are large amounts of suitable habitats for wintering Hen Harriers within the study area and birds could be expected virtually anywhere during winter. It is likely that the birds recorded during winter in the Littleton area are from local breeding sites, namely the Slieve Felim or the Slieve Bloom uplands.

Goshawk

Conservation status

- Amber list (Lynas *et al.* 2007)

Goshawk is a rare species in Ireland, with a small number of breeding pairs mostly confined to Northern Ireland. It is traditionally a species of well wooded landscapes.

The sighting of a bird at Killeen is of interest though this is likely to be a lone bird of vagrant origin

Buzzard

Conservation status

Buzzard does not have any particular conservation importance (other than full protection under the Wildlife Acts, as all wild bird have). It is included here as it had formerly been much rarer than it is today throughout Ireland and is a large, conspicuous bird of prey.

Buzzard had formerly been a rare species throughout much of Ireland but has increased markedly in the last two decades and is now widespread throughout much of the country and especially the eastern and northern regions. Breeding sites are usually tall trees in woodland stands.

During the winter survey, Buzzards were observed at Knockahaw, Clonbuagh and Ballysorrell. Two birds were at each of these sites in February/March and were associating with adjoining tall woodland (suggesting breeding locations).

Kestrel

Conservation status

- Amber list (Lynas *et al.* 2007)

Kestrel is a widespread breeding and wintering species throughout Ireland.

Kestrels occurred widely in the study area, with records from all but three sites. Most records were of single birds though two were together at Littleton in December.

It is considered that the areas of remnant or regenerating cutaway bog providing particularly useful habitat for foraging Kestrels though nesting sites would be off-site.

Merlin

Conservation status

- Annex I EU Birds Directive
- Amber list (Lynas *et al.* 2007)

Merlin is a scarce breeding bird in Ireland but occurs widely, though scarcely, in a range of habitats during winter (though not at high altitudes). Habitats utilised for hunting include bog, fen, salt marshes, and mixed agricultural lands. However, due to its small size and rather secretive nature it can be easily overlooked.

Only one Merlin was recorded during the survey, a male bird at Derryvella and Lanespark on 10th December 2013. This was observed flying low across the two bogs and then resting on a peat windrow.

Generally, there are large amounts of suitable habitats for wintering Merlin both within and around the various bog sites and birds could be expected virtually anywhere in the study area during winter. Even narrow, marginal strips around the large commercial peat fields would provide suitable hunting habitat for birds during winter. However, Merlin is undoubtedly scarce in the area as shown by only one record for the entire study area during a very intensive survey.

Peregrine Falcon

Conservation status

- Annex I EU Birds Directive
- Amber list (Lynas *et al.* 2007)

Peregrine is a widespread breeding species in Ireland though traditionally has been scarce in the midlands due to the near absence of natural breeding sites. However, in recent decades the range has spread due to the use of quarries and buildings as nest sites (Madden et al. 2009). Birds often remain in the vicinity of the nest site during the winter period and may roost close to it.

A single Peregrine was recorded over Bawnmore bog on 27th February 2013. A bird was also recorded off-site, approximately 1 km south of Carrickhill, on 13th March 2013.

Generally, Peregrines could be expected at any of the bog sites in the group, either passing overhead or hunting. A Peregrine had been recorded at Templetuohy bog in December 2009 during survey for the proposed Bruckana wind farm.

Water Rail

Conservation status

- Amber list (Lynas *et al.* 2007)

Water Rail is a widespread, resident species associated with well developed wetlands and especially reedbeds or swamp vegetation. It is, however, extremely secretive and is seldom seen and the presence of Water Rail is usually established by calling birds.

A Water Rail was heard at the artificial lake in Derryvella on 11th December 2012.

Apart from this site, there are limited opportunities for this species to occur within the study sites.

Golden Plover

Conservation status

- Annex I EU Birds Directive

- Amber list (Lynas *et al.* 2007)

In Ireland, Golden Plover is a common winter visitor throughout much of the country. The majority of birds wintering in Ireland are immigrants from the population breeding in Iceland and the Faeroes (*P. a. altifrons*). Most of this population winters in Ireland and Britain (Byrkjedal & Thompson 1998, Delany *et al*. 2009).

A flock of 9,300 or more Golden Plover (1% or more of the total flyway population) is an Internationally Important flock, while a flock of 1,700 or more (1% or more of the estimated total Irish wintering population) is a Nationally Important flock (Delany & Scott 2006, Boland & Crowe 2012).

Typically Golden Plover occur in large, densely-packed flocks, and in a variety of habitats, both coastal and inland. Significant numbers of Golden Plover wintering in Ireland use non-wetland sites, predominantly farmland.

Golden Plover feed on a variety of soil and surface-living invertebrates, principally beetles (Coleoptera) and earthworms (Lumbriidae), but also on plant material such as berries, seeds and grasses (Cramp & Simmons 1983). They are recorded regularly feeding in association with Lapwing. In winter, roost sites are often traditional within flock range, sometimes distant from feeding grounds; ploughed land and low growing crops are preferred. Furthermore, there appears to be a preference for feeding and roosting in large fields, with fields less than 4 ha seldom used (Byrkjedal & Thompson 1998).

Golden Plover were recorded at Knockahaw (2 records) and Littleton (1 record). Numbers, however, were low (30 maximum) and well below the threshold for national importance (i.e. 1,700). At Knockahaw the birds were resting on recently burned bog while at Littleton the flock was on bare peat. The usage of bogs for roosting or resting was noted widely during winter 2012/13 from other Bord na Móna bog sites in Counties Kildare and Offaly. It is presumed that feeding opportunities are virtually non-existent at these sites and that the main usage is the provision of safe roost and resting sites.

Snipe

Conservation status

- Amber list (Lynas *et al.* 2007)

Irish wintering Snipe comprise residents and immigrants from the *gallinago* race, which breeds across northern Europe, as well as immigrants from the *faeroeensis* population, which breeds in Iceland, the Faeroes and the Shetland and Orkney Islands (Delany *et al*. 2009).

During the day, Snipe generally rest or preen. Feeding occurs during the first half of the night and at dawn. Their winter diet consists largely of vegetable matter and seeds, and earthworms, tipulid larvae and other soil invertebrates. Snipe have a highly dispersed distribution in winter. They forage across a variety of wetland and damp habitats, including bogs, marshes and wet fields.

Due to their elusive nature and widespread distribution, they are difficult to census and populations are invariably under-estimated. No national population estimate has yet been derived (Crowe 2005).

Records of Snipe were widespread in the study area, with birds recorded from all, apart from one (Inch), sites.

Single birds, or twos and threes, were usually flushed during transect walks, with records from remnant bog, regenerating cutaway bog, and even bare peat. Peak counts were as follows:

Clonbuagh:	8 on 31st December
Bawnmore:	7 on 15th January
Littleton:	9 on 2nd February
Killeen:	12 on 4th January

Stock Dove

Conservation status

- Amber list (Lynas *et al.* 2007)

In Ireland, Stock Dove is a resident species mostly associated with mixed agricultural areas.

There was a single record of three birds at Derryvella on 11th December 2012.

Stock Dove is likely to be an occasional visitor to the Bord na Móna sites, especially where there is well developed scrub or low woodland.

Skylark

Conservation status

- Amber list (Lynas *et al.* 2007)

Skylark is widely distributed within the bog sites during winter though in small numbers (maximum count of 5 at Knockahaw, Templetuohy, Bawnmore, Littleton). There was a higher number of records in February and March than in the mid winter period, as breeding birds return to establish territories.

Skylark utilise a range of habitats, including bare peat, regenerating bog with scattered scrub and remnant bog.

Starling

Conservation status

- Amber list (Lynas *et al.* 2007)

Starling is a widespread and common bird of the countryside during winter.

Small to medium sized flocks (20 to 200) were recorded at Ballysorrel, Derryville, Bawnmore, Inch, Popes bog, Littleton, and Killeen.

Starlings typically prefer sparsely vegetated areas though will also utilise scrub for roosting.

Linnet

Conservation status

- Amber list (Lynas *et al.* 2007)

Linnet was fairly widespread throughout the study area, with records from all sites except Clonbuagh, Carrickhill and Inch. Most records were of less than 10 birds, with a peak count of 15 at Lanespark on 12th February 2013.

The birds were usually found within areas of regenerating cutaway bog, often near tracks.

3.6 Overview of Importance of Study Area and Sites for Wintering Birds

Despite some limitations (as discussed in methods and in following section), the 2012/13 winter survey has shown that the cutaway bog sites in the Littleton group are of relatively low importance for wintering birds.

From a species perspective, 15 species of conservation importance were recorded within the study area (see Table 1). Five of these, Whooper Swan, Hen Harrier, Merlin, Peregrine and Golden Plover are listed on Annex I of the EU Birds Directive. Whooper Swan winters in the wider area but there were only two on-site records. There were three records of Hen Harrier at two of the sites and a winter roost is known within several kilometres of the bog group. There were single records of Merlin and Peregrine within the sites, with a further Peregrine record nearby. Golden Plover was recorded roosting on bare or recently burnt peat at two of the sites.

Table 1. Bird species of conservation importance recorded on Littleton Bord na Móna sites, winter 2012-2013.

Species	EU Birds Directive Annex 1	Birds of Conservation Concern in Ireland: Red List	Birds of Conservation Concern in Ireland: Amber List
Little Grebe			X
Whooper Swan	X		X
Teal			X
Hen Harrier	X		X
Goshawk			X
Kestrel			X
Merlin	X		X
Peregrine	X		
Water Rail			X
Golden Plover	X		X
Snipe			X
Stock Dove			X
Skylark			X
Starling			X
Linnet			X

Fourteen of the 15 species are listed as Birds of Conservation Concern in Ireland, Amber list (i.e. Medium Conservation Concern). Four of these (Little Grebe, Goshawk, Water Rail & Stock Dove) were recorded on one occasion only, while Teal was confined to three sites

where suitable wetland habitats occur. Kestrel, Snipe, Skylark, Starling and Linnet occurred fairly widely and regularly on the sites.

Practically all of the recorded species of conservation interest could be expected in the wider countryside (i.e. agricultural lands) where pockets of semi-natural habitats exist (such as lakes, ponds, bog, scrub, woodland). None of the species are dependant solely on bog vegetation though several are characteristic of bog habitats, especially Snipe and Skylark.

The areas of the bogs that are not in current commercial production provide good foraging habitats for birds of prey, mainly Kestrel, Sparrowhawk, Buzzard, Hen Harrier and Merlin. These birds will hunt over both agricultural habitats and semi-natural habitats and during a hunting trip could pass readily over several types of habitats and, indeed, between several sites.

In practice, the cutaway bogs, either those with large areas of regenerating habitats or with marginal strips of remnant or regenerating cutover bog (as occur on practically all sites), provide useful semi-natural habitat refuges for a wide diversity of birds.

There follows discussion on the value of the cutaway bogs for some key species.

Whooper Swan

As already noted, Whooper Swans were recorded on two of the bog sites and up to four others have some potential to support swans. However, occurrences are likely to be occasional and involve small numbers of birds. Swans recorded on the bogs are likely to be from one of the regular populations in the wider area. The study also showed that there were no daily or regular movements of swans over any of the sites.

Overall, the Littleton bogs presently have low potential for Whooper Swans and are not within any regular flightline corridors.

Hen Harrier

Hen Harrier was recorded at two of the bog sites (Ballysorrell and Littleton). With a known winter roost c.3 km south of Killeen, and past records from the Nore Valley Bogs NHA (to the north of Knockahaw), it is likely that the species has a scattered distribution during winter within the wider area and probably could be expected at any of the bog sites within the group.

The timing of the sightings at Ballysorrell and Littleton would suggest that the birds were roosting locally and possibly within the Bird na Móna properties. It is noted that winter roosts are difficult to locate unless there is a number of birds using the same location over a period of several winters. Hen Harriers can roost singularly and may change locations between evenings.

Overall, the regenerating areas of cutaway bogs and the remnant bogs provide useful foraging habitats for wintering Hen Harriers, with potential for winter roosts at a few sites. However, the study sites are only part of a much larger area used by these wintering birds.

Peregrine

Peregrine is a widespread species throughout the Irish countryside during winter and the sighting of a bird over a bog site (Bawnmore) is not unexpected (along with a further record

to the south of Carrickhill and a previous record from Templetuohy).

Hunting Peregrines cover very large areas (tens of square kilometres) and one bird could easily pass over several of the bog sites in one session. Most of the cutaway bog sites support prey items (typically medium to large sized birds, including skylark, finches, starling and pigeons) that would attract hunting Peregrines and no one site is of any particular importance for this species. The open nature of the sites may give hunting Peregrines an advantage when chasing prey.

Overall, most of the cutaway bog sites provide useful habitat for hunting Peregrines though the birds would not be closely linked to any specific sites.

Merlin

While not common in Ireland during winter, the recording of just one Merlin in the study area was somewhat surprising as most of the cutaway bog sites offer suitable hunting habitat for the species (i.e. open, bog type habitats).

While Merlin can be easily missed due to its small size and typical fast, low flight behaviour, if a regular local population was present the combination of survey methods used in the present study would be expected to pick up the occasional bird. Further, the weather in winter 2012/13 was not noted for severe or prolonged freezing cold spells when birds might be expected to migrate to milder coastal areas.

On the basis of the survey results, it is concluded that the study area is not of any particular importance for wintering Merlin.

Golden Plover

Golden Plover were recorded roosting at two sites during the study. At Knockahaw there were two records of birds roosting on an area of recently burned bog while at Littleton there was one record of birds roosting on bare peat. The habit of using the open bogs as roost or resting sites was observed fairly widely in the Derrygreenagh/Ballydermot group of bogs and to some extent in the Ballivor group. Some limited feeding may also take place though feeding potential in bare peat must surely be very low. Usage of bare peat bogs by Golden Plover does not appear to have been described previously in the literature. However, it is not unexpected, as in winter Golden Plover typically roost in wide, open areas for safety, such as large fields (arable and pasture), beaches or mudflats. The numbers involved, however, were relatively low, with a maximum of only 30 birds (threshold for national importance is 1,700).

Overall, the usage of sites within the study area by Golden Plover is of interest but the number of birds involved is only at the level of local importance.

Sites Evaluation

Based on the range of species recorded in the study area, their use of the bog sites, and the conservation value of the species, it is considered that the key species (or receptors) that should be used in assessing the importance of the sites in the study area are as follows:

- Whooper Swan – regular occurrence on a site (for feeding and/or roosting) in the context of the site being part of the range for a regionally or nationally important

population

- Hen Harrier – regular occurrence on a site, i.e. more than one known record (from this study or other sources), and with potential for winter roosting

- Golden Plover – more than one occurrence on a site, though sites identified on this criterion only are unlikely to be of high importance (may require further assessment)

- Wetland bird assemblage – i.e. sites which support a range of bird species characteristic of wetland habitats

While Peregrine and Merlin are species of conservation importance, these could occur on practically any of the sites and their presence does not necessarily confer a rating of ornithological importance to the site (unless there was a winter roost or a breeding location on site).

None of the sites in the Littleton group qualify as of importance on the basis of a regular presence of Whooper Swans (though the presence of even small numbers is of some local interest)

The occurrence of Hen Harriers at two sites is of interest, especially at Littleton where two separate sightings were made. As the sighting at Ballysorrell and one of the Littleton sightings were made near roosting times this would indicate local roosts (possibly on-site). Observations over a longer time period (i.e. more than one winter) would be necessary to establish if Hen Harriers are regular visitors to a particular site and if there are any on-site night roosts.

As Golden Plover is an Annex I Birds Directive species (though a widespread visitor to Ireland during winter), any record is of some interest. The study has shown that Golden Plover will utilise the large commercial peat fields as safe roost or resting sites. The numbers involved, however, have been small and their occurrence is no more than of local interest.

Littleton is the principal site in the group with wetland habitats and supports wintering duck on a regular basis. Small areas of wetland habitats exist at Templetuohy, Bawnmore and Derryvella (artificial pond) but these support low numbers of wetland bird species.

Rating of Sites

As described in the Methods, wetland sites can be rated quantitatively based on bird populations reaching recognised threshold levels for national or international importance. Below the national level, however, there is no quantitative system for rating bird populations. In the Winter Wetlands Survey 1984/85 – 1986/87, Sheppard (1993) assigned all sites with some wetland birds as 'Regionally/Locally Important Sites'.

In the first main review of the I-WeBS project, Crowe (2005) describes internationally and nationally important sites following the standard criteria, and then includes a category 'Other notable sites' which are 'other sites deemed important, as they support significant concentrations of gulls, or occasionally support concentrations of international or national importance of other water bird species'. Any other sites where counts took place are

included in a fourth category of sites 'Other sites covered'.

Using the standard assessment method based on population size, the few 'wetland' sites in the Littleton bog group would qualify under the 'Other sites covered' category of Crowe (namely Littleton and Derryvella, and possibly Templetuohy and Bawnmore).

For EIA purposes, the various sites will in due course be assessed on their general ecological importance, including non-wetland wintering birds, breeding birds, habitats, mammals, etc., and the ecological valuation classification proposed by the NRA (2009) is likely to be more appropriate for their assessment.

While all the sites in the study area support various wintering bird species, including a range of Amber list species (i.e. birds of medium conservation concern), all of these species occur widely in the general countryside and are not dependent on, or necessarily closely associated with, the Bord na Móna sites. However, many of the bog sites provide extensive areas of relatively undisturbed habitats (mainly regenerating bog/heath and scrub, and remnant bog) and thus are useful refuges for these commoner species. The sites with extensive areas of such habitats are listed below and all could be considered as of 'local' value for birds:

Knockahaw
Clonbuagh
Ballysorrell
Templetuohy
Bawnmore
Littleton
Derryvella

Of these sites, Littleton is the one which is identified as having the highest value (though still at the local level of importance) due to the presence of substantial wetland habitats which attract wildfowl on a regular basis and with records of Whooper Swan, Golden Plover and Hen Harrier.

The remaining sites, namely Derryville, Carrickhill, Inch, Popes bog, Lanespark, Ballybeg and Killeen, are dominated by bare peat but the various marginal habitats still support some Amber-listed birds of conservation importance and could be considered of some local importance. It is noted that while Whooper Swans (no. 3) were recorded at Carrickhill, this was from a small pond in the northernmost part of site which was drained later in the winter and the main part of the site is in commercial peat production.

Based on the present data set, all sites are given a rating of some local importance for wintering birds – the interests of each are listed in Table 2. This rating system will be refined with further survey for both wintering and breeding birds.

Table 2. Summary of ornithological importance of Littleton sites on the basis of the 2012/13 winter survey.

Site	Interests	Tentative rating
Knockahaw	Golden Plover (2 records) Amber list species: Snipe, Skylark, Linnet	Local
Clonbuagh	Amber list species: Kestrel, Snipe, Skylark)	Local
Ballysorrell	Hen Harrier (1 record) Amber list species: Kestrel, Snipe, Skylark, Starling, Linnet	Local
Templetuohy	Amber list species: Kestrel, Snipe, Skylark	Local
Derryville	Amber list species: Snipe, Skylark, Starling, Linnet	Local
Carrickhill	Whooper Swan (1 record) Amber list species: Kestrel, Snipe	Local
Bawnmore	Peregrine (1 record) Amber list species: Kestrel, Teal, Snipe, Skylark, Starling, Linnet	Local
Inch	Amber list species: Kestrel, Starling	Local
Popes bog	Amber list species: Kestrel, Snipe, Skylark, Starling, Linnet	Local
Littleton	Whooper Swan (1 record) Hen Harrier (2 records) Golden Plover (1 record) Wetland birds Amber list species: Kestrel, Snipe, Skylark, Starling, Linnet	Local +
Lanespark	Peregrine (1 record) Amber list species: Snipe, Skylark, Linnet	Local
Derryvella	Peregrine (1 record) Amber list species: Little Grebe, Kestrel, Water Rail, Snipe, Stock Dove, Skylark, Linnet	Local
Ballybeg	Amber list species: Kestrel, Snipe	Local

Killeen	Amber list species: Kestrel, Snipe, Skylark, Starling, Linnet	Local

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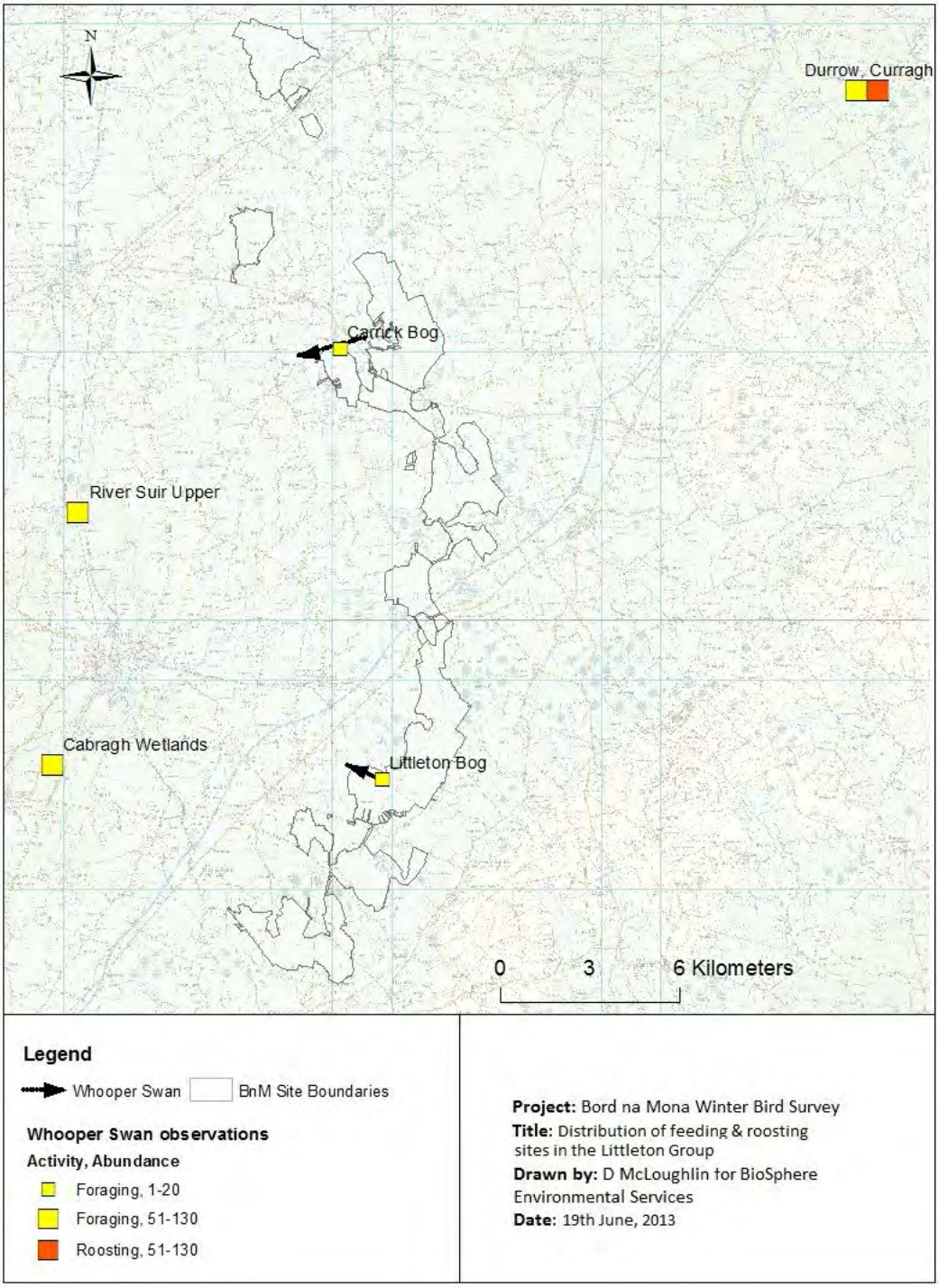
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Figure 1. Distribution of Whooper Swans in the Littleton bog group and hinterland, winter 2012/13.



APPENDIX 1

Scientific Names of Bird Species

Little Grebe	*Tachybaptus ruficollis*
Grey Heron	*Ardea cinerea*
Whooper Swan	*Cygnus cygnus*
Mute Swan	*Cygnus olor*
Greenland White-fronted Goose	*Anser albifrons flavirostris*
Teal	*Anas crecca*
Mallard	*Anas platyrhynchos*
Buzzard	*Buteo buteo*
Hen Harrier	*Circus cyaneus*
Sparrowhawk	*Accipiter nisus*
Kestrel	*Falco tinnunculus*
Merlin	*Falco columbarius*
Peregrine	*Falco peregrinus*
Red Grouse	*Lagopus lagopus*
Moorhen	*Gallinula chloropus*
Pheasant	*Phasianus colchicus*
Water Rail	*Rallus aquaticus*
Golden Plover	*Pluvialis apricaria*
Lapwing	*Vanellus vanellus*
Snipe	*Gallinago gallinago*
Woodpigeon	*Columba palumbus*
Skylark	*Alauda arvensis*
Meadow Pipit	*Anthus pratensis*
Pied Wagtail	*Motacilla alba*
Wren	*Troglodytes troglodytes*
Robin	*Erithacus rubecula*
Stonechat	*Saxicola torquata*
Blackbird	*Turdus merula*
Fieldfare	*Turdus pilaris*
Song Thrush	*Turdus philomelos*
Mistle Thrush	*Turdus viscivorus*
Goldcrest	*Regulus regulus*
Coal Tit	*Parus ater*
Blue Tit	*Parus caerulus*
Great Tit	*Parus major*
Magpie	*Pica pica*
Hooded Crow	*Corvus corone*
Raven	*Corvus corax*
Starling	*Sturnus vulgaris*
Chaffinch	*Fringilla coelebs*
Goldfinch	*Carduelis carduelis*
Siskin	*Carduelis spinus*
Linnet	*Carduelis cannabina*
Lesser Redpoll	*Carduelis flammea*
Bullfinch	*Pyrrhula pyrrhua*
Reed Bunting	*Emberiza schoeniclus*

BORD NA MONA
BREEDING BIRD SURVEY 2013

LITTLETON BOG GROUP

FINAL REPORT

JUNE 2014

Prepared for

Bord na Móna

by

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APPENDIX 1. Scientific Names of Bird Species

APPENDIX 2. Breeding Status Codes as used in Bird Atlas

EXECUTIVE SUMMARY

- A baseline study of breeding birds associated with the Bord na Móna Littleton Bog Group was carried out between April and August 2013. There are 14 sites within the group, covering an area of just over 5,000 ha. Most of the bogs in the Group are still in peat production to some degree, although in some instances production may be confined to localised areas. Some bogs have re-vegetated considerably, whereas some have peat reserves with depths in excess of 2 m at present.

- The study included a desk review and consultations with relevant agencies, namely National Parks & Wildlife Service (local management staff), BirdWatch Ireland and the Irish Peatland Conservation Council. Field methods employed were a combination of transect surveys, vantage point watches and focused searches for scarcer species and especially wetland birds. Three rounds of surveys were carried out during the breeding season.

- While none of the bog sites are designated for conservation, there are 19 designated sites within a 15 km radius of the Group, comprising two SPAs, six SACs, two NHAs, and nine pNHAs.

- A review of past bird information relating to the immediate study area concluded that this is scant and generally of limited value in the context of the present study.

- A brief description of each of the 14 bog sites is followed by details of target species recorded, the potential for other target species, other species of note recorded and an overview of the value of the site for wintering birds. A map showing locations of sampling transects and vantage points, plus locations and/or flight lines of target species where relevant, is presented, along with selected photographs.

- For breeding bird communities, the habitats or vegetation types within the sites can be broadly separated as follows: Bare or near bare peat; Cutaway bog dominated by open regenerating bog/heath vegetation, with perhaps scattered scrub; Cutaway bog dominated by scrub/low woodland; Remnant bog; Wetlands and open water; Conifer plantation.

- From a conservation perspective, 21 species of importance were recorded within the study area during the breeding season. One is listed as an EU Birds Directive Annex I species, four are Red listed and 17 are Amber listed species. Summary species accounts are given for the species of conservation importance.

- Sixteen of the 21 species are considered to have bred (possible, probable or confirmed) on site according to the breeding status codes of the Bird Atlas. The other five species were classified as non-breeding but using the sites for feeding and/or other activities.

- Hen Harrier was the Annex I species recorded. The record was a female bird at Littleton bog on two dates in July. This was considered a post-breeding or perhaps

failed breeder from breeding grounds elsewhere.

- Four breeding species are listed as Birds of Conservation Concern in Ireland, Red List (i.e. High Conservation Concern). Lapwing was the most widespread of these, breeding at three sites. Curlew and Black-headed Gull both bred only at Littleton bog. Yellowhammer bred along the margins of Bawnmore bog.

- Five of the Amber listed species were considered to be non-breeding species, using the sites for feeding or other activities. These were Hen Harrier (as already noted), Kestrel, Swift, Sand Martin and Wheatear. The record of Wheatear referred to birds on migration, while the other listed species are considered to have bred locally.

- The Amber listed species which nested within the sites were as follows: Teal, Little Grebe, Water Rail, Ringed Plover, Snipe, Woodcock, Common Sandpiper, Skylark, Swallow, Starling, Spotted Flycatcher and Linnet.

- The most important group of species using the cutaway bogs as nesting habitat is the wetland birds and especially the waders. Snipe is the most widely distributed species (12 pairs at 7 sites), nesting in a range of vegetation types from intact or uncut bog to wet regenerating bog. Lapwing (10 pairs) was confined to open sites (no. 3), with permanent standing water and low growing vegetation. Single pairs of Ringed Plover, Curlew and Common Sandpiper bred at one site each. Teal and Little Grebe both occurred at two sites, with one colony of Black-headed Gulls. All of these wetland species have experienced population declines in Ireland in recent decades but the decline is particularly marked in the wader species and Black-headed Gull.

- The cutaway bogs are also of some significance for supporting breeding populations of other species. Skylark and Linnet were widely distributed, while Spotted Flycatcher occurred at two of the sites. The bog sites provide useful habitat for hunting Kestrel. Other species associated with the sites which have localised distributions in Ireland, though are not necessarily of conservation concern at present, included Sparrowhawk, Buzzard, Cuckoo, Whitethroat, Willow Warbler, Meadow Pipit, Lesser Redpoll, Reed Bunting and Stonechat.

- The sites are ranked for their importance for breeding birds on the basis of the presence and population size of the 'listed' species of conservation importance. The five-point classification scale used by the National Roads Authority is adapted (i.e. International Importance; National Importance; County Importance; Local Importance, higher value; Local Importance, lower value). There are no sites which are rated of International or National Importance on the basis of breeding birds. Two sites, Littleton and Bawnmore, are ranked as at least the County Importance level on account of the assemblage of breeding wetland birds. A suite of five sites is identified as of Local Importance (higher value) on the basis of breeding wetland birds (mostly Snipe) and other Amber listed species. These are Knockahaw, Ballysorrell, Templetuohy, Derryvella and Killeen. All other sites are considered to be of Local Importance (lower value). Each provides some potential habitat for nesting birds, which include widespread but nevertheless declining species such as Skylark. These sites may also be used as hunting grounds for important species such as Kestrel.

1.0 INTRODUCTION

1.1 Background to Project

Bord na Móna is considering using some of its bogs in the midlands for large scale wind farm development and has carried out some high level assessment of the suitability of various sites for this purpose. Farm layouts, however, have not yet been prepared to a significant level of detail at this stage.

As part of the planning work, Bord na Móna issued a request for a breeding bird study, including consultation, on the avian species and populations either using, or likely to use, the various sites. This was considered a preliminary step in the approach to the bird studies that will be required should the development of a wind farm be progressed. A contract to carry out the required work was awarded to BioSphere Environmental Services in early April 2013.

The project comprised the following bog groups for consideration as follows:

1. Ballydermot & Derrygreenagh Bog Group
2. Ballivor Bog Group
3. Littleton Bog Group
4. Cul na Mona Bog Group
5. Kilberry Bog

Key requirements of the study were as follows:

- Consult with appropriate bodies, such as NPWS and BWI, regarding sightings and any existing information on the site or surrounding area and discuss / agree appropriate methodologies in the context of the scale and nature of the sites
- provide GIS maps of features and sightings of interest
- provide a detailed recommended methodology for future bird surveys should the project proceed to EIS
- provide a description of the suitability of the habitats present for key species not recorded but which could potentially occur
- provide a summary of likely constraints with regard to the known bird community.

The following mapping was supplied for each bog group by Bord na Móna

- Site Location Map (Discovery map base)
- Orthophoto View (from 2006)
- Land Use Map (prepared by BnaM)
- Biodiversity Value Map (prepared by BnaM; not complete coverage)

A copy of *Birds on Cutaway Peatlands: Baseline Breeding Bird Population Survey* (2011) by Dr. Alex Copland, BirdWatch Ireland (carried out for Bord na Móna) was supplied for reference.

The present report considers the Littleton Bog Group.

1.2 Overview of Study Area

The following general description is based on the information supplied by Bord na Móna in the tender documentation.

Littleton Group of Bogs

The Littleton Group of bogs is located on the border of counties Kilkenny, Tipperary and Laois. The Group consists of just over 5,000 hectares of bogland in open, flat, rural countryside surrounded by adjoining farmland. Human settlement is a combination of small villages and individual private dwellings along the peripheral regional and minor road network.

The bogs within the Group provide peat to the nearby briquette factory which is still in production. Most of the bogs in the Group are still in peat production to some degree, although in some instances production may be confined to localised areas. Some bogs have re-vegetated considerably, whereas some bogs have peat reserves with depths in excess of 2m at present.

Coillte forestry is located at various locations close to some of the bogs within the Group, and there are also a number of established on-site Coillte forests on some bogs. Varying degrees of on-site vegetation, ranging from light scrub to established trees exist on some bogs, depending on the level of production activity and how long production has ceased. Construction work is also underway on a 40MW Wind Farm at Bruckana, located on Templetuohy bog. There is an existing wind farm, Lisheen, in the area. Access to sites is generally good, with most bogs within the Group accessible via the peripheral regional and minor road network, and local access roads.

The study area is within the catchments of the Nore and Suir river systems.

2.0 SURVEY METHODS

2.1 Desk Review and Consultations

In addition to a perusal of the general ornithological literature on Ireland's birds, including the annual journal *Irish Birds*, the following key sources of electronic information were accessed for references to the study area:

www.birdwatchireland.ie - Distribution map of I-WeBS sites in Ireland

www.npws.ie - Distribution maps and associated information for sites designated for conservation by NPWS (i.e. SPAs, SACs, NHAs, pNHAs)

Consultations, mostly by email and/or telephone, took place with the following:

NPWS

Ms Aine Lynch, Conservation Ranger – Co. Tipperary, Tel.: 067 46325; email: Aine.Lynch@ahg.gov.ie

BirdWatch Ireland

Dr Alex Copland, Senior Conservation Officer Crank House, Banagher, Co. Offaly
Tel.: 057 9151676; email: acopland@birdwatchireland.ie

Dr Olivia Crowe, Senior Conservation Officer; email: ocrowe@birdwatchireland.ie;

Irish Peatland Conservation Council

Dr Catherine O'Connell, CEO, IPCC, Tel.: 045 860 133; email: bogs@ipcc.ie

Mr Tadhg O Corcora, Conservation Officer, IPCC, Tel.: 045 860 133; email: bogs@ipcc.ie

2.2 Field Surveys

The tender documentation had noted the following points in respect of survey methodology:

- The Breeding Bird Surveys should be undertaken between the months of April and August and should focus in particular on breeding waders, wildfowl, Hen Harriers and other raptors, Annex 1 species and birds of conservation interest.
- All sites should be visited a minimum of three times during the survey period, or more frequently as appropriate, with the approach and methodology varying depending on the target species.
- The survey should include all, or a selection of the following; focused wetlands surveys; transects; vantage point surveys; bog walks; roost watches; flight paths and migration studies; or other methodologies as appropriate.

The tender also noted that '*adherence to approved methodologies is a key requirement of the project. However, given the scale and fragmented nature of the area to be surveyed, and the nature of the studies to be undertaken, a pragmatic approach is required. This must balance*

the detail required to be acceptable for a planning application for a wind farm project of very significant scale with the fact that much of the area is still utilised for industrial scale peat extraction or peat extraction has ceased only recently.'

Taking the above into account, the following approach was taken at the sites:

2.2.1 Site visits

The contract commenced in early April which allowed for early, mid and late season surveys at all sites. It is noted, however, that records had been collated for early breeding birds on some sites during March, when late-winter site visits were being undertaken (previous contract by BES). The timing of the survey periods were roughly as follows:

- Early season visit April into early May
- Mid season visit mid May into mid June
- Late season visit late June into August

2.2.2 Survey methods

Use of a combination of the following methods was employed at the sites as relevant. However, transect surveys and vantage point watches were the main methods and a combination of these were used in all sites.

Surveys were carried out largely in suitable weather conditions, with avoidance of persistent rain and winds in excess of F4-5. During part of summer 2013, exceptional high temperatures precluded survey in the middle part of the day.

Transects surveys

The use of transects to record birds within sites is a well established survey method (Bibby *et al.* 2000). The method is particularly useful for open habitats such as peatlands. The value of the method is that it is repeatable over time, which is particularly relevant to the Bord na Móna cutaway bogs where habitat conditions are somewhat transient and bird communities can be expected to change over time in response to vegetation types present.

The transects used in the surveys had been selected for the winter 2012/13 survey. These typically followed identifiable tracks (inc. rail tracks) which made coverage quicker and also safer compared to across open bog. Further, tracks are often slightly elevated which makes recording more efficient. As it was important to ensure that all species of conservation importance within the sites were recorded, deviations from the selected transects were made as necessary where potential nesting habitats for such species existed.

Bird recording is normally within a zone 200-300 m wide either side of the transect though the flat nature of the sites made larger sized or obvious birds (such as Lapwing) at further distances easily visible. Birds were recorded by sight (with aid of binoculars) and sound.

During the study, particular emphasis was placed on the potential occurrence of Red Grouse on areas of uncut or largely uncut remnant bog. Where significant bog remnants occur, a transect was walked across the bog in each survey period.

Vantage point surveys

Vantage point surveys were carried out in general accordance with the recommended methodology published by Scottish Natural Heritage (SNH 2005). The purpose of these surveys was mainly to detect birds of prey, though all birds observed during watches were recorded. The main deviation from the SNH guidelines was in the duration of the vantage point watches carried out, which varied from 30 minutes to up to 3 hours per month. For the purpose of the breeding baseline survey, this survey effort was considered adequate for sites where there was generally no history of regular populations of target species and often there was little or no potential for such species to occur due to the habitats present.

At each site a representative number of vantage points were established to provide views over large areas of the site and adjoining lands, with focus on expanses of habitats of potential value to wintering birds. The vantage points were positioned on elevated ground where feasible – these range from naturally higher ground (hillocks etc) to roads/embankments and even milled peat piles. At a small number of sites, heavy growth of scrub and low woodland partly obscured the view from the vantage point.

When a target species was sighted during a watch, the flightline was plotted onto a field map along with estimated flight height, duration of observation and any other parameters such as age and gender of bird, behaviour of bird (e.g. hunting, flying, roosting) etc.

General search for species of conservation value

In addition to the transect and vantage point watches, other habitats within each site with potential for breeding birds of conservation interest were visited during the surveys so as to ensure that all bird species of conservation importance associated with the site were recorded. These habitats comprised mainly localised wetlands and regenerating bog strips.

2.2.3 Target species

The breeding surveys were focused on the potential presence of the following groups of birds or species:

- Waders, especially Lapwing, Snipe and Curlew
- Other waterbirds, including Little Grebe, Teal, and gull species
- Summering Merlin, Hen Harriers and other birds of prey
- Red Grouse
- Any other Annex 1 species of EU Birds Directive
- Any other Red or Amber listed species as given in Lynas *et al*. (2007)

2.3 Survey Limitations

The breeding survey was carried out within the recommended season (April-August) at all sites. Standard methodologies were following, with the approach generally following that used in the Breeding Atlas 2007-2011 Survey (BTO 2009).

It is considered that no constraints or limitations were associated with the surveys.

2.4 Criteria for Evaluation of Ornithological Importance of Sites

No particular quantitative method is available to assess the importance of sites for breeding birds. Instead, the value can be determined by the presence of 'listed' species as follows:

- Annex I EU Birds Directive species
- Birds of Conservation Concern - Red List (High conservation concern) species (after Lynas *et al*. 2007).
- Birds of Conservation Concern – Amber List (Moderate conservation concern) species (after Lynas *et al*. 2007).

Often, a subjective assessment may need to be made based on available baseline data – for instance, the regular presence within the site of a breeding pair of Peregrines (Annex I species) would be of more significance than the occasional record of hunting birds.

For an overall ecological assessment of the importance of a site, taking into account not just ornithological interests but also habitats, flora and other fauna types etc., reference is made to the NRA *Guidelines for Assessment of Ecological Impacts of National Road Schemes* (NRA, 2009). Whilst the NRA guidelines were devised specifically for road schemes, they can be applied to general environmental impact assessment. The NRA system uses the following five-point scale:

- International Importance
- National Importance
- County Importance
- Local Importance (higher value)
- Local Importance (lower value)

3.0 RESULTS AND DISCUSSION

3.1 Sites Designated for Nature Conservation

The following designated sites are located within a distance of approximately 15 km of the study area. These comprise the following types of designations:

- Special Protection Areas - SPAs are designated under Council Directive 79/409/EEC on the conservation of wild birds (i.e. the Birds Directive).

- Special Areas of Conservation - SACs are designated under Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (i.e. the Habitats Directive).

- Natural Heritage Areas - NHAs are designated under the Wildlife Amendment Act 2000.

- proposed Natural Heritage Areas - pNHAs do not receive legal protection though the ecological value of pNHAs is recognised by Planning and Licencing Authorities.

Apart from SPAs, these sites do not necessarily have ornithological interests though many would support some birds of conservation interest. In the following list, a note is made on whether the site has known ornithological interest.

Slieve Bloom Mountains SPA (code 004160)

This large upland site is designated for a nationally important population of breeding Hen Harriers. The site is situated on the border between Counties Offaly and Laois and runs along a northeast/southwest aligned ridge for approximately 25 km. The SPA includes the majority of the Slieve Bloom uplands.

Along with Hen Harriers, the site supports breeding Merlin and Red Grouse.

The SPA is situated just over 10 km north of Knockahaw bog.

River Nore SPA (code 004233)

This large site consists of the freshwater stretches of the River Nore and its main tributaries, including the Delour, Erkina and Kings rivers.

The site is a SPA as it is of special importance of Kingfisher. A survey in 2010 recorded 22 pairs of Kingfishers within the SPA. Other species which occur include Mute Swan (35), Mallard (267), Cormorant (14), Snipe (17) and Sand Martin (1,029) – all figures are peak counts recorded during the 2010 survey.

The bogs in the northern part of the Littleton group are within the Nore catchment. Knockahaw and Clonbuagh bogs are located approximately 15 km from Boston Bridge, the upper limit of the SPA along the Erkina River, while Templetuohy bog is within 13 km of Boston Bridge (all straight line distances).

River Barrow and River Nore SAC (code 002162)

This large site consists of the freshwater stretches of the Barrow/Nore River catchments as far upstream as the Slieve Bloom Mountains. All the main tributary rivers form part of the site, included the Delour, Dinin, Erkina, Munster, Arrigle and King's River on the Nore. Overall, the site is of considerable conservation significance for the occurrence of good examples of a range of habitats and of populations of plant and animal species that are listed on Annexes I and II of the EU Habitats Directive respectively.

The NPWS site synopsis notes that the site is of ornithological importance for a number of E.U. Birds Directive Annex I species including Greenland White-fronted Goose, Whooper Swan, Bewick's Swan, Bar-tailed Godwit, Peregrine and Kingfisher. Nationally important numbers of Golden Plover and Bar-tailed Godwit are found during the winter. Wintering flocks of migratory birds are seen in Shanahoe Marsh and the Curragh and Goul Marsh, both in Co. Laois.

Much of the area of the Littleton bog group is drained by the Nore system.

Lower River Suir SAC (code 002137)

This large site consists of the freshwater stretches of the River Suir immediately south of Thurles. All the main tributary rivers form part of the site. Overall, the site is of considerable conservation significance for the occurrence of good examples of a range of habitats and of populations of plant and animal species that are listed on Annexes I and II of the EU Habitats Directive respectively.

The NPWS site synopsis notes that parts of the site are of ornithological importance for a number of E.U. Birds Directive Annex I species including Greenland White-fronted Goose (10), Golden Plover (1490), Whooper Swan (7) and Kingfisher (figures given in brackets are the average maximum counts from 4 count areas within the site for the three winters between 1994 and 1997). Wintering populations of migratory birds use the site. In Cabragh marshes there is abundant food for surface feeding wildfowl which total at 1,000 or so in winter. Widgeon, Teal and Mallard are numerous and the latter has a large breeding population - with up to 400 in summer. In addition, less frequent species like Shoveler and Pintail occur and there are records for both Whooper and Bewick's swans. Kingfisher, a species that is listed on Annex I of the EU Birds Directive, occurs along some of the many tributaries throughout the site.

The southern part of the Littleton bog group is drained by the Suir system.

The Loughans SAC (code 0407)

This site which comprises three lakes is a turlough situated in flat land about 3 km east of Urlingford, below the Slieve Ardagh Hills. The site contains a numbers of rare and scarce plant species. The Loughans is approximately 5 km east of Bawnmore and Inch bogs, approximately 8 km east-northeast of Pope's bog and over 9 km northeast of Littleton bog.

This site is not of known ornithological interest.

Spahill and Clomantagh Hill SAC (code 0849)

Spahill and the adjacent hills form part of an escarpment that links the Slieve Ardagh Hills

with the Castlecomer Plateau. The area is mostly limestone and supports a rich flora, including rare orchids.

The SAC site is located approximately 8 km northeast of Bawnmore and Inch bogs, and over 10 km northeast of Pope's bog and Littleton bog.

This site is not of known ornithological interest.

Cullahill Mountain SAC (code 0831)

This site lies on western outlier of the Castlecomer Plateau, 6 km northeast of Johnstown. The area is mostly limestone and supports a rich flora, including rare orchids.

The SAC site is located approximately 11 km northeast of Bawnmore and Inch bogs, and approximately 10 km east of Templetuohy bog.

This site is not of known ornithological interest.

Kilduff, Devilsbit Mountain SAC (code 0934)

This upland site is situated approximately 5 km northwest of Templemore. The site supports upland grassland, heath and woodland habitats.

The SAC site is located approximately 10 km west of Knockahaw and Ballysorrell bogs.

Peregrine breeds within the site.

Nore Valley Bogs NHA (code 001853)

The site is good example of a relatively intact raised bog. It is located approximately 5 km southeast of Roscrea and approximately 8 km north of Knockahaw Bog.

The NPWS site synopsis notes that Hen Harrier has been recorded on the site.

Monaincha Bog/Ballaghmore Bog NHA (code 00652)

This NHA is a good example of a relatively intact raised bog. It is located about 3 km east of Roscrea and approximately 7 km north of Knockahaw Bog.

This site is not listed as being of ornithological interest.

Killough Hill pNHA (code 0959)

This site surrounds a limestone quarry approximately 6 km south-southwest of Thurles. It is of importance due to the presence of some limestone pavement, as well as calcareous grassland and woodland and scrub.

The site is located approximately 5 km west of Killeen and Ballybeg bogs.

The woodland at the site is noted as having a large bird population.

Cabragh Wetlands pNHA (code 01934)

This site is in two parts both situated close to the River Suir near Thurles. The largest

section is the Cabragh marshes, located approximately 3 km southwest of the town. This is a large reedbed, with fen and marsh. The other sector is located at Ardbaun, just north of the town. This is a spring fed marsh, with abundant Saw Sedge.

The southern part of the site is located approximately 10 km west of Littleton and Ballybeg bogs, while the northern part is located approximately 10 km west of the Popes bog.

The main Cabragh wetland is an important site for wetland birds, especially wildfowl (Teal, Wigeon, Mallard) but also Whooper Swans. The northern part supports small numbers of wetland birds.

Laffansbridge pNHA (code 00965)

This pNHA is a cluster of five separate areas of calcareous grassland located near Laffansbridge village to the west of Killenaule. The herb-rich sward supports the rare plant Green-winged Orchid.

This pNHA is located just over 1 km south of Killeen bog.

This site is not of known ornithological interest.

Kilcooly Abbey Lake pNHA (code 00958)

This pNHA is a small lake in the estate grounds of an old abbey. It is located about 6 km southeast of Urlingford. The lake has a varied aquatic flora.

The pNHA is located approximately 7 km east of Popes bog and Inch bog.

The lake supports wetland bird species such as Mallard, Moorhen, Coot and Grey Heron.

Aghsmear House pNHA (code 02060)

This pNHA is a nursery roost of the Natterer's bat. It is located in the grounds of Aghsmear House, four kilometres south of Roscrea.

This pNHA is located 5 km northwest of Knockahaw bog.

This site is not of known ornithological interest.

St Anne's (Sean Ross Abbey), Roscrea pNHA (code 0656)

This pNHA is a nursery roost of the Leisler's bat. It is located within a modern school building in Roscrea.

The pNHA is located approximately 9 km northwest of Knockahaw bog.

This site is not of known ornithological interest.

Sheehills Esker pNHA (code 0938)

This pNHA consists of a series of discrete sandy esker ridges. The ridges are mostly wooded but also support patches of grassland. A number of scarce plants have been recorded from

the site.

The pNHA is located approximately 8 km northwest of Knockahaw bog.

This site is not of known ornithological interest.

The Curragh and Goul River Marsh pNHA (code 0420)

This site, which lies between the towns of Rathdowney and Durrow, comprises a 6 km stretch of wet meadow through which flows the River Erkina. It supports an excellent diversity of wetland vegetation types.

The pNHA is located approximately 15 km east of the northernmost sector of the Littleton bog group.

The site is noted as an important winter feeding site for Greenland White-fronted Geese.

Grantstown Wood and Lough pNHA (code 0417)

This state owned Nature Reserve is located some 8 km northwest of Durrow. The lough is completely surrounded by woodland and there is an excellent seral transition of wetland habitats.

The pNHA is located approximately 15 km east of the northernmost sector of the Littleton bog group.

The site is not listed as being of ornithological interest.

3.2 Review of Past Data for Study Area

There appears to be no published or unpublished information on the breeding birds of the bogs in the Littleton bog group.

NPWS

The NPWS Conservation Ranger Ms Aine Lynch is not aware of any specific species of breeding bird associated with these sites.

Irish Peatland Conservation Council

The IPCC is not familiar with this group of bogs and is not aware of any peatland sites of significance in this particular area.

BirdWatch Ireland

BirdWatch Ireland is not aware of any specific bird interests associated with the bogs in the study area.

Bruckana Wind Farm – Environmental Impact Statement

A breeding bird survey for the Bruckana Wind Farm site, which is within Templetouhy bog, was carried out in June and July 2009.

A Peregrine (Annex I Birds Directive) was noted on one occasion foraging in the study area though no potential breeding site exists on site.

Two red listed species of conservation importance were recorded on site, Black-headed Gull and Yellowhammer. A small colony of Black-headed Gulls (approximately 30 birds) was recorded in June 2009 on a pond in the southern part of site but the colony was abandoned by the time of the second visit in July. A male Yellowhammer was recorded holding territory at the southern edge of the study area in July 2009.

Other species of conservation importance recorded as breeding or possibly breeding were as follows: Teal, Kestrel, Snipe (4), Woodcock, Skylark and Linnet.

Overall Appraisal of Available Information

From the review of the literature and contact with relevant organisations, it is concluded that apart from an EIS baseline study for the Bruckana wind farm, there does not appear to be any past information on the breeding birds within the Littleton group of Bord na Móna bogs.

3.3 Site Descriptions

Sites are described in a standard format, as follows:

brief, general description of the site
outline details of the survey locations
target species recorded
potential for other target species
other species of note
overview

A map showing the survey locations and any target species recorded is presented for each site (some sites had no target species). A representative photograph(s) is also included.

Data for all bird surveys are compiled in an accompanying database.

Scientific names of bird species are given in Appendix 1.

SITE: KNOCKAHAW

Knockahaw bog is a medium sized site located just over seven kilometres northeast of Templemore town. This is an outlying site from the other sites in the Littleton Group. The main access points used for the site are from lanes or tracks off third class roads to the east and west. The site extends for approximately 2 km from north to south and for 2 km from east to west.

Knockahaw is dominated by remnant bog, the majority of which has had surface drains inserted (presumably in preparation for harvesting). There is evidence of a recent fire event on part of the bog surface.

The site is surrounded mainly by farmland. Further bog occurs to the northeast and there is some forestry to the east and south. There is a small patch of mixed woodland (oak and sycamore) on the north east boundary.

Survey locations

Transect 1 starts at vantage point 1 in the northwest of the site and runs southeast along the site boundary crossing drained remnant bog and sod peat production. It then follows the boundary lane southeast along the edge of the site through birch woodland.

Transect 2 starts at the site access point in the east of the site and comprises a loop across drained remnant bog.

Vantage Point 1 is located at the start of transect 1 at the northwest boundary and looks southeast over the majority of site (drained remnant bog).

Target species recorded

Snipe
Displaying birds (2) present on remnant and regenerating bog.

Potential for other target species

Knockahaw bog does not have significant potential to support breeding wetland species (other than Snipe) or other species of conservation importance.

Other species of note

Kestrel – single bird in May.

Skylark – estimated 4 territories in remnant and regenerating bog habitats.

Swallow – recorded regularly feeding over site.

Stonechat – 1 pair bred successfully on site.

Overview

Knockahaw bog has limited potential for breeding birds of conservation importance.

It does, however, comprise a substantial area of remnant bog and supports breeding Snipe and Skylark. There is extensive marginal woodland and scrub, with woodland species such as Blackcap present.

SITE: KNOCKAHAW – BREEDING BIRDS 2013

Species	Maximum Breeding Evidence	No. of pairs (where relevant)	Breeding Status	BoCCI Status
Grey Heron	U		Non-breeding	G
Kestrel	**F**		**Non-breeding**	**A**
Snipe	**D**	**2**	**Probable**	**A**
Woodpigeon	P		Probable	G
Cuckoo	T	2	Probable	G
Magpie	P		Probable	G
Hooded Crow	H		Possible	G
Raven	F		Non-breeding	G
Goldcrest	S		Possible	G
Blue Tit	P		Probable	G
Great Tit	H		Possible	G
Skylark	**P**	**4**	**Probable**	**A**
Swallow	**F**		**Non-breeding**	**A**
Long-tailed Tit	H		Possible	G
Willow Warbler	A		Probable	G
Blackcap	T		Probable	G
Whitethroat	T		Probable	G
Wren	FL		Confirmed	G
Blackbird	FL		Confirmed	G
Song Thrush	T		Probable	G
Mistle Thrush	H		Possible	G
Robin	T		Probable	G
Stonechat	FL	1	Confirmed	G
Meadow Pipit	FL		Confirmed	G
Chaffinch	T		Probable	G
Lesser Redpoll	H		Possible	G
Reed Bunting	A		Probable	G

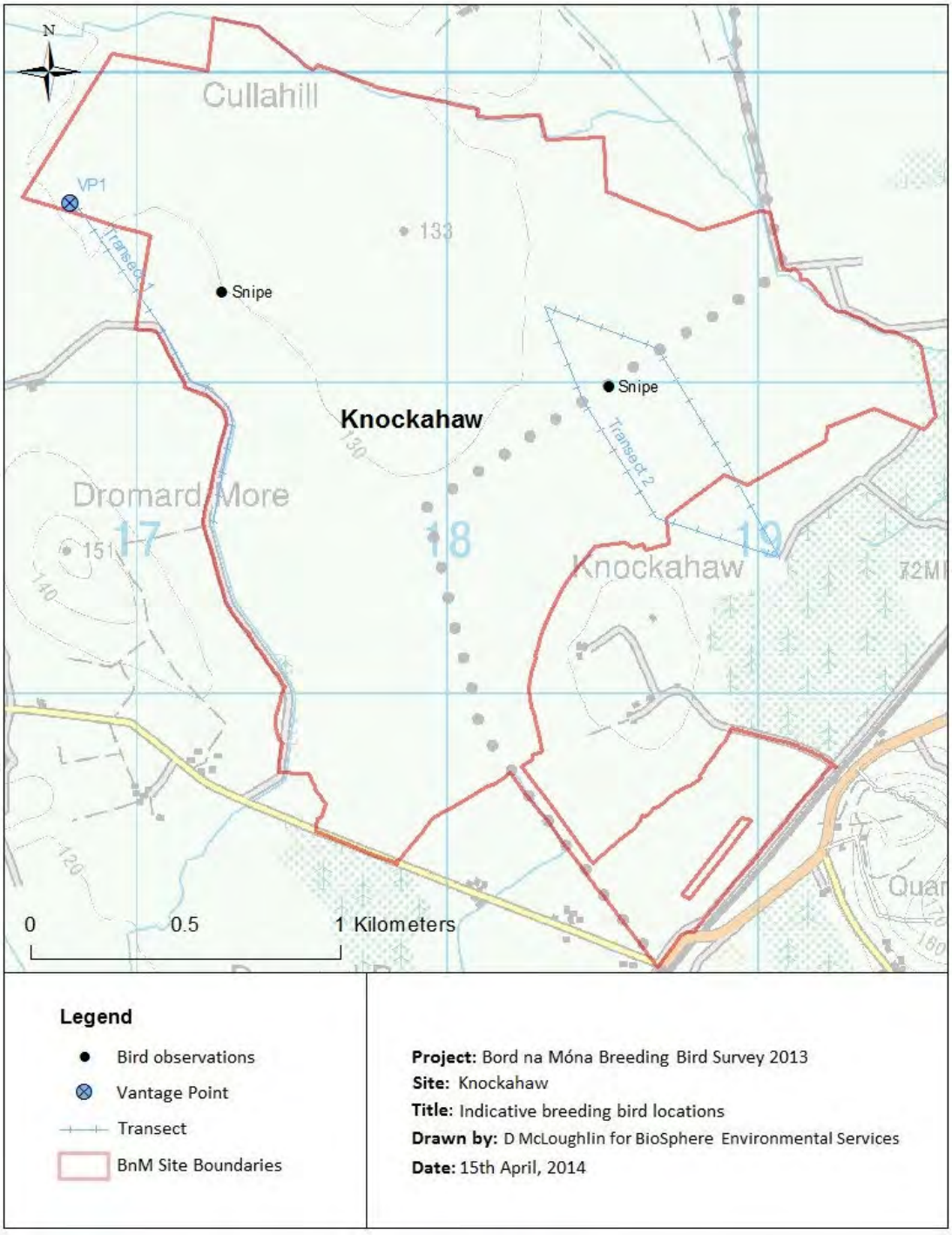
Breeding Status Codes are detailed in Appendix 2

BoCCI Status: **R – Red**; **A – Amber**; **G – Green**



Knockahaw bog, Plate 1: view of bog surface with drains.

Knockahaw: Map showing transect and vantage point locations, with records of target species.



SITE: CLONBUAGH (KNOCKAHAW)

Clonbuagh Bog is a small site located eight kilometres northeast of Templemore town. This is an outlying site from the other sites in the Littleton Group and is located approximately 1 km southeast of the main Knockahaw site. The access route used to the site is from a lane leading from a regional class road to the north. The site extends for c.700 m from north to south and c.500 m from east to west.

The site is a remnant bog with some drains but still largely intact and very wet. Birch woodland occurs along much of the margins.

The site is surrounded by farmland and forestry. A large quarry complex occurs to the northeast

Survey locations

Transect 1 starts at the southern end of the site where the bog road crosses a drain. It runs northwest over remnant bog to a clump of Scots pine trees.

Transect 2 starts at the clump of Scots pines and runs east to the southeast site boundary then turns south following the site boundary and back to the start of transect 1.

Vantage Point 1 is located at the clump of Scots pine trees in the bog and offers good views over the entire site (mainly remnant bog and birch woodland).

Target species recorded

No target species were recorded.

Potential for other target species

Clonbuagh bog has good potential to support breeding Snipe.

Other species of note

Buzzard – recorded over site and probably breeds nearby.

Sparrowhawk – recorded in marginal woodland, may nest on site.

Skylark – estimated 4 territories in remnant and regenerating bog habitats.

Swallow – recorded regularly feeding over site.

Overview

Clonbuagh bog is a small site with limited potential for breeding birds of conservation importance.

It is, however, a largely intact bog and supports breeding Skylark. Snipe would be expected though was not recorded in summer 2013. Marginal and adjoining woodland and scrub supports woodland species such as Sparrowhawk and Blackcap.

SITE: CLONBUAGH – BREEDING BIRDS 2013

Species	Maximum Breeding Evidence	No. of pairs (where relevant)	Breeding Status	BoCCI Status
Mallard	H		Possible	**G**
Buzzard	F	1	Non-breeding	**G**
Sparrowhawk	H	1	Possible	**G**
Woodpigeon	P		Probable	**G**
Hooded Crow	H		Possible	**G**
Raven	F		Non-breeding	**G**
Goldcrest	S		Possible	**G**
Blue Tit	P		Probable	**G**
Skylark	**P**	**3**	**Probable**	**A**
Swallow	**F**		**Non-breeding**	**A**
Chiffchaff	H		Possible	**G**
Willow Warbler	A		Probable	**G**
Blackcap	T		Probable	**G**
Wren	T		Probable	**G**
Blackbird	P		Probable	**G**
Mistle Thrush	H		Possible	**G**
Robin	T		Probable	**G**
Meadow Pipit	FL		Confirmed	**G**
Chaffinch	T		Probable	**G**

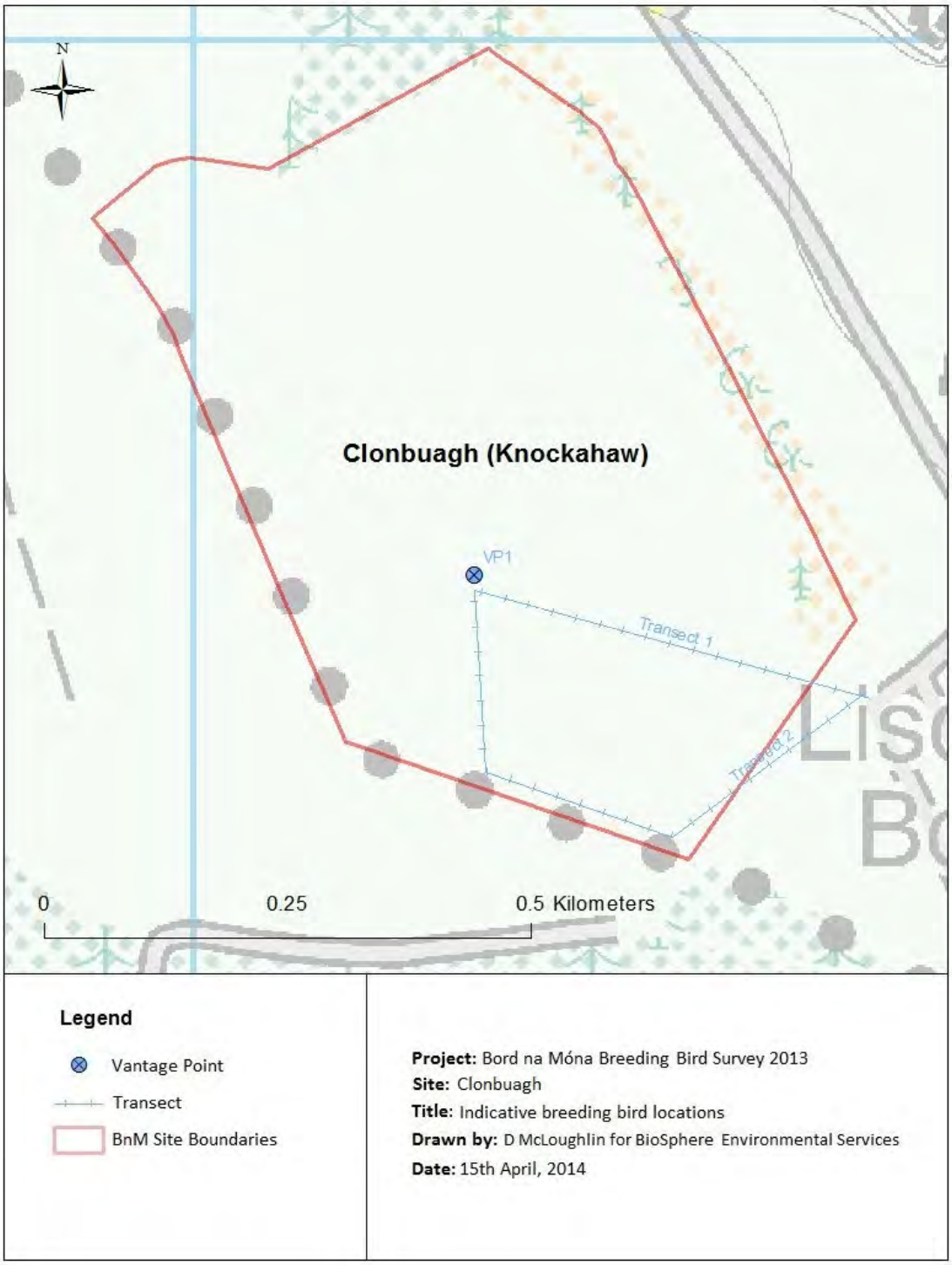
Breeding Status Codes are detailed in Appendix 2

BoCCI Status: **R – Red**; **A – Amber**; **G – Green**



Clonbuagh bog, Plate 1: view of relatively intact bog surface.

Clonbuagh: Map showing transect and vantage point locations.



SITE: BALLYSORRELL

Ballysorrell Bog is a small sized site located approximately five kilometres east of Templemore town and about two kilometres northwest of Templetoughy village. This is an outlying site, being 3 km east of the next bog site in the group (Templetouhy). The main access to the site is from a (gated) lane leading from a regional class road to the south. The site extends for less than 2 km from north to south and c.1 km from east to west.

Ballysorrell is largely remnant and regenerating cutover bog. Birch woodland and gorse scrub occur in the marginal areas of the site.

The site is mostly surrounded by farmland, with commercial forestry to the north.

Survey locations

Transect 1 starts at the site access point in the southeast and runs northwest crossing remnant bog. The transect then turns north towards the centre of the site (an abandoned tractor and draining machine occurs here). On the return loop the transect passes through gorse scrub.

Vantage Point 1 is located at the heather cutting machines near the track and looks west and northwest over the entire southern sector of the site (scrub and remnant bog).

Vantage Point 2 is located at the abandoned tractor; it offers views all round the central and northern parts of the site.

Target species recorded

Snipe
One displaying bird recorded on remnant bog.

Potential for other target species

Ballysorrell bog does not have significant potential to support breeding wetland species (other than Snipe) or other species of conservation importance.

Other species of note

Buzzard – pair probably bred in tall woodland along southern margin of site.

Sparrowhawk – one bird in May – pair may have bred on site.

Kestrel – single bird in May.

Woodcock – roding bird over scrub and woodland in southeast sector of site. Probably bred.

Skylark – at least 1 territory in remnant bog habitat.

Swallow – recorded regularly feeding over site.

Stonechat – 2 pairs on site.

Linnet – 2 pairs bred on site.

Overview

Ballysorrell bog has limited potential for breeding birds of conservation importance.

It does, however, comprise a substantial area of remnant bog and heath and supports breeding Snipe, Woodcock, Skylark and Linnet. There is extensive marginal woodland and scrub, with woodland species such as Sparrowhawk and Blackcap present.

SITE: BALLYSORRELL – BREEDING BIRDS 2013

Species	Maximum Breeding Evidence	No. of pairs (where relevant)	Breeding Status	BoCCI Status
Buzzard	H	1	Possible	G
Sparrowhawk	H	1	Possible	G
Kestrel	F		Non-breeding	A
Snipe	D	1	Probable	A
Woodcock	D	1	Probable	A
Woodpigeon	P		Probable	G
Cuckoo	P	1	Probable	G
Magpie	H		Possible	G
Hooded Crow	H		Possible	G
Raven	F		Non-breeding	G
Blue Tit	P		Probable	G
Great Tit	H		Possible	G
Skylark	P	1	Probable	A
Swallow	F		Non-breeding	A
Long-tailed Tit	H		Possible	G
Willow Warbler	FL		Confirmed	G
Blackcap	T		Probable	G
Whitethroat	T		Probable	G
Wren	FL		Confirmed	G
Blackbird	T		Probable	G
Song Thrush	T		Probable	G
Robin	T		Probable	G
Stonechat	FL	2	Confirmed	G
Meadow Pipit	FL		Confirmed	G
Chaffinch	T		Probable	G
Lesser Redpoll	H		Possible	G
Linnet	T	2	Probable	A
Reed Bunting	A		Probable	G

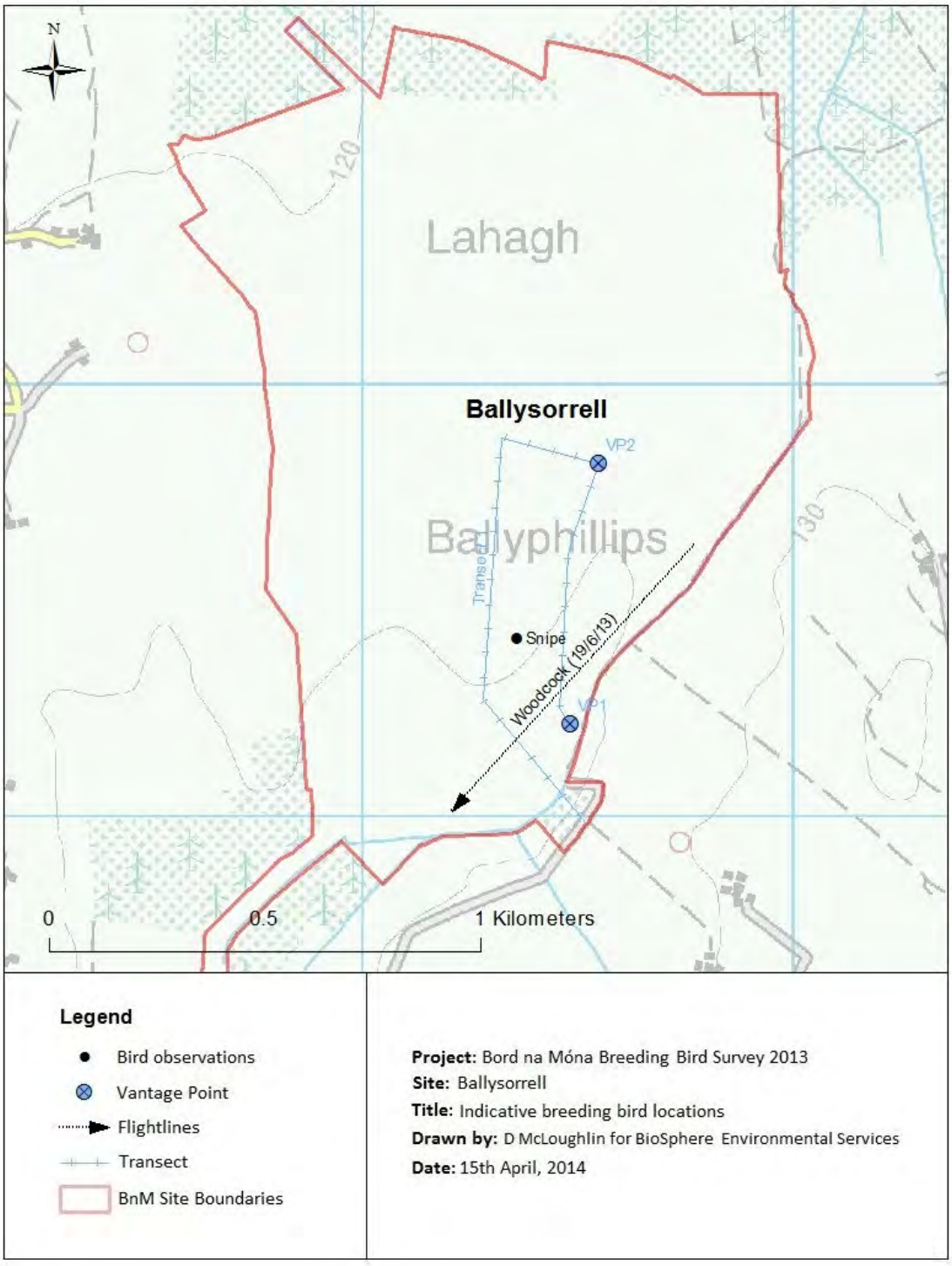
Breeding Status Codes are detailed in Appendix 2

BoCCI Status: **R – Red**; **A – Amber**; **G – Green**



Ballysorrell bog, Plate 1: view of bog surface.

Ballysorrell: Map showing transect and vantage point locations, with records of target species.



SITE: TEMPLETUOHY

Templetuohy bog is a medium sized site located approximately 2 kilometres east of Templetuohy village and 11 kilometres northeast of Thurles town. The site adjoins Derryville bog to the south. The main access used for the survey is from a lane off a regional class road mid west of the site. The site extends for c. 4 km from north to south and for up to 2 km from east to west.

Roughly half the site is bare peat with commercial production still in progress. The remainder is regenerating cutover, remnant bog and some open water.

Templetouhy bog is mostly surrounded by farmland but with stands of mixed coniferous forestry to the east, south and west.

Survey locations

Transect 1 is a long, rectangular loop which passes over the main part of the site and through the principal habitats on site.

Vantage Point 1 is located at the end of the bog road in the mid west of the site and looks over the remnant bog and bare peat, offering good views over large areas of the central and southern parts.

Vantage Point 2 is located along a third class road at the northernmost point of the site and looks south over remnant cutover bog and bare peat in the northern half of the site.

Target species recorded

Snipe
Two displaying birds on site.

Potential for other target species

Templetouhy bog has some small wetland areas which could support breeding wetland species such as Teal.

Other species of note

Sparrowhawk – one bird in April – pair may have bred on site.

Kestrel – single bird in April.

Water Rail – calling bird heard, probably bred.

Moorhen – pair bred.

Skylark – at least 4 territories on remnant and regenerating bog habitats.

Swallow – pair bred in building, also recorded regularly feeding over site.

Linnet – 1 pair bred.

Overview

Templetouhy bog has limited potential for breeding birds of conservation importance.

It does, however, comprise a substantial area of regenerating and remnant bog habitats and has some small ponded areas. Supports breeding Snipe, Water Rail, Skylark and Linnet. There is extensive scrub and developing woodland, with species such as Sparrowhawk, Jay and Blackcap present. Swallows nest in buildings.

During a breeding bird survey in 2009 (for Bruckana wind farm which is within Templetouhy), Black-headed Gulls, Teal, Snipe, Woodcock and Yellowhammer were recorded breeding or possibly breeding on site.

SITE: TEMPLETOUHY – BREEDING BIRDS 2013

Species	Maximum Breeding Evidence	No. of pairs (where relevant)	Breeding Status	BoCCI Status
Grey Heron	F		Non-breeding	G
Mallard	H		Possible	G
Sparrowhawk	H	1	Possible	G
Kestrel	**F**		**Non-breeding**	**A**
Water Rail	**H**	**1**	**Possible**	**A**
Moorhen	FL	1	Confirmed	G
Snipe	**D**	**2**	**Probable**	**A**
Woodpigeon	P		Probable	G
Cuckoo	H		Possible	G
Hooded Crow	H		Possible	G
Raven	F		Non-breeding	G
Blue Tit	P		Probable	G
Coal Tit	T		Probable	G
Skylark	**T**	**4**	**Probable**	**A**
Swallow	**UN**		**Confirmed**	**A**
Long-tailed Tit	P		Probable	G
Willow Warbler	FL		Confirmed	G
Blackcap	T		Probable	G
Whitethroat	T		Probable	G
Wren	FL		Confirmed	G
Blackbird	FL		Confirmed	G
Song Thrush	T		Probable	G
Robin	FL		Confirmed	G
Stonechat	FL	1	Confirmed	G
Meadow Pipit	FL		Confirmed	G
Chaffinch	FL		Confirmed	G
Lesser Redpoll	H		Possible	G
Linnet	**P**	**1**	**Probable**	**A**
Reed Bunting	A		Probable	G

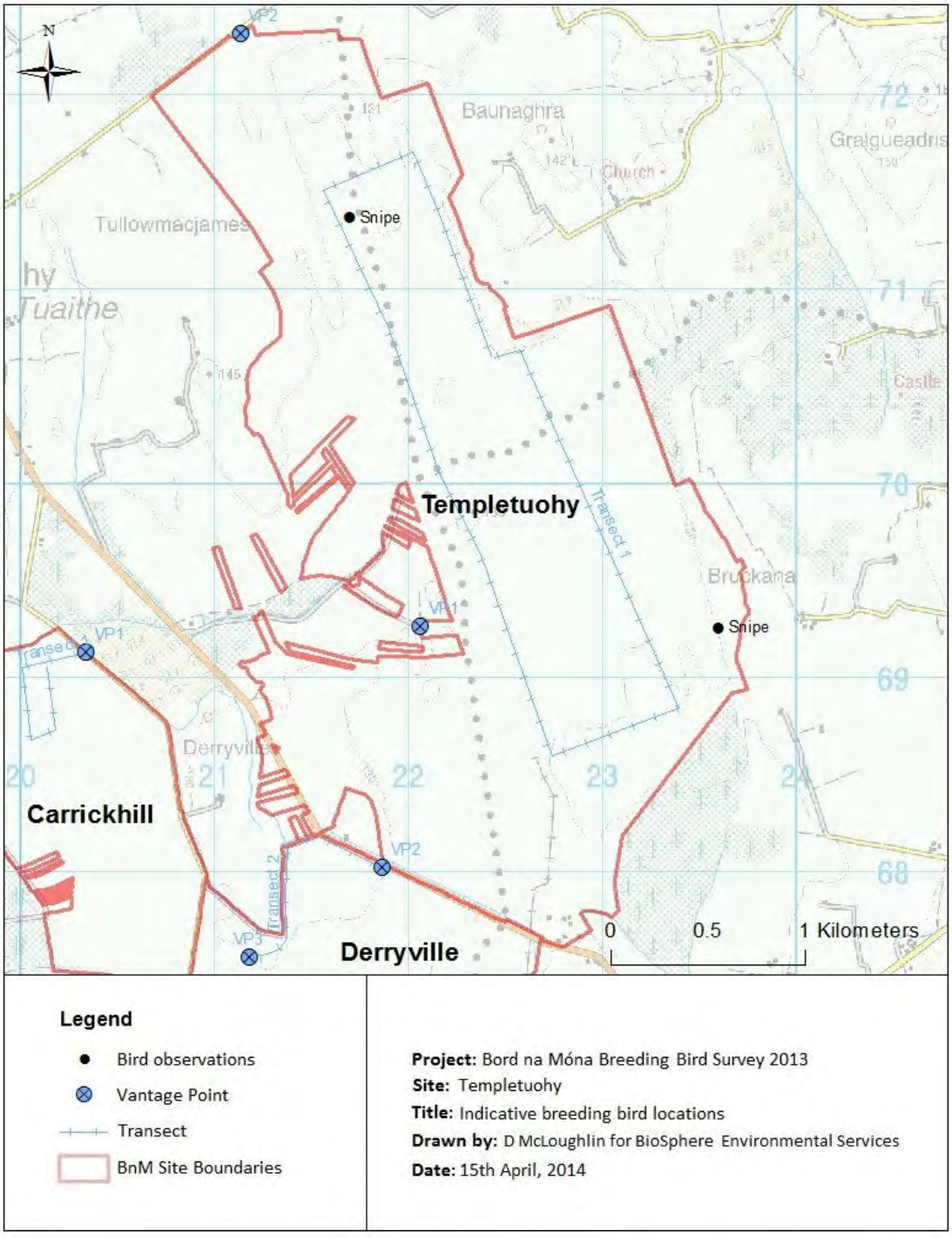
Breeding Status Codes are detailed in Appendix 2

BoCCI Status: **R – Red**; **A – Amber**; **G – Green**



Templetuohy bog, Plate 1: view of wetland habitat within site which supports nesting Snipe.

Templetuohy: Map showing transect and vantage point locations, with records of target species.



SITE: DERRYVILLE

Derryville bog is a small to medium sized site located ten kilometres northeast of Thurles town. It adjoins Templetuohy to the north, Carrickhill to the west and Bawnmore to the south. The main accesses used are from a second class road at the north of the site and a third class road at the south. The site extends for up to 1 km from north to south and for approximately 2.5 km from east to west.

Derryville is largely bare peat with production still in progress over much of the area. There are some small areas of regenerating cutover bog along the margins and a small area of mature coniferous forestry in the southwest corner.

As noted, Derryville adjoins three other bog sites, with areas of farmland and forestry to the east and north. The Lisheen mines complex occurs to the south of the site.

Survey locations

Transect 1 starts at the road at the southern boundary of the site and runs north following the track on eastern side of the railway line, with forestry and remnant bog on the eastern side and bare peat to the west.

Transect 2 starts at the road at the north end of the site and follows the boundary at the northwest corner, finishing at the site buildings. It runs through an area of cutover and looks over bare peat to the east and south

Vantage Point 1 is located at the north end of transect 1 and covers the eastern sector of the site (predominantly bare peat).

Vantage Point 2 is located at the eastern end of transect 2 (at the site buildings) and looks out over the central area of the site (predominately bare peat).

Vantage Point 3 is located at the western end of transect 2 and looks out over the western area of the site.

Target species recorded

No target species were recorded.

Potential for other target species

Due to the near absence of suitable habitats, Derryville bog has low potential to support breeding species such as Snipe.

Other species of note

No species of note were recorded during the summer surveys.

Overview

Derryville Bog comprises almost entirely commercial peat fields and has no significant potential for supporting breeding birds of conservation importance.

SITE: DERRYVILLE – BREEDING BIRDS 2013

Species	Maximum Breeding Evidence	No. of pairs (where relevant)	Breeding Status	BoCCI Status
Woodpigeon	P		Probable	**G**
Hooded Crow	H		Possible	**G**
Raven	F		Non-breeding	**G**
Blue Tit	P		Probable	**G**
Coal Tit	T		Probable	**G**
Long-tailed Tit	P		Probable	**G**
Willow Warbler	T		Probable	**G**
Whitethroat	T		Probable	**G**
Wren	FL		Confirmed	**G**
Blackbird	FL		Confirmed	**G**
Song Thrush	T		Probable	**G**
Mistle Thrush	H		Possible	**G**
Robin	FL		Confirmed	**G**
Chaffinch	FL		Confirmed	**G**
Goldfinch	H		Possible	**G**
Lesser Redpoll	H		Possible	**G**
Reed Bunting	A		Probable	**G**

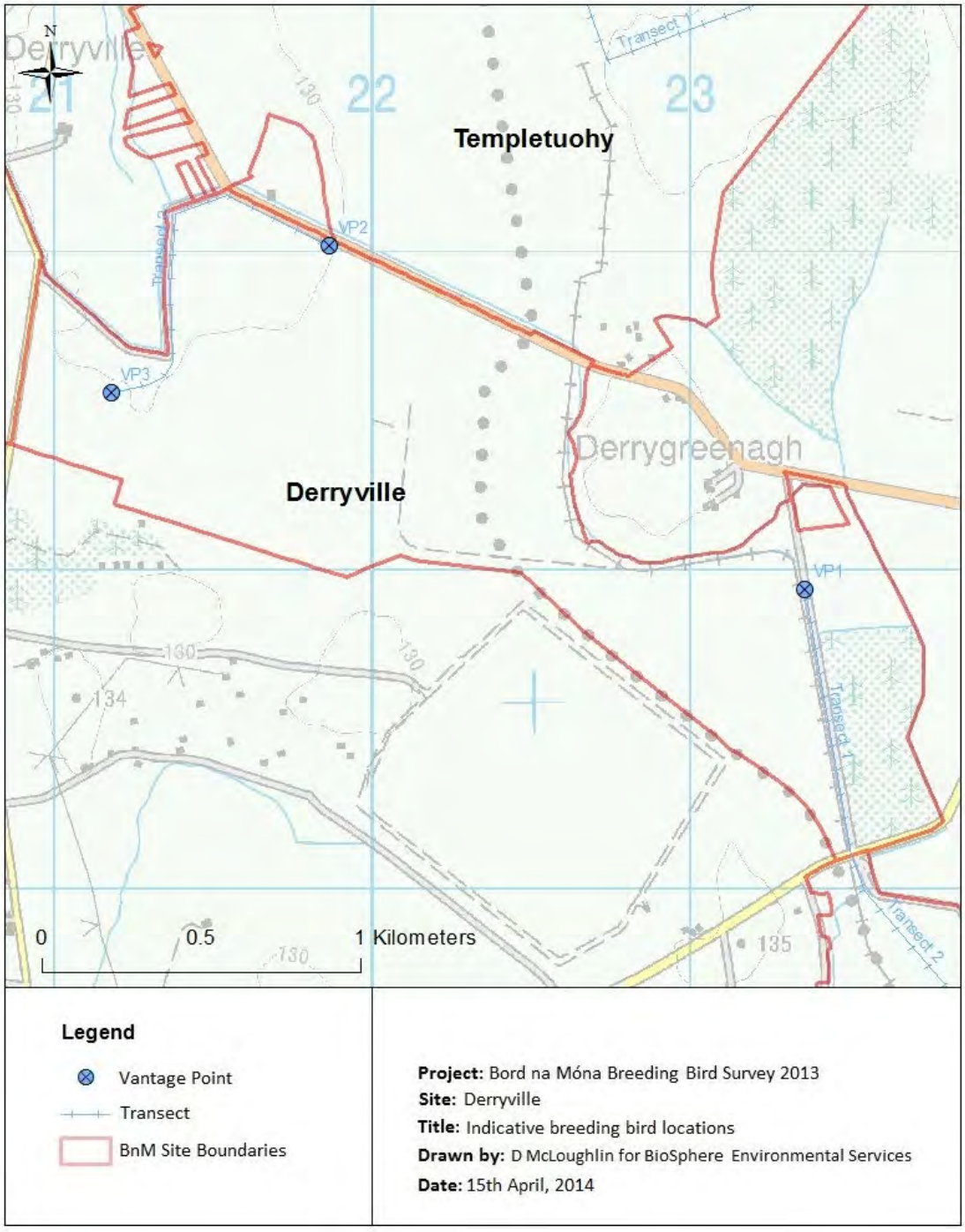
Breeding Status Codes are detailed in Appendix 2

BoCCI Status: **R – Red**; **A – Amber**; **G – Green**



Derryville bog, Plate 1: view of typical habitats within site.

Derryville: Map showing transect and vantage point locations.



SITE: CARRICKHILL

Carrickhill bog is a small site located ten kilometres northeast of Thurles town. It adjoins Derryville to the east. The main access to the site is from a third class road on the northeastern boundary. The site extends for up to 2 km from north to south and for up to 1 km from east to west.

Carrickhill is largely bare peat with production still in progress over much of the area. There are small areas of regenerating and remnant bog along the northern and western margins of the site. There was a small body of open water on the northern boundary but this was drained during the winter survey period.

The site is surrounded by farmland and mature coniferous forestry.

Survey locations

Transect 1 starts at the roadside on the northern boundary. It runs west along the railway line for about three hundred metres then turns south and runs around a small area of regenerating cutover.

Vantage Point 1 is located at the start of transect 1 and gives a good view over the majority of the site (predominantly bare peat).

Target species recorded

No target species were recorded during the surveys.

Potential for other target species

Carrickhill has low potential for supporting species of conservation importance as it is a small site that is mainly bare peat. However, remnant bog in the northwest section could support breeding Snipe.

Other species of note

Sparrowhawk – one bird in April – pair may have bred on site.

Skylark – at least 1 territory in remnant bog along western margin.

Swallow – feeding birds recorded over the site.

Overview

Carrickhill bog has limited potential for supporting breeding birds of conservation importance as it is a relatively small site that is largely in commercial peat production.

Skylark breeds on remnant bog along the western margin of the site.

SITE: CARRICKHILL – BREEDING BIRDS 2013

Species	Maximum Breeding Evidence	No. of pairs (where relevant)	Breeding Status	BoCCI Status
Grey Heron	F		Non-breeding	**G**
Woodpigeon	P		Probable	**G**
Hooded Crow	H		Possible	**G**
Jay	H		Possible	**G**
Blue Tit	P		Probable	**G**
Coal Tit	T		Probable	**G**
Skylark	**T**	**1**	**Probable**	**A**
Swallow	**F**		**Non-breeding**	**A**
Long-tailed Tit	P		Probable	**G**
Willow Warbler	T		Probable	**G**
Whitethroat	T		Probable	**G**
Wren	FL		Confirmed	**G**
Blackbird	FL		Confirmed	**G**
Song Thrush	T		Probable	**G**
Robin	FL		Confirmed	**G**
Meadow Pipit	T		Probable	**G**
Chaffinch	FL		Confirmed	**G**
Lesser Redpoll	H		Possible	**G**
Bullfinch	H		Possible	**G**
Reed Bunting	A		Probable	**G**

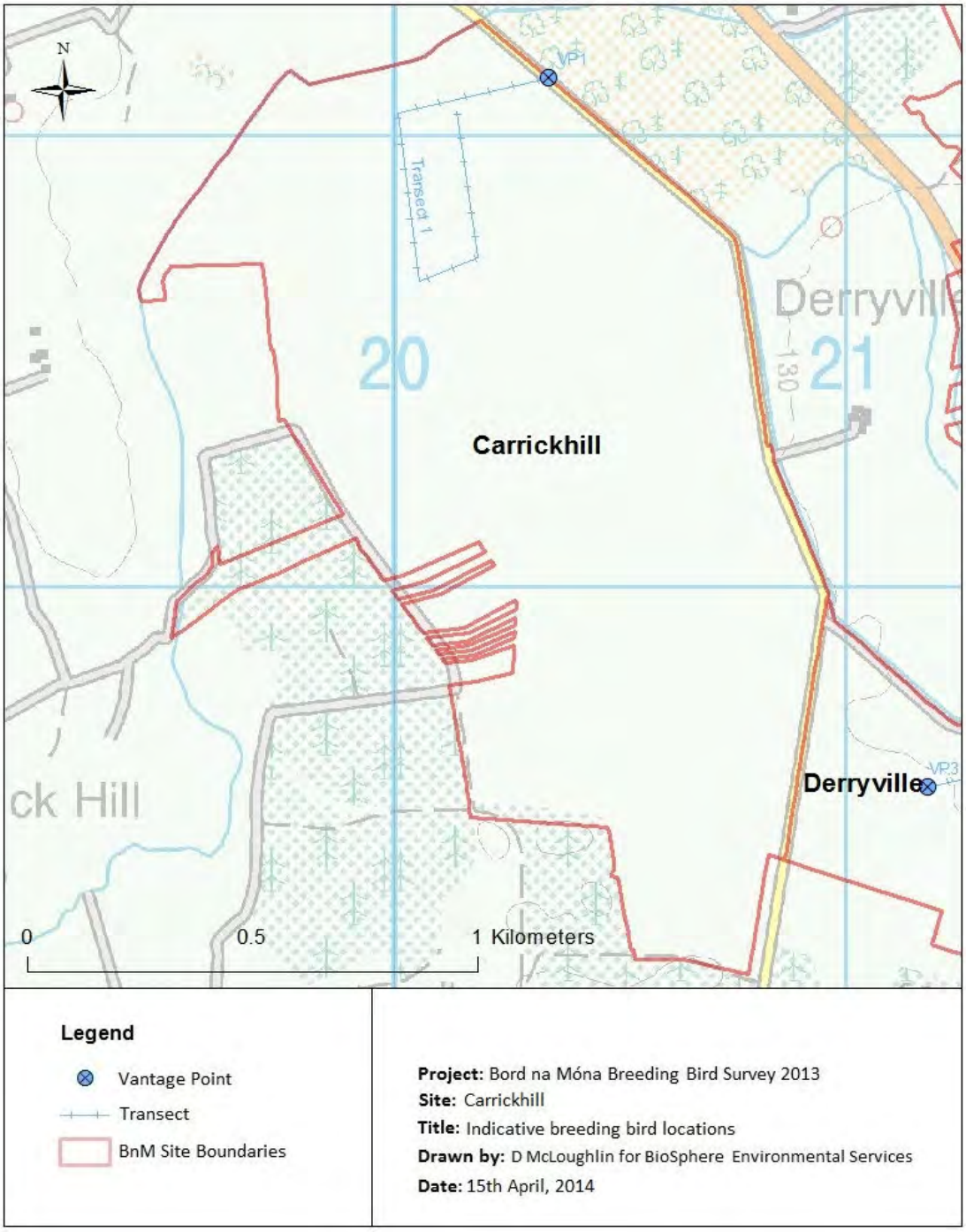
Breeding Status Codes are detailed in Appendix 2

BoCCI Status: **R – Red**; **A – Amber**; **G – Green**



Carrickhill bog, Plate 1: view of typical habitats within site, looking towards Lisheen wind farm.

Carrickhill: Map showing transect and vantage point locations, with records of target species.



SITE: BAWNMORE

Bawnmore bog is a medium sized site located almost ten kilometres northeast of Thurles town and just over 2 kilometres west-northwest of Urlingford. Bawnmore adjoins Derryville bog to the northwest and Inch to the south. The main access to the site is from a third class road at the north end of the site. The site extends for up to 2.5 km from north to south and for just over 2 km from east to west. A small outlier of remnant bog occurs to the west of the main site.

Bawnmore is largely bare peat with production still in progress over much of the area Regenerating cutover bog occurs in the southwestern quarter and along the western margin. There are some small areas of remnant bog along the northeast margin of the site, including a small patch of reeds (*Phragmites australis*).

The site is surrounded mostly by farmland, though there is an extensive area of mature coniferous forestry to the east.

Survey locations

Transect 1 starts at the railway line in the southern end of the site and runs north through an area of cutover bog.

Transect 2 starts at the road at the north of the site and runs southeast for over 1.5 km. It then turns northwest at the railway following it for 500 m and then turning north-northwest over bare peat to an area of remnant bog.

Vantage Point 1 is located at the north end of transect 1 and covers the southern sector of the site.

Vantage Point 2 is located at the end of transect 2 and covers the northern sector of the site (remnant and bare peat).

Vantage Point 3 overlooks the outlier area of remnant bog to the west and also gives views over the northwest sector of the main site.

Target species recorded

Lapwing
Estimated 4 pairs bred in wetland in northwest sector and 2 pairs in southwest (total of 6 pairs).

Ringed Plover
Pair with 2 juveniles in wetland area in southwest sector.

Snipe
Single displaying birds in the northwest and southwest sectors.

Teal
Female in wetland area in southwest sector on 8th July – possibly bred.

Yellowhammer

3 singing males along edge of cutover bog in northern part of site (adjacent to sheep pasture). Probably bred in scrub bank along site boundary.

Potential for other target species

The wetland habitat in the southwest and northwest of the site could possibly support species such as Black-headed Gull.

Other species of note

Buzzard – one bird in early May.

Kestrel – single bird in July.

Moorhen – at least one pair bred.

Skylark – minimum of 6 territories on remnant and regenerating bog habitats.

Swallow – pair bred in building (tea hut) on site, also recorded regularly feeding over site.

Wheatear – 2 birds in May were migrants.

Starling – probably bred on site.

Linnet – at least 2 pairs bred on site.

Overview

Bawnmore Bog is of importance for breeding wetland birds of conservation importance, with nesting Lapwing, Ringed Plover, Snipe and possibly Teal.

It also supports breeding Yellowhammer, a Red list species normally associated with mixed agricultural land. A range of Amber listed species occur, including Skylark, Swallow and Linnet.

SITE: BAWNMORE – BREEDING BIRDS 2013

Species	Maximum Breeding Evidence	No. of pairs (where relevant)	Breeding Status	BoCCI Status
Grey Heron	F		Non-breeding	G
Mallard	FL	2	Confirmed	G
Teal	H	1	Possible	A
Buzzard	F		Non-breeding	G
Kestrel	F		Non-breeding	A
Moorhen	FL	1	Confirmed	G
Lapwing	A	6	Probable	R
Ringed Plover	FL	1	Confirmed	A
Snipe	D	2	Probable	A
Woodpigeon	P		Probable	G
Cuckoo	H	1	Possible	G
Magpie	P		Probable	G
Hooded Crow	H		Possible	G
Raven	F		Non-breeding	G
Blue Tit	P		Probable	G
Coal Tit	T		Probable	G
Skylark	T	6+	Probable	A
Swallow	UN		Confirmed	A
Long-tailed Tit	P		Probable	G
Sedge Warbler	A		Probable	G
Willow Warbler	FL		Confirmed	G
Blackcap	H		Possible	G
Whitethroat	T		Probable	G
Wren	FL		Confirmed	G
Starling	P		Probable	A
Blackbird	FL		Confirmed	G
Song Thrush	T		Probable	G
Mistle Thrush	FL		Confirmed	G
Robin	FL		Confirmed	G
Wheatear	M	2	Non-breeding	A
Meadow Pipit	FL		Confirmed	G
Chaffinch	FL		Confirmed	G
Greenfinch	H		Possible	G
Lesser Redpoll	H		Possible	G
Linnet	P	2	Probable	A
Bullfinch	H		Possible	A
Reed Bunting	A		Probable	G
Yellowhammer	T	3	Probable	R

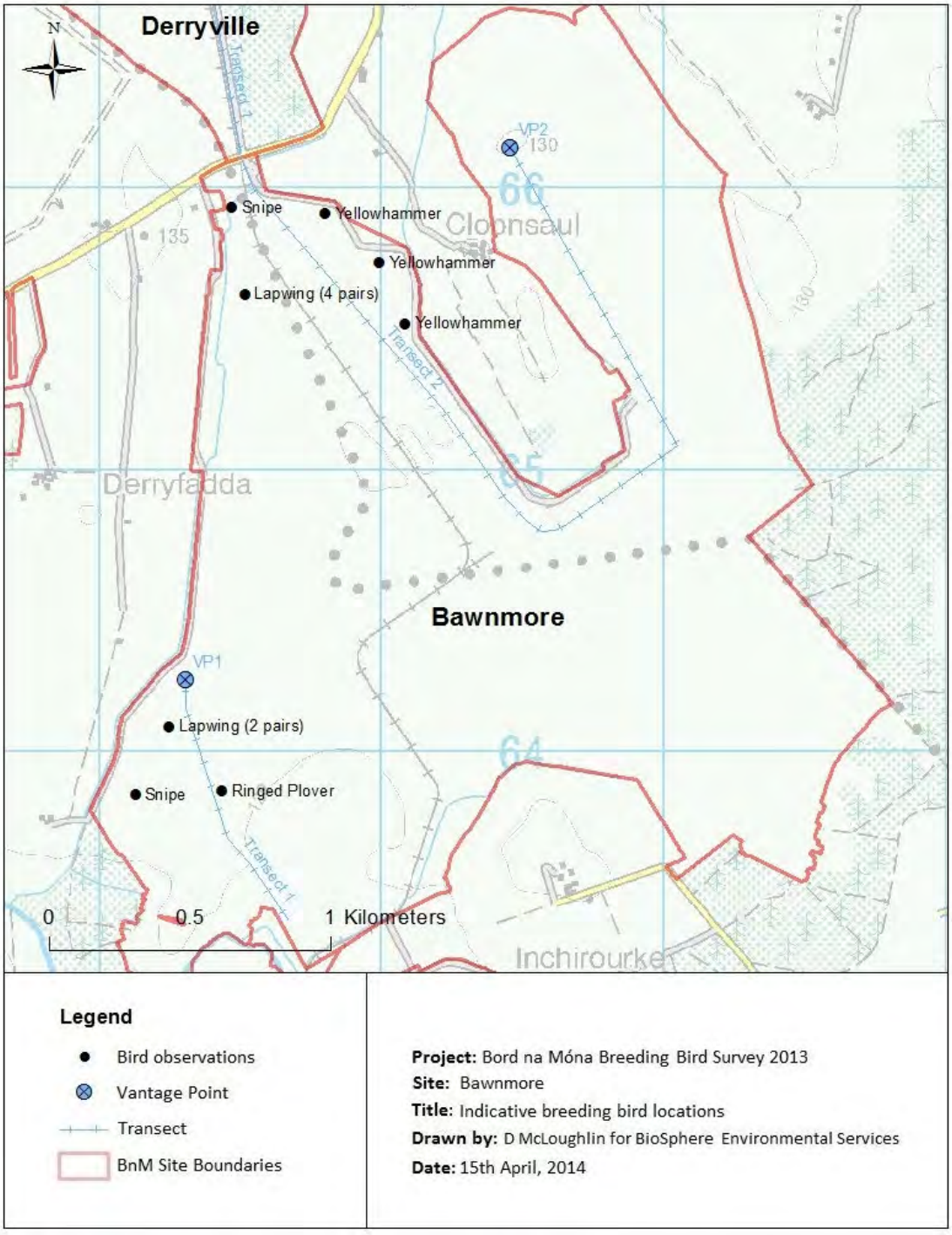
Breeding Status Codes are detailed in Appendix 2

BoCCI Status: **R – Red**; **A – Amber**; **G – Green**



Bawnmore bog, Plate 1: view of regenerating cutover bog with ponds in southwest sector.

Bawnmore: Map showing transect and vantage point locations, with records of target species.



SITE: INCH

Inch bog is a small site located approximately ten kilometres east-northeast of Thurles town and just over two kilometres west of Urlingford. Inch adjoins Bawnmore to the north and is connected to Popes Bog to the southwest (via a rail line corridor). The main access to the site is from a third class road at the southwest corner of the site. The site extends for up to 1 km from north to south and for just over 1 km from east to west.

Inch is largely bare peat with production still in progress over much of the area. There are strips of regenerating cutover bog and remnant bog along the boundaries of the site. A large dyke runs along the northwestern side of the site.

Inch is surrounded largely by farmland, with mature coniferous forestry to the west.

Survey locations

Transect 1 starts at the southwest corner of the site and runs along the railway line and ends where it joins Bawnmore bog.

Target species recorded

Lapwing
A single displaying bird was recorded on grassland in the westernmost part of the site on 4th April but was not seen on further site visits and breeding was not suspected.

Potential for other target species

Inch has limited potential for supporting nesting species of conservation importance.

Other species of note

Buzzard – one bird over site in June – pair probably nested nearby.

Kestrel – 2 juveniles in early July indicates local nesting.

Swallow – recorded regularly feeding over site.

Stonechat – pair bred on site.

Linnet – 2 pairs on site.

Overview

Inch bog is a small site that is largely in commercial production and has limited potential for breeding birds of conservation importance.

A displaying Lapwing in April was considered a passing bird though breeding is a possibility. The marginal strips of remnant bog support breeding Stonechat and Linnet. Buzzard and Kestrel hunt over the site.

SITE: INCH – BREEDING BIRDS 2013

Species	Maximum Breeding Evidence	No. of pairs (where relevant)	Breeding Status	BoCCI Status
Grey Heron	F		Non-breeding	G
Mallard	H		Possible	A
Buzzard	F		Non-breeding	G
Kestrel	**F**		**Non-breeding**	**A**
Lapwing	**D**	**1 i**	**Possible**	**R**
Jackdaw	F		Non-breeding	G
Hooded Crow	H		Possible	G
Blue Tit	P		Probable	G
Swallow	**F**		**Non-breeding**	**A**
Whitethroat	H		Possible	G
Wren	T		Probable	G
Blackbird	A		Probable	G
Song Thrush	H		Possible	G
Robin	H		Possible	G
Stonechat	A	1	Probable	G
Pied Wagtail	H		Possible	G
Meadow Pipit	P		Probable	G
Chaffinch	H		Possible	G
Linnet	**P**	**2**	**Probable**	**A**
Reed Bunting	A		Probable	G

Breeding Status Codes are detailed in Appendix 2

BoCCI Status: **R – Red**; **A – Amber**; **G – Green**



Inch bog, Plate 1: view of dyke along western end of site.

Inch: Map showing transect and vantage point locations.



SITE: LONGFORD PASS (POPES BOG)

Popes bog is a small to medium sized site located approximately eight kilometres east-northeast of Thurles town and just over 5 km southwest of Urlingford. The site adjoins Inch to the northeast (via a railway corridor) and is contiguous with Littleton to the south (though separated by a road). The main access to the site is from a third class road on the north boundary of the site, at the railway line. The site extends for c.2 km from north to south and for over 1 km from east to west.

Popes bog is largely bare peat with production still in progress over much of the area. There are strips of regenerating cutover bog and patches of remnant bog along the margins and a more extensive area of these habitats at the southern end of the site (though latter separated from main site by motorway).

The site is surrounded by farmland, with a stand of coniferous forest to the southwest.

Survey locations

Transect 1 starts at the railway line at the north end of the site. It runs south along the line and ends where the line turns west.

Vantage Point 1 is located at the south end of transect 1 and gives a view over much of the site.

Target species recorded

No target species were recorded during the surveys.

Potential for other target species

Popes Bog has limited potential for supporting nesting species of conservation importance.

Other species of note

Buzzard – one bird over site.

Skylark – at least 1 territory on regenerating bog habitats.

Swallow – recorded regularly feeding over site.

Linnet – at least 1 pair bred on site.

Overview

Popes bog is a small site that is largely in commercial production and has limited potential for breeding birds of conservation importance.

The marginal strips of remnant bog support breeding Skylark and Linnet.

SITE: POPES BOG – BREEDING BIRDS 2013

Species	Maximum Breeding Evidence	No. of pairs (where relevant)	Breeding Status	BoCCI Status
Buzzard	F		Non-breeding	G
Woodpigeon	P		Probable	G
Cuckoo	H		Possible	G
Magpie	H		Possible	G
Hooded Crow	H		Possible	G
Blue Tit	P		Probable	G
Coal Tit	T		Probable	G
Skylark	T	1	Probable	A
Swallow	F		Non-breeding	A
Long-tailed Tit	P		Probable	G
Willow Warbler	T		Probable	G
Blackcap	H		Possible	G
Whitethroat	T		Probable	G
Wren	FL		Confirmed	G
Blackbird	FL		Confirmed	G
Song Thrush	T		Probable	G
Robin	FL		Confirmed	G
Meadow Pipit	FL		Confirmed	G
Chaffinch	FL		Confirmed	G
Linnet	T	1	Probable	A
Bullfinch	H		Possible	A
Reed Bunting	T		Probable	G

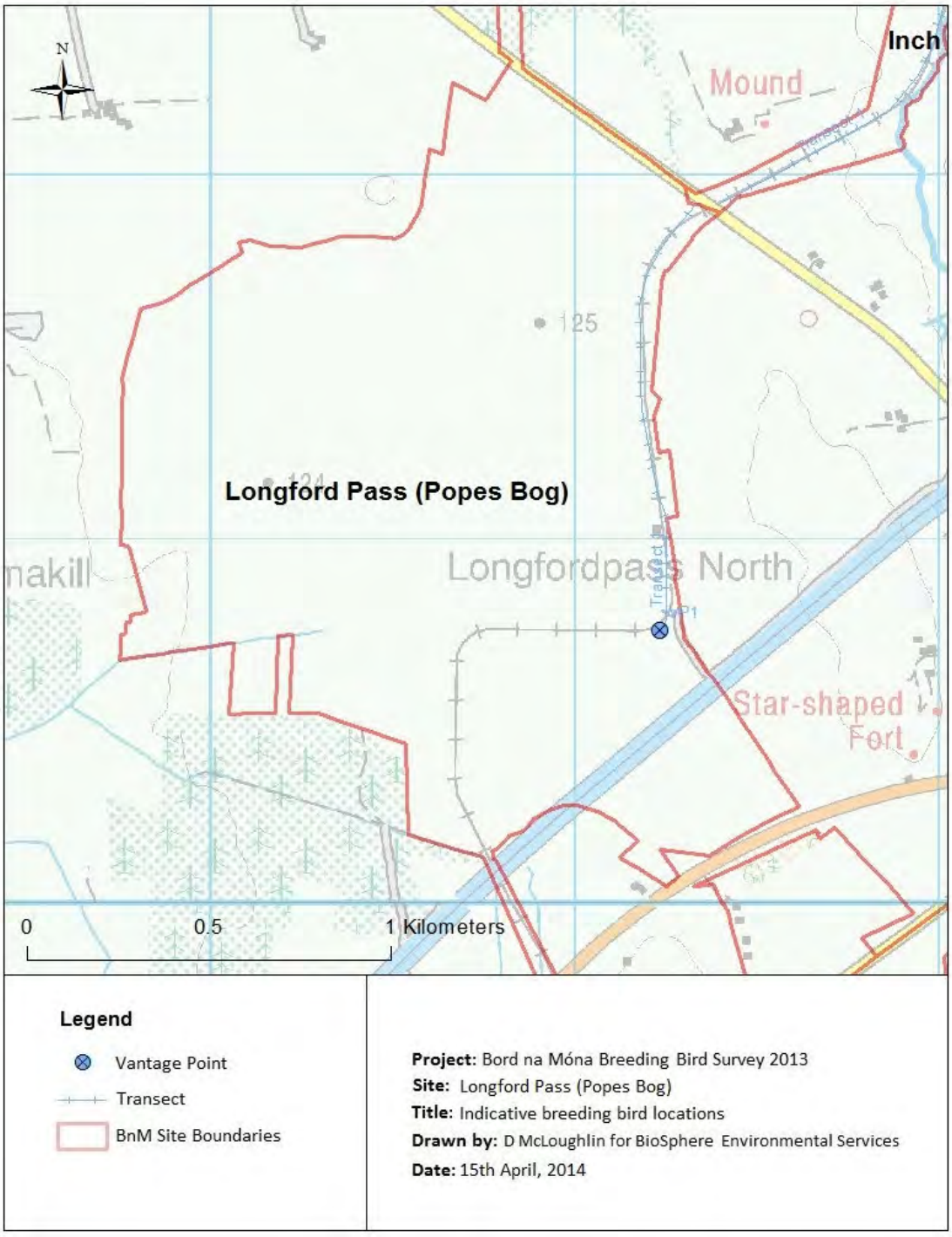
Breeding Status Codes are detailed in Appendix 2

BoCCI Status: **R – Red**; **A – Amber**; **G – Green**



Popes bog, Plate 1: general view of site.

Popes bog: Map showing transect and vantage point locations.



SITE: LITTLETON

Littleton Bog is a large site located 8.5 kilometres east-southeast of Thurles town. It adjoins Popes bog to the north and Lanespark to the south (latter via a rail corridor). The main site accesses are at the north and south ends of the bog adjacent to the railway line. The site extends for just over 5 km from north to south and from c.1 km (at north end) to 3 km (at south end) from east to west.

A high proportion of the site is regenerating cutover (heath, scrub, woodland) but includes open areas with large bodies of open water. Areas of remnant bog occur scattered along the boundaries. Commercial production is still in progress in other areas, mainly the north, of the site. A conifer plantation occurs in the southernmost part of the site.

Littleton is generally surrounded by farmland but there are extensive conifer plantations along the eastern and western boundaries.

Survey locations

Transect 1 starts at the southern corner of the site on the western side of the railway line and runs north-northeast. It turns west at the old railway line and follows the line to the edge of the site, then turns northwest and goes around a large lake and back to the old railway.

Transect 2 starts at the northern end of the site at the railway, following the rail line south where it turns west and runs to the northern end of a large lake. It then turns north and ends on the public road.

Transect 3 starts at the southwestern corner of the site and runs north and northwest over remnant and cutover bog. It ends at the railway line which runs north-south through the entire site.

Vantage Point 1 is located along transect 1 and covers the southern sector of the site (predominantly regenerating cutover bog).

Vantage Point 2 is at the northern end of the site on the public roadside (at S2269 5878) and covers the north sector of the site (cutover and bare peat)

Vantage Point 3 is located at the beginning of transect 3 and affords a view over the central sector of the site. On a clear day the wind turbines at Lisheen, 12 km away, can be seen.

Target species recorded

Hen Harrier

A single female (probably same individual) was seen hunting over site on 3rd and 8th July. However, no evidence of local nesting despite prolonged periods of observations.

Teal

Four birds on lake in northern sector of site on 4th April. Two on southern lakes on 4th May. Four again on 20th July. Probably at least one pair bred on site.

Lapwing

Pair in southern sector of site in early May but not present afterwards. Breeding seemed

unlikely to have occurred.

Snipe
Two pairs probably bred on site.

Curlew
Bird flushed on 22nd May, gave alarm call and flew west out of site. Further sightings in July as follows: on 3rd bird heard calling along southern margin of site, on 20th bird flushed, alarm call and flew c. 2 km west of site. Considered that one pair bred on site.

Black-headed Gull
Colony on lake in southern sector of site supported an estimated 40 pairs and produced approximately 80 fledged young.

Potential for other target species

The wetland habitats on site could also support species such as Ringed Plover and Water Rail.

Other species of note

Little Grebe – 2 pairs nested successfully.

Kestrel – single birds in April and July.

Moorhen – at least one pair bred.

Skylark – minimum of 6 territories on remnant and regenerating bog habitats.

Swift – recorded feeding over site in July.

Sand Martin – recorded feeding over site.

Swallow – several pairs bred in buildings in the southwest corner of the site, also recorded regularly feeding over site.

Wheatear – 2 birds in May were considered migrants.

Starling – may have bred on site.

Linnet – at least 2 pairs bred on site.

Overview

Littleton bog is of importance for breeding wetland birds of conservation importance, with breeding Little Grebe, Lapwing, Snipe, Curlew, Common Sandpiper, Black-headed Gull and possibly Teal. A Hen Harrier used the site for hunting in July though was not suspected of breeding on site.

A range of Amber listed species occur, including Skylark, Swallow and Linnet.

SITE: LITTLETON – BREEDING BIRDS 2013

Species	Maximum Breeding Evidence	No. of pairs (where relevant)	Breeding Status	BoCCI Status
Grey Heron	F		Non-breeding	G
Greylag Goose	H	1 i	Possible	G
Mallard	FL	2	Confirmed	G
Teal	**H**	**1-2**	**Possible**	**A**
Hen Harrier	**H**	**1 i**	**Non-breeding**	**A**
Kestrel	**F**		**Non-breeding**	**A**
Moorhen	T	2	Probable	G
Lapwing	**A**	**1**	**Possible**	**R**
Snipe	**D**	**2**	**Probable**	**A**
Curlew	**T**	**1**	**Probable**	**R**
Common Sandpiper	**FL**	**1**	**Confirmed**	**A**
Black-headed Gull	**FL**	**40 p**	**Confirmed**	**R**
Woodpigeon	P		Probable	G
Swift	**F**		**Non-breeding**	**A**
Cuckoo	H	2	Possible	G
Magpie	H		Possible	G
Hooded Crow	P		Probable	G
Raven	F		Non-breeding	G
Blue Tit	P		Probable	G
Coal Tit	T		Probable	G
Skylark	**T**	**6+**	**Probable**	**A**
Sand Martin	**F**		**Non-breeding**	**A**
Swallow	**UN**		**Confirmed**	**A**
Long-tailed Tit	T		Probable	G
Sedge Warbler	T		Probable	G
Chiffchaff	T		Probable	T
Willow Warbler	FL		Confirmed	G
Blackcap	T		Possible	G
Whitethroat	T		Probable	G
Wren	FL		Confirmed	G
Starling	**H**		**Possible**	**A**
Blackbird	H		Possible	G
Song Thrush	T		Probable	G
Mistle Thrush	FL		Confirmed	G
Robin	FL		Confirmed	G
Wheatear	**M**	**2**	**Non-breeding**	**A**
Meadow Pipit	T		Probable	G
Chaffinch	FL		Confirmed	G
Goldfinch	H		Possible	G
Lesser Redpoll	H		Possible	G
Linnet	**P**	**2**	**Probable**	**A**
Bullfinch	T		Probable	A
Reed Bunting	T		Probable	G

Breeding Status Codes are detailed in Appendix 2

BoCCI Status: **R – Red**; **A – Amber**; **G – Green**

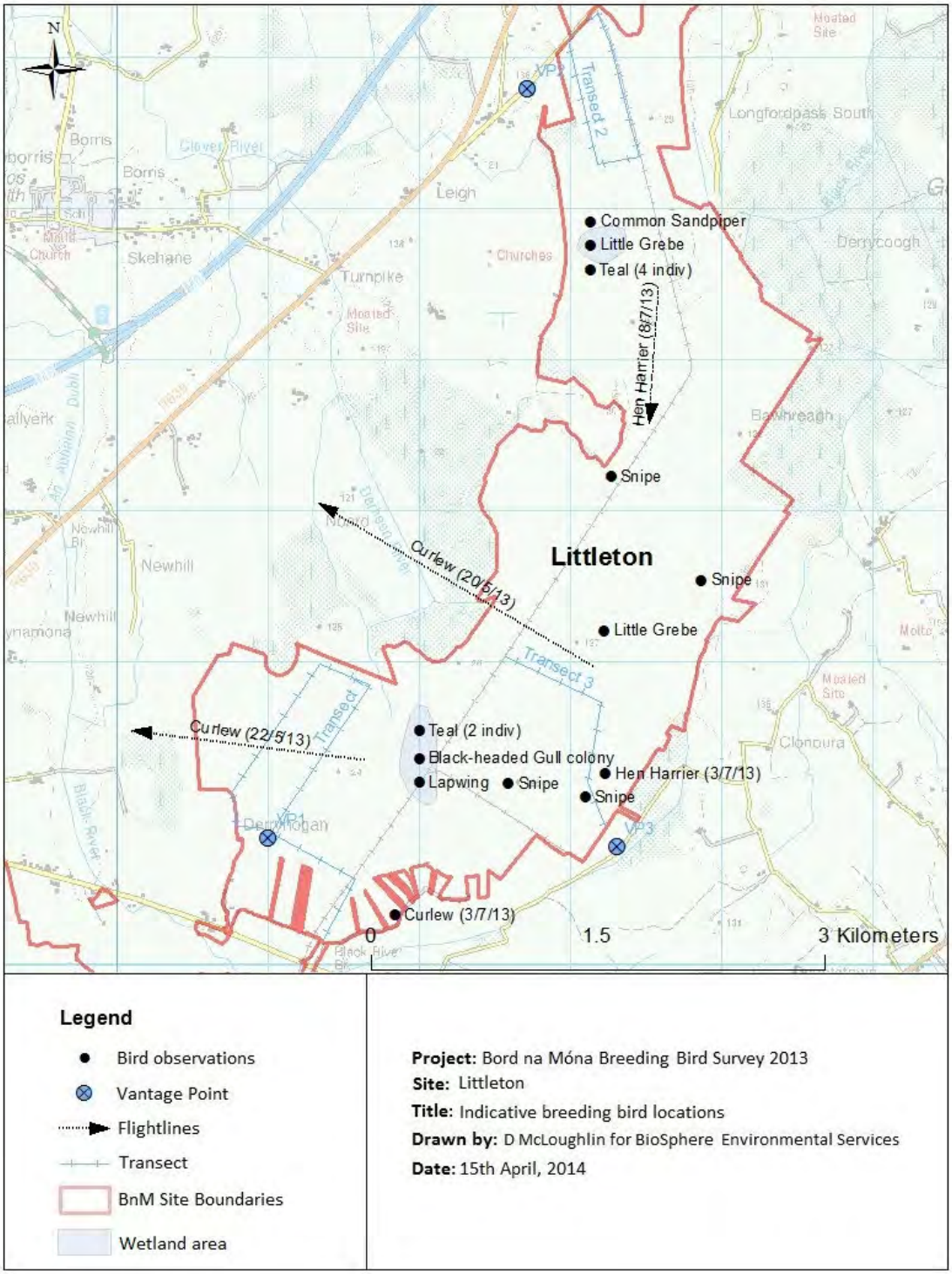


Littleton bog, Plate 1: view of regenerating cutover bog.



Littleton bog, Plate 2: view of Black-headed Gull colony.

Littleton: Map showing transect and vantage point locations, with records of target species.



SITE: LANESPARK

Lanespark bog is a small to medium sized site located just over eight kilometres southeast of Thurles town. It is contiguous with Derryvella bog to the east and is connected by rail corridors to Littleton to the north and Ballybeg to the northwest. The point used to access the site is from a third class road in the west end of the site. The site extends for up to 2 km from north to south and approximately 2 km from east to west.

Lanespark is largely bare peat with production still in progress over much of the area. There are strips of regenerating cutover bog and remnant bog along the margins.

The site is surrounded by farmland, with a conifer plantation to the north.

Survey locations

Transect 1 starts at the railway crossing at the western corner of the site and runs northeast following the railway line for 500m (through scrub and bare peat). It then turns east and finishes at the road between Lanespark and Derryvella.

Target species recorded

No target species were recorded during the surveys.

Potential for other target species

Lanespark has no significant potential to support nesting species of conservation importance.

Other species of note

Kestrel – one over site in early July.

Skylark – 1 territory on regenerating bog.

Spotted Flycatcher – one pair probably bred in scrub.

Swallow – recorded regularly feeding over site.

Linnet – 1 pair bred on site.

Overview

Lanespark is largely in commercial peat production and has limited potential for breeding birds of conservation importance.

However, marginal strips of remnant bog and scrub support breeding Skylark, Spotted Flycatcher and Linnet.

SITE: LANESPARK – BREEDING BIRDS 2013

Species	Maximum Breeding Evidence	No. of pairs (where relevant)	Breeding Status	BoCCI Status
Kestrel	**F**		**Non-breeding**	**A**
Woodpigeon	P		Probable	**G**
Cuckoo	H		Possible	**G**
Magpie	H		Possible	**G**
Hooded Crow	H		Possible	**G**
Blue Tit	P		Probable	**G**
Skylark	**T**	**1**	**Probable**	**A**
Swallow	**F**		**Non-breeding**	**A**
Long-tailed Tit	P		Probable	**G**
Willow Warbler	T		Probable	**G**
Blackcap	H		Possible	**G**
Whitethroat	T		Probable	**G**
Wren	FL		Confirmed	**G**
Starling	**T**		**Probable**	**A**
Blackbird	FL		Confirmed	**G**
Song Thrush	T		Probable	**G**
Robin	FL		Confirmed	**G**
Spotted Flycatcher	**A**	**1**	**Probable**	**A**
Meadow Pipit	FL		Confirmed	**G**
Chaffinch	FL		Confirmed	**G**
Linnet	**T**	**1**	**Probable**	**A**
Reed Bunting	T		Probable	**G**

Breeding Status Codes are detailed in Appendix 2

BoCCI Status: **R – Red**; **A – Amber**; **G – Green**



Lanespark bog, Plate 1: general view of site.

Lanespark bog: Map showing transect and vantage point locations, with records of target species.



SITE: DERRYVELLA

Derryvella bog is a small site located approximately nine kilometres southeast of Thurles town. It is contiguous with Lanespark to the west. The access to the site is from the Derryvella lakeside car park. The site extends for c.1 km from north to south and c.1 km from east to west.

The western half of the site is regenerating cutover (heath, scrub) surrounding a small lake, while the eastern half is largely bare peat with production still in progress over much of the area.

The site is surrounded largely by farmland, with a mature coniferous plantation to the east.

Survey locations

Transect 1 starts at VP2 (lakeside) and runs southwest along the road that bounds the site. It turns southeast with the road, leaving the road after 500 m and following the old railway line to the site boundary and back again along the visitor trail to the lakeside (VP2). The transect runs through cutover heath habitat.

Vantage Point 1 is located on the public road on the northeast boundary of the site and covers the entire eastern sector of the site (predominantly bare peat).

Vantage Point 2 is located at Derryvella lake and covers the open water and adjoining regenerating cutover.

Target species recorded

Snipe
One displaying bird in western sector of site on 4th May.

Potential for other target species

Derryvella has limited potential to support nesting species of conservation importance though the lake probably has breeding Water Rail (recorded in winter) and could attract wildfowl such as Teal.

Other species of note

Little Grebe – pair probably bred on lake.

Kestrel – single bird in May.

Moorhen – at least one pair bred.

Raven – regular in easternmost part of site, with peak of 30 in late May.

Skylark – two pairs recorded on remnant and regenerating bog habitats.

Swallow – recorded regularly feeding over site.

Linnet – at least 1 pair bred on site.

Overview

Derryvella has some potential for supporting breeding birds of conservation importance. The lake supports Little Grebe and wetland species such as Mallard and Moorhen. The areas of remnant and regenerating bog habitats support breeding Snipe, Skylark and Linnet. High numbers of corvids congregate in the easternmost part of site (attracted by local greyhound unit), with a peak count of 30 Ravens and 45 Hooded Crows.

SITE: DERRYVELLA – BREEDING BIRDS 2013

Species	Maximum Breeding Evidence	No. of pairs (where relevant)	Breeding Status	BoCCI Status
Little Grebe	**D**	**1**	**Probable**	**A**
Mallard	H		Possible	**G**
Kestrel	**F**		**Non-breeding**	**A**
Moorhen	P	1	Probable	**G**
Snipe	**D**	**1**	**Probable**	**A**
Woodpigeon	P		Probable	**G**
Cuckoo	H	1	Possible	**G**
Magpie	P		Probable	**G**
Hooded Crow	H		Possible	**G**
Raven	F	30 i	Non-breeding	**G**
Coal Tit	T		Probable	**G**
Skylark	**T**	**2**	**Probable**	**A**
Swallow	**F**		**Non-breeding**	**A**
Sedge Warbler	H		Possible	**G**
Willow Warbler	FL		Confirmed	**G**
Blackcap	H		Possible	**G**
Whitethroat	T		Probable	**G**
Wren	FL		Confirmed	**G**
Blackbird	FL		Confirmed	**G**
Song Thrush	T		Probable	**G**
Robin	FL		Confirmed	**G**
Meadow Pipit	FL		Confirmed	**G**
Chaffinch	FL		Confirmed	**G**
Greenfinch	H		Possible	**G**
Lesser Redpoll	H		Possible	**G**
Linnet	**P**	**1**	**Probable**	**A**
Bullfinch	H		Possible	**A**
Reed Bunting	A		Probable	**G**

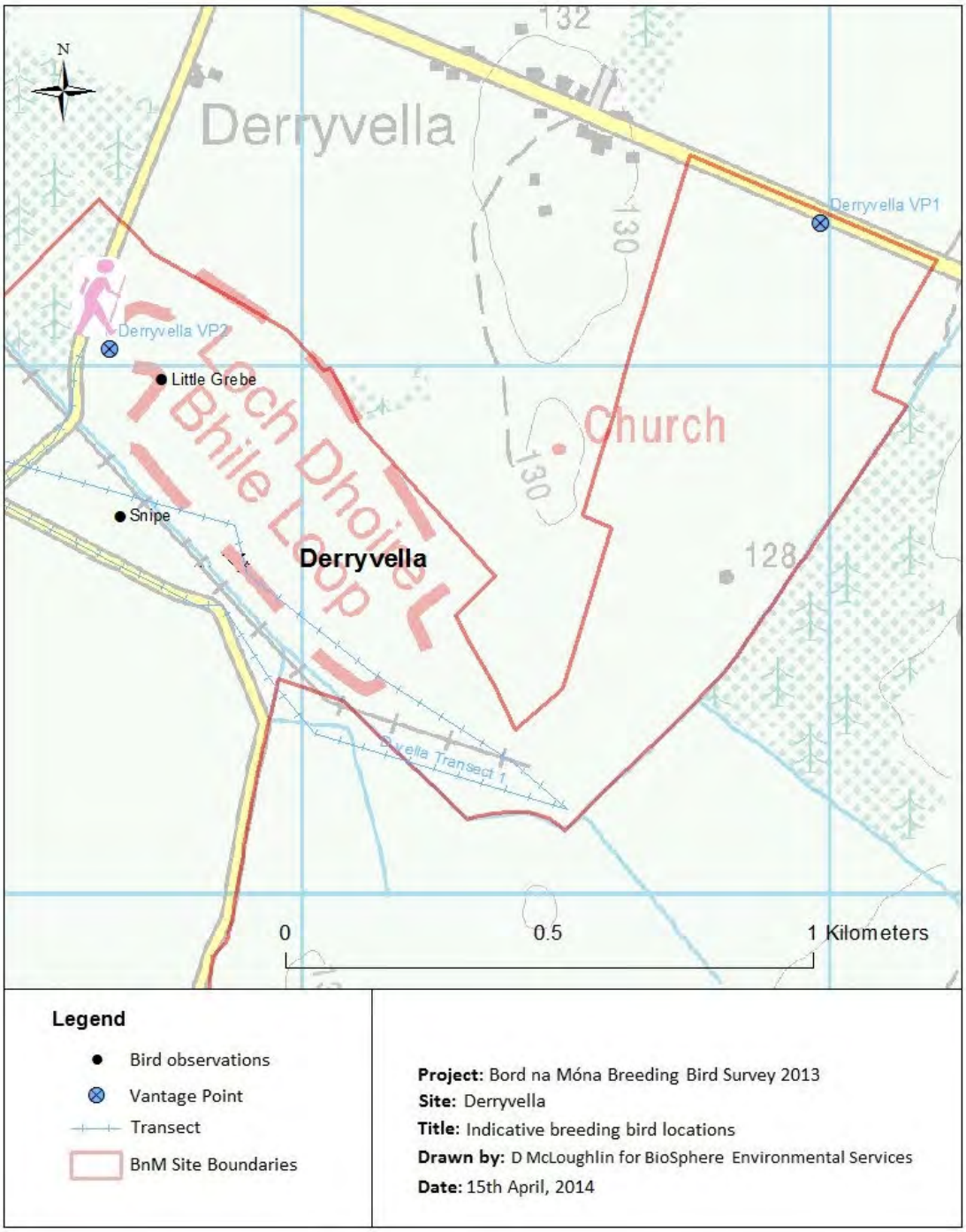
Breeding Status Codes are detailed in Appendix 2

BoCCI Status: **R – Red**; **A – Amber**; **G – Green**



Derryvella bog, Plate 1: view of western part of site with pond.

Derryvella: Map showing transect and vantage point locations, with records of target species.



SITE: BALLYBEG

Ballybeg bog is a small site located seven kilometres southeast of Thurles town. The site is located to the west of Lanespark and connected by a rail corridor. The main access to the site is from a third class road southeast of the site. The site extends for just over 1 km from north to south and for up to 1 km from east to west.

Ballybeg is largely bare peat with production still in progress over much of the area. There are strips of regenerating cutover bog and remnant bog along the margins of the site.

Ballybeg is entirely surrounded by farmland.

Survey locations

Transect 1 starts at VP1 and runs south to the road at the southern boundary through an area of regenerating cutover.

Transect 2 starts at the railway crossing at the southeast corner of the site and runs north and northwest towards VP1.

Vantage Point 1 is located at the north end of transect 2 and gives views over virtually the entire site.

Target species recorded

No target species were recorded during the breeding surveys.

Potential for other target species

Ballybeg has no significant potential to support nesting species of conservation importance.

Other species of note

Skylark – 1 territory on remnant bog.

Swallow – recorded regularly feeding over site.

Starling – 4 non-breeding birds in July.

Overview

Ballybeg is largely in commercial peat production and has limited potential for breeding birds of conservation importance.

However, the marginal areas of regenerating cutover and remnant bog support breeding Skylark.

SITE: BALLYBEG – BREEDING BIRDS 2013

Species	Maximum Breeding Evidence	No. of pairs (where relevant)	Breeding Status	BoCCI Status
Mallard	H		Possible	G
Woodpigeon	P		Probable	G
Cuckoo	H	1	Possible	G
Magpie	H		Possible	G
Hooded Crow	H		Possible	G
Skylark	P	1	Probable	A
Swallow	F		Non-breeding	A
Willow Warbler	NE		Confirmed	G
Whitethroat	T		Probable	G
Wren	FL		Confirmed	G
Starling	F		Non-breeding	A
Blackbird	FL		Confirmed	G
Song Thrush	S		Possible	G
Robin	T		Probable	G
Meadow Pipit	A		Probable	G
Chaffinch	A		Probable	G
Lesser Redpoll	S		Possible	G
Bullfinch	A		Probable	G
Reed Bunting	T		Probable	G

Breeding Status Codes are detailed in Appendix 2

BoCCI Status: **R – Red**; **A – Amber**; **G – Green**



Ballybeg bog, Plate 1: view over main area of site.

Ballybeg: Map showing transect and vantage point locations.



SITE: KILLEEN

Killeen Bog is a medium to large sized site located just over seven kilometres southeast of Thurles town and approximately 1.5 km southeast of Horse and Jockey. It is situated at the southern end of the Littleton bog group and is connected to Lanespark by a rail corridor. Access to the site is easily available from two third class roads which traverse the site. The site extends for up to 3 km from north to south and for over 3 km from east to west.

The site is largely bare peat with production still in progress over much of the area. There are strips of regenerating cutover and small areas of remnant bog along the boundaries.

The site is surrounded mostly by farmland with some large conifer plantations to the northwest.

Survey locations

Transect 1 starts at the site buildings (situated 300 m west of the north/south road intersecting the site) and runs south around a small area of cutover bog and back to the buildings. It then follows the rail line west to Derrynaflan church through bare peat.

Transect 2 follows the NW/SW road intersecting the site passing through bare peat and cutover bog (open water, rushes and scrub). It turns north at the rail line following the line (bare peat to one side and remnant bog and scrub on the other) and finishing at the mature forestry

Vantage Point 1 is located at the western end of transect 1 and covers the northwest sector of the site (predominantly bare peat).

Vantage Point 2 is located along the north/south road intersecting the site and looks west and east over all of the central part of the site.

Vantage Point 3 is located on the small bridge over the road at the northern edge of the site and gives views of the northern sector of the site.

Target species recorded

Lapwing
Estimated 3 pairs bred in wetland habitat along eastern margin of site.

Snipe
Displaying birds in suitable regenerating bog habitat in central and eastern sectors of site.

Black-headed Gull
Two gulls being mobbed by Lapwing on 29th May – not breeding on site.

Potential for other target species

The wetland habitat in the easternmost part of the site could support breeding Teal and Ringed Plover.

Other species of note

Buzzard – regular over site, probably bred locally.

Kestrel – single bird in April.

Moorhen – one pair may have bred.

Skylark – two displaying birds on remnant and regenerating bog habitats.

Spotted Flycatcher – pair may have bred in woodland.

Swallow – several pairs bred in buildings (tea huts) on site, also recorded regularly feeding over site.

Wheatear – 2 birds in late May were considered migrants.

Starling – may have bred on site.

Linnet – at least 2 pairs bred on site.

Overview

Killeen Bog is of some importance for breeding wetland birds of conservation importance, with nesting Lapwing and Snipe.

It also supports breeding Skylark, Swallow, Spotted Flycatcher and Linnet (all Amber species), as well as Blackcap and Stonechat. Kestrel and Buzzard hunt over the site.

SITE: KILLEEN – BREEDING BIRDS 2013

Species	Maximum Breeding Evidence	No. of pairs (where relevant)	Breeding Status	BoCCI Status
Mallard	H		Possible	G
Buzzard	F		Non-breeding	G
Kestrel	**F**		**Non-breeding**	**A**
Moorhen	H		Possible	G
Lapwing	**A**	**3**	**Probable**	**R**
Snipe	**D**	**2**	**Probable**	**A**
Black-headed Gull	**F**	**2 i**	**Non-breeding**	**R**
Woodpigeon	P		Probable	G
Hooded Crow	H		Possible	G
Raven	F		Non-breeding	G
Blue Tit	P		Probable	G
Coal Tit	T		Probable	G
Skylark	**T**	**6+**	**Probable**	**A**
Swallow	**UN**	**2+**	**Confirmed**	**A**
Long-tailed Tit	P		Probable	G
Sedge Warbler	H		Possible	G
Willow Warbler	FL		Confirmed	G
Blackcap	H		Possible	G
Whitethroat	T		Probable	G
Wren	FL		Confirmed	G
Starling	**H**		**Possible**	**A**
Blackbird	FL		Confirmed	G
Song Thrush	T		Probable	G
Mistle Thrush	H		Possible	G
Robin	FL		Confirmed	G
Stonechat	H		Possible	G
Wheatear	**M**	**2**	**Non-breeding**	**A**
Spotted Flycatcher	**S**	**1**	**Possible**	**A**
Meadow Pipit	FL		Confirmed	G
Chaffinch	FL		Confirmed	G
Greenfinch	H		Possible	G
Lesser Redpoll	H		Possible	G
Linnet	**P**	**2**	**Probable**	**A**
Siskin	H		Possible	A
Reed Bunting	FL		Confirmed	G

Breeding Status Codes are detailed in Appendix 2

BoCCI Status: **R – Red**; **A – Amber**; **G – Green**

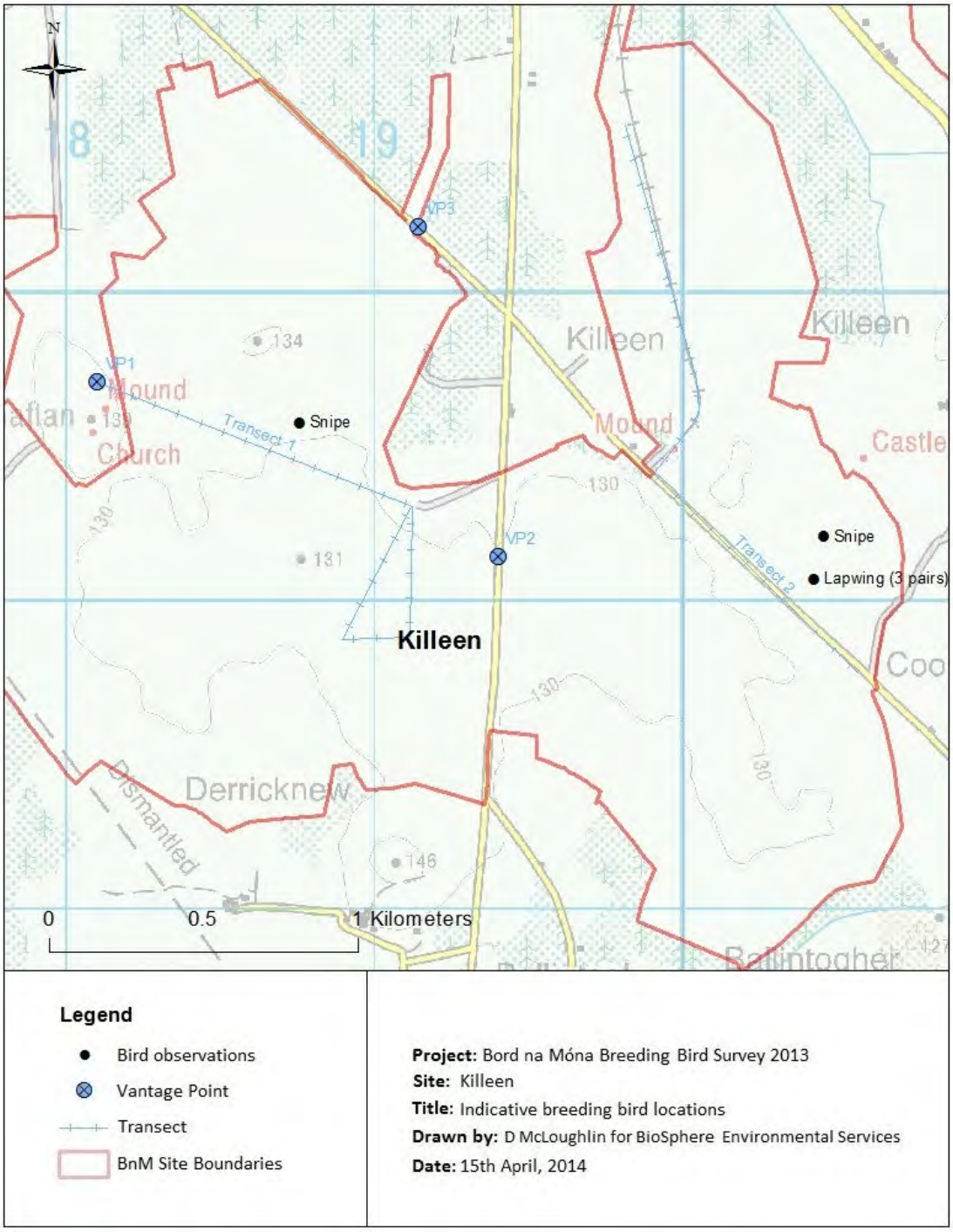


Killeen bog, Plate 1: view over main area of site.



Killeen bog, Plate 2: view over habitat where Lapwing breeds.

Killeen: Map showing transect and vantage point locations, with records of target species.



3.4 Bird Communities of the Bog Sites

Within the sites, a number of principal breeding bird communities can be separated based on main habitat types. At all sites, however, there is a range of habitat types present and it is noted that most species will occur in more than one of the habitat types.

Bare or near bare peat

This habitat type includes peat fields in production and fields recently out of production, with at most sparse or patchy vegetation. It is the dominant habitat type at a number of sites, notably Carrickhill, Derryville, Inch, Popes bog, Ballybeg, Lanespark and Killeen.

This habitat presumably has low feeding potential for most birds, though in summer surface flies and other small invertebrates may be present. Nevertheless, species such as Snipe, Meadow Pipit and Skylark were recorded on bare peat at a few sites, as well as Reed Bunting, Pied Wagtail and Lesser Redpoll.

Cutaway bog dominated by open regenerating bog/heath vegetation, with perhaps scattered scrub

This is a widespread habitat type on areas which have been out of production for some years. It can vary from dry, heath type habitat dominated by heather (*Calluna vulgaris*) to wetter areas of bog type vegetation often dominated by common bog cotton (*Eriophorum angustifolium*) and rushes (*Juncus* spp.). It is most useful where scrub has not developed to any great extent. The habitat is found locally in parts of the following sites: Ballysorrell, Templetouhy, Bawnmore, Littleton, Lanespark and Derryvella.

This habitat type supports a wide range of bird species, with bog or wetland species such as Snipe, Meadow Pipit, Skylark and Reed Bunting, as well as finches such as Linnet and Lesser Redpoll. Ubiquitous species such as Wren is also found here. This habitat type provides useful foraging habitat for birds of prey.

Cutaway bog dominated by scrub/low woodland

This habitat occurs at those sites that have been out of production for the longest periods and could be considered as an early stage of woodland dominance. The habitat usually occurs in association with more open areas (i.e. previous category). The scrub is formed predominantly by birch and willow, with alder in wetter areas. Scrub is particularly well developed at Templetouhy and Littleton.

The bird species occurring are mostly widespread and common species that one finds in woodland, scrub and hedgerow habitats throughout Ireland. Species recorded widely include Blackbird, Robin, Wren, Chaffinch, Lesser Redpoll and the four common tit species. Sparrowhawk is a typical scrub species though other birds of prey often hunt over it and within openings.

Remnant bog

Areas of remnant bog occur at all the sites, typically in marginal areas. These comprise bog which has not been harvested commercially but which may have had surface drains inserted (i.e. peat dome remains in various stages of intactness). Where drains have been inserted,

the Sphagnum layer is often depleted.

Remnant bog, which has had surface drains inserted over much of the area, is dominant at Knockahaw and Ballysorrell. Clonbuagh is a good example of a largely undrained bog.

Remnant bog supports a relatively low bird diversity, with Meadow Pipit and Skylark the most frequent species during summer. Snipe breed in this habitat. Wrens and Reed Bunting may also be found. Birds of prey, mainly Kestrel and Buzzard, often hunt over remnant bog areas. Remnant bog could support Red Grouse, though it appears that there are no populations of grouse on the Littleton bogs.

Wetlands and open water

The occurrence of areas of wetland habitat or open water is limited within the Littleton bog group, with the main sites being Templetouhy, Bawnmore and Littleton. An established pond (artificial in origin) occurs at Derryvella.

Wetland habitats increase the diversity of breeding birds and support such species as Little Grebe, Lapwing, Teal and Black-headed Gulls.

Conifer plantation

A substantial conifer plantation occurs in the southernmost part of Littleton bog, with a small stand in the easternmost sector of Derryville. In addition, conifer plantations are fairly widespread along the boundaries of the bogs in this group.

The plantations support a range of birds that one finds in conifers elsewhere, including Blackbird, Song Thrush, Chaffinch, Goldcrest, tit species, Siskin etc.

3.5 Birds of Conservation Importance – Species Accounts

There follows accounts of the various species of conservation importance recorded in the study area – species of importance are classified on the basis of the following criteria:

- EU Birds Directive, Annex I
- Birds of Conservation Concern Red List (High conservation concern) or Amber List (Medium conservation concern), after Lynas *et al*. (2007)

Teal

Conservation status

- Amber list (Lynas *et al.* 2007)

Teal is a widespread wintering duck in Ireland but a localised breeding species (though may be somewhat under-recorded).

Teal were recorded during the breeding surveys at the following sites:

Bawnmore	one female type bird suitable habitat on 8th July
Littleton	4 birds on lake in April and July. 1-2 pairs may have bred.

Breeding was possible at the above sites as suitable breeding habitat is present.

The Bird Atlas 2007-11 showed the breeding Teal population in Ireland to have declined by 46% since the 1968-72 Breeding Atlas (Balmer *et al*. 2013). The main reason for the decline in Ireland is thought to be from landuse change, especially land drainage.

Little Grebe

Conservation status

- Amber list (Lynas *et al.* 2007)

Little Grebe is a species associated with still or slow moving waters and for a breeding site requires submerged and emergent vegetation. While widespread in Ireland, it has a localised distribution due to a scarcity of suitable habitat in some areas. Little Grebe is often resident, breeding and wintering at the same location.

Two pairs of Little Grebes bred on ponds at Littleton bog, and one pair bred on the lake at Derryvella.

The Bird Atlas 2007-11 showed the Little Grebe population in Ireland to be relatively stable (9% decline) since the 1968-72 Breeding Atlas (Balmer *et al.* 2013).

Hen Harrier

Conservation status

- Annex I EU Birds Directive
- Amber list (Lynas *et al.* 2007)

The breeding range of the Hen Harrier in Ireland is generally restricted to upland areas and is concentrated in the south-west of the country.

The female bird recorded at Littleton bog in July was most probably a post breeding bird (perhaps a failed breeder) from the Slieve Bloom uplands to the north or the Slievefelim-Silvermines upland complex to the west (within 20 km), though there is some chance that a pair could breed in the Slieve Ardagh Hills to the east.

Buzzard

Conservation status

Buzzard does not have any particular conservation importance. It is included here as it had formerly been much rarer than it is today throughout Ireland and is a large, conspicuous bird of prey.

Buzzard had formerly been a rare species throughout much of Ireland but has increased markedly in the last two decades and is now widespread throughout much of the eastern and northern sectors of the country. The Bird Atlas 2007-11 showed the Buzzard population in Ireland to have increased by a massive 1,976% since the 1968-72 Breeding Atlas (Balmer *et al*. 2013). Breeding sites are usually tall trees in woodland stands.

During the breeding survey, Buzzards were observed regularly within and around a number of the sites in the Littleton group of bogs (Clonbuagh, Ballysorrell, Bawnmore, Inch, Popes Bog, Killeen). As the species is largely sedentary, it is likely that most of the sightings refer to local breeding birds, with breeding suspected in woodland along the margin of Ballysorrell bog.

Kestrel

Conservation status

- Amber list (Lynas *et al.* 2007)

Kestrel is a widespread breeding and wintering species throughout Ireland.

Kestrels occurred widely within the study area, with records from nine of the sites. However, breeding was not suspected within any of the sites. Many of the sightings were of birds hunting over the cutover bogs. The marginal strips of remnant or regenerating cutaway provide particularly useful habitat for foraging.

Water Rail

Conservation status

- Amber list (Lynas *et al.* 2007)

Water Rail is a widespread, resident species in Ireland associated with well developed wetlands and especially reedbeds or swamp vegetation. It is, however, extremely secretive and is seldom seen and the presence of Water Rail is usually established by calling birds.

Water Rail was recorded (heard) at Templetuohy bog and probably breeds on site.

It is noted that Water Rail was heard at the artificial lake in Derryvella in December 2012 and probably breeds there (though not recorded in the summer surveys).

Ringed Plover

Conservation status

- Amber list (Lynas *et al.* 2007)

The breeding population of Ringed Plover in Ireland is mainly coastal. The birds that breed in Ireland are believed to be mainly sedentary, with just small latitudinal shifts between wintering and breeding sites for some individuals. Inland breeding occurs in a range of mainly wetland habitats, with breeding first reported from harvested peat bogs in the late 1990s (Cooney 1998).

During the study, successful breeding by one pair was recorded at Bawnmore bog.

The Bird Atlas 2007-11 showed the Ringed Plover population in Ireland to have declined by 23% since the 1968-72 Breeding Atlas (Balmer *et al*. 2013).

Lapwing

Conservation status

- Red list (Lynas et al. 2007)

While Lapwing is still a relatively widespread breeding species in Ireland, there has been a dramatic decline in distribution and numbers since the mid to late 1900s. A study of the Lapwing population along the Shannon callows showed a decline of 80% between 1987 and 2002 (Tierney *et al*. 2002), while the Bird Atlas 2007-11 showed the Lapwing population in Ireland to have declined by 53% since the 1968-72 Breeding Atlas (Balmer *et al*. 2013).

Breeding Lapwing utilise a fairly wide range of habitats, from wet grassland or marsh along rivers and lakes to farmland, both pasture and arable. However, at all nesting sites they require relatively short vegetation, often with bare ground, for feeding.

During the study, breeding (possible/probable/confirmed) was recorded mainly at sites which have permanent wetland habitats, as follows:

Bawnmore	6 pairs
Inch	single bird (breeding not suspected)
Littleton	1 pair (present only in early May)
Killeen	3 pairs

The study shows that Lapwing is well established at Bawnmore and Killeen and may attempt breeding at Littleton.

The Bawnmore population is of particular interest as Berg *et al*. (1992) noted that predation of Lapwing nests may be density dependent, with the risk of nest predation being negatively correlated to the number of close neighbours. They report that nests were less likely to be robbed at colonies with six or more nests than colonies that held between two and five nests.

The serious declines in both the Irish and British breeding Lapwing populations is thought to be due mainly to changes in agricultural practice, though predation may be important in some areas. With such recent population declines, the breeding population on the Bord na Móna Littleton bogs is of significant importance.

Snipe

Conservation status

- Amber list (Lynas *et al.* 2007)

Snipe is a widespread breeding species in Ireland, though the population has declined in recent decades. The species is very secretive and breeding is usually established by recording displaying birds (probable breeding). Display activity is most frequent in the early and late parts of the day, or during drizzle or light rain. For these reasons, the population estimates are considered as minima.

Records of Snipe were fairly widespread in the study area, with breeding birds (possible/probable/confirmed) recorded from the following sites:

Knockahaw	2 displaying birds
Ballysorrell	1 displaying bird
Templetuohy	2 displaying birds
Bawnmore	2 displaying birds
Littleton	2 displaying birds
Derryvella	1 displaying bird
Killeen	2 displaying birds

In addition, Clonbuagh bog is considered very suitable habitat for breeding Snipe.

Breeding birds are generally confined to the sectors where wet bog, usually with bog cotton (*Eriophorum angustifolium*) and sedges, is regenerating well or on remnant bog that has not been cut but possibly drained.

In a study of breeding waders on cutover bogs in (west) County Offaly in 2002, Hudson *et al* (2002) recorded Snipe breeding at 10 out of 12 sites, with a total of 37 pairs.

The Bird Atlas 2007-11 showed the Snipe population in Ireland to have declined by 34% since the 1968-72 Breeding Atlas (Balmer *et al*. 2013). The general decline throughout Ireland and Britain is linked to agricultural intensification and the drainage of wet tussocky grassland, resulting in the loss of damp pasture. With such recent population declines, the breeding population in the Littleton study area (estimate of 12 pairs) is of significant importance.

Woodcock (Amber list)

Conservation status

- Amber list (Lynas *et al.* 2007)

Woodcock has a localised breeding distribution in Ireland though due to their crepuscular behaviour the real distribution is probably under-recorded. They are early breeders, with birds beginning to rode (display) in early February. During the breeding survey, a displaying (roding) Woodcock was recorded at Ballysorrell bog and probably bred in marginal woodland and scrub.

The Bird Atlas 2007-11 showed the Woodcock population in Ireland to have declined by 73% since the 1968-72 Breeding Atlas (Balmer *et al*. 2013). Despite the problems with surveying this species, it is considered that a real population decline has occurred over the 40 year period. The reasons for the decline are unclear but may include recreational

disturbance, the drying out of woodland, and the maturing of new woodlands. With such a national decline, any site with breeding birds is of some significance.

Curlew

Conservation status

- Red list (Lynas et al. 2007)

Curlew is now an extremely rare breeding bird in Ireland. Traditional nesting habitat is lowland wet grassland, raised bog and upland blanket bog.

One breeding territory was recorded on Littleton bog, with breeding considered probable.

On the River Shannon Callows, Tierney *et al.* (2002) recorded an overall decline of 81.3% in the breeding Curlew population between 1987 (48 pairs) and 2002 (8 pairs). Hudson et al (2002) did not record Curlew during a study of breeding waders on cutover bogs in (west) County Offaly in 2002. The Bird Atlas 2007-11 showed the Curlew population in Ireland to have declined by 78% since the 1968-72 Breeding Atlas (Balmer *et al*. 2013). The general decline throughout lowland areas of Ireland and Britain is linked to agricultural intensification and land drainage.

The presence of breeding Curlew on Littleton bog is extremely significant.

Common Sandpiper

Conservation status

- Amber list (Lynas *et al.* 2007)

The main breeding distribution of Common Sandpiper is along the western seaboard. The breeding habitat is generally along rivers and lakes, especially where there are exposed alluvial deposits and stony rather than muddy or marshy shores.

During the study, breeding (possible/probable/confirmed) was recorded only at Littleton bog, where a pair bred successfully.

The Bird Atlas 2007-11 showed the Common Sandpiper population in Ireland to have declined by 41% since the 1968-72 Breeding Atlas (Balmer *et al.* 2013).

The occurrence of Common Sandpiper on cutover bogs is dependent on the presence of substantial ponds or lakes.

Black-headed Gull

Conservation status

- Red list (Lynas *et al.* 2007)

Black-headed Gull is a widespread but localised breeding species in Ireland. The Seabird 2000 census (1998-2002) showed that in Ireland coastal colonies had increased since the previous census (1985-87) but that there had been a dramatic decline (by at least 81%) in the

number of inland breeding colonies (Mitchell et al. 2004). The overall national population estimate for the species during Seabird 2000 was 13,983 (Apparently Occupied Nests). Predation, especially by mink, is considered a primary cause for the decline at inland colonies in Ireland.

One site, Littleton bog, supported a breeding colony of Black-headed Gulls. The colony is on flooded swamp vegetation within a lake. An estimate of 40 pairs (nests) produced approximately 80 fledged young.

This is the first known breeding of Black-headed Gulls at Littleton bog, though a colony of c.30 pairs had been recorded at Templetuohy bog in June 2009. Movement between local sites is typical for this species.

Due to the significant decrease in the breeding population at inland sites in Ireland, a colony of 40 pairs successfully fledging up to 80 chicks is of significance.

A sighting of two Black-headed Gulls was made at Killeen and birds from Littleton could be expected to visit any of the bogs in the group where open water exists.

Swift

Conservation status

- Amber list (Lynas *et al.* 2007)

Swift was recorded at only one site, Littleton bog, but feeding birds could be expected over any of the sites in the group.

The Bird Atlas 2007-11 showed Swift to be a widely distributed species over much of Ireland, though a population decline of 25% has occurred since the 1968-72 Breeding Atlas (Balmer *et al.* 2013).

Overall, the bog sites in the study area are not of any particular importance for breeding Swifts.

Skylark

Conservation status

- Amber list (Lynas *et al.* 2007)

Skylark, a ground nesting species, is widely distributed as a breeding bird throughout the study area, with birds recorded at all sites other than Derryville and Inch (both sites mainly in commercial production). Estimated numbers of pairs (as defined by singing males) varied from 1 to 6, with the highest counts (6) at Bawnmore and Littleton. Habitats used by breeding birds ranged from uncut bog to regenerating bog with varying amounts of vegetation cover.

The Bird Atlas 2007-11 showed Skylark to be a widely distributed species throughout Ireland, though a population decline of 14% has occurred since the 1968-72 Breeding Atlas (Balmer *et al.* 2013).

Overall, the bog sites in the study area represent an important resource for breeding Skylarks.

Sand Martin

Conservation status

- Amber list (Lynas *et al.* 2007)

Sand Martins are summer visitors to Ireland and are widely distributed as a breeding bird throughout the country. No breeding colonies were recorded on the bog sites, and feeding birds were recorded only at Littleton bog. However, feeding birds would be expected at other sites as well.

The Bird Atlas 2007-11 showed the Sand Martin population to be fairly stable (6% decline) in Ireland since the 1968-72 Breeding Atlas (Balmer *et al.* 2013).

Overall, the bog sites in the study area provide useful feeding areas for Sand Martins, though there are limited opportunities for nesting.

Swallow

Conservation status

- Amber list (Lynas *et al.* 2007)

Swallow is a summer visitor to Ireland and is widely distributed as a breeding bird throughout the country. Breeding occurred on a few sites (Templetuohy, Bawnmore, Littleton, Killeen), with tea huts or other buildings being used as nest locations. Feeding birds were recorded regularly through the summer over all sites except for Derryville.

The Bird Atlas 2007-11 showed the Swallow population to be fairly stable (1% increase) in Ireland since the 1968-72 Breeding Atlas (Balmer *et al.* 2013).

Overall, the bog sites in the study area provide useful feeding areas for Swallows, though there are limited opportunities for nesting.

Starling

Conservation status

- Amber list (Lynas *et al.* 2007)

While Starling is a widespread breeding bird throughout Ireland, there were surprisingly few records for the bog sites during the summer survey. This reflects the requirement for holes or cavities (natural or man-made) for nesting. Breeding was suspected at Bawnmore, Littleton and Killeen, with birds recorded also at Ballybeg.

The Bird Atlas 2007-11 showed the Starling population to be fairly stable (1% increase) in Ireland since the 1968-72 Breeding Atlas (Balmer *et al.* 2013).

Spotted Flycatcher

Conservation status

- Amber list (Lynas *et al.* 2007)

Spotted Flycatcher is a widespread though localised breeding bird in Ireland. It is a summer visitor and nests mainly in woodland and scrub habitats.

There were two records of Spotted Flycatcher, as follows: pair at Lanespark in scrub habitat probably bred, and single bird in forestry at Killeen in July possibly bred.

The Bird Atlas 2007-11 showed a 21% decline in the Spotted Flycatcher population in Ireland since the 1968-72 Breeding Atlas (Balmer *et al.* 2013).

Wheatear

Conservation status

- Amber list (Lynas *et al.* 2007)

Wheatear is a summer visitor to Ireland. Breeding occurs mostly along the western seaboard and in upland areas such as the Wicklow Mountains. Migrant birds occur widely through the country, especially in spring.

Breeding was not suspected at any of the sites and records at Bawnmore, Littleton and Killeen in May were considered to be birds on migration.

The Bird Atlas 2007-11 showed the Wheatear population in Ireland to have declined substantially (24% decline) since the 1968-72 Breeding Atlas (Balmer *et al.* 2013). The cutaway bogs provide useful habitat for Wheatears on migration.

Linnet

Conservation status

- Amber list (Lynas *et al.* 2007)

Linnet is widely distributed as a breeding bird throughout the study area. One to two pairs were recorded at all sites other than Knockahaw, Clonbuagh, Derryville, Carrickhill and Ballybeg. Regenerating bog with scattered scrub provided excellent habitat for this finch species.

The Bird Atlas 2007-11 showed Linnet to be a widely distributed species throughout Ireland, with a fairly stable population (2% decline) since the 1968-72 Breeding Atlas (Balmer *et al.* 2013). The cutaway bogs provide an important resource for breeding Linnets.

Yellowhammer

Conservation status

- Red list (Lynas *et al.* 2007)

Yellowhammer is typically a species of mixed agricultural landscapes in southern and eastern Ireland.

Three singing males held territories within scrub habitat along the northern boundary of Bawnmore bog during the summer and breeding was considered likely.

The Bird Atlas 2007-11 showed Yellowhammer to have suffered a 61% population decline in Ireland since the 1968-72 Breeding Atlas (Balmer *et al.* 2013). Generally nesting Yellowhammers would not be associated with cutaway bog habitats, though a pair was also recorded at Templetuohy bog in 2009.

4.0 Conservation Status of Species Recorded and Evaluation of Populations and Sites

From a species perspective, 21 species of conservation importance were recorded within the study area during the breeding season (see Table 1).

Sixteen of these are classified as breeding (possible, probable or confirmed) according to the breeding status codes of the Bird Atlas (see Appendix 2). The other five species were classified as non-breeding – these were using the sites for feeding and other activities or merely passing over.

Table 1. Bird species of conservation importance recorded on Bord na Móna sites, summer 2013.

Species	EU Birds Directive Annex 1	Birds of Conservation Concern in Ireland: Red List	Birds of Conservation Concern in Ireland: Amber List
Teal			X
Little Grebe			X
*Hen Harrier	X		X
*Kestrel			X
Water Rail			X
Ringed Plover			X
Lapwing		X	
Snipe			X
Woodcock			X
Curlew		X	
Common Sandpiper			X
Black-headed Gull		X	
*Swift			X
Skylark			X
*Sand Martin			X
Swallow			X
Starling			X
Spotted Flycatcher			X
*Wheatear			X
Linnet			X
Yellowhammer		X	

* = species not known to or suspected of breeding on sites

4.1 Annex I species

One of the species, Hen Harrier, is listed on Annex I of the EU Birds Directive. This was considered to have been a visiting bird from a nesting site elsewhere.

4.2 Red list species

Four breeding species are listed as Birds of Conservation Concern in Ireland, Red List (i.e. High Conservation Concern) – Lapwing, Curlew, Black-headed Gull and Yellowhammer.

Lapwing was the most widespread of these, breeding at three sites with a total of 10 pairs. Curlew bred at one site (Littleton), with an important colony of Black-headed Gulls at Littleton.

Yellowhammer is not a species associated with bog habitats but it appears several pairs bred within scrub along the boundary of Bawnmore bog

4.3 Amber list species

Seventeen species recorded in the breeding season are listed as Birds of Conservation Concern in Ireland, Amber List (i.e. Moderate Conservation Concern).

Of the 17, reference has already been made to Hen Harrier, which is also an Annex I species.

Four of the species were considered to be non-breeding species, using the sites for feeding and/or roosting, as follows:

- Kestrel was recorded regularly within the sites where birds were often seen hunting over remnant and regenerating bog. Most of these birds would be expected to nest locally (in quarries, buildings, holes in large trees, disused nests of crows etc.).
- Swifts and Sand Martins were recorded feeding over sites and would be expected to nest locally (on buildings). These two summer visitors could be expected over any of the sites in the study area.
- The records of Wheatear at three of the sites during May were considered to be birds on migration.

Of the 12 species which bred (possible/probable/confirmed) within the sites, seven had a distribution restricted to one or two sites, as follows:

- Teal probably bred at Littleton, while a single female bird at Bawnmore in July could indicate breeding on site.
- Little Grebe bred at Littleton and probably on the lake at Derryvella.
- A pair of Ringed Plover bred successfully at Bawnmore, while breeding by Common Sandpiper is considered to have occurred at Littleton, where a pair bred successfully on a lake. Woodcock probably bred at Ballysorrell bog.
- Water Rail was recorded at Templetuohy and would be expected also at Derryvella as birds had been heard there in winter.
- Spotted Flycatcher was recorded at two sites, Lanespark and Killeen. Breeding appears to have occurred in scrub at Lanespark and may have taken place in forest at Killeen.

The remaining Amber listed species were recorded fairly widely at sites. Snipe is considered to have bred at seven sites and could be expected at one or two further sites.

Skylark and Linnet were fairly widespread breeding species on the bog and heath habitats. Swallow nested in buildings in a few sites and was recorded feeding actively over most of the sites. Starling was recorded at a few sites though is not a typical species of bog habitats.

4.4 Overview

Wetland species

The most important group of species using the cutaway bogs as nesting habitat is the wetland birds and especially the waders. While some species would naturally be associated with ombrotrophic bog habitats, especially Snipe and Curlew but also Teal, Little Grebe and Black-headed Gulls where bog lakes occur (see Watson & O'Hare 1979, Madden 1987, Bracken et al. 2008), most (including Ringed Plover and Lapwing) are opportunistically availing of the wetland habitats that are developing in the cut bogs.

The distribution across the sites of the principal wetland species is given in Table 2. Snipe is the most widely distributed species, nesting in a range of vegetation types from intact or uncut bog to wet regenerating bog. Lapwing, Ringed Plover and Common Sandpiper are confined largely to sites with permanent standing water and low growing vegetation without extensive scrub cover. The habitat used by Curlew at Littleton was a mix of wet bog and heather dominated regenerating bog. The breeding location for the Black-headed Gull colony was an area of flooded regenerating bog. The other wetland species listed, Teal, Little Grebe and Water Rail, are species associated with established ponds and lakes with aquatic and marginal wetland vegetation.

All of the wetland species listed in Table 2 have experienced population declines in Ireland in recent decades (Balmer *et al.* 2013) but the decline is particularly marked in the wader species, i.e. Ringed Plover, Lapwing, Snipe, Curlew and Common Sandpiper (see monitoring studies by Tierney *et al*. 2002, Sudderby 2010). The national population of Black-headed Gull, and especially the inland population, has also shown a substantial decline (Mitchell *et al.* 2004, McGreal 2011).

Table 2. Summary of main wetland bird species recorded breeding (possible/probable/confirmed) at cutaway bog sites, summer 2013. Numbers given refer to estimated number of pairs. T. = Teal, LG = Little Grebe, WA = Water Rail, RP = Ringed Plover, L. = Lapwing, SN = Snipe, CU = Curlew, CS = Common Sandpiper, BHG = Black-headed Gull.

Site	T.	LG	WA	RP	L.	SN	CU	CS	BHG
Knockahaw	-	-	-	-	-	2	-	-	-
Clonbuagh	-	-	-	-	-	-	-	-	-
Ballysorrell	-	-	-	-	-	1	-	-	-
Templetuohy	-	-	1	-	-	2	-	-	-
Derryville	-	-	-	-	-	-	-	-	-
Carrickhill	-	-	-	-	-	-	-	-	-
Bawnmore	1	-	-	1	6	2	-	-	-
Inch	-	-	-	-	-	-	-	-	-
Popes Bog	-	-	-	-	-	-	-	-	-
Littleton	2	2	-	-	1	2	1	1	40
Lanespark	-	-	-	-	-	-	-	-	-
Derryvella	-	1	-	-	-	1	-	-	-
Ballybeg	-	-	-	-	-	-	-	-	-
Killeen	-	-	-	-	3	2	-	-	-
Totals	**3**	**3**	**1**	**1**	**10**	**12**	**1**	**1**	**40**

From the present study it can be concluded that two of the sites in the Littleton cutaway bog group (Bawnmore & Littleton) support important populations of wetland birds, with a scatter of breeding species, and especially Snipe, across some of the other sites.

While only a single pair of Curlew was recorded during the study, this species has shown a serious decline throughout Ireland in recent decades (78% according to Bird Atlas) and even single breeding pairs are of importance.

Non-wetland species

The cutaway bogs also provide useful habitat to a range of other species for nesting and/or feeding purposes.

Skylark, a characteristic species of bog habitats, has a particularly widespread breeding distribution being found on almost all sites. Skylark has declined throughout Ireland in recent decades, with a 14% decline registered by the Bird Atlas project since the 1968-72 Atlas. In an analysis of population trends in widespread breeding birds in Ireland between 1998 and 2008, Skylark was one of the few species to register a statistically significant decline (-2.98% per year) (Crowe et al. 2010). **Linnet** is another species of conservation importance that nested widely on the cutaway bog sites.

Two species of conservation importance which were recorded breeding would not typically be associated with bog habitats – these are Spotted Flycatcher and Yellowhammer. Spotted Flycatcher is a species of woodland margins, especially along rivers and lakeshores, while Yellowhammer is a species of mixed agricultural landscapes with hedging and scrub. The occurrence of these species reflects the range of habitats which develop in the cutaway bogs.

During summer, **Kestrel** and **Buzzard,** and, to a lesser extent, **Sparrowhawk** were recorded regularly within the cutaway bog sites. Sparrowhawk is likely to have nested in some sites within areas of scrub or woodland, while the other two species used the sites largely for feeding purposes. In the analysis of widespread breeding birds in Ireland, Crowe *et al*. (2010) identified a statistically significant decline (-3.09% per year) in the Kestrel population. While Sparrowhawk and Buzzard are not listed of conservation concern in Ireland, their occurrence is of some note as they are top predators and indicative of a normal functioning environment.

Woodcock, a wader not necessarily associated with wetlands during the breeding season, was recorded at one bog site and may well occur at others as it is an extremely difficult species to census. Despite the problems with surveying this species, it is considered that a real population decline has occurred throughout Ireland in recent decades.

Apart from the listed species of conservation importance, the cutaway bog sites support a range of species some of which have localised distributions and have shown declines in recent years. **Cuckoo** was a regularly recorded species throughout the study area. Meadow pipit, one of the most frequent species recorded on the sites, is generally considered the commonest host species for Cuckoo in Ireland so the widespread occurrence of Cuckoo is not surprising. The Bird Atlas 2007-11 showed the Cuckoo population in Ireland to have declined substantially (26% decline) since the 1968-72 Breeding Atlas (Balmer *et al.* 2013). A significant decline (-1.08% per year) in the Cuckoo population in Ireland was also

identified in the assessment of population trends of widespread breeding birds in Ireland by Crowe *et al*. (2010). Other summer visitors, while not showing recent population declines, were also found within the site – these included **Whitethroat**, **Sedge Warbler** and **Willow Warbler**.

Resident species in Ireland with localised distributions which were commonly recorded breeding within the sites included **Meadow Pipit**, **Lesser Redpoll** and **Reed Bunting**. The **Stonechat** population in Ireland was heavily affected by the severe winters of 2009/10 and 2010/11, with the breeding population much reduced (see Lovatt & Madden 2013).

4.5 Evaluation of Sites for Breeding Species

As noted in the methods section, unlike the evaluation of wintering wetland sites no particular quantitative method is available to assess the importance of sites for most breeding birds (gulls are an exception as national populations of 'seabirds' are reasonably well known – see Mitchell *et al*. 2004). Generally, the value is determined by the presence of 'listed' species as described in this report and which are as follows:

- Annex I EU Birds Directive species
- Birds of Conservation Concern - Red List (High conservation concern) species
- Birds of Conservation Concern – Amber List (Moderate conservation concern) species

However, a subjective assessment may still be required which might consider how the birds are using the site during summer and, if nesting, the number of breeding pairs involved. For instance, while Peregrine is an EU Birds Directive Annex I species, the presence of an occasional hunting bird within a site is not of high significance as Peregrines have very large territories and would cover large tracts of countryside including bog sites when hunting. However, if a pair of Peregrines was nesting within a site, there would be a higher significance. A further example is the numbers of nesting pairs of a species such as Lapwing (Red list) at a site – while one or two nesting pairs is of note, the viability of the species surviving as a breeding species in such low numbers may be doubtful due to predation and other reasons. Therefore, such a site would be ranked lower than a site with maybe four or five pairs where there is a greater prospect of long-term survival of the species at the site.

The Bird Atlas 2007-11 project has provided useful information on recent distribution of all nesting species and has analysed trends since the first Atlas project in 1968-72 (allowing for differences in methodologies etc). The results of this project, as well as other monitoring studies (as referred to in species discussion), are also considered.

On the basis of the above, an attempt is made to divide the sites according to the five-point scale used by the National Roads Authority (*Guidelines for Assessment of Ecological Impacts of National Road Schemes,* (NRA 2009) though it is noted that an ecological ranking of a site would also normally consider habitats, flora and other fauna types etc.. The NRA system uses the following scale:

- International Importance
- National Importance

- County Importance
- Local Importance (higher value)
- Local Importance (lower value)

International Importance

There are no sites which are rated of International Importance on the basis of breeding birds.

National Importance

There are no sites which are rated of National Importance on the basis of breeding birds.

County Importance

Littleton bog is ranked as of at least County Importance on the basis of the assemblage of breeding wetland birds and notably Curlew, Teal and Black-headed Gulls. While the colony of Black-headed Gulls is well below the threshold for qualifying as national importance (i.e. 140), this appears to be a new colony and typically could expand significantly over two or three years.

Bawnmore is also ranked as of at least County Importance on the basis of breeding Teal, Lapwing (6 prs), Ringed Plover and Snipe.

Local Importance (higher value)

Killeen is ranked as of Local Importance (higher value) on the basis of breeding Lapwing (3 prs) and Snipe.

Also ranked in this category are Knockahaw, Ballysorrell, Templetuohy and Derryvella, mainly on the basis of breeding Snipe and other Amber listed species. Substantial areas of remnant or regenerating bog habitats exist at these sites.

Local Importance (lower value)

All other sites are considered to be of Local Importance (lower value) (see Table 3). Sites in this category comprise almost entirely commercial peat fields and have low potential for breeding birds.

Table 3. Rating of importance of sites for breeding birds on basis of 2013 summer survey.

Site	Interests	Tentative rating
Littleton (most of site apart from bare peat and afforested areas)	Breeding wetland birds, including Curlew, Black-headed Gulls & Teal,	County +
Bawnmore (western sector only)	Breeding wetland birds, especially Lapwing	County +
Killeen (much of site is commercial peat fields and not of interest)	Breeding wetland birds, especially Lapwing	Local (higher value)
Knockahaw	Amber species (inc. Snipe)	Local (higher value)
Ballysorrell	Amber species (inc. Snipe)	Local (higher value)
Templetuohy	Amber species (inc. Snipe)	Local (higher value)
Derryvella	Amber species (inc. Snipe)	Local (higher value)
Clonbuagh	Amber species	Local (lower value)
Derryville	No species of significance	Local (lower value)
Carrickhill	Amber species	Local (lower value)
Inch	Amber species	Local (lower value)
Popes Bog	Amber species	Local (lower value)
Lanespark	Amber species	Local (lower value)
Ballybeg	Amber species	Local (lower value)

5.0 CONCLUDING REMARKS

From the baseline 2013 breeding survey, an attempt has been made to rank the 14 bog sites according to their importance for breeding birds. In the absence of a quantitative system for classifying the importance of sites for breeding birds in Ireland (other than for a restrictive number of species), the approach used was to consider the conservation status of the species present and the size of the breeding populations. The ratings given must therefore be considered as tentative and subject to change as further information becomes available on the conservation status of various populations. The recently published Bird Atlas has provided an analysis of population trends for all species in Britain and Ireland and has been referred to extensively in the present report. From the results of this ambitious project, which will set the agendas for bird conservation in Britain and Ireland for the next 20 years, it is certain that the conservation status of many species will be upgraded in the next review of the Red and Amber lists.

The breeding survey has shown that the most important group of species associated with the bogs during the summer season are the wetland birds and particularly the waders (Ringed Plover, Lapwing, Snipe, Curlew, Common Sandpiper). All of these wader species, but especially Lapwing and Curlew, have undergone substantial declines in Ireland in recent years and it appears that the declines are continuing. For this reason, two of the sites (Littleton and Bawnmore) are ranked at least of County Importance. Littleton also supports a colony of Black-headed Gulls, a species which has also shown a marked decline in Ireland in recent years.

A further five sites (Knockahaw, Ballysorrell, Templetuohy, Derryvella, Killeen) are ranked as Local Importance (higher value) on the basis of some wetland species and especially Snipe. These sites also have extensive areas of remnant and regenerating bog habitats and support various other Amber listed species, including Skylark and Linnet.

The remaining 7 sites are classified as Local Importance (lower value). These sites are largely in commercial production, with limited bird interest which is confined usually to marginal strips or sectors that are undeveloped or in the process of regeneration.

Finally, it is noted that some of the breeding species, including Lapwing, which now have important populations on some of the cutaway bogs would not necessarily be associated with natural raised bog systems. Several species, however, some of which are widespread on the sites, would have strong associations with bog habitats though would not be confined to such – these include Snipe, Curlew, Skylark, Teal and, to some extent, Little Grebe.

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APPENDIX 1

Scientific Names of Bird Species

Teal	*Anas crecca*
Mallard	*Anas platyrhynchos*
Pheasant	*Phasianus colchicus*
Grey Heron	*Ardea cinerea*
Water Rail	*Rallus aquaticus*
Little Grebe	*Tachybaptus ruficollis*
Buzzard	*Buteo buteo*
Hen Harrier	*Circus cyaneus*
Sparrowhawk	*Accipiter nisus*
Kestrel	*Falco tinnunculus*
Merlin	*Falco columbarius*
Peregrine	*Falco peregrinus*
Red Grouse	*Lagopus lagopus*
Moorhen	*Gallinula chloropus*
Ringed Plover	*Charadrius hiaticula*
Lapwing	*Vanellus vanellus*
Snipe	*Gallinago gallinago*
Woodcock	*Scolopax rusticola*
Black-headed Gull	*Chroicocephalus ridibundus*
Woodpigeon	*Columba palumbus*
Cuckoo	*Cuculus canorus*
Swift	*Apus apus*
Jay	*Garrulus glandarius*
Magpie	*Pica pica*
Hooded Crow	*Corvus corone*
Raven	*Corvus corax*
Goldcrest	*Regulus regulus*
Coal Tit	*Parus ater*
Blue Tit	*Parus caerulus*
Great Tit	*Parus major*
Skylark	*Alauda arvensis*
Sand Martin	*Riparia riparia*
House Martin	*Delichon urbica*
Swallow	*Hirundo rustica*
Long-tailed Tit	*Aegithalos caudatus*
Willow Warbler	*Phylloscopus trochilus*
Blackcap	*Sylvia atricapillia*
Whitethroat	*Sylvia communis*
Sedge Warbler	*Acrocephalus schoenobarnus*
Wren	*Troglodytes troglodytes*
Blackbird	*Turdus merula*
Song Thrush	*Turdus philomelos*
Mistle Thrush	*Turdus viscivorus*
Robin	*Erithacus rubecula*
Stonechat	*Saxicola torquata*
Wheatear	*Oenanthe oneanthe*
Dunnock	*Prunella modularis*
Pied Wagtail	*Motacilla alba*

Meadow Pipit	*Anthus pratensis*
Starling	*Sturnus vulgaris*
Chaffinch	*Fringilla coelebs*
Goldfinch	*Carduelis carduelis*
Siskin	*Carduelis spinus*
Linnet	*Carduelis cannabina*
Lesser Redpoll	*Carduelis flammea*
Bullfinch	*Pyrrhula pyrrhua*
Reed Bunting	*Emberiza schoeniclus*
Yellowhammer	*Emberiza citronella*

APPENDIX 2

Breeding Status Codes as used in Bird Atlas

All codes for **Possible, Probable** and **Confirmed** Breeding have to relate to individuals in **potentially suitable nesting habitat.**

Non-breeding

F **F**lying over
M Species observed but suspected to be still on **M**igration
U Species observed but suspected to be s**U**mmering non-breeder

Possible breeder

H Species observed in breeding season in suitable nesting **H**abitat
S **S**inging male present (or breeding calls heard) in breeding season in suitable breeding habitat

Probable breeding

P **P**air observed in suitable nesting habitat in breeding season
T Permanent **T**erritory presumed through registration of territorial behaviour (song etc) on at least two different days a week or more apart at the same place or many individuals on one day
D Courtship and **D**isplay (judged to be in or near potential breeding habitat; be cautious with wildfowl)
N Visiting probable **N**est site
A **A**gitated behaviour or anxiety calls from adults, suggesting probable presence of nest or young nearby
I Brood patch on adult examined in the hand, suggesting **I**ncubation
B Nest **B**uilding or excavating nest-hole

Confirmed breeding

DD **D**istraction-**D**isplay or injury feigning
UN **U**sed **N**est or eggshells found (occupied or laid within period of survey)
FL Recently **FL**edged young (nidicolous species) or downy young (nidifugous species). Careful consideration should be given to the likely provenance of any fledged juvenile capable of significant geographical movement. Evidence of dependency on adults (e.g. feeding) is helpful. Be cautious, even if the record comes from suitable habitat.
ON Adults entering or leaving nest-site in circumstances indicating **O**ccupied **N**est (including high nests or nest holes, the contents of which can not be seen) or adults seen incubating
FF Adult carrying **F**aecal sac or **F**ood for young
NE **N**est containing **E**ggs
NY **N**est with **Y**oung seen or heard

BORD NA MONA
WINTER BIRD SURVEY, 2013-2014

LITTLETON BOG GROUP

FINAL REPORT

DECEMBER 2014

Prepared for

Bord na Móna

by

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Appendix 1. Scientific names of bird species

Appendix 2. Results for Vantage Point watches for Littleton bog (separate file)

EXECUTIVE SUMMARY

- A baseline study of wintering birds associated with the Bord na Móna Littleton Bog Group was carried out between October 2013 and March 2014. There are 14 sites within the group, covering an area of just over 5,000 ha. Most of the bogs in the Group are still in peat production to some degree, although in some instances production may be confined to localised areas. Some bogs have re-vegetated considerably, whereas some have peat reserves with depths in excess of 2 m at present.

- The study included a desk review and consultations with relevant agencies (namely National Parks & Wildlife Service (local management staff), BirdWatch Ireland, Irish Peatland Conservation Council). Field methods employed were a combination of transect surveys, vantage point watches and focused surveys for wetland birds. Three rounds of surveys were carried out during the winter period. At Littleton bog, monthly vantage point watches achieved 36 hours of observations over the site.

- While none of the bog sites are designated for conservation, there are 19 designated sites within a 15 km radius of the Group, comprising two SPAs, six SACs, two NHAs, and nine pNHAs.

- A review of past bird information relating to the immediate study area concluded that this is scant and generally of limited value in the context of the present study.

- A brief description of each of the 14 bog sites is followed by details of target species recorded, the potential for other target species, other species of note recorded and an overview of the value of the site for wintering birds. A map showing locations of sampling transects and vantage points, plus flight lines of target species where relevant, is presented.

- Target species were recorded as follows: Knockahaw (Hen Harrier); Ballysorrell (Hen Harrier, Merlin, Peregrine); Bawnmore (Lapwing); Popes Bog (Peregrine); Littleton (Whooper Swan, Greylag Goose, Hen Harrier, Merlin, Peregrine); Killeen (Golden Plover, Lapwing).

- Five species listed on Annex I of the EU Birds Directive were recorded, as follows: Whooper Swan, Hen Harrier, Merlin, Peregrine, and Golden Plover.

- Amber listed species were recorded at all of the sites. The range of Amber listed species recorded was as follows: Whooper Swan, Greylag Goose, Teal, Wigeon, Little Grebe, Hen Harrier, Merlin, Kestrel, Water Rail, Lapwing, Snipe, Jack Snipe, Woodcock, Lesser Black-backed Gull, Skylark, Starling and Linnet.

- From the perspective of wintering bird communities, the habitats or vegetation types within the sites can be broadly separated as follows: Bare or near bare peat; Cutaway bog dominated by open regenerating bog/heath vegetation, with perhaps scattered scrub; Cutaway bog dominated by scrub/low woodland; Remnant bog; Wetlands and open water; Conifer plantation.

- Summary species accounts are given for the various EU Birds Directive Annex I species, Birds of Conservation Concern (Red or Amber listed), and selected Green listed species (such as Buzzard). Reference is made to the new list of Birds of Conservation Concern in Ireland for the period 2014 to 2019

- Whooper Swan (Annex I species) was recorded on Littleton bog through the winter, though numbers involved were relatively low (peak single count of 34). The swans were using the bog as one of several feeding sites in the wider area. The winter surveys have shown that the Littleton bogs are not within any regular flightline corridors associated with the known swan populations along the River Suir and at the Curragh/Durrow wetlands.

- The winter 2013/14 survey confirmed a Hen Harrier night roost at Littleton bog. Hen Harriers were also recorded at Ballysorrell bog for a second winter though roosting was not confirmed. Generally the bogs in the group provide useful foraging habitats and in addition to the two named sites practically any of the bogs could be used for foraging purposes during winter.

- Merlin, a further Annex I species, was recorded at two of the sites, Ballysorrell and Littleton bogs. These birds were using the sites for hunting, with one bird observed carrying a prey item. Generally, there are large amounts of suitable habitats for wintering Merlin both within and around the various bog sites and birds could be expected virtually anywhere in the study area during winter.

- Peregrine (Annex I species) was recorded at several of the bog sites. It is considered that most of the cutaway bog sites support prey items that would attract hunting Peregrines and no one site is of particular importance for the species.

- Golden Plover were surprisingly scarce in the study area in winter 2013/14 with only one record just off-site. However, birds could be expected to avail of any of the commercial peat fields for roosting purposes, as shown by their usage of this habitat in bog sites elsewhere (especially the Derrygreenagh/Ballydermot group of bogs). Overall, the bog sites within the Littleton group are not used to any extent by Golden Plover.

- In addition to the Annex I species described (all Amber listed other than Peregrine), a further 14 species listed as Birds of Conservation Concern in Ireland, Amber list were recorded. Five of these were recorded at only one site each as follows: Little Grebe (Derryvella), Greylag Goose (Littleton), Wigeon (Littleton), Water Rail (Littleton) and Jack Snipe (Littleton). The Greylag Geese are considered to be feral birds as there is no traditional population of wild geese in this area of the country. A further three species were recorded at two sites each: Lapwing (Bawnmore, Killeen), Woodcock (Littleton, Derryvella) and Lesser Black-back Gull (Carrickhill, Bawnmore). Some of the Lapwing records were considered to be returning breeding birds rather than wintering birds. The Lesser Black-back Gulls were merely resting in the sites on one day only. Teal was recorded at three sites. The remaining species (Kestrel, Snipe, Skylark, Starling, Linnet) occurred fairly widely and could be expected at any of the cutaway bog sites.

- All the bog sites provide useful semi-natural habitat refuges for a wide diversity of birds. However, all of the recorded species of conservation interest could be expected in the wider countryside and none of the species are dependant solely on bog habitats (though several are characteristic of bogs, such as Snipe, Jack Snipe and Skylark).

- From the results of the winter survey 2013/14, supported by the results of the 2012/13 survey, it is apparent that the cutaway bogs in the Littleton bog group do not support notable populations (i.e. at national level) of any species of particular conservation importance. Littleton bog, however, is of importance due to the presence of a Hen Harrier roosts and also usage by Whooper Swans and Merlin.

- The issue of rating of sites for ornithological importance is discussed. It is suggested that one site, Littleton bog, is rated of County importance as it supports a regular winter roost for Hen Harrier and has habitats to support Whooper Swans, Merlin and a range of Amber listed species. All other sites in the group can be rated as having Local importance due to the presence (at times) of Annex I listed species and/or Amber listed species using semi-natural habitats. These sites vary in interest, with Knockahaw, Clonbuagh, Ballysorrell, Templetuohy, Bawnmore, Littleton and Derryvella having extensive areas of semi-natural habitats useful to wintering birds.

1.0 INTRODUCTION

1.1 Background to Project

Bord na Móna is considering using some of its bogs in the midlands for large scale wind farm development and has carried out some high level assessment of the suitability of various sites for this purpose. Farm layouts, however, have not yet been prepared to a significant level of detail at this stage.

As part of the planning work, Bord na Móna issued a request for a winter bird study (2013/14), including consultation, on the avian species and populations either using, or likely to use, the various sites. This is a follow-up study to the winter bird survey completed for the 2012/13 winter (final report, BES 2013). Both the previous study and the present study will supply key baseline data in the assessment of the impact on birds of potential wind farm construction and operation.

The project comprised six bog groups for consideration as follows:

1. Ballydermot Bog Group
2. Derrygreenagh Bog Group
3. Littleton Bog Group
4. Ballivor Bog Group
5. Cul na Mona Group
6. Kilberry Bog

Key requirements of the study were as follows:

- Consult with appropriate bodies, such as NPWS and BWI, regarding sightings and any existing information on the site or surrounding area and discuss / agree appropriate methodologies in the context of the scale and nature of the sites
- provide GIS maps of features and sightings of interest
- provide a detailed recommended methodology for future bird surveys should the project proceed to EIS
- provide a description of the suitability of the habitats present for key species not recorded but which could potentially occur
- provide a summary of likely constraints with regard to the known bird community.

The following mapping was supplied for each bog group by Bord na Móna:

- Site Location Map (Discovery map base)
- Orthophoto View (from 2006)
- Land Use Map (prepared by BnaM)
- Biodiversity Value Map (prepared by BnaM; not complete coverage)

A copy of *Birds on Cutaway Peatlands: Baseline Breeding Bird Population Survey* (2011) by Dr. Alex Copland, BirdWatch Ireland (carried out for Bord na Móna) was supplied for reference.

A contract to carry out the required work was awarded to BioSphere Environmental Services in October 2013.

The present report considers the Littleton Bog Group.

1.2 Overview of Study Area

The following general description is based on the information supplied by Bord na Móna in the tender documentation.

Littleton Group of Bogs

The Littleton Group of bogs is located on the border of counties Kilkenny, Tipperary and Laois. The Group consists of just over 5,000 hectares of bogland in open, flat, rural countryside surrounded by adjoining farmland. Human settlement is a combination of small villages and individual private dwellings along the peripheral regional and minor road network.

The bogs within the Group provide peat to the nearby briquette factory which is still in production. Most of the bogs in the Group are still in peat production to some degree, although in some instances production may be confined to localised areas. Some bogs have re-vegetated considerably, whereas some bogs have peat reserves with depths in excess of 2m at present.

Coillte forestry is located at various locations close to some of the bogs within the Group, and there are also a number of established on-site Coillte forests on some bogs. Varying degrees of on-site vegetation, ranging from light scrub to established trees exist on some bogs, depending on the level of production activity and how long production has ceased. Construction work is also underway on a 40MW Wind Farm at Bruckana, located on Templetuohy bog. There is an existing wind farm, Lisheen, in the area. Access to sites is generally good, with most bogs within the Group accessible via the peripheral regional and minor road network, and local access roads.

The study area is within the catchments of the Nore and Suir river systems.

2.0 SURVEY METHODS

2.1 Desk Review and Consultations

In addition to a perusal of the general ornithological literature on Ireland's birds, including the annual journal *Irish Birds*, the following key sources of information (written and/or electronic) were accessed for references to the study area:

Boland, H. & Crowe, O. (2012) *Irish Wetland Bird Survey: Waterbird Status and Distribution 2001/02 – 2008/09*. BirdWatch Ireland, Kilcoole, Co. Wicklow.

Crowe, O. (2005) *Ireland's Wetlands and their Waterbirds, Status and Distribution*. BirdWatch Ireland, Newcastle, Co. Wicklow.

Fox, A.D., Norriss, D.W., Stroud, D.A. & Wilson, H.J. (1994). *Greenland White-fronted Geese in Ireland and Britain, 1982/83-1993/94. The first twelve years of international conservation monitoring*. Greenland White-fronted Goose Study and National Parks & Wildlife Service, Dublin.

Hutchinson, C.D. (1979) *Ireland's Wetlands and their Birds*. Irish Wildbird Conservancy, Dublin.

Sheppard, R. (1993) *Ireland's Wetland Wealth*. Irish Wildbird Conservancy, Dublin.

www.birdwatchireland.ie - Distribution map of I-WeBS sites in Ireland

www.npws.ie - Distribution maps and associated information for sites designated for conservation by NPWS (i.e. SPAs, SACs, NHAs, pNHAs)

Consultations, mostly by email and/or telephone, took place with the following:

NPWS

Ms Aine Lynch, Conservation Ranger – Co. Tipperary, Tel.: 067 46325; email: Aine.Lynch@ahg.gov.ie

BirdWatch Ireland

Dr Alex Copland, Senior Conservation Officer Crank House, Banagher, Co. Offaly
Tel.: 057 9151676; email: acopland@birdwatchireland.ie

Dr Olivia Crowe & Ms Helen Boland (I-WeBS co-ordinators)
email: ocrowe@birdwatchireland.ie; hboland@birdwatchireland.ie

Irish Peatland Conservation Council

Dr Catherine O'Connell, CEO, IPCC, Tel.: 045 860 133; email: bogs@ipcc.ie

Mr Tadhg O Corcora, Conservation Officer, IPCC, Tel.: 045 860 133; email: bogs@ipcc.ie

2.2 Field Surveys

The tender documentation had noted the following points in respect of survey methodology:

- The Winter Bird Surveys should be undertaken between the months of October and March and should focus in particular on wintering waders, wildfowl - notably geese and swans, any winter Hen Harrier roosts, other raptors, Annex 1 species and birds of conservation interest.
- All sites should be visited a minimum of three times during the winter period, or more frequently as appropriate, with the approach and methodology varying depending on the target species.
- The survey should include all, or a selection of the following; focused wetlands surveys; transects; vantage point surveys; bog walks; roost watches; flight paths and migration studies; or other methodologies as appropriate.

The tender also noted that '*adherence to approved methodologies is a key requirement of the project. However, given the scale and fragmented nature of the area to be surveyed, and the nature of the studies to be undertaken, a pragmatic approach is required. This must balance the detail required to be acceptable for a planning application for a wind farm project of very significant scale with the fact that much of the area is still utilised for industrial scale peat extraction or peat extraction has ceased only recently*.'

Taking the above into account, the following approach was taken at the sites:

2.2.1 Number of site visits

With the contract commencing in October 2013, this allowed for at least three rounds of survey sessions, comprising early-winter (October/November), mid-winter (December/January) and late-winter (February/March). For Littleton bog, monthly visits were carried out.

2.2.2 Survey methods

Use of the following methods was employed at the sites as relevant. However, transect surveys and vantage point watches were the main methods and a combination of these were used in all sites.

Surveys were carried out largely in suitable weather conditions, with avoidance of persistent rain, mist/fog and winds in excess of F4-5.

Transects surveys

The use of transects to record birds within sites is a well established survey method (Bibby *et al.* 2000). The method is particularly useful for open habitats such as peatlands. The value of the method is that it is repeatable over time, which is particularly relevant to the Bord na Móna cutaway bogs where habitat conditions are somewhat transient and bird communities can be expected to change over time in response to vegetation types present.

The transects selected typically followed identifiable tracks (inc. rail tracks) which made coverage quicker and also safer compared to across open bog. Further, tracks are often

slightly elevated which makes recording more efficient. The number of transects used at each site was determined by the size of the site and the diversity of habitats present.

Bird recording is normally within a zone 200-300 m wide either side of the transect though the flat nature of the sites made larger sized or obvious birds (such as Golden Plover flocks) at further distances easily visible. Birds were recorded by sight (with aid of binoculars) and sound.

Vantage point surveys

Vantage point surveys were carried out in general accordance with the methodology used for assessing impacts of wind farms on bird communities published by Scottish Natural Heritage (SNH 2013). The purpose of these surveys was mainly to detect birds of prey and passing waterbirds (swans, geese, duck, waders etc.), though all birds observed during watches were recorded.

For sites other than Littleton bog, the duration of the vantage point watches carried out varied from 1 hour to in excess of 2 hours. This survey effort is considered adequate for these sites where there is no history of regular populations of target species and limited potential for such species to occur due to the habitats present (as shown from results of 2012/13 winter survey).

At Littleton bog, the full duration of 36 hours of observations at each vantage point over the site was achieved as required by the methodology (Scottish Natural Heritage, August 2013)

At each site a representative number of vantage points were established to provide views over large areas of the site and adjoining lands, with focus on expanses of habitats of potential value to wintering birds. The vantage points were positioned on elevated ground where feasible – these range from naturally higher ground (hillocks etc) to roads/embankments and even milled peat piles. At a small number of sites, heavy growth of scrub and low woodland partly obscured the view from the vantage point.

When a target species was sighted during a watch, the flightline was plotted onto a field map along with estimated flight height, duration of observation and any other parameters such as age and gender of bird, behaviour of bird (e.g. hunting, flying, roosting) etc.

Focused surveys for wetland birds

During the surveys carried out in the previous winter (2012/13), search had been made in the areas surrounding the bog sites for potential wetland or grassland sites which could support wintering waterbirds. No such sites were located in the immediate area of the Littleton bog sites. Further search, especially for Whooper Swan feeding sites, was made in the present winter.

Hen Harrier roost watches

Roost watches were carried out on two sites (Ballysorrell & Littleton bogs) where Hen Harrier activity had been recorded during winter 2012/13.

2.2.3 Target species

The winter surveys were focused on the potential presence of the following groups of birds or species:

- Waterfowl, especially Whooper Swan but also any geese or duck species
- Waders, especially flocks of Golden Plover, Lapwing or Curlew
- Hen Harriers, Merlin and other birds of prey
- Any other Annex 1 species of EU Birds Directive
- Any other Red or Amber listed species as given in Lynas *et al*. (2007)

Note re. update of Birds of Conservation Concern in Ireland

A new list of Birds of Conservation Concern in Ireland for the period 2014 to 2019 was published in late 2013 (Colhoun & Cummins 2013). The present winter survey was undertaken using the 2008-2013 though in this report reference is made to species that have been given a changed status. The principal changes involving species which can occur on the cutaway bog sites are as follows:

Green to Red

Meadow Pipit	short-term decline in breeding population
Grey Wagtail	short-term decline in breeding population

Amber to Red

Wigeon	long-term decline in non-breeding population
Tufted Duck	short-term decline in non-breeding population
Woodcock	long-term decline in breeding range (breeding & winter populations also given Amber status on basis of European status SPEC)

Green to Amber

Sparrowhawk	short-term decline in breeding population
Robin	short-term decline in breeding population
Stonechat	short-term decline in breeding population
Mistle Thrush	short-term decline in breeding population
Goldcrest	short-term decline in breeding population
Stonechat	short-term decline in breeding population
Greenfinch	short-term decline in breeding population

2.3 Survey Limitations

Surveys following standard methods and within the recommended time frames were carried out at all sites during the 2013/14 winter and hence there were no survey limitations.

However, as noted in the winter 2012/13 report, bird populations can vary between years, mainly as a result of weather but also due to other factors such as breeding success, local disturbance at sites, etc. (see Crowe 2005). For instance, species such as Golden Plover and Lapwing are highly affected by cold weather events. Cold weather usually results in large-scale movements, particularly from their preferred inland feeding areas to the relatively ice-

free coastline. Under more severe conditions, they may vacate Ireland altogether, possibly for France and Iberia. Whooper Swans may also be affected by severe cold weather and in the 2010 national census results were considered to be affected by the severe weather at the time, which resulted in flocks being widely dispersed and in locations where they had not previously been recorded as a result of the freezing-over of water bodies (Boland *et al*. 2010). It is therefore preferable to have more than one season's data in evaluating the importance of sites so as to dampen annual fluctuations in numbers (Crowe 2005). With baseline data available from the 2012/13 winter, the results of the present survey will provide a more robust assessment of the importance of sites for wintering birds.

2.4 Criteria for Evaluation of Ornithological Importance of Sites

The importance of winter wetland bird populations is evaluated according to the standard 1% thresholds for national (all-Ireland) and international importance (see Crowe 2006, Boland & Crowe 2012, Delaney and Scott 2006).

Evaluation of sites may also be made on the basis of the presence of species listed in Annex I of the EU Birds Directive or species listed as 'Birds of Conservation Concern', either on the Red List (High conservation concern) or Amber List (Medium conservation concern) (after Lynas *et al*. 2007). As evaluating sites due to the presence of such is not quantitative, a subjective assessment may need to be made – for instance, the regular presence within the site of a breeding pair of Peregrines (Annex I species) would be of more significance than the occasional record of hunting birds.

For an overall ecological assessment of the importance of a site, taking into account not just ornithological interests but also habitats, flora and other fauna types etc., reference is made to the NRA *Guidelines for Assessment of Ecological Impacts of National Road Schemes* (NRA, 2009). Whilst the NRA guidelines were devised specifically for road schemes, they can be applied to general environmental impact assessment. The NRA system uses the following five-point scale:

- International Importance
- National Importance
- County Importance
- Local Importance (higher value)
- Local Importance (lower value)

3.0 RESULTS AND DISCUSSION

3.1 Sites Designated for Nature Conservation

The following designated sites are located within a distance of approximately 15 km of the study area. These comprise the following types of designations:

- Special Protection Areas - SPAs are designated under Council Directive 79/409/EEC on the conservation of wild birds (i.e. the Birds Directive).

- Special Areas of Conservation - SACs are designated under Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (i.e. the Habitats Directive).

- Natural Heritage Areas - NHAs are designated under the Wildlife Amendment Act 2000.

- proposed Natural Heritage Areas - pNHAs do not receive legal protection though the ecological value of pNHAs is recognised by Planning and Licencing Authorities.

Apart from SPAs, these sites do not necessarily have ornithological interests though many would support some birds of conservation interest. In the following list, a note is made on whether the site has known ornithological interest.

Slieve Bloom Mountains SPA (code 004160)

This large upland site is designated for a nationally important population of breeding Hen Harriers. The site is situated on the border between Counties Offaly and Laois and runs along a northeast/southwest aligned ridge for approximately 25 km. The SPA includes the majority of the Slieve Bloom uplands.

Along with Hen Harriers, the site supports breeding Merlin and Red Grouse.

The SPA is situated just over 10 km north of Knockahaw bog.

River Nore SPA (code 004233)

This large site consists of the freshwater stretches of the River Nore and its main tributaries, including the Delour, Erkina and Kings rivers.

The site is a SPA as it is of special importance of Kingfisher. A survey in 2010 recorded 22 pairs of Kingfishers within the SPA. Other species which occur include Mute Swan (35), Mallard (267), Cormorant (14), Snipe (17) and Sand Martin (1,029) – all figures are peak counts recorded during the 2010 survey.

The bogs in the northern part of the Littleton group are within the Nore catchment. Knockahaw and Clonbuagh bogs are located approximately 15 km from Boston Bridge, the upper limit of the SPA along the Erkina River, while Templetuohy bog is within 13 km of Boston Bridge (all straight line distances).

River Barrow and River Nore SAC (code 002162)

This large site consists of the freshwater stretches of the Barrow/Nore River catchments as far upstream as the Slieve Bloom Mountains. All the main tributary rivers form part of the site, included the Delour, Dinin, Erkina, Munster, Arrigle and King's River on the Nore. Overall, the site is of considerable conservation significance for the occurrence of good examples of a range of habitats and of populations of plant and animal species that are listed on Annexes I and II of the EU Habitats Directive respectively.

The NPWS site synopsis notes that the site is of ornithological importance for a number of E.U. Birds Directive Annex I species including Greenland White-fronted Goose, Whooper Swan, Bewick's Swan, Bar-tailed Godwit, Peregrine and Kingfisher. Nationally important numbers of Golden Plover and Bar-tailed Godwit are found during the winter. Wintering flocks of migratory birds are seen in Shanahoe Marsh and the Curragh and Goul Marsh, both in Co. Laois.

Much of the area of the Littleton bog group is drained by the Nore system.

Lower River Suir SAC (code 002137)

This large site consists of the freshwater stretches of the River Suir immediately south of Thurles. All the main tributary rivers form part of the site. Overall, the site is of considerable conservation significance for the occurrence of good examples of a range of habitats and of populations of plant and animal species that are listed on Annexes I and II of the EU Habitats Directive respectively.

The NPWS site synopsis notes that parts of the site are of ornithological importance for a number of E.U. Birds Directive Annex I species including Greenland White-fronted Goose (10), Golden Plover (1490), Whooper Swan (7) and Kingfisher (figures given in brackets are the average maximum counts from 4 count areas within the site for the three winters between 1994 and 1997). Wintering populations of migratory birds use the site. In Cabragh marshes there is abundant food for surface feeding wildfowl which total at 1,000 or so in winter. Widgeon, Teal and Mallard are numerous and the latter has a large breeding population - with up to 400 in summer. In addition, less frequent species like Shoveler and Pintail occur and there are records for both Whooper and Bewick's swans. Kingfisher, a species that is listed on Annex I of the EU Birds Directive, occurs along some of the many tributaries throughout the site.

The southern part of the Littleton bog group is drained by the Suir system.

The Loughans SAC (code 0407)

This site which comprises three lakes is a turlough situated in flat land about 3 km east of Urlingford, below the Slieve Ardagh Hills. The site contains a numbers of rare and scarce plant species. The Loughans is approximately 5 km east of Bawnmore and Inch bogs, approximately 8 km east-northeast of Pope's bog and over 9 km northeast of Littleton bog.

This site is not of known ornithological interest.

Spahill and Clomantagh Hill SAC (code 0849)

Spahill and the adjacent hills form part of an escarpment that links the Slieve Ardagh Hills with the Castlecomer Plateau. The area is mostly limestone and supports a rich flora,

including rare orchids.

The SAC site is located approximately 8 km northeast of Bawnmore and Inch bogs, and over 10 km northeast of Pope's bog and Littleton bog.

This site is not of known ornithological interest.

Cullahill Mountain SAC (code 0831)

This site lies on western outlier of the Castlecomer Plateau, 6 km northeast of Johnstown. The area is mostly limestone and supports a rich flora, including rare orchids.

The SAC site is located approximately 11 km northeast of Bawnmore and Inch bogs, and approximately 10 km east of Templetuohy bog.

This site is not of known ornithological interest.

Kilduff, Devilsbit Mountain SAC (code 0934)

This upland site is situated approximately 5 km northwest of Templemore. The site supports upland grassland, heath and woodland habitats.

The SAC site is located approximately 10 km west of Knockahaw and Ballysorrell bogs.

Peregrine breeds within the site.

Nore Valley Bogs NHA (code 001853)

The site is good example of a relatively intact raised bog. It is located approximately 5 km southeast of Roscrea and approximately 8 km north of Knockahaw Bog.

The NPWS site synopsis notes that Hen Harrier has been recorded on the site.

Monaincha Bog/Ballaghmore Bog NHA (code 00652)

This NHA is a good example of a relatively intact raised bog. It is located about 3 km east of Roscrea Longwood and approximately 4 km south of Ballivor Bog.

This site is not listed as being of ornithological interest.

Killough Hill pNHA (code 0959)

This site surrounds a limestone quarry approximately 6 km south-southwest of Thurles. It is of importance due to the presence of some limestone pavement, as well as calcareous grassland and woodland and scrub.

The site is located approximately 5 km west of Killeen and Ballybeg bogs.

The woodland at the site is noted as having a large bird population.

Cabragh Wetlands pNHA (code 01934)

This site is in two parts both situated close to the River Suir near Thurles. The largest section is the Cabragh marshes, located approximately 3 km southwest of the town. This is a

large reedbed, with fen and marsh. The other sector is located at Ardbaun, just north of the town. This is a spring fed marsh, with abundant Saw Sedge.

The southern part of the site is located approximately 10 km west of Littleton and Ballybeg bogs, while the northern part is located approximately 10 km west of the Popes bog.

The main Cabragh wetland is an important site for wetland birds, especially wildfowl (Teal, Wigeon, Mallard) but also Whooper Swans. The northern part supports small numbers of wetland birds.

Laffansbridge pNHA (code 00965)

This pNHA is a cluster of five separate areas of calcareous grassland located near Laffansbridge village to the west of Killenaule. The herb-rich sward supports the rare plant Green-winged Orchid.

This pNHA is located just over 1 km south of Killeen bog.

This site is not of known ornithological interest.

Kilcooly Abbey Lake pNHA (code 00958)

This pNHA is a small lake in the estate grounds of an old abbey. It is located about 6 km southeast of Urlingford. The lake has a varied aquatic flora.

The pNHA is located approximately 7 km east of Popes bog and Inch bog.

The lake supports wetland bird species such as Mallard, Moorhen, Coot and Grey Heron.

Aghsmear House pNHA (code 02060)

This pNHA is a nursery roost of the Natterer's bat. It is located in the grounds of Aghsmear House, four kilometres south of Roscrea.

This pNHA is located 5 km northwest of Knockahaw bog.

This site is not of known ornithological interest.

St Anne's (Sean Ross Abbey), Roscrea pNHA (code 0656)

This pNHA is a nursery roost of the Leisler's bat. It is located within a modern school building in Roscrea.

The pNHA is located approximately 9 km northwest of Knockahaw bog.

This site is not of known ornithological interest.

Sheehills Esker pNHA (code 0938)

This pNHA consists of a series of discrete sandy esker ridges. The ridges are mostly wooded but also support patches of grassland. A number of scarce plants have been recorded from the site.

The pNHA is located approximately 8 km northwest of Knockahaw bog.

This site is not of known ornithological interest.

The Curragh and Goul River Marsh pNHA (code 0420)

This site, which lies between the towns of Rathdowney and Durrow, comprises a 6 km stretch of wet meadow through which flows the River Erkina. It supports an excellent diversity of wetland vegetation types.

The pNHA is located approximately 15 km east of the northernmost sector of the Littleton bog group.

The site is noted as an important winter feeding site for Greenland White-fronted Geese.

Grantstown Wood and Lough pNHA (code 0417)

This state owned Nature Reserve is located some 8 km northwest of Durrow. The lough is completely surrounded by woodland and there is an excellent seral transition of wetland habitats.

The pNHA is located approximately 15 km east of the northernmost sector of the Littleton bog group.

The site is not listed as being of ornithological interest.

3.2 Review of Past Data for Study Area

Some information on wetland birds in the wider study area is available through the various national wetland surveys that have take place since the early 1970s, though coverage in the area has been generally poor. There have been three national surveys (with I-WeBS on-going) as follows:

Irish Wetlands Enquiry

In the *Irish Wetlands Enquiry* (winters 1971-72 to 1974-75), which was the first national census of wetland birds, the **Thurles Sugar Factory Lagoons** is the only site in the wider area of the Littleton Bog Group that was included. The site was listed as being important for duck (over 1,000 comprising Teal, Wigeon, Shoveler and Pintail), with Whooper Swans (40) and Bewick's Swans (120) also present (Hutchinson 1979).

Winter Wetlands Survey

A further national census of wetland birds, the *Winter Wetlands Survey***,** took place over the three winters 1984-85 to 1986-87 (Sheppard 1993). Information was presented for the following sites in the present study area:

Co. Tipperary

Thurles Sugar Factory Lagoons (23 counts over 3 seasons):

Species with Nationally Important numbers:
Teal 1,073; Mallard 1,133; Shoveler 61

Species with Regionally/Locally Important numbers:
Bewick's Swan 30; Whooper Swan 38; Wigeon 387; Pintail 19; Golden Plover 890; Lapwing 1,050; Curlew 500.

Sheppard noted that the recent closure of the factory and the drainage of the lagoons would seem to spell the end of the interest at this site.

Upper River Suir (23 counts over 3 seasons)

Sheppard wrote 'Although the main area of interest is between Lafnagh and Golden, this stretch of the river could be taken to include the whole distance between Brittas (north of Thurles) and Caher.'

Species with Regionally/Locally Important numbers:
Mute Swan 33; Bewick's Swan 43; Whooper Swan 60; Wigeon 123; Teal 29; Mallard 70; Golden Plover 872; Lapwing 1,053.

Co Laois

Cullahill (S3576) (5 counts over 2 seasons)

Species with Nationally Important numbers:
Golden Plover 1,375

Species with Regionally/Locally Important numbers:
White-fronted Goose 95; Lapwing 950; Curlew 70.

This site appears to be a river flood plain, with fluctuating number of birds.

Durrow Curragh (S3778) (4 counts over 2 seasons)

Species with Nationally Important numbers:
Golden Plover 1,075

Species with Regionally/Locally Important numbers:
Lapwing 400; Curlew 65.

Irish Wetland Bird Survey **(I-WeBS)**

The *Irish Wetland Bird Survey* was initiated in 1994/95 and continues to the present. All major wetlands in the country are covered each winter by this scheme. Annual reports have been published and the first major review was carried out for the period 1994/95 to 1999/2000 (Crowe 2005), with a further review (species based rather than site based) for the period 2001/02 to 2008/09 carried out by Boland and Crowe (2012).

The following sites which are relevant to the study area are listed in the review by Crowe

(2005) (see Appendix 2 for full details of recent available count data):

Co. Tipperary

Cabragh Wetlands

The Cabragh Wetlands is noted as of national importance for Shoveler, with an average mean of 44 for the winters 1996/97 to 2000/01. The site is described as consisting of a large reedbed, a permanent pond, and an extensive area of callows which flood each winter. The site is located on the River Suir approximately 4 km southwest of the town of Thurles. The site is situated adjacent to the former sugar factory which discharged into it through a number of holding lagoons (now removed). The site is owned and managed by the Cabragh Wetlands Trust.

Other species which occur in significant numbers (though below relevant national importance thresholds) include the following:

> Mute Swan 16; Whooper Swan 21; White-fronted Goose 10, Wigeon 590; Teal 670; Mallard 160; Pintail 20; Golden Plover 900; Lapwing 700; Snipe 55; Curlew 151; Black-headed Gull 200; Lesser Black-backed Gull 310.

I-WeBS data (mean average peaks) for the 5 winters 2007/08 to 2011/12 are as follows:

> Mute Swan 6; Whooper Swan 34; White-fronted Goose 9, Wigeon 186; Teal 436; Mallard 86; Pintail 7; Shoveler 16; Golden Plover 190; Lapwing 610; Snipe 20; Curlew 135; Black-headed Gull 58; Lesser Black-backed Gull 2.

River Suir Upper

This section of the Suir includes one section near Brittas, located approximately 3 km north of Thurles. The site occasionally supports nationally important numbers of Golden Plover and Lapwing, along with the following:

> Mute Swan 14; Bewick's Swan 13; Whooper Swan 42; Wigeon 96; Teal 56; Mallard 9; Snipe 20 (all counts below relevant national importance thresholds).

I-WeBS data (mean average peaks) for the 5 winters 2007/08 to 2011/12 are as follows:

> Mute Swan 6; Whooper Swan 25; Wigeon 8; Teal 26; Mallard 1; Golden Plover 100; Lapwing 103; Curlew 17; Black-headed Gull 60.

Co. Laois

Durrow Curragh

This site is located approximately 3 km west of Durrow and includes an area of lowland grassland through which the Erkina River and the River Goul flow. These rivers flood in most winters.

The site is noted as being important for both Bewick's and Whooper Swans and formerly supported significant numbers of Greenland White-fronted Geese. The following counts are given (all below relevant national importance thresholds):

> Mute Swan 11; Bewick's Swan 47; Whooper Swan 108; Wigeon 1,000; Mallard 50; Golden Plover 3,000; Lapwing 500; Curlew 100.

There are no recent I-WeBS data other than a count of 73 Whooper Swans in winter 2004/05. Also, it can be assumed that the site is no longer used by Bewick's Swans as this species has declined throughout the country (Boland *et al*. 2010).

Status of Greenland White-fronted Goose in area

Ruttledge & Ogilvie (1979,) identified 'The Curragh' (site no. 09) as a traditional site for Greenland White-fronted Geese. They note that this was formerly a considerable area of callows liable to flooding alongside the River Erkina south of Bellacolla. They wrote that the small and very mobile population moves among several sites in the complex and at times the geese are inexplicably absent for a considerable period. Monaincha Bog, just SE of Roscrea, was listed as being formerly a haunt of 50-60 birds but it had been largely deserted as a result of shooting.

In the Greenland White-fronted Goose Site Inventory (Norriss unpublished), the following sites are within the present study area:

- Monaincha S179 882
- Curragh S365 797
- Goul River marsh S349 755
- Grantstown Lough S335 800
- Cabragh, Thurles S115 558

Fox *et al*. (1994) list the River Nore, Co Kilkenny (site no. 27) as a traditional site for Greenland White-fronted Geese (equates to site no.9 in R & O). There are eight known feeding sites, all on improved grassland. There is one suitable roost, Shanahoe marsh (S4088), with an alternative at Grantstown Lough though latter is considered too enclosed and disturbed for regular usage. A mean annual peak of 52 is given for the period 1988/89 to 1993/94.

Since then, the size of the population has dwindled, with the following peaks recorded in recent winters (Fox et al. 2010, 2011, 2012):

Winter 2009/10	9
Winter 2010/11	9
Winter 2011/12	11

Bruckana Wind Farm – Environmental Impact Statement

A winter bird survey for the Bruckana Wind Farm site, which is within Templetouhy bog, was carried out in December 2009 and February 2010. Peregrine was the only species of conservation importance recorded (1 record) on site. Small flocks of Teal and Mallard were recorded on the southern ponds, while counts in excess of 20 Snipe were made on site.

The December survey confirmed that flocks of Lapwing (80+) and Golden Plover (200+) use fields immediately east of the proposed wind farm site. In addition, 17 Whooper Swans were recorded using wetlands approximately 3 km from the site (though none present in February 2010).

Other Sources of Information

NPWS

The local NPWS Conservation Ranger, Ms Aine Lynch, provided information on a local Hen Harrier winter roost in the wider area but was not aware of any particular bird interests

associated with the Bord na Móna bog sites.

Irish Peatland Conservation Council

The IPCC is not familiar with this group of bogs and is not aware of any peatland sites of significance in this particular area.

BirdWatch Ireland

Whilst BirdWatch Ireland carried out a bird survey of Littleton bog as part of a wider study (see Copland 2011) this was a breeding bird survey and no information was collated on wintering birds.

BirdWatch Ireland is not familiar with the other bog sites in the group.

Overall Appraisal of Available Information

Generally there is very little past information available on wintering birds for the Bord na Móna bogs in the study area. Internal Bord na Móna information has identified several sites (mainly Littleton and Bawnmore) as supporting small numbers of wetland birds but this information is generally derived from casual observations. While wintering Hen Harriers are known to occur sparsely through the area, winter roosts have not been recorded or suspected on Bord na Móna lands.

In the wider region, there are several wetland sites that support swans and other waterbirds and which have been reasonably well monitored by the I-WeBS scheme (and its predecessors) over the years. However, these are at distances of between 10 and 15 km (approximately) from any of the bog sites.

It is concluded that past bird information relating to the immediate study area is scant and generally of limited value in the context of the present study.

3.3 Site Descriptions

Sites are described in a standard format, as follows:

brief, general description of the site
outline details of the survey locations
target species recorded
potential for other target species
other species of note
overview

A map showing the survey locations and any target species recorded is presented for each site (some sites had no target species). Selected photographs are included.

Scientific names of bird species are given in Appendix 1.

The detailed vantage point survey data for Littleton bog are given in Appendix 2.

SITE: KNOCKAHAW

Knockahaw bog is a medium sized site located just over seven kilometres northeast of Templemore town. This is an outlying site from the other sites in the Littleton Group. The main access points used for the site are from lanes or tracks off third class roads to the east and west. The site extends for approximately 2 km from north to south and for 2 km from east to west.

Knockahaw is dominated by remnant high bog, the majority of which has had surface drains inserted (presumably in preparation for harvesting). Much of the bog has been burnt extensively in the recent past. Cutover bog, with birch scrub and bog woodland in places, occurs along parts of the margins of the site.

The site is surrounded mainly by farmland. Further bog occurs to the northeast and there is some forestry to the east and south. There is a small patch of mixed woodland (oak and sycamore) on the north east boundary.

Survey locations

Transect 1 starts at vantage point 1 in the northwest of the site and runs southeast along the site boundary crossing drained remnant bog and sod peat production. It then follows the boundary lane southeast along the edge of the site through birch woodland.

Transect 2 starts at the site access point in the east of the site and comprises a loop across drained remnant bog.

Vantage Point 1 is located at the start of transect 1 at the northwest boundary and looks southeast over the majority of site (drained remnant bog).

Target species recorded

Hen Harrier

There were two records as follows:

A male bird seen in poor light in easternmost part of site on 1st October. Bird was flying at less than 10 m height.

An adult male hunting (<10 m) over northeast part of site on 7th December.

Potential for other target species

Golden Plover had been recorded on the site in winter 2012/13. The bog habitat could attract hunting Merlin.

Other species of note

Buzzard – one in October and two in March, considered to breed in tall woodland to east of site.

Kestrel – single bird hunting over bog on 15th March.

Snipe – recorded in low numbers (<5) in October and March.

Skylark – five on 1st October, seven on 15th March.

Meadow Pipit – present on each site visit, with peak of 15 on 1st October. Resident on site.

Linnet – flock of c.20 on 1st October

Overview

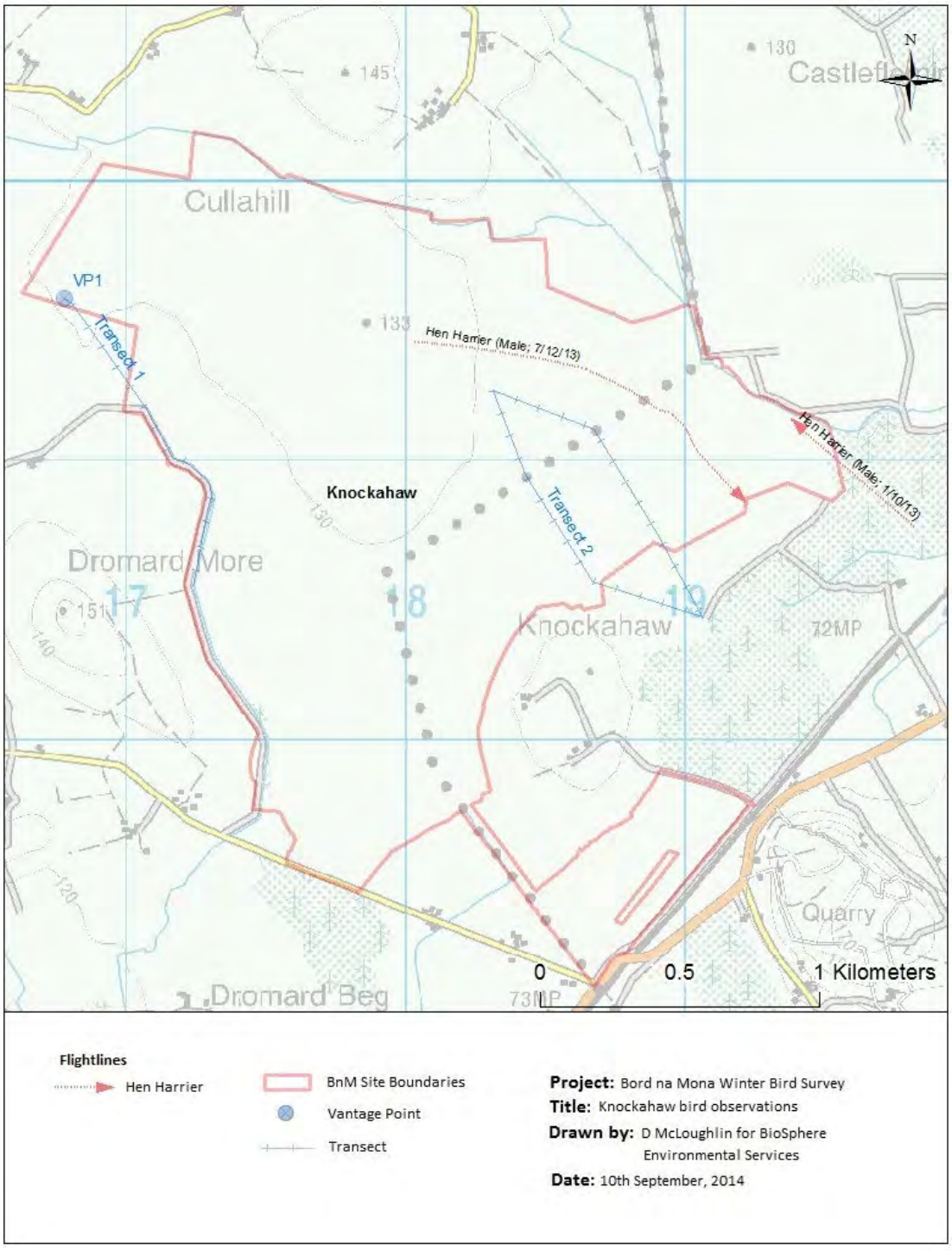
Knockahaw bog has limited potential for wintering birds of conservation importance.

It does, however, provide suitable foraging habitat for Hen Harrier and could attract Merlin. Golden Plover had been recorded roosting on the bog in the previous winter. The remnant bog provides habitat for Kestrel, Snipe, Skylark and Linnet (Amber listed species). Meadow Pipit occurs widely in the site.



Knockahaw bog, Plate 1: view of bog surface with drains.

Knockahaw: Map showing transect and vantage point locations, with records of target species.



SITE: CLONBUAGH (KNOCKAHAW)

Clonbuagh bog is a small site located eight kilometres northeast of Templemore town. This is an outlying site from the other sites in the Littleton Group and is located approximately 1 km southeast of the main Knockahaw site. The access route used to the site is from a lane leading from a regional class road to the north. The site extends for c.700 m from north to south and c.500 m from east to west.

The site is a remnant raised bog with some drains but still largely intact and very wet. Birch woodland occurs along much of the margins.

The site is surrounded by farmland and forestry. A large quarry complex occurs to the northeast

Survey locations

Transect 1 starts at the southern end of the site where the bog road crosses a drain. It runs northwest over remnant bog to a clump of Scots pine trees.

Transect 2 starts at the clump of Scots pines and runs east to the southeast site boundary then turns south following the site boundary and back to the start of transect 1.

Vantage Point 1 is located at the clump of Scots pine trees in the bog and offers good views over the entire site (mainly remnant bog and birch woodland).

Target species recorded

No target species were recorded during the surveys.

Potential for other target species

The site could attract hunting Hen Harrier and Merlin.

Other species of note

Buzzard – five birds soaring over the margin of the site and adjoining woodland on 15th March. Undoubtedly breeds close to the site.

Kestrel – one on 1st October and a displaying pair on 15th March. Breeds locally.

Snipe – six flushed from bog on 1st October and two on 29th January.

Skylark – three on 1st October, two on 15th March 2013.

Meadow Pipit – present on each site visit, with peak of nine on 1st October. Breeds on site.

Overview

Clonbuagh bog has limited potential for wintering birds of conservation importance.

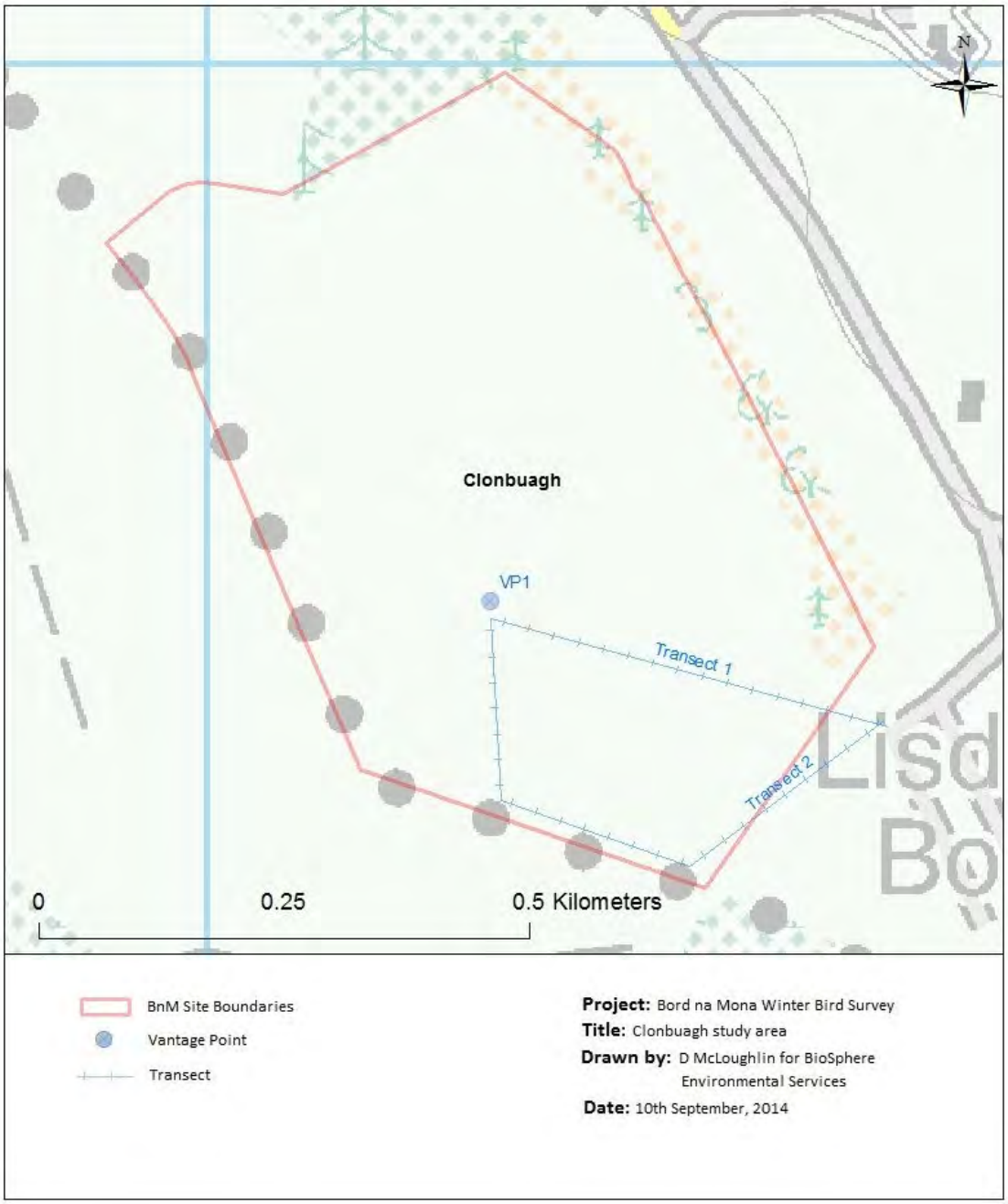
It is, however, a relatively intact raised bog and provides potential foraging habitat for Hen

Harrier and Merlin. The bog provides habitat for Kestrel, Snipe and Skylark (Amber listed species). Meadow Pipit occurs widely in the site.



Clonbuagh bog, Plate 1: view of relatively intact bog surface.

Clonbuagh: Map showing transect and vantage point locations.



SITE: BALLYSORRELL

Ballysorrell bog is a small sized site located approximately five kilometres east of Templemore town and about two kilometres northwest of Templetuohy village. This is an outlying site, being 3 km east of the next bog site in the group (Templetuohy). The main access to the site is from a (gated) lane leading from a regional class road to the south. The site extends for less than 2 km from north to south and c.1 km from east to west.

Ballysorrell comprises largely remnant high bog and regenerating cutover bog. Birch woodland and gorse scrub occur in the marginal areas of the site.

The site is mostly surrounded by farmland, with commercial forestry to the north.

Survey locations

Transect 1 starts at the site access point in the southeast and runs northwest crossing remnant bog. The transect then turns north towards the centre of the site (an abandoned tractor and draining machine occurs here). On the return loop the transect passes through gorse scrub.

Vantage Point 1 is located at the heather cutting machines near the track and looks west and northwest over the entire southern sector of the site (scrub and remnant bog).

Vantage Point 2 is located at the abandoned tractor; it offers views all round the central and northern parts of the site.

Target species recorded

Hen Harrier

Two ringtails (considered 1st year male birds due to small size) flying together over cutover bog in south of site at 12.20 hrs on 7th December. Flying between 10 m and 50 m height. Observed for about 30 seconds but not seen again.

With a male recorded in January 2013, there is possibly a roost either on site or close by.

Merlin

On 7th December a Merlin was observed perched in a small bush in the central area of the site and was observed hunting in same area about 10 minutes later (at height of <10 m).

On 4th February at 08.47 hrs, a female Merlin was observed carrying prey while flying low (<10 m) towards the western boundary of the site. At 08.55 hrs, a male bird was recorded hunting in the same general area.

Peregrine

Two Peregrines (male and female) were recorded just to the northeast of the site on 7th December. The birds were hunting in a flock of Rooks and then were observed perched on the ground

Potential for other target species

There is no potential for species such as Whooper Swans on this site.

Other species of note

Sparrowhawk – one on site on 14th November.

Buzzard – one just off southern boundary of site on 14th November.

Kestrel – singles hunting within the site on 14th November and 4th February.

Snipe – two on 7th December and four on 4th February.

Skylark – two on 4th February.

Stonechat – pair in February.

Meadow Pipit – recorded on each site visit, with peak of nine on 4th February.

Overview

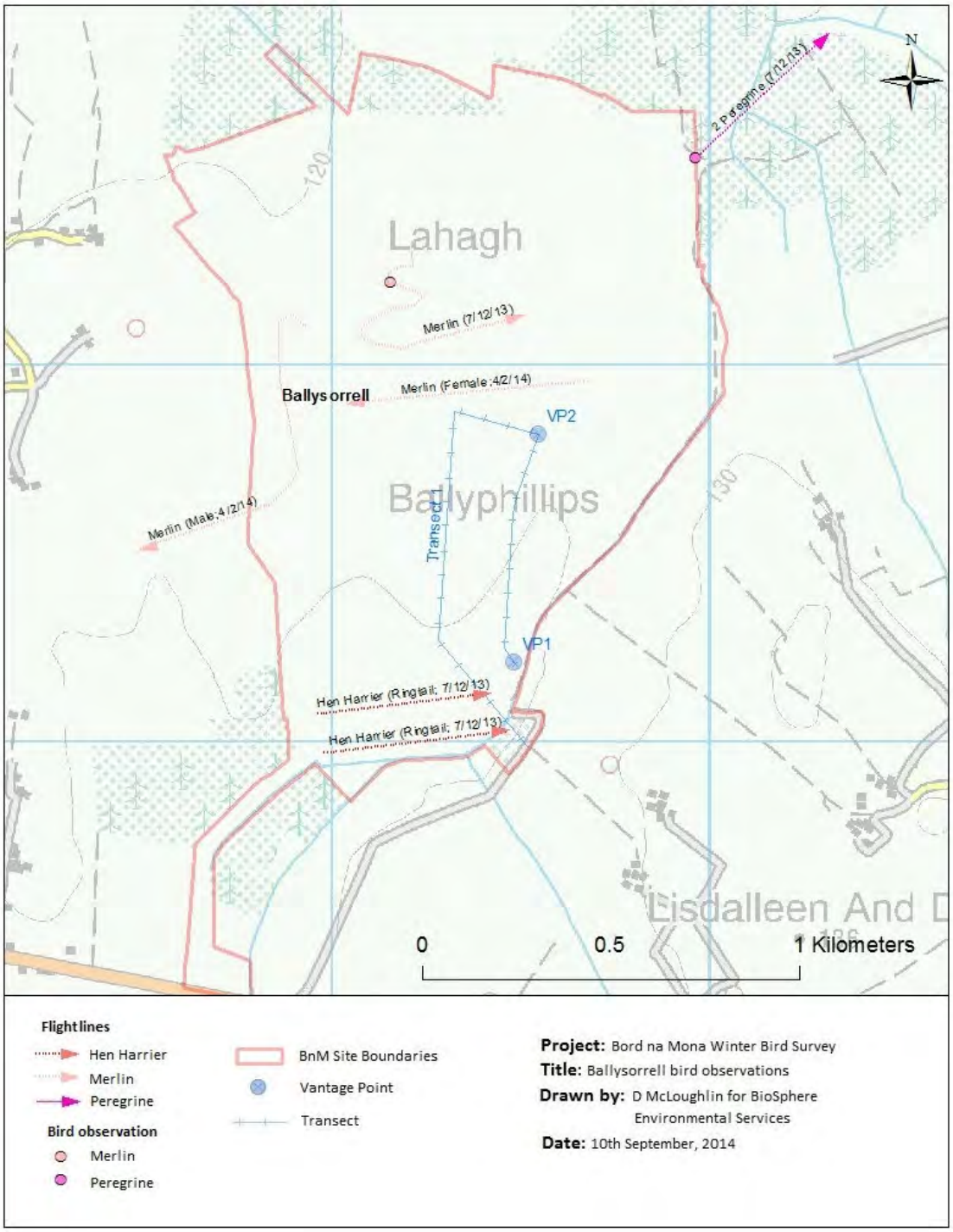
Ballysorrell bog is of some conservation importance for wintering birds due to the presence of Hen Harriers on site in both winters and with some potential for a roost on site or close by. The presence of Merlin on two occasions, including a pair in February may indicate a local breeding territory (though not necessarily on site).

The site provides habitat for Kestrel, Snipe, Skylark (Amber listed species), as well as Sparrowhawk and Meadow Pipit.



Ballysorrell bog, Plate 1: view of bog surface.

Ballysorrell: Map showing transect and vantage point locations, with records of target species.



SITE: TEMPLETUOHY

Templetuohy bog is a medium sized site located approximately 2 kilometres east of Templetuohy village and 11 kilometres northeast of Thurles town. The site adjoins Derryville bog to the south. The main access used for the survey is from a lane off a regional class road mid west of the site. The site extends for c. 4 km from north to south and for up to 2 km from east to west. The recently constructed Bruckana Wind Farm is located within this site.

Roughly half the site is bare peat with commercial production still in progress. The remainder is regenerating cutover, remnant high bog and some open water.

Templetouhy bog is mostly surrounded by farmland but with stands of mixed coniferous forestry to the east, south and west.

Survey locations

Transect 1 is a long, rectangular loop which passes over the main part of the site and through the principal habitats on site.

Vantage Point 1 is located at the end of the bog road in the mid west of the site and looks over the remnant bog and bare peat, offering good views over large areas of the central and southern parts.

Vantage Point 2 is located along a third class road at the northernmost point of the site and looks south over remnant cutover bog and bare peat in the northern half of the site.

Target species recorded

No target species were recorded during the surveys.

Potential for other target species

While Whooper Swan could potentially use the site as there are some areas of open water, there were no records over the two winters of survey. The nearest known swan activity is at Thurles (c. 10km to west).

The remnant and cutover bog habitats could attract hunting Hen Harrier and Merlin.

Other species of note

Kestrel – single hunting birds recorded on site on 14th November, 29th January and 19th March.

Snipe – one on 14th November, with four on 29th January and on 19th March.

Skylark – three on 19th March were displaying.

Stonechat - Single bird present on 29th January.

Meadow Pipit – recorded on each site visit, with peak of 15 on 19th March.

Overview

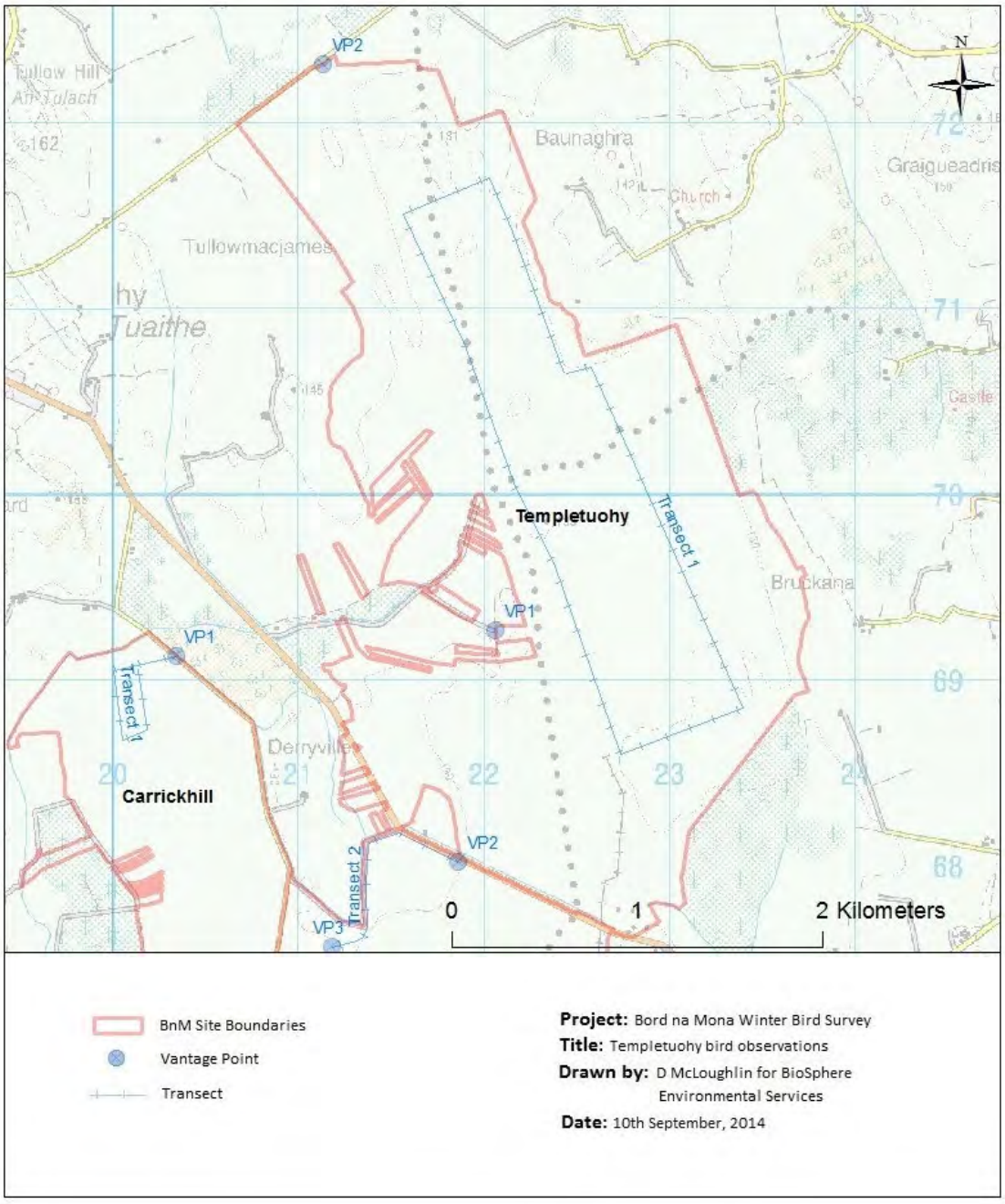
While no target species were recorded during the surveys, Templetuohy bog has potential to support species such as Hen Harrier and Merlin and possibly Whooper Swan on occasions.

Several Amber listed species were recorded, including Kestrel, Snipe and Skylark. Meadow Pipit is widespread on site.



Templetuohy bog, Plate 1: view of wetland habitat within site.

Templetuohy: Map showing transect and vantage point locations.



SITE: DERRYVILLE

Derryville bog is a small to medium sized site located ten kilometres northeast of Thurles town. It adjoins Templetuohy to the north, Carrickhill to the west and Bawnmore to the south. The main accesses used are from a second class road at the north of the site and a third class road at the south. The site extends for up to 1 km from north to south and for approximately 2.5 km from east to west.

Derryville bog is largely bare peat with production still in progress over much of the area. There are some small areas of regenerating cutaway bog and remnant high bog along the margins and a small area of mature coniferous forestry in the southwest corner.

As noted, Derryville adjoins three other bog sites, with areas of farmland and forestry to the east and north. The Lisheen mines complex occurs to the south of the site.

Survey locations

Transect 1 starts at the road at the southern boundary of the site and runs north following the track on eastern side of the railway line, with forestry and remnant bog on the eastern side and bare peat to the west.

Transect 2 starts at the road at the north end of the site and follows the boundary at the northwest corner, finishing at the site buildings. It runs through an area of cutover and looks over bare peat to the east and south

Vantage Point 1 is located at the north end of transect 1 and covers the eastern sector of the site (predominantly bare peat).

Vantage Point 2 is located at the eastern end of transect 2 (at the site buildings) and looks out over the central area of the site (predominately bare peat).

Vantage Point 3 is located at the western end of transect 2 and looks out over the western area of the site.

Target species recorded

No target species were recorded during the winter surveys.

Potential for other target species

There is no potential for wetland bird species, such as Whooper Swan, to use this site.

The marginal remnant and cutover bog habitats could attract hunting Hen Harrier and Merlin though the extent of these habitats is limited.

Other species of note

Snipe – two on 23rd January, one on 8th March.

Stonechat – pair on 8th March.

Meadow Pipit – five on 14th November, seven on 8th March.

Linnet – 12 on 23rd January.

Overview

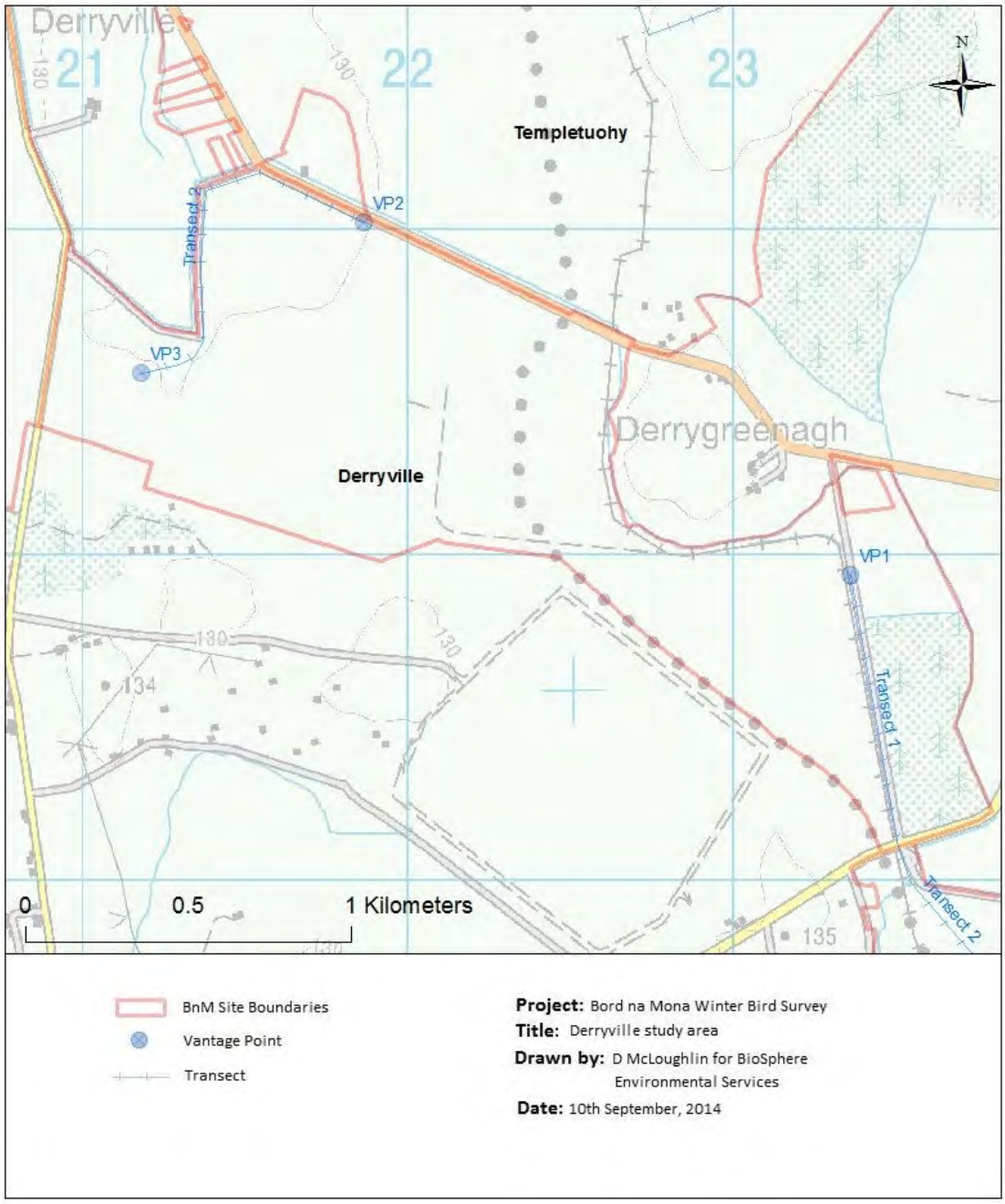
Derryville Bog has limited potential for wintering birds of conservation importance.

The most useful areas of habitat are the small areas remnant/cutover bog on the eastern boundary which could attract species such as Hen Harrier and Merlin. Supports Snipe and Linnet, both Amber listed species.



Derryville bog, Plate 1: view of typical habitats within site.

Derryville: Map showing transect and vantage point locations.



SITE: CARRICKHILL

Carrickhill bog is a small site located ten kilometres northeast of Thurles town. It adjoins Derryville to the east. The main access to the site is from a third class road on the northeastern boundary. The site extends for up to 2 km from north to south and for up to 1 km from east to west.

Carrickhill is largely bare peat with production still in progress over much of the area. There are small areas of regenerating and remnant high bog along the northern and western margins of the site.

The site is surrounded by farmland and mature coniferous forestry.

Survey locations

Transect 1 starts at the roadside on the northern boundary. It runs west along the railway line for about three hundred metres then turns south and runs around a small area of regenerating cutover.

Vantage Point 1 is located at the start of transect 1 and gives a good view over the majority of the site (predominantly bare peat).

Target species recorded

No target species were recorded during the winter surveys.

Potential for other target species

The marginal remnant and cutover bog habitats could attract hunting Hen Harrier and Merlin.

While Whooper Swans were recorded on site in December 2012, this was at a time when there was a small body of open water on the northern boundary.

Other species of note

Kestrel – one hunting along margin of site on 11th November.

Snipe – three flushed on 11th November, two on 1st March.

Lesser Black-backed Gull – 115 resting on bare peat with standing water on 11th November.

Skylark – three on 1st March

Meadow Pipit – present in each month of survey, with peak of 13 on 11th November.

Linnet – four on 11th November.

Overview

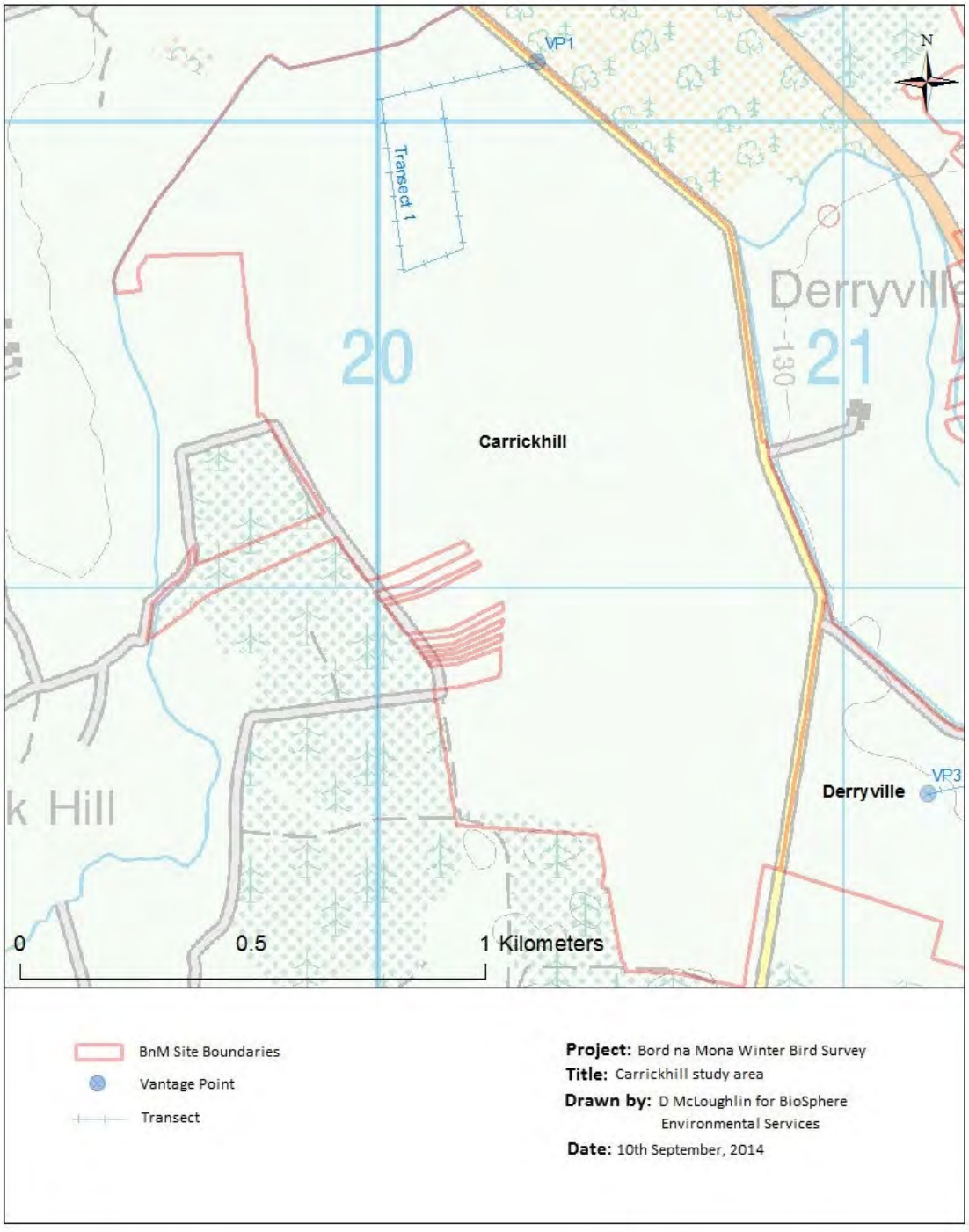
Carrickhill bog has limited potential for wintering birds of conservation importance. The marginal cutover and remnant bog habitats could attract species such as Hen Harrier and Merlin.

Several Amber listed species were recorded, namely Kestrel, Snipe, Lesser Black-backed Gull, Skylark and Linnet. The Lesser Black-backed Gulls were considered to be birds on migration which availed of the wet peat for resting.



Carrickhill bog, Plate 1: view of typical habitats within site, looking towards Lisheen wind farm.

Carrickhill: Map showing transect and vantage point locations.



SITE: BAWNMORE

Bawnmore bog is a medium sized site located almost ten kilometres northeast of Thurles town and just over 2 kilometres west-northwest of Urlingford. Bawnmore adjoins Derryville bog to the northwest and Inch to the south. The main access to the site is from a third class road at the north end of the site. The site extends for up to 2.5 km from north to south and for just over 2 km from east to west. A small outlier of remnant bog occurs to the west of the main site.

Bawnmore is largely bare peat with production still in progress over much of the area Regenerating cutaway bog and old cutover occurs in the southwestern quarter and along the western margin. There are some small areas of remnant high bog along the northeast margin of the site, along with a small patch of reeds (*Phragmites australis*).

The site is surrounded mostly by farmland, though there is an extensive area of mature coniferous forestry to the east.

Survey locations

Transect 1 starts at the railway line in the southern end of the site and runs north through an area of cutover bog.

Transect 2 starts at the road at the north of the site and runs southeast for over 1.5 km. It then turns northwest at the railway following it for 500 m and then turning north-northwest over bare peat to an area of remnant bog.

Vantage Point 1 is located at the north end of transect 1 and covers the southern sector of the site.

Vantage Point 2 is located at the end of transect 2 and covers the northern sector of the site (remnant and bare peat).

Vantage Point 3 overlooks the outlier area of remnant bog to the west and also gives views over the northwest sector of the main site.

Target species recorded

Lapwing
c.50 resting on sparsely vegetated cutaway on 11th November. Four on 8th March were returned breeding birds.

Potential for other target species

The marginal remnant and cutover bog habitats could attract hunting Hen Harriers and Merlin.

Whooper Swans could potentially use the site as there are small areas of open water in the southwest sector of the bog. However, there were no sightings during the two years of winter surveys. The nearest known swan activity is at Thurles (c.8 km to NW).

Other species of note

Teal – four on 18th February.

Kestrel – singles recorded hunting on site on 15th October, 11th November and 18th February.

Sparrowhawk – one on 18th February, one carrying prey item on 8th March.

Snipe – recorded on all site visits, with peak of five on 18th February.

Lesser Black-backed Gull – four on bare peat on 11th November.

Skylark – three on 15th October and four on 11th November. Two singing birds on 8th March.

Stonechat – one on 20th January, pair on 8th March.

Meadow Pipit – recorded on all site visits with peaks of 22 on 15th October and 15 on 8th March.

Linnet – two on 11th November, eight on 18th February.

Overview

Bawnmore bog has limited potential for wintering birds of conservation importance.

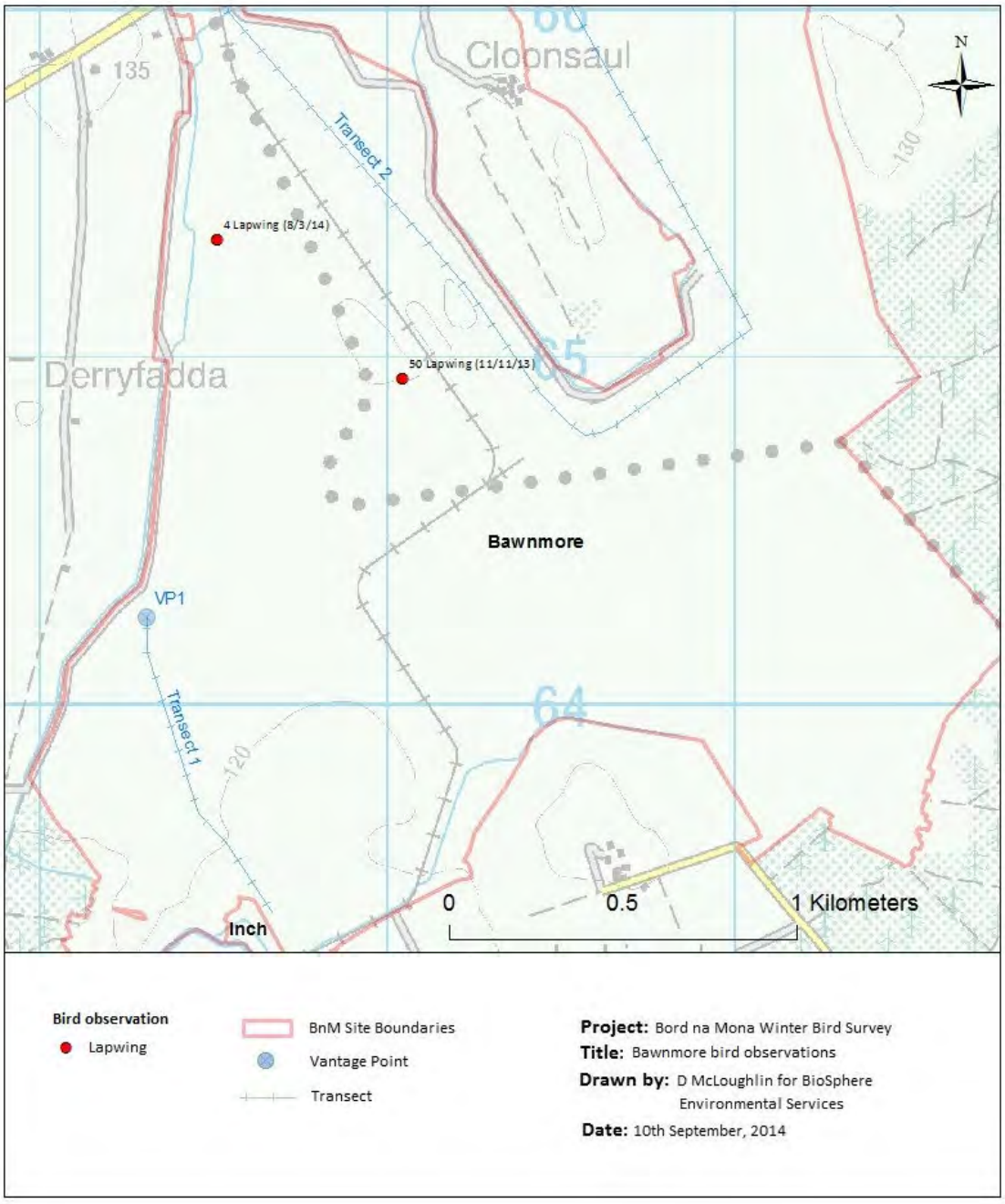
However, the remnant bog in the northeast and the regenerating cutaway in the southwestern quarter provide good habitat for species such as Hen Harrier and Merlin and there is some potential, albeit limited, for Whooper Swans. Lapwing was recorded in winter, with territorial birds present in March.

A number of Amber listed species were recorded, including Kestrel, Teal, Lapwing, Snipe, Skylark and Linnet. Meadow Pipit is widespread on the site.



Bawnmore bog, Plate 1: view of regenerating cutover bog with ponds in southwest sector.

Bawnmore: Map showing transect and vantage point locations, with records of target species.



SITE: INCH

Inch bog is a small site located approximately ten kilometres east-northeast of Thurles town and just over two kilometres west of Urlingford. Inch adjoins Bawnmore to the north and is connected to Popes bog to the southwest (via a rail line corridor). The main access to the site is from a third class road at the southwest corner of the site. The site extends for up to 1 km from north to south and for just over 1 km from east to west.

Inch is largely bare peat with production still in progress over much of the area. There are strips of old cutover bog and remnant bog along the boundaries of the site. A large dyke runs along the northwestern side of the site.

Inch is surrounded largely by farmland, with mature coniferous forestry to the west.

Survey locations

Transect 1 starts at the southwest corner of the site and runs along the railway line and ends where it joins Bawnmore bog.

Target species recorded

No target species were recorded during the surveys.

Potential for other target species

There is limited potential for Inch bog to attract target species. However, the marginal strips of remnant and cutover bog habitats could attract hunting Hen Harrier and Merlin.

Other species of note

Sparrowhawk – one hunting over marginal scrub on 30th December.

Kestrel – one hunting bird present on 18th February.

Snipe – three on 15th October, two on 30th December.

Skylark – two on 15th October.

Stonechat – one on 15th October.

Meadow Pipit – recorded in low numbers in each survey visit, with peak of four on 18th February.

Overview

Inch bog has limited potential for wintering birds of conservation importance.

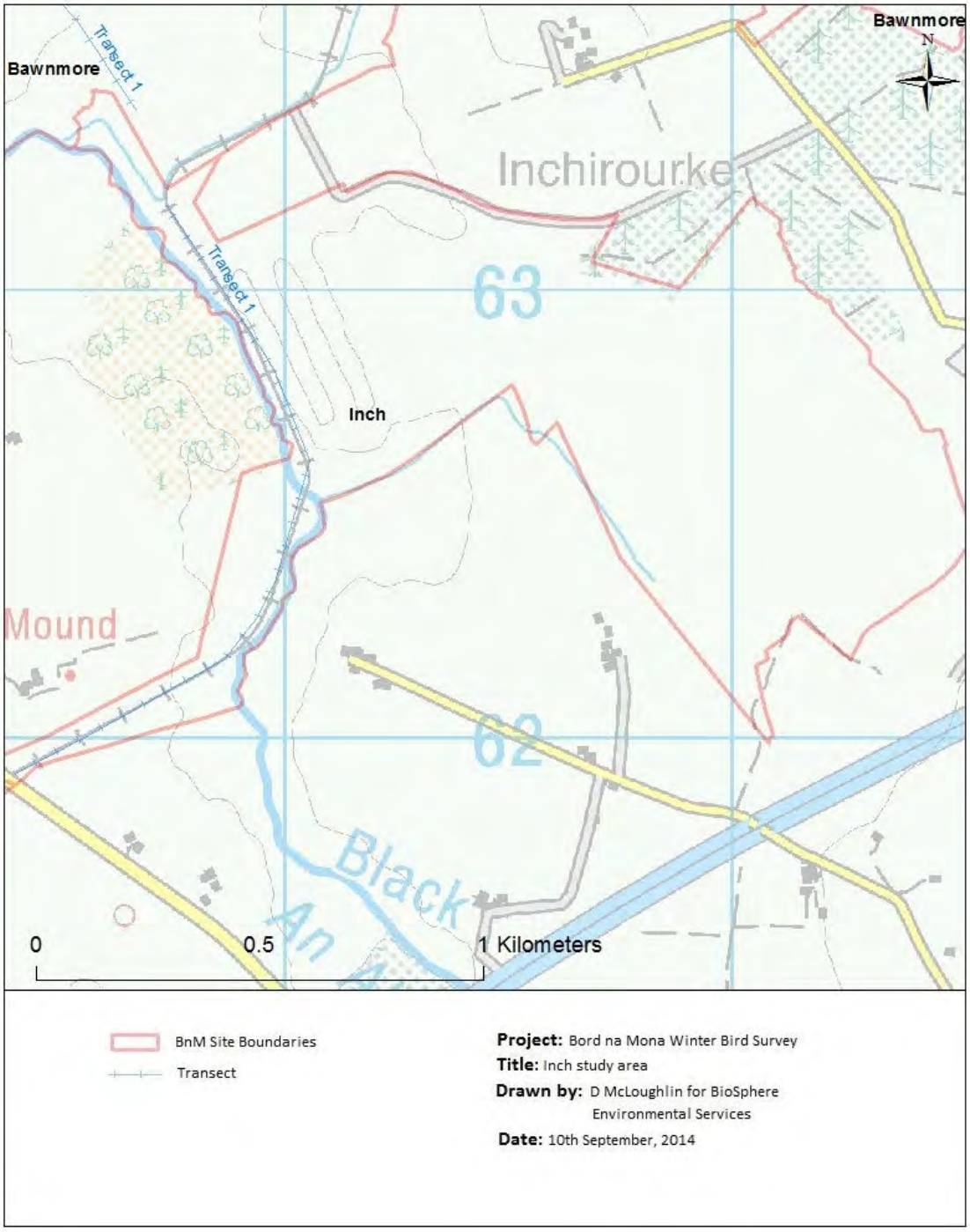
The most useful areas of habitat are the small areas of remnant/cutover bog on the boundaries which could attract species such as Hen Harrier and Merlin.

A number of Amber listed species were recorded, namely Kestrel, Snipe and Skylark. Meadow Pipit occurs sparsely on the site.



Inch bog, Plate 1: view of dyke along western end of site.

Inch: Map showing transect and vantage point locations.



SITE: LONGFORD PASS (POPES BOG)

Popes bog is a small to medium sized site located approximately eight kilometres east-northeast of Thurles town and just over 5 km southwest of Urlingford. The site adjoins Inch bog to the northeast (via a railway corridor) and is contiguous with Littleton to the south (though separated by a road). The main access to the site is from a third class road on the north boundary of the site, at the railway line. The site extends for c.2 km from north to south and for over 1 km from east to west.

Popes bog is largely bare peat with production still in progress over much of the area. There are strips of regenerating cutaway bog and patches of remnant high bog and old cutover along the margins, with a more extensive area of these habitats at the southern end of the site (though latter separated from main site by motorway).

The site is surrounded by farmland, with a stand of coniferous forest to the southwest.

Survey locations

Transect 1 starts at the railway line at the north end of the site. It runs south along the line and ends where the line turns west.

Vantage Point 1 is located at the south end of transect 1 and gives a view over much of the site.

Target species recorded

Peregrine
Two birds were recorded soaring over the bog at a height of 100+ m on 12th October.

Potential for other target species

The marginal remnant and cutover bog habitats could attract hunting Hen Harrier and Merlin.

Other species of note

Kestrel – singles recorded hunting on site 12th October and 18th February.

Snipe – three on 12th October, two on 11th December, one on 18th February.

Skylark – two on 12th October.

Meadow Pipit – five on 12th October, three on 11th December and six on 18th February.

Overview

Popes bog has limited potential for wintering birds of conservation importance.

The various areas of remnant and cutover bog along the boundaries and especially in the south sector could attract species such as Hen Harrier and Merlin. Peregrine was recorded over the site, with several amber listed species recorded on site, namely Kestrel, Snipe and Skylark.



Popes bog, Plate 1: general view of site.

Popes bog: Map showing transect and vantage point locations, and records of target species.



SITE: LITTLETON

Littleton bog is a large site located 8.5 kilometres east-southeast of Thurles town. It adjoins Popes bog to the north and Lanespark to the south (latter via a rail corridor). The main site accesses are at the north and south ends of the bog adjacent to the railway line. The site extends for just over 5 km from north to south and from c.1 km (at north end) to 3 km (at south end) from east to west.

A high proportion of the site is regenerating cutaway (heath, scrub, woodland) but includes open areas with large bodies of open water. Areas of remnant high bog occur scattered along the boundaries. Commercial production is still in progress in other areas, mainly the north, of the site. A conifer plantation occurs in the southernmost part of the site.

Littleton is generally surrounded by farmland but there are extensive conifer plantations along the eastern and western boundaries.

Survey locations

Transect 1 starts at the southern corner of the site on the western side of the railway line and runs north-northeast. It turns west at the old railway line and follows the line to the edge of the site, then turns northwest and goes around a large lake and back to the old railway.

Transect 2 starts at the northern end of the site at the railway, following the rail line south where it turns west and runs to the northern end of a large lake. It then turns north and ends on the public road.

Transect 3 starts at the southwestern corner of the site and runs north and northwest over remnant and cutover bog. It ends at the railway line which runs north-south through the entire site.

Vantage Point 1 is located along transect 1 and covers the southern sector of the site predominantly regenerating cutover bog).

Vantage Point 2 is at the northern end of the site on the public roadside and covers the north sector of the site (cutover and bare peat)

Vantage Point 3 is located at the beginning of transect 3 and affords a view over the central sector of the site. On a clear day the wind turbines at Lisheen, 12 km away, can be seen.

Target species recorded

<u>Whooper Swan</u>

The followings sightings were made during vantage point watches:

On 12th October, one flew northwards over north end of site.

On 11th December, a flock of 11 flew southwest from grassland feeding site to west of site. Also, two flew in a northeast direction across site.

On 19th December, five took off from lake in southwest of site (at 10.26 hrs) and flew east and then south. Later (10.47 hrs), probable same five flew across site.

On 30th December, a flock of nine flew to a feeding area in north of site – fed for 80 minutes and then flew out of site to southwest.

On 9th January, 15 swans recorded feeding and resting on wet bog beside flooded area.

On 20th January, 34 swans recorded feeding (for 3 hrs) on flooded bog in north of site.

On 10th February, party of six flew northwards out of site.

On 18th February, 22 swans flew north towards grassland feeding site just west of site boundary.

On 28th February, 28 swans were feeding on the grassland site just west of site boundary.

On 1st March, 18 swans flew towards the grassland site just west of site boundary.

On 5th March, five swans were feeding on the grassland site just west of site boundary.

The vantage point surveys showed Whooper Swan activity within and around the site through much of the winter. Swans were recorded feeding and/or resting in at least three locations within the site, all being wet bog or shallow ponded areas. A grassland feeding site occurs to the northwest of the site. Swans were also recorded (11th December) feeding in a fodder beet field approximately 1.5 km to the northeast of the site. These birds flew towards Littleton bog at dusk, possibly to roost within the site. While there was a regular presence of swans at the site, numbers involved were relatively low with a peak of 34 on 20th January.

Greylag Goose

Seven flying over central area of site on 18th February were considered feral birds.

Hen Harrier

On 8th October, three sightings of a ringtail were made in the southern sector of the site, all probably involving the one individual.

On 4th November, a ringtail was recorded hunting in the southwest sector, with a further sighting nearby later in day (probable same bird). An adult male was also recorded.

On 21st November, a male was observed going to roost in regenerating heather bog and scrub close to southeast corner of site at 16.46 hours.

On 11th December, two birds, an adult female and a first year male, were present in the northern half of the site at 09.43 hours.

On 19th December, a ringtail, probably a first year male, was present hunting in the extreme southwest sector of the site (at 10.23 hrs). At 16.42 hrs, a ringtail was observed going to roost in heather in the southeast sector.

Littleton bog provides good hunting habitat for Hen Harriers and supports a night roost. At least three individual birds were involved in the sightings from October to December. The roost location is in regenerating heather close to the southwest boundary of the site. Birds had been seen in this area the previous winter when a roost was suspected.

Merlin

On 8th October, a Merlin flew west in the extreme southwest of the site at 07.35 hrs, later at 08.33 hrs the presumed same bird was observed hunting nearby.

On 4th November, one flew into the southwest sector of the site and hunted over heather.

On 2nd December, a bird flew eastwards just north of VP2.

On 19th December, a female bird was observed hunting and then perched on a stump for c.40 minutes.

Littleton provides good hunting habitat for Merlin, with four sightings all in the south-western sector of the site.

Peregrine
On 6th December, a Peregrine was observed perched on a pine stump along the site boundary for c.1.5 hours.

Potential for other target species

Golden Plover could be expected on parts of the site and had been recorded in the previous winter.

Other species of note

Teal – recorded on areas of open water several times through the winter though in small numbers (peak of 9).

Wigeon – flocks of 15 and 20 recorded on open water in southwest sector of site on 19th December and 3rd February respectively.

Mallard – present on ponds and flooded areas through the winter, with peak count of 68 on 8th October.

Sparrowhawk – single birds recorded in all months apart from March.

Buzzard – one to two birds observed on most site visits.

Kestrel – recorded in all winter months. All records were of single birds, with the majority hunting on site.

Water Rail – one to two regularly heard in wetland areas, with three on 6th December. Most records were at dusk.

Snipe – well distributed throughout the site though in relatively small numbers, with highest count of eight.

Jack Snipe – singles on 11th December and 10th February.

Woodcock – singles on 6th and 19th December, two on 5th March, one on 18th March.

Skylark – recorded in October (4), November (1), and March (8) (latter breeding birds).

Starling – flocks of c.100 regular on site, with peak of 300 on 2nd February. .

Stonechat – one to two birds recorded in most months.

Meadow Pipit – regular on site through the winter though in small numbers (peak of c.20 in October). Territorial birds on site in March.

Linnet – regular through the winter, with peak count of 20 on 12th October.

Overview

Littleton bog contains some good habitat for wintering birds of conservation importance.

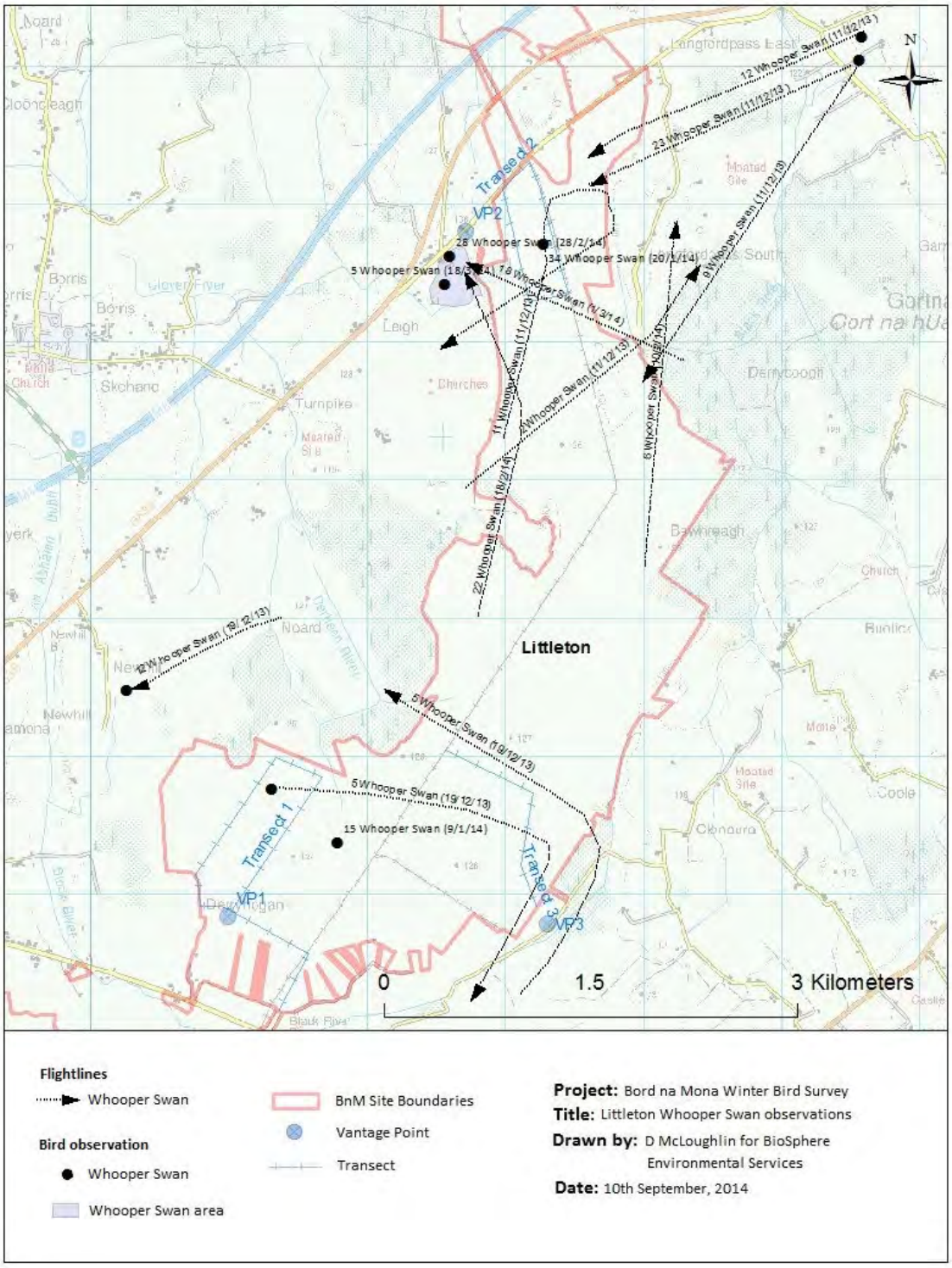
Whooper Swans were recorded feeding on site and also on adjoining grassland. Hen Harriers were recorded foraging extensively and an on-site roost was confirmed. The southwest sector of the site had several Merlin sightings.

Littleton is one of few sites in the group to support wintering duck on a regular basis, with Mallard, Teal and on occasions Wigeon. Water Rail is resident on site, and Snipe is widespread. Supports a range of other Amber listed species, including Kestrel, Jack Snipe, Woodcock, Skylark, Starling and Linnet.

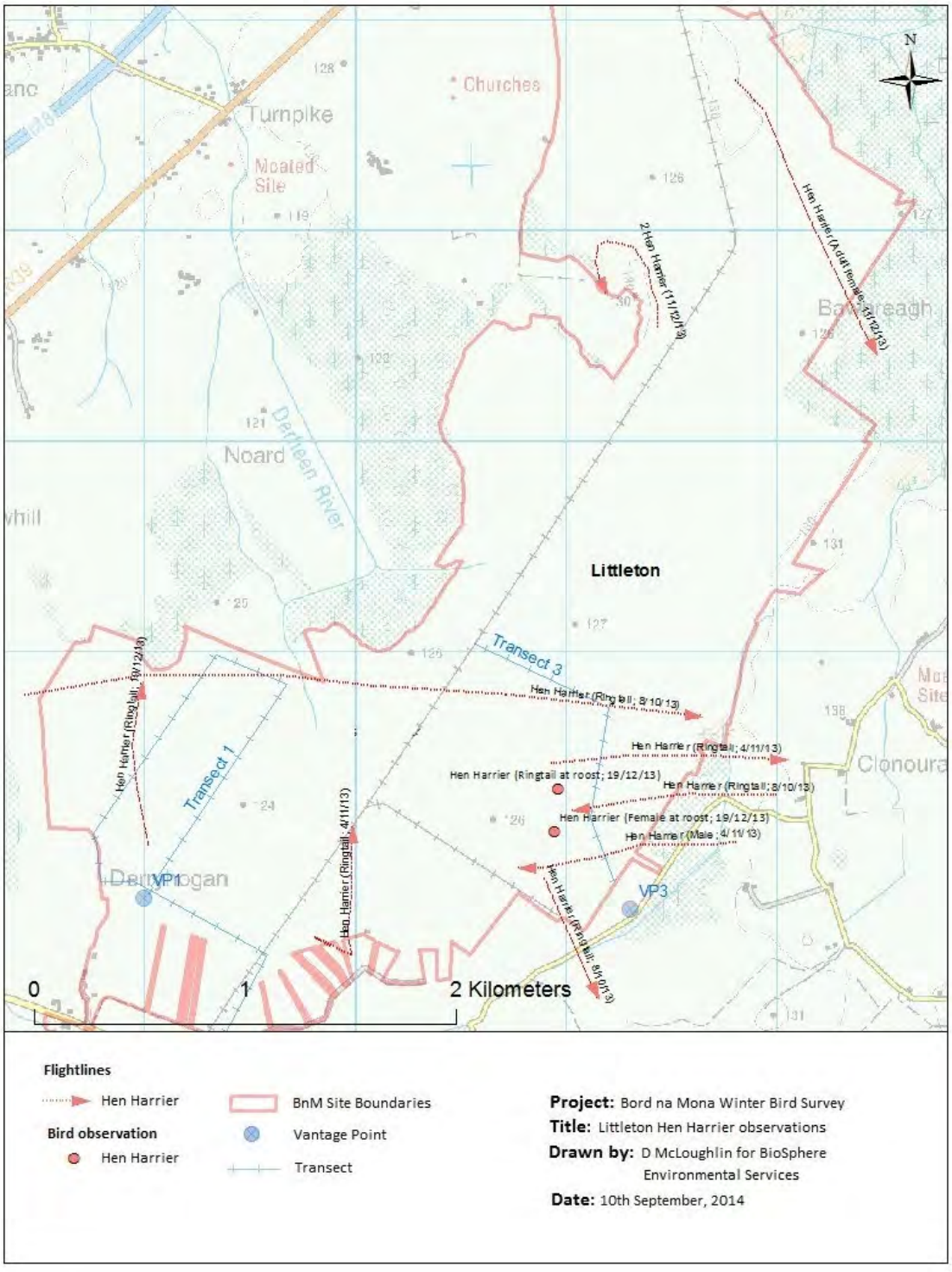


Littleton bog, Plate 1: view of regenerating cutover bog.

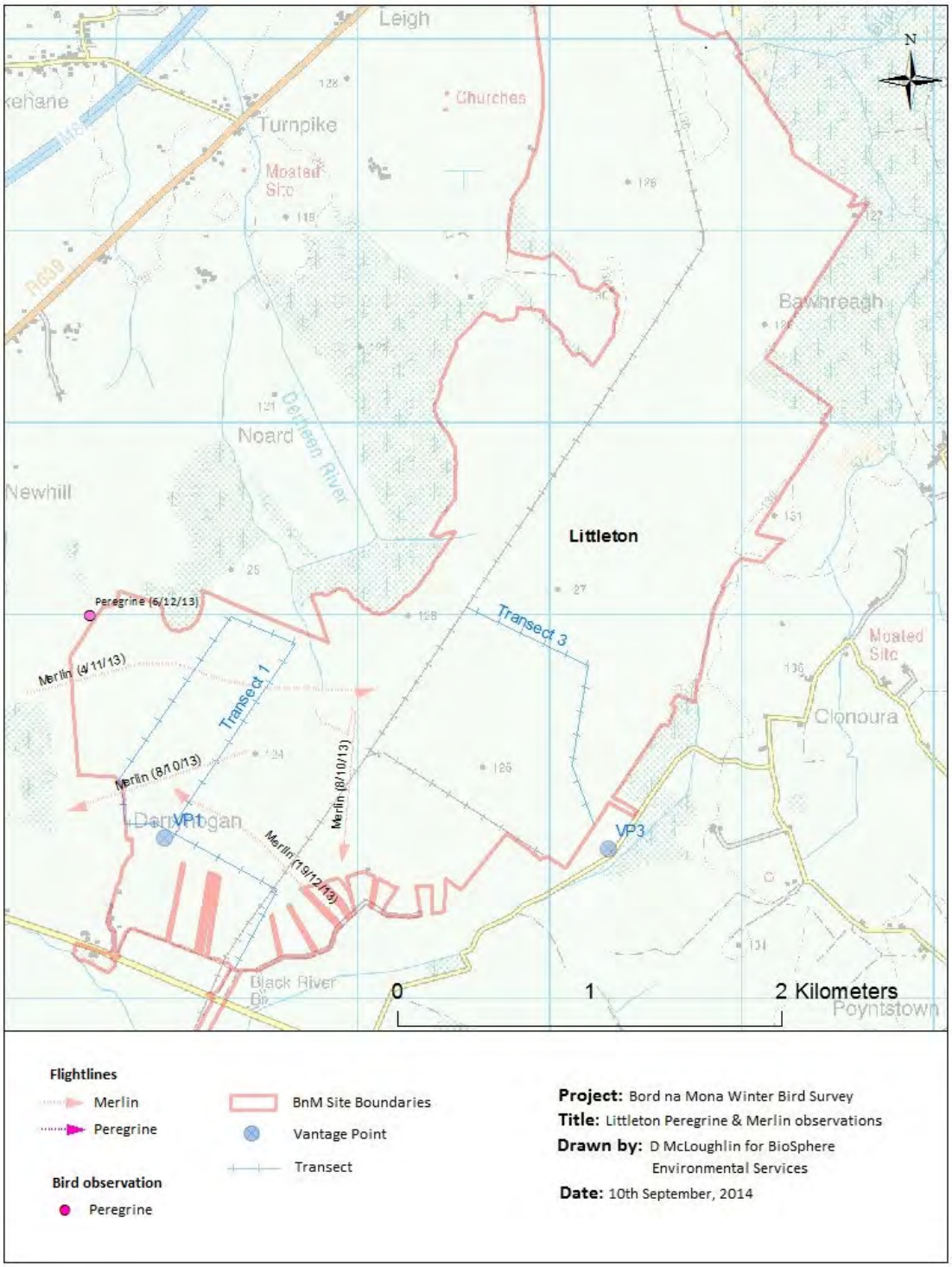
Littleton: Map 1, showing transect and vantage point locations, with records of Whooper Swans.



Littleton: Map 2, showing transect and vantage point locations, with records of Hen Harriers.



Littleton: Map 3, showing transect and vantage point locations, with records of Merlin and Peregrine.



SITE: LANESPARK

Lanespark bog is a small to medium sized site located just over eight kilometres southeast of Thurles town. It is contiguous with Derryville bog to the east and is connected by rail corridors to Littleton to the north and Ballybeg to the northwest. The point used to access the site is from a third class road in the west end of the site. The site extends for up to 2 km from north to south and approximately 2 km from east to west.

Lanespark is largely bare peat with production still in progress over much of the area. There are areas of regenerating cutaway bog and some remnant high bog and old cutover bog, especially along the margins.

The site is surrounded by farmland, with a conifer plantation to the north.

Survey locations

Transect 1 starts at the railway crossing at the western corner of the site and runs northeast following the railway line for 500m (through scrub and bare peat). It then turns east and finishes at the road between Lanespark and Derryvella.

Target species recorded

No target species were recorded during the winter surveys.

Potential for other target species

The marginal remnant and cutover bog habitats could attract hunting Hen Harriers and Merlin (one Merlin recorded in December 2012).

Other species of note

Kestrel – one on 1st February.

Snipe – three on 15th November, two on 2nd January.

Skylark – one on 15th November.

Meadow Pipit – three on 15th November, five on 2nd January, three on 1st February.

Linnet – flock of 25 on 15th November, six on 1st February.

Overview

Lanespark bog has limited potential for wintering birds of conservation importance.

The most useful areas of habitat are the small areas of remnant/cutover bog on the boundaries. Merlin was recorded on site in December 2012 and Hen Harrier could also be attracted. The site supports some Amber listed species, namely Kestrel, Snipe, Skylark and Linnet.



Lanespark bog, Plate 1: general view of site.

Lanespark bog: Map showing transect and vantage point locations.



SITE: DERRYVELLA

Derryvella bog is a small site located approximately nine kilometres southeast of Thurles town. It is contiguous with Lanespark bog to the west. The access to the site is from the Derryvella lakeside car park. The site extends for c.1 km from north to south and c.1 km from east to west.

The western half of the site is regenerating cutaway (heath, scrub) surrounding a small lake, while the eastern half is largely bare peat with production still in progress over much of the area.

The site is surrounded largely by farmland, with a mature coniferous plantation to the east.

Survey locations

Transect 1 starts at VP2 (lakeside) and runs southwest along the road that bounds the site. It turns southeast with the road, leaving the road after 500 m and following the old railway line to the site boundary and back again along the visitor trail to the lakeside (VP2). The transect runs through cutover heath habitat.

Vantage Point 1 is located on the public road on the northeast boundary of the site and covers the entire eastern sector of the site (predominantly bare peat).

Vantage Point 2 is located at Derryvella lake and covers the open water and adjoining regenerating cutover.

Target species recorded

No target species were recorded during the winter surveys.

Potential for other target species

Whooper Swans could potentially use the lake. However, only occasional usage would be expected and no observations were made during two years of winter surveys. The nearest known swan activity is at Hollyford (c. 10km to NW).

The cutaway and remnant bog habitats could attract hunting Hen Harriers. A Merlin was recorded on site in December 2012.

Other species of note

Teal – four on lake on 14th October and two there on 3rd February.

Little Grebe – one to two birds recorded on the lake in October and November.

Kestrel – single birds recorded hunting on site during all site visits.

Snipe – three on 14th October, two on 2nd January, four on 3rd February.

Woodcock – one flushed on 2nd January.

Green Sandpiper – two flushed on 14th October were considered birds on migration.

Skylark – three on 14th October, one on 3rd February.

Stonechat – pair on 3rd February.

Starling – 20+ on 3rd February.

Meadow Pipit – recorded in all site visits, with peak of 12 on 14th October.

Linnet – flock of c.20 on 14th October.

Overview

Derryvella bog has relatively low potential for wintering birds of conservation importance.

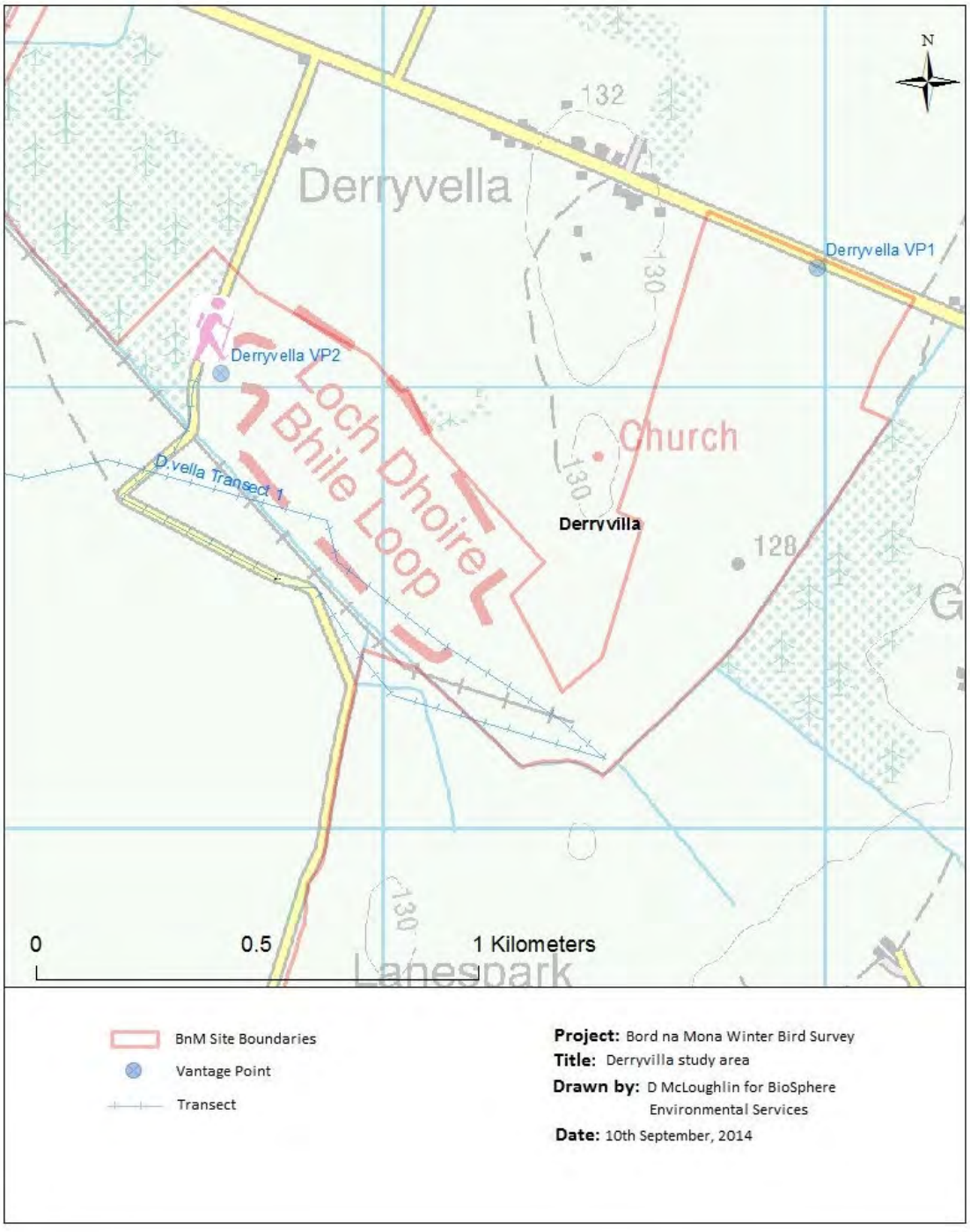
The lake could attract Whooper Swans though its potential is limited due to the small size. It does, however, support Little Grebe and small numbers of Teal.

The remnant and cutaway bog in the western sector provides useful habitat for a range of Amber listed species, including Kestrel, Snipe, Woodcock, Skylark and Linnet.



Derryvella bog, Plate 1: view of western part of site with pond.

Derryvella: Map showing transect and vantage point locations.



SITE: BALLYBEG

Ballybeg bog is a small site located seven kilometres southeast of Thurles town. The site is located to the west of Lanespark bog and connected by a rail corridor. The main access to the site is from a third class road southeast of the site. The site extends for just over 1 km from north to south and for up to 1 km from east to west.

Ballybeg is largely bare peat with production still in progress over much of the area. There are strips of cutover bog along the margins of the site.

Ballybeg is entirely surrounded by farmland.

Survey locations

Transect 1 starts at VP1 and runs south to the road at the southern boundary through an area of regenerating cutover.

Transect 2 starts at the railway crossing at the southeast corner of the site and runs north and northwest towards VP1.

Vantage Point 1 is located at the north end of transect 2 and gives views over virtually the entire site.

Target species recorded

No target species were recorded during the winter surveys.

Potential for other target species

The marginal and cutover bog habitats could attract hunting Hen Harriers and Merlin.

Other species of note

Kestrel – one on 2nd February.

Snipe – three on 21st November.

Skylark – two on 21st November.

Meadow Pipit – three on 21st November, five on 2nd February.

Linnet – two on 2nd January, seven on 2nd February.

Overview

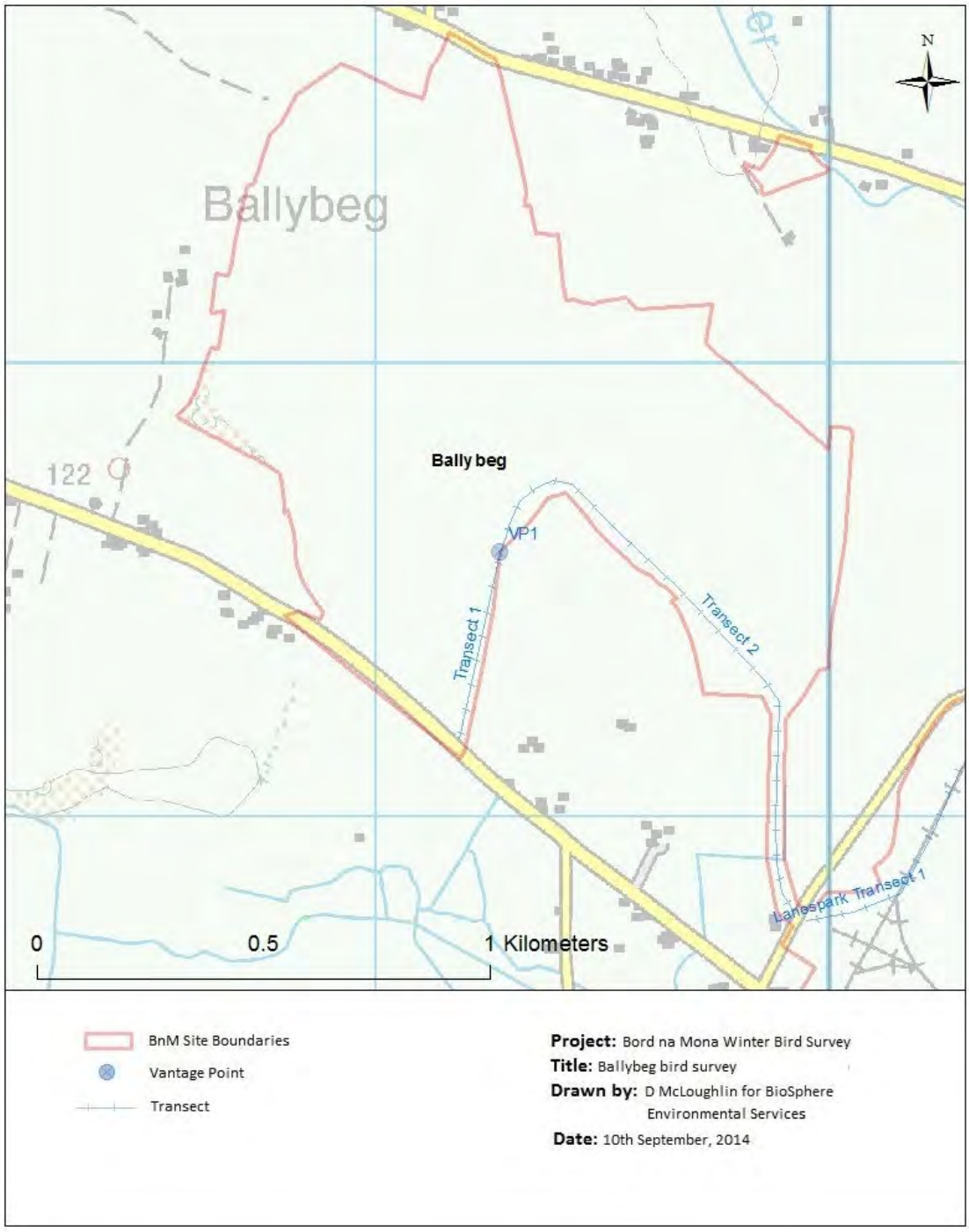
Ballybeg bog has limited potential for wintering birds of conservation importance.

The marginal areas of regenerating cutover and remnant bog could attract species such as Hen Harrier and Merlin. Several Amber listed species were recorded, namely Kestrel, Snipe, Skylark and Linnet.



Ballybeg bog, Plate 1: view over main area of site.

Ballybeg: Map showing transect and vantage point locations.



SITE: KILLEEN

Killeen bog is a medium to large sized site located just over seven kilometres southeast of Thurles town and approximately 1.5 km southeast of Horse and Jockey. It is situated at the southern end of the Littleton bog group and is connected to Lanespark by a rail corridor. Access to the site is easily available from two third class roads which traverse the site. The site extends for up to 3 km from north to south and for over 3 km from east to west.

The site is largely bare peat with production still in progress over much of the area. However, there are strips of regenerating cutaway bog and small areas of remnant high bog and cutover bog along most of the boundaries.

The site is surrounded mostly by farmland with some large conifer plantations to the northwest.

Survey locations

Transect 1 starts at the site buildings (situated 300 m west of the north/south road intersecting the site) and runs south around a small area of cutover bog and back to the buildings. It then follows the rail line west to Derrynaflan church through bare peat.

Transect 2 follows the NW/SW road intersecting the site passing through bare peat and cutover bog (open water, rushes and scrub). It turns north at the rail line following the line (bare peat to one side and remnant bog and scrub on the other) and finishing at the mature forestry

Vantage Point 1 is located at the western end of transect 1 and covers the northwest sector of the site (predominantly bare peat).

Vantage Point 2 is located along the north/south road intersecting the site and looks west and east over all of the central part of the site.

Vantage Point 3 is located on the small bridge over the road at the northern edge of the site and gives views of the northern sector of the site.

Target species recorded

Golden Plover
Flock of c.400 just to the north of the site on 1st November. Birds were circling at c.100 m height.

Lapwing
12 in easternmost part of site on 2nd February were considered to be returning breeding birds.

Potential for other target species

Whooper swans could potentially use the site as there are small areas of open water northwest of transect 2. However, no observations were made in any of the winter surveys. The nearest known swan activity is at Hollyford (c. 10km to NW).

The marginal remnant and cutover bog habitats could attract hunting Hen Harriers and Merlin.

Other species of note

Kestrel – single birds recorded hunting on site in each of the site visits.

Snipe – three on 1st November, one on 4th December, seven on 2nd February.

Skylark – five on 1st November, three on 2nd February.

Starling – 30+ on 2nd February 2013.

Stonechat – two on 1st November.

Meadow Pipit – recorded on each site visit, with peak of 12 on 1st November.

Linnet – flock of 20 on 1st November.

Overview

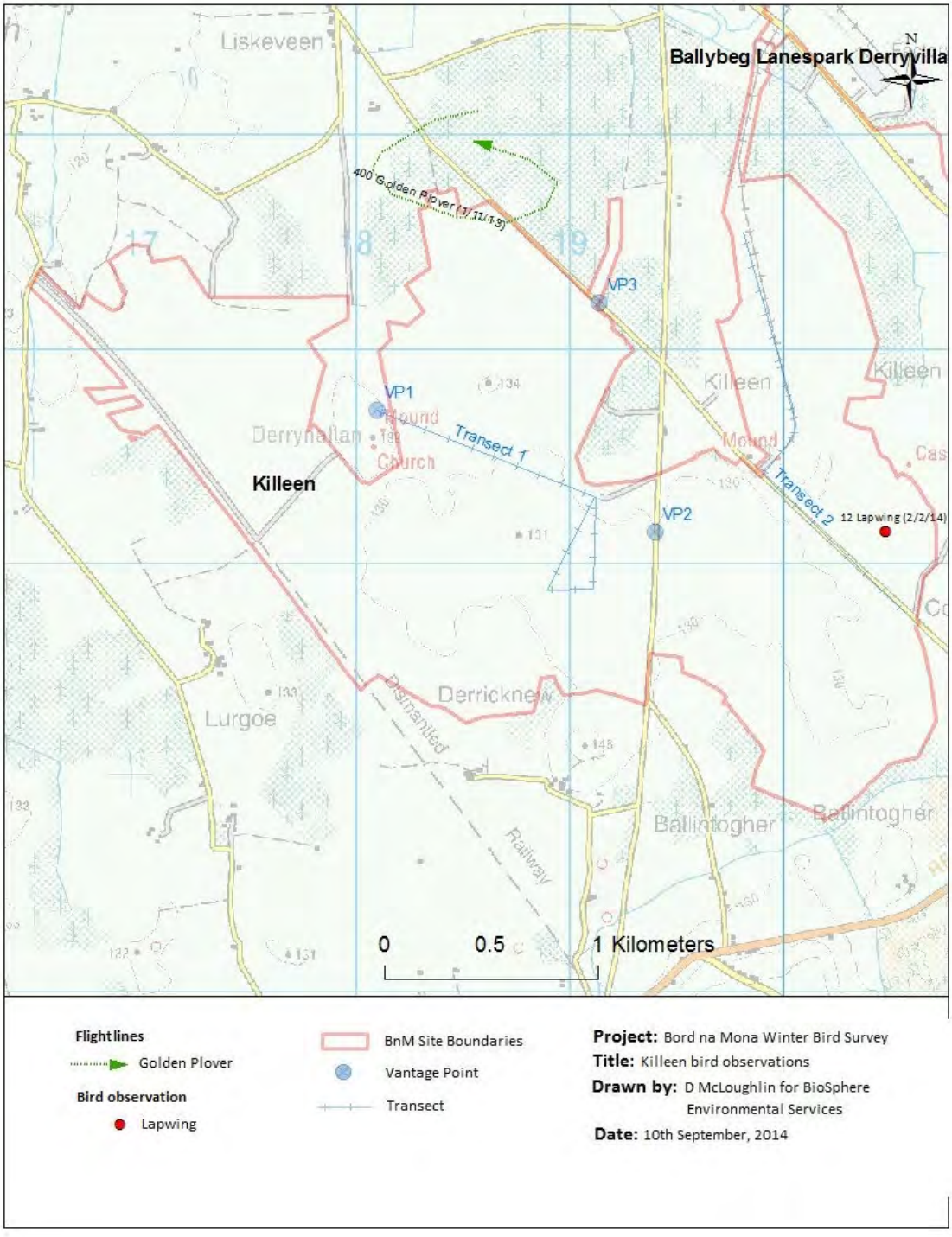
Killeen bog has limited potential for wintering birds of conservation importance.

Species such as Hen Harrier and Merlin could be attracted to the areas of remnant and cutover bog along the boundaries of the site. The site supports Snipe, along with other Amber list species, namely Kestrel, Skylark, Starling and Linnet. Meadow Pipit occurs on site throughout the winter.



Killeen bog, Plate 1: view over main area of site.

Killeen: Map showing transect and vantage point locations, with records of target species.



3.4 Bird Communities of the Bog Sites

Within the sites, a number of principal wintering bird communities can be separated based on main habitat types. At all sites, however, there is a range of habitat types present and it is noted that most species will occur in more than one of the habitat types.

Bare or near bare peat

This habitat type includes peat fields in production and fields recently out of production, with at most sparse or patchy vegetation. It is the dominant habitat type at a number of sites, notably Carrickhill, Derryville, Inch, Popes bog, Ballybeg, Lanespark and Killeen.

This habitat presumably has low feeding potential for most birds, especially in winter when surface flies and other small invertebrates are largely absent. Nevertheless, species such as Snipe and Meadow Pipit were recorded at a few sites, as well as Reed Bunting, Pied Wagtail and Lesser Redpoll. Perhaps the most useful value of the habitat is that it provides a suitable roost site for Golden Plover (though in relatively low numbers) due to the open character.

Cutaway bog dominated by open regenerating bog/heath vegetation, with perhaps scattered scrub

This is a widespread habitat type on areas which have been out of production for some years. It can vary from dry, heath type habitat dominated by heather (*Calluna vulgaris*) to wetter areas of bog type vegetation often dominated by common bog cotton (*Eriophorum angustifolium*) and rushes (*Juncus* spp.). It is most useful where scrub has not developed to any great extent. The habitat is found locally in parts of the following sites: Ballysorrell, Templetouhy, Bawnmore, Littleton, Lanespark and Derryvella.

This habitat type supports a wide range of bird species, with bog or wetland species such as Snipe, Meadow Pipit, Skylark and Reed Bunting, as well as finches such as Linnet and Lesser Redpoll. Ubiquitous species such as Wren is also found here. This habitat type provides useful foraging habitat for birds of prey, including Hen Harrier and Kestrel.

Cutaway bog dominated by scrub/low woodland

This habitat occurs at those sites that have been out of production for the longest periods and could be considered as an early stage of woodland dominance. The habitat usually occurs in association with more open areas (i.e. previous category). The scrub is formed predominantly by birch and willow, with alder in wetter areas. Scrub is particularly well developed at Templetouhy and Littleton.

The bird species occurring are mostly widespread and common species that one finds in woodland, scrub and hedgerow habitats throughout Ireland. Species recorded widely include Blackbird, Robin, Wren, Chaffinch, Lesser Redpoll and the four common tit species. Sparrowhawk is a typical scrub species though other birds of prey often hunt over it and within openings.

Remnant bog

Areas of remnant bog occur at all the sites, typically in marginal areas. These comprise bog which has not been harvested commercially but which may have had surface drains inserted

(i.e. peat dome remains in various stages of intactness). Where drains have been inserted, the Sphagnum layer is often depleted.

Remnant bog, which has had surface drains inserted over much of the area, is dominant at Knockahaw and Ballysorrell. Clonbuagh is a good example of a largely undrained bog.

Remnant bog supports a relatively low bird diversity, with Meadow Pipit the most frequent species during winter. Skylarks occur sparsely, as do Snipe. Wrens and Reed Bunting may also be found. Birds of prey, mainly Kestrel but also Hen Harrier, often hunt over remnant bog areas.

Remnant bog could support Red Grouse, though there are no known recent occurrences in the Littleton group.

Wetlands and open water

The occurrence of areas of wetland habitat or open water is limited within the Littleton bog group, with the main sites being Templetouhy, Bawnmore and Littleton. An established pond (artificial in origin) occurs at Derryvella.

Wetland habitats increase the diversity of wintering birds and can support such species as Whooper Swans, various duck species, Little Grebe and Water Rail.

Conifer plantation

A substantial conifer plantation occurs in the southernmost part of Littleton bog, with a small stand in the easternmost sector of Derryville. In addition, conifer plantations are fairly widespread along the boundaries of the bogs in this group.

The plantations support a range of birds that one finds in conifers elsewhere, including Blackbird, Song Thrush, Chaffinch, Goldcrest, tit species, Siskin etc.

3.5 Birds of Conservation Importance – Species Accounts

There follows accounts of the various species of conservation importance recorded in the study area – species of importance are classified on the basis of the following criteria:

- EU Birds Directive, Annex I
- Birds of Conservation Concern Red List (High conservation concern) or Amber List (Medium conservation concern) 2009-2013 after Lynas *et al*. (2007) (with reference made to BoCCI 2014-2019, after Colhoun & Cummins 2013)

Little Grebe

Conservation status

- Amber list (Lynas *et al.* 2007) (retained on Amber list 2014-2019, Colhoun & Cummins 2013)

Little Grebe is a species associated with still or slow moving waters and for a breeding site requires submerged and emergent vegetation. While widespread in Ireland, it has a localised distribution due to a scarcity of suitable habitat in some areas. Little Grebe is often resident, breeding and wintering at the same location.

Little Grebe was recorded at the small lake at Derryvella in October and November and is probably resident.

Whooper Swan

Conservation status

- Annex I EU Birds Directive
- Amber list (Lynas *et al.* 2007) (retained on Amber list 2014-2019, Colhoun & Cummins 2013)

The Whooper Swans which occur in Ireland during the winter months (mainly October – March) belong to the Icelandic breeding population. The latest census of these swans in Ireland was carried out in January 2010 (Boland *et al.* 2010) and produced a total of 14,981 birds in 387 flocks. The Irish wintering swans represent 72.5% of the entire Icelandic population (20,900, Delany & Scott 2006) and are therefore of International Importance.

A flock of 210 or more Whooper Swans (1% or more of the total Icelandic population) is an Internationally Important flock, while a flock of 130 or more (1% or more of the total Irish wintering population) is a Nationally Important flock (Delany & Scott 2006, Boland & Crowe 2012).

Whooper Swans are widely distributed within Ireland, with most concentrations around major inland and coastal wetlands at low altitude. The traditional habitats are lakes, turloughs and callow grasslands along river corridors. Nowadays, however, improved grassland is a principal feeding habitat. At night, the swans require a safe roost site which is usually on water. The feeding and roost site may be several kilometres apart.

The Littleton group of bogs is located between three regular swan sites - these are as follows:

Curragh or Durrow wetlands along the Erkina River (approximately 15 km east of the Littleton bogs) – held in excess of 100 in winters 1995/96 (108), 2011/12 (107) and 2012/13 (116)

River Suir north of Thurles (approximately 9 km west of the Littleton bogs) – regularly holds in excess of 20 swans, with peaks of 42 in winter 2008/09 and 2012/13

River Suir south of Thurles, Cabragh/Holycross area, and associated with the former Thurles Sugar Factory Lagoons (approximately 8 km west of the Littleton bogs) – regularly holds in excess of 20 swans, with peak of 85 in 2009/10

In winter 2012/13, Whooper Swans were recorded at two Bord na Móna bog sites, as follows:

- Carrickhill - 3 on small pond (later drained) on 27th December 2012
- Littleton – 10 roosting/loafing on pond, then flew west

The winter 2013/14 study confirmed that the bogs in the Littleton group have relatively low potential to support feeding or roosting Whooper Swans. Littleton bog was the only site to support swans, with birds feeding and possibly roosting on site. Fields of improved grassland which adjoin the site to the northwest were used as a feeding site and birds were also recorded feeding on grass at Newhill (along Black River) and on fodder beet to the northeast of the site. Numbers involved however were relatively low with a peak count of 34 birds. It is considered likely that the swans which are associated with Littleton bog winter in the local area rather than commuting to one of the traditional Whooper Swan sites, such as along the River Suir or the Curragh wetland.

Greylag Goose

Conservation status

- Amber list (Lynas *et al.* 2007) (retained on Amber list 2014-2019, Colhoun & Cummins 2013)

Greylag Goose is a localised winter vistor to Ireland, with many of the sites used being traditional. There is no regular wild population in the study area. In recent decades, feral populations have become established throughout Ireland and numbers have been increasing, especially since 2000/01 (Boland & Crowe 2012). The true origins of these flocks are unknown but there is evidence that birds from the large naturalised population in Britain have reached Ireland.

The records of seven flying over Littleton on 18th February is considered to refer to feral birds as there is no history of Greylag Geese wintering in the wider area.

Teal

Conservation status

- Amber list (Lynas *et al.* 2007) (retained on Amber list 2014-2019, Colhoun & Cummins 2013)

Teal is a widespread wintering duck in Ireland, occurring in a range of coastal and inland wetland habitats, including small lakes and ponds, bogs, drainage channels and rivers.

Teal were recorded at three of the sites which have permanent water bodies, as follows:

Bawnmore (peak of 4)
Littleton (peak of 9)
Derryvella (peak of 4)

Littleton is the main wetland site for this species within the group and in winter 2012/13 supported up to 98 Teal. Overall, the numbers involved on the bog sites in the group are low though higher numbers can occur at times.

Wigeon

Conservation status

- Amber list (Lynas *et al.* 2007) (upgraded to Red list 2014-2019, Colhoun & Cummins 2013)

Wigeon is a widespread wintering duck in Ireland, occurring in a range of coastal and inland wetland habitats, including lakes and large ponds, turloughs and callow grasslands.

Wigeon was recorded only at Littleton bog, with counts of 15 and 20 on 19th December and 3rd February respectively.

Wigeon is undoubtedly a scarce species in the study area (no records at sites in winter 2012/13), with no significant populations present (threshold for national importance is 850).

Hen Harrier

Conservation status

- Annex I EU Birds Directive
- Amber list (Lynas *et al.* 2007) (retained on Amber list 2014-2019, Colhoun & Cummins 2013)

Hen Harriers are sparsely distributed but fairly widespread throughout Ireland during the non-breeding season. Birds usually occur singly or in pairs and will forage over a wide range of semi-natural and agricultural habitats.

Hen Harriers may roost each evening alone or communally. The basic requirements by a Hen Harrier for roosting are shelter and protection. Roosts are typically in well-developed bog, scrub, young forestry, reeds, etc.

The birds seen in winter may be from local breeding grounds or may be immigrants from Britain or elsewhere.

The winter 2012/13 study had shown that at least two of the sites, Ballysorrell and Littleton bogs, were used by hunting Hen Harriers and indeed may be used as local night roosts.

In winter 2013/14, Hen Harriers were recorded at three bog sites - Knockahaw, Ballysorrell and Littleton, as follows:

Knockahaw: sightings of a male in October and December.

Ballysorrell: two ringtails on 7th December.

Littleton: regular sightings involving at least three individuals between 8th October and 19th December, with on-site roosting confirmed.

With Hen Harriers recorded at Ballysorrell and Littleton bogs in two winters, these sites have considerable importance for the species. However, other sites in the group also have suitable habitat for foraging and may be visited at times. It is likely that the birds recorded during winter in the Littleton area are from local breeding sites, namely the Slieve Felim or the Slieve Bloom uplands.

Sparrowhawk

Conservation status

- Green list (Lynas *et al.* 2007) (upgraded to Amber list 2014-2019 on basis of breeding population, Colhoun & Cummins 2013)

Sparrowhawk is a widespread, mostly resident species throughout the island of Ireland. It is a typical bird of woodlands, scrub and parkland. However, a population decline has been shown to have occurred in Ireland in recent years and the species is now on the Amber list.

Sparrowhawk was recorded from four of the bog sites (Ballysorrell, Bawnmore, Inch, Littleton) but could be expected in any site where scrub and/or woodland occurs.

Buzzard

Conservation status

- Green list (Lynas *et al.* 2007) (retained on Green list 2014-2019, Colhoun & Cummins 2013)

Buzzard does not have any particular conservation importance. It is included here as it had formerly been much rarer than it is today throughout Ireland and is a large, conspicuous bird of prey.

Buzzard has increased markedly throughout much of Ireland in the last two decades and is now widespread throughout much of the country and especially the eastern and northern regions. Breeding sites are usually tall trees in woodland stands including conifer plantations. In Ireland, the species has a broad and relatively unspecialised diet (Rooney & Montgomery 2013).

During the winter survey, Buzzards were recorded from five of the sites (Knockahaw, Clonbuagh, Ballysorrell, Templetuohy, Littleton). Most of the records are considered to involve birds which breed locally and which forage over the bog sites.

Kestrel

Conservation status

- Amber list (Lynas *et al.* 2007) (retained on Amber list 2014-2019, Colhoun & Cummins 2013)

Kestrel is a widespread breeding and wintering species throughout Ireland.

Kestrels occurred widely in the study area, with records from all but two sites. Most records were of single birds hunting within the sites. These birds would probably breed locally.

It is considered that the areas of remnant or regenerating cutaway bog providing particularly useful habitat for foraging Kestrels though nesting sites would be off-site.

Merlin

Conservation status

- Annex I EU Birds Directive
- Amber list (Lynas *et al.* 2007) (retained on Amber list 2014-2019, Colhoun & Cummins 2013)

Merlin is a scarce breeding bird in Ireland but occurs widely, though scarcely, in a range of habitats during winter (though not at high altitudes). Habitats utilised for hunting include bog, fen, salt marshes, and mixed agricultural lands. However, due to its small size and rather secretive nature it can be easily overlooked.

Merlin was recorded at two sites, Ballysorrell and Littleton bog, as follows:

Ballysorrell: one on 7th December, male and female on 4th February.

Littleton: series of four records (possibly same bird) in southwest sector between 8th October and 19th December.

Most of the sightings involved birds hunting over cutover or remnant bog with one of the Ballysorrell birds observed carrying prey.

Generally, there are large amounts of suitable habitats for wintering Merlin both within and around the various bog sites and birds could be expected virtually anywhere in the study area during winter. A Merlin had been recorded flying across Derryvella and Lanespark bogs in the previous winter.

Peregrine Falcon

Conservation status

- Annex I EU Birds Directive
- Green list (Lynas *et al.* 2007) (retained on Green list 2014-2019, Colhoun & Cummins 2013)

Peregrine is a widespread breeding species in Ireland though traditionally has been scarce in the midlands due to the near absence of natural breeding sites. However, in recent decades the range has spread due to the use of quarries and buildings as nest sites (Madden et al. 2009). Birds often remain in the vicinity of the nest site during the winter period and may roost close to it.

Peregrine was recorded at three of the bog sites as follows:

Ballysorrell bog: two along boundary on 7th December.

Popes bog: two over the site on 12th October.

Littleton bog: bird perched on stump on 6th December.

Generally, Peregrines could be expected at any of the bog sites in the group, either passing overhead or hunting. Peregrine had been recorded at Bawnmore bog in February 2013, and one was at Templetuohy bog in December 2009 during survey for the Bruckana wind farm. With two birds together at two of the sites, it is likely that there is a breeding pair in the wider vicinity (possibly a quarry nesting pair).

Water Rail

Conservation status

- Amber list (Lynas *et al.* 2007) (retained on Amber list 2014-2019, though mistakenly listed as Green: Colhoun & Cummins 2013 & S. Cummins pers. comm.)

Water Rail is a widespread, resident species associated with well developed wetlands and especially reedbeds or swamp vegetation. It is, however, extremely secretive and is seldom seen and the presence of Water Rail is usually established by calling birds.

Water Rails were recorded regularly at several locations within Littleton bog. Most of the records were of birds heard at dusk.

Water Rail had been heard at the lake in Derryvella bog in December 2012 and undoubtedly still occurs there. Apart from these sites, there are limited opportunities for this species to occur within the study area.

Golden Plover

Conservation status

- Annex I EU Birds Directive
- Red list for breeding population only (Lynas *et al.* 2007) (winter population upgraded to Red list 2014-2019, Colhoun & Cummins 2013)

In Ireland, Golden Plover is a common winter visitor throughout much of the country. The majority of birds wintering in Ireland are immigrants from the population breeding in Iceland and the Faeroes (*P. a. altifrons*). Most of this population winters in Ireland and Britain (Byrkjedal & Thompson 1998, Delany *et al*. 2009).

A flock of 9,300 or more Golden Plover (1% or more of the total flyway population) is an Internationally Important flock, while a flock of 1,700 or more (1% or more of the estimated total Irish wintering population) is a Nationally Important flock (Delany & Scott 2006, Boland & Crowe 2012).

Typically Golden Plover occur in large, densely-packed flocks, and in a variety of habitats, both coastal and inland. Significant numbers of Golden Plover wintering in Ireland use non-wetland sites, predominantly farmland.

Golden Plover feed on a variety of soil and surface-living invertebrates, principally beetles (Coleoptera) and earthworms (Lumbriidae), but also on plant material such as berries, seeds and grasses (Cramp & Simmons 1983). They are recorded regularly feeding in association with Lapwing. In winter, roost sites are often traditional within flock range, sometimes

distant from feeding grounds; ploughed land and low growing crops are preferred. Furthermore, there appears to be a preference for feeding and roosting in large fields, with fields less than 4 ha seldom used (Byrkjedal & Thompson 1998).

Golden Plover were not recorded within any of the cutaway bog sites during the winter 2013/14 surveys. However, a flock of c.400 was observed circling just north of Killeen bog on 1st November and birds may be expected to land on areas of bare peat within the site.

The usage of bogs for roosting or resting was noted widely from various Bord na Móna bog sites in production in Counties Kildare and Offaly during winters 2012/13 and 2013/14 and flocks would be expected on occasions to roost on the bare peat expanses in the bogs in the Littleton group (in winter 2012/13, roosting birds were recorded at Littleton bog). The numbers involved, however, have been relatively low.

Lapwing

Conservation status

- Red list for breeding population only, Amber list for winter population (Lynas *et al.* 2007) (winter population upgraded to Red list 2014-2019, Colhoun & Cummins 2013)

Wintering Lapwing is a typical inland feeding wader species and can occur in large flocks often associated with Golden Plover.

Lapwing was recorded within only one site, Bawnmore, with c.50 resting birds on sparsely vegetated cutaway on 11th November and some displaying birds on 8th March.

A group of 12 at Killeen bog on 2nd February were considered to be early returning breeding birds (as Lapwing nest on site).

From the above it is apparent, perhaps surprisingly, that Lapwing is a scarce bird on the cutaway bogs during winter. Flocks do, however, occur in the wider countryside and may on occasions pass over the sites.

Snipe

Conservation status

- Amber list (Lynas *et al.* 2007) (retained on Amber list 2014-2019, Colhoun & Cummins 2013)

Irish wintering Snipe comprise residents and immigrants from the *gallinago* race, which breeds across northern Europe, as well as immigrants from the *faeroeensis* population, which breeds in Iceland, the Faeroes and the Shetland and Orkney Islands (Delany *et al*. 2009).

During the day, Snipe generally rest or preen. Feeding occurs during the first half of the night and at dawn. Their winter diet consists largely of vegetable matter and seeds, and earthworms, tipulid larvae and other soil invertebrates. Snipe have a highly dispersed distribution in winter. They forage across a variety of wetland and damp habitats, including bogs, marshes and wet fields.

Due to their elusive nature and widespread distribution, they are difficult to census and populations are invariably under-estimated. No national population estimate has yet been derived (Crowe 2005).

Records of Snipe were widespread in the study area, with birds recorded from all sites. Numbers, however, were relatively low, with peak counts of seven (Killeen bog) and eight (Littleton bog). Records were from remnant bog, regenerating cutaway bog, old cutover, and even bare peat.

Jack Snipe

Conservation status

- Amber list but incorrectly classified as Green list by Lynas *et al.* (2007). Correction noted by Colhoun & Cummins (2013) and Amber status retained for 2014-2019 period

Jack Snipe occur in Ireland and Britain throughout the winter period and also on passage. Most arrive in October and November and begin to depart for their breeding grounds in March. The species is highly elusive and well dispersed on marshes and bogs.

Jack Snipe was recorded from Littleton bog, with records of singles in December and February.

Jack Snipe could be expected at other cutaway bog sites where remnant bog occurs.

Woodcock

Conservation status

- Amber list (Lynas *et al.* 2007) (upgraded to Red list 2014-2019 on basis of breeding population, Colhoun & Cummins 2013)

In winter, the Woodcock population comprises Irish breeding birds (largely sedentary) and immigrants from Scandinavia and Russia. During the winter, Woodcocks roost in small areas of cover within woodland during the day and fly to pasture to feed at night. Generally, they are highly elusive though may be flushed from the margins of woodlands at dusk. They are early breeders, with birds beginning to rode (display) in early February.

Woodcock were recorded at two sites, Littleton and Derryvella bogs, though are likely to be present at other sites in the group. At Littleton, there were records in December and March, with the March records (involving 2 birds) probably representing breeding birds. There was a single January record at Derryvella.

Lesser Black-backed Gull

Conservation status

- Amber list for breeding population (Lynas *et al.* 2007) (retained on Amber list 2014-2019, Colhoun & Cummins 2013)

Lesser Black-backed Gull is a widespread but localised breeding species in Ireland.

Traditionally most birds migrate south during winter but in recent decades birds have been over-wintering in Ireland mostly along the large river corridors in the south of the country.

Lesser Black-backed Gulls were recorded at two sites on 11th November as follows: 115 at Carrickhill bog and four at Bawnmore bog. At both sites the birds were resting on bare peat.

These birds were probably part of an autumn/early-winter movement along the River Nore valley. Usage of the bogs by the gulls is probably an occasional event.

Skylark

Conservation status

- Amber list (Lynas *et al.* 2007) (retained on Amber list 2014-2019, Colhoun & Cummins 2013)

The 2013/14 winter survey confirmed that Skylark is widely distributed within the bog sites during the early and late winter periods and mostly absent in mid winter (December-January). By March, breeding birds are establishing breeding territories on sites.

Maximum counts were of eight at Littleton and seven at Knockahaw, both in March.

Skylark utilise a range of habitats, from regenerating cutaway bog with scattered scrub to remnant high bog and may on occasions be found on bare peat.

Starling

Conservation status

Amber list (Lynas *et al.* 2007) (retained on Amber list 2014-2019, Colhoun & Cummins 2013)

Starling is a widespread and common bird of the countryside during winter being particularly associated with pasture grasslands. The breeding population, which is largely resident, is joined by migrants from continental Europe.

Small sized flocks (<50) were recorded at several of the sites, with a flock of c.300 at Littleton bog on 2nd February. Generally Starlings are not dependent to any extent on the cutaway bogs.

Stonechat

Conservation status

- Green list (Lynas *et al.* 2007) (upgraded to Amber list 2014-2019 for breeding population, Colhoun & Cummins 2013)

The Stonechat is a resident and largely sedentary species in Ireland. It is prone to population declines during severe winters and the population was heavily affected by the cold winters of 2009/10 and 2010/11. In many areas, populations were virtually wiped out (Lovatt & Madden, 2012). Since then, there has been a partial recovery in the population but numbers have not yet reached the pre 2009 levels.

Stonechat is a species typical of open scrub habitats and is often found in the marginal areas of bogs and on cutaway bog. During the winter study, Stonechats were recorded (usually 1-2 birds) at Ballysorrell, Templetouhy, Derryville, Bawnmore, Inch, Littleton, Derryvella and Killeen. Stonechat is likely to be resident on the sites.

Meadow Pipit

Conservation status

- Green list (Lynas *et al.* 2007) (upgraded to Red list 2014-2019 for breeding population, Colhoun & Cummins 2013)

The 2013/14 winter survey demonstrated that Meadow Pipit is a very widely distributed species on the cutaway bog sites being found at all sites. The species was recorded throughout the winter period, though highest numbers were usually in October and November when loose post-breeding flocks were often encountered. Counts of 10 or more as follows:

Knockahaw:	15 on 15th October
Templetouhy:	15 on 19th March
Carrickhill:	13 on 11th November
Bawnmore:	22 on 15th October
Littleton:	20+ on 14th October
Lanespark:	25 on 15th November
Derryvella:	12 on 14th October
Killeen:	12 on 1st November

Overall, Meadow Pipit is one of the most characteristic species of the cutaway bogs (though not confined to bog habitats).

Linnet

Conservation status

Amber list (Lynas *et al.* 2007) (retained on Amber list 2014-2019, Colhoun & Cummins 2013)

Linnet was recorded quite widely within the study site, usually in areas of regenerating cutaway bog though also on remnant bog and occasionally on bare peat. This species often frequents tracks where it searches the open ground for seeds and other food items.

Counts of 10 or more were made as follows:

Knockahaw:	20 on 1st October
Derryville:	12 on 23rd January
Littleton:	20 on 20th October
Lanespark:	25 on 15th November
Derryvella:	20 on 14th October
Killeen:	20 on 1st November

Overall, the cutaway bog sites provide good winter habitat for Linnets.

4.0 DISCUSSION

4.1 Importance of Study Area for Wintering Bird Populations

The 2013/14 winter survey provided baseline data on wintering birds for the selected bog sites in the Littleton bog group. As the survey was carried out over a full winter season (October-March) using a combination of standard methods, there were no survey limitations or constraints associated with the 2013/14 study. The survey builds on the baseline study carried out in winter 2012/13, which extended from December 2012 to March 2013.

From a species perspective, 19 species listed as of conservation importance were recorded within the study sites (see Table 1). Five of these are listed on Annex I of the EU Birds Directive. All 19 species, other than Peregrine, are listed on the Amber list of Birds of Conservation Importance in Ireland (Lynas et al. 2007). There were no Red listed species recorded (it is noted that for two species recorded in the study, the breeding population only is Red listed – these are Golden Plover & Lapwing).

4.1.1 Annex I species

The five Annex I species recorded had a restricted distribution within the study sites. Whooper Swan was recorded at Littleton bog only with regular observations there through the winter. Hen Harrier occurred at three sites (Knockahaw, Ballysorrell, Littleton), Merlin at two (Ballysorrell, Littleton) and Peregrine at three (Ballysorrell, Popes bog, Littleton). Golden Plover was not recorded within any of the sites though a flock occurred within 500 m of Killeen bog on one occasion.

4.1.2 Amber listed species

Eighteen species recorded are listed as Birds of Conservation Concern in Ireland, Amber list (i.e. Medium Conservation Concern). The list of Amber species includes four of the five Annex I listed species already mentioned.

Five of the species were recorded at only one site as follows: Little Grebe (Derryvella), Greylag Goose (Littleton), Wigeon (Littleton), Water Rail (Littleton) and Jack Snipe (Littleton). The Greylag Geese are considered to be feral birds as there is no traditional population of wild geese in this area of the country.

A further three species were recorded at two sites each: Lapwing (Bawnmore, Killeen), Woodcock (Littleton, Derryvella) and Lesser Black-back Gull (Carrickhill, Bawnmore). Teal was recorded at three sites. Some of the Lapwing records were considered to be returning breeding birds rather than wintering birds. The Lesser Black-back Gulls were merely resting in the sites on one day only and would not be particularly associated with cutaway bogs.

The remaining species (Kestrel, Snipe, Skylark, Starling, Linnet) occurred fairly widely and could be expected at any of the cutaway bog sites. The remnant and regenerating bog habitats are particularly good for foraging Kestrels (which are often more or less resident in the sites), while Snipe occur widely though in relatively small numbers. Skylark was found on the sites mainly in the early part of the winter (October-November) but is scarce on the

bogs in mid winter when birds migrate to more hospitable coastal areas or mixed agricultural landscapes where feeding is better. Starling has a scattered distribution, with small numbers often present and occasional larger flocks. Linnet is a fairly widespread species of the bog sites during winter, being often found in marginal areas or along tracks where they feed on seeds.

Table 1. Bird species of conservation importance recorded on Bord na Móna bog sites in Littleton bog group, winter 2013-2014

Species	EU Birds Directive Annex 1	Birds of Conservation Concern in Ireland: Red List	Birds of Conservation Concern in Ireland: Amber List
Little Grebe			X
Whooper Swan	X		X
*Greylag Goose			X
Teal			X
Wigeon			X
Hen Harrier	X		X
Kestrel			X
Merlin	X		X
Peregrine	X		
Water Rail			X
Golden Plover	X		X
Lapwing			X
Snipe			X
Jack Snipe			X
Woodcock			X
Lesser Black-backed Gull			X
Skylark			X
Starling			X
Linnet			X

* Greylag Goose considered feral in area

4.1.3 Importance of study area for species of conservation interest

While a fair number of species of conservation importance was recorded in the study sites during the winter surveys, most of these could be considered as being widespread in the general countryside, i.e. agriculture land mixed with pockets of semi-natural habitats such as lakes, ponds, bog, scrub and woodland.

None of the species recorded is dependant solely on bog vegetation (Red Grouse would be the exception were it to occur), though several are characteristically associated with bogs (both raised and blanket), namely Snipe, Jack Snipe, Skylark and to some extent Golden Plover and Hen Harrier.

In practice, the cutaway bogs, either those with large areas of regenerating or remnant habitats or with marginal strips of cutover bog, provide useful semi-natural habitat refuges for a diversity of birds.

From the results of the winter survey 2013/14, supported by the results of the 2012/13 survey, it is apparent that the cutaway bogs in the study area, with the exception of Littleton bog, generally do not support important populations (i.e. at a county or national level) of any species of high conservation value.

The surveys have shown, however, that a number of EU Birds Directive Annex I species have a regular presence on some of the bogs, though these species are not confined to Bord na Móna sites. There follows discussion on the value of the cutaway bogs for these Annex I species.

Whooper Swan

Littleton bog was shown to be of some importance for Whooper Swans in winter 2013/14, though numbers involved were relatively low (peak single count of 34) and considerably less than the threshold for national importance (i.e. 130). The swans were using the bog as one of several feeding sites in the wider area.

The winter surveys have shown that the Littleton bogs are not within any regular flightline corridors associated with the known swan populations along the River Suir and at the Curragh/Durrow wetlands.

Hen Harrier

The winter 2013/14 survey confirmed a Hen Harrier night roost at Littleton bog. Hen Harriers were also recorded at Ballysorrell bog for a second winter though roosting was not confirmed. Generally the bogs in the group provide useful foraging habitats and in addition to the two named sites practically any of the bogs could be used for foraging purposes during winter.

Merlin

Two of the sites, Ballysorrell and Littleton, each had records of Merlin. These birds were using the sites for hunting, with one bird observed carrying a prey item. The presence of a pair at Ballysorrell in February would suggest local breeding though not necessarily on the bog site.

A Merlin had been recorded flying across Derryvella and Lanespark bogs in the previous winter. Generally, there are large amounts of suitable habitats for wintering Merlin both within and around the various bog sites and birds could be expected virtually anywhere in the study area during winter.

Peregrine

Peregrine is a widespread species throughout the Irish countryside during winter and the sighting of birds on or over three of the bogs sites in not unexpected.

Hunting Peregrines cover very large areas (tens of square kilometres) and one bird could easily pass over several of the bog sites in one session. Most of the cutaway bog sites support prey items (typically medium to large sized birds, including skylark, finches, starling and pigeons) that would attract hunting Peregrines and no one site is of any particular importance for this species. The open nature of the sites may give hunting Peregrines an

advantage when chasing prey.

Overall, most of the cutaway bog sites provide useful habitat for hunting Peregrines though the birds would not be closely linked to any specific sites.

Golden Plover

Golden Plover were surprisingly scarce in the study area in winter 2013/14 with only one record just off-site. In the previous winter Golden Plover had been recorded at Knockahaw and Littleton bogs. Birds could be expected to avail of any of the commercial peat fields for roosting purposes, as shown by their usage of this habitat in bog sites elsewhere (especially the Derrygreenagh/Ballydermot group of bogs).

Overall, the bog sites within the Littleton group are not used to any extent by Golden Plover.

4.2 Evaluation and Rating of Sites for Wintering Birds

On the basis of the results of the now two winter surveys, it is apparent that Littleton bog is the only site in the group to support a regular wetland bird community and which could be considered in the context of being evaluated or ranked quantitatively based on wetland bird populations reaching recognised threshold levels (as described in Crowe 2005).

However, below the National level, there is no quantitative system for rating wetland bird populations. In the Winter Wetlands Survey 1984/85 – 1986/87, Sheppard (1993) assigned all sites with some wetland birds as 'Regionally/Locally Important Sites'. In the first main review of the I-WeBS project, Crowe (2005) describes internationally and nationally important sites following the standard criteria, and then includes a category 'Other notable sites' which are 'other sites deemed important, as they support significant concentrations of gulls, or occasionally support concentrations of international or national importance of other water bird species'. Any other sites where counts took place are included in a fourth category of sites 'Other sites covered'.

From the above, Littleton can probably best be ranked as Locally important on the basis of wetland birds.

For the bog sites in general, ranking of their importance is more appropriately carried out by consideration of the occurrence of species with recognised conservation importance in an international or national context, especially species which are listed on Annex I of the EU Birds Directive or Red listed, and to a lesser extent Amber listed, in a national context. Should such species occur at a site, the frequency of occurrence and the use of the site by the bird, such as for feeding and/or roosting, is of importance.

For EIA purposes, the relevant sites will in due course be assessed on their general ecological importance, including wintering and breeding birds, habitats, mammals, etc., and the ecological valuation classification proposed by the NRA (2009) is likely to be appropriate for their assessment. For the immediate purpose of assessing wintering birds, the valuation classification proposed by the NRA (2009) is still followed (see Section 2.4). However, a deviation is made from the above in respect of the two Local categories, which are merged as 'Local'. The reason for this is that there is no guidance on defining what a 'local' area is in terms of ecology and also the difference between these two categories is not really clear.

It can be stated with confidence that none of the sites in the Littleton bog group qualify as of importance in an international or national context. While species such as Whooper Swan, Hen Harrier and Merlin are present on some sites, the bogs provide only a minor part of the winter territories for these species.

Littleton bog is by far the most important of the sites in the group, reflecting the developing regenerating cutaway habitats including permanent wetland areas, as well as a scatter of remnant high bog. The site is ranked as of County importance on the basis of (i) Whooper Swans utilising the site along with other wetland species including ducks and Water Rail, (ii) a on-site Hen Harrier roost, (iii) usage by other important species, notably Merlin.

All other sites are rated of Local importance. These vary from those with substantial interests, such as Ballysorrell for Hen Harrier and Merlin, to those with very low interest, such as Inch and Ballybeg bogs.

Table 2. Summary of ornithological importance of sites in the Littleton bog group on the basis of the 2012/13 and 2013/14 winter surveys.

Site	Interests	Rating
Littleton	Whooper Swan Hen Harrier Merlin Peregrine Golden Plover (2012/13) <u>Amber list species</u>: Teal Wigeon Kestrel Water Rail Snipe Jack Snipe Woodcock Skylark Starling Linnet	County
Knockahaw	Hen Harrier Golden Plover (2012/13) <u>Amber list species</u>: Kestrel Snipe Skylark Linnet	Local
Clonbuagh	<u>Amber list species</u>: Kestrel Snipe Skylark	Local
Ballysorrell	Hen Harrier Merlin	Local

	Peregrine Amber list species: Kestrel Snipe Skylark Linnet	
Templetuohy	Amber list species: Kestrel Snipe Skylark	Local
Derryville	Amber list species: Snipe Skylark Linnet	Local
Carrickhill	Amber list species: Kestrel Snipe Lesser Black-backed Gull Skylark Linnet	Local
Bawnmore	Amber list species: Teal Kestrel Lapwing Snipe Lesser Black-backed Gull Skylark Linnet	Local
Inch	Amber list species: Kestrel Snipe Skylark	Local
Popes Bog	Amber list species: Kestrel Snipe Skylark Linnet	Local
Lanespark	Amber list species: Kestrel Snipe Skylark Linnet	Local
Derryvella	Amber list species: Teal Little Grebe Kestrel Water Rail Snipe Woodcock Skylark	Local

	Starling Linnet	
Ballybeg	Amber list species: Kestrel Snipe Skylark Linnet	Local
Killeen	Golden Plover (off-site) Lapwing Amber list species: Kestrel Snipe Skylark Starling Linnet	Local

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Website of Department of Heritage, Arts & the Gaeltacht: www.npws.ie

APPENDIX 1

Scientific Names of Bird Species

Little Grebe	*Tachybaptus ruficollis*
Grey Heron	*Ardea cinerea*
Whooper Swan	*Cygnus cygnus*
Greenland White-fronted Goose	*Anser albifrons flavirostris*
Greylag Goose	*Anser anser*
Teal	*Anas crecca*
Mallard	*Anas platyrhynchos*
Wigeon	*Anas penelope*
Buzzard	*Buteo buteo*
Hen Harrier	*Circus cyaneus*
Sparrowhawk	*Accipiter nisus*
Kestrel	*Falco tinnunculus*
Merlin	*Falco columbarius*
Peregrine	*Falco peregrinus*
Red Grouse	*Lagopus lagopus*
Moorhen	*Gallinula chloropus*
Pheasant	*Phasianus colchicus*
Water Rail	*Rallus aquaticus*
Golden Plover	*Pluvialis apricaria*
Lapwing	*Vanellus vanellus*
Snipe	*Gallinago gallinago*
Woodpigeon	*Columba palumbus*
Skylark	*Alauda arvensis*
Meadow Pipit	*Anthus pratensis*
Pied Wagtail	*Motacilla alba*
Wren	*Troglodytes troglodytes*
Robin	*Erithacus rubecula*
Stonechat	*Saxicola torquata*
Blackbird	*Turdus merula*
Fieldfare	*Turdus pilaris*
Song Thrush	*Turdus philomelos*
Mistle Thrush	*Turdus viscivorus*
Goldcrest	*Regulus regulus*
Coal Tit	*Parus ater*
Blue Tit	*Parus caerulus*
Great Tit	*Parus major*
Magpie	*Pica pica*
Hooded Crow	*Corvus corone*
Raven	*Corvus corax*
Starling	*Sturnus vulgaris*
Chaffinch	*Fringilla coelebs*
Goldfinch	*Carduelis carduelis*
Siskin	*Carduelis spinus*
Linnet	*Carduelis cannabina*
Lesser Redpoll	*Carduelis flammea*
Bullfinch	*Pyrrhula pyrrhua*
Reed Bunting	*Emberiza schoeniclus*

APPENDIX 6.2

Triturus Aquatic Reports

Aquatic baseline report for Littleton wind farm, Co. Tipperary

Prepared by Triturus Environmental Ltd. for Fehily Timoney & Company

March 2023

Please cite as:

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1. Introduction

1.1 Background

Triturus Environmental Ltd. were commissioned by Fehily Timoney and Company to conduct baseline aquatic surveys to inform EIAR preparation for the proposed Littleton wind farm project. The following report provides a baseline assessment of the aquatic ecology including fisheries and biological water quality, as well as protected aquatic species and habitats in the vicinity of the proposed project, located near Littleton, Co. Tipperary.

Undertaken on a catchment-wide scale, the baseline surveys focused on the detection of freshwater habitats and species of high conservation value. These included surveys for white-clawed crayfish (*Austropotamobius pallipes*), otter (*Lutra lutra*), macro-invertebrates (biological water quality) and fish of high conservation value, inclusive of supporting nursery and spawning habitat. The surveys also documented macrophyte and aquatic bryophyte communities including Annex I habitat associations in the vicinity of the project (**Figure 2.1**). Aquatic surveys were undertaken in September and October 2021.

1.2 Project description

A full description of the proposed project will be provided in any Environmental Impact Assessment Report (EIAR) used to support consenting applications.

2. Methodology

2.1 Selection of watercourses for assessment

All freshwater watercourses which could be affected directly or indirectly by the proposed wind farm project were considered as part of the current baseline. A total of 20 no. riverine sites were selected for detailed aquatic assessment (see **Table 2.1, Figure 2.1** below). The nomenclature for the watercourses surveyed is as per the Environmental Protection Agency (EPA). Riverine survey sites survey sites were present on the Clover River (EPA code: 16C04), Drish River (16D02), Cooleeny River (16C14), Ballygammane River (16B55), North Glengoole River (16N28), Breegagh River (16B03) and several unnamed watercourses (**Table 2.1**). Additionally, a total of 17 no. lakes/wetlands located within the proposed site boundary at Littleton Bog were also surveyed in October 2021 (**Table 2.1; Figure 2.2**).

The aquatic survey sites were located within the Suir_SC_040 river sub-catchment. The proposed wind farm site boundary did not overlap with any European sites. However, there was potential downstream hydrological connectivity between the proposed project and the Lower River Suir SAC (002137), a site designated for a range of aquatic qualifying interests (NPWS, 2017a).

Please note this aquatic report should be read in conjunction with the Environmental Impact Assessment Report (EIAR) prepared for the proposed project. More specific aquatic methodology is outlined below and in the appendices of this report.

2.2 Aquatic site surveys

Aquatic surveys of the watercourses within the vicinity of the proposed wind farm project were conducted in September 2021. Survey effort focused on both instream and riparian habitats at each aquatic sampling location (**Figure 2.1**). Surveys at each of these sites included a fisheries assessment (electro-fishing and or fisheries habitat appraisal), white-clawed crayfish survey, otter survey (within 150m of the survey site), macrophyte and aquatic bryophyte survey and (at a subset) biological water quality sampling (Q-sampling) (**Figure 2.1**). To help verify site surveys, environmental DNA (eDNA) sampling was undertaken for white-clawed crayfish and crayfish plague (*Aphanomyces astaci*) at 5 no. strategically chosen riverine locations within the vicinity of the project. This holistic approach informed the overall aquatic ecological evaluation of each site in context of the proposed project and ensured that any habitats and species of high conservation value would be detected to best inform mitigation for the wind farm project.

In addition to the ecological characteristics of the site, a broad aquatic and riparian habitat assessment was conducted utilising elements of the methodology given in the Environment Agency's 'River Habitat Survey in Britain and Ireland Field Survey Guidance Manual 2003' (EA, 2003) and the Irish Heritage Council's 'A Guide to Habitats in Ireland' (Fossitt, 2000). This broad characterisation helped define the watercourses' conformity or departure from naturalness. All sites were assessed in terms of:

- Physical watercourse/waterbody characteristics (i.e. width, depth etc.) including associated evidence of historical drainage

- Substrate type, listing substrate fractions in order of dominance (i.e. bedrock, boulder, cobble, gravel, sand, silt etc.)
- Flow type by proportion of riffle, glide and pool in the sampling area
- An appraisal of the macrophyte and aquatic bryophyte community at each site
- Riparian vegetation composition

Table 2.1 Location of 37 no. aquatic survey sites in the vicinity of Littleton wind farm, Co. Tipperary (* indicates eDNA sampling)

Site no.	Watercourse	EPA code	Location	X (ITM)	Y (ITM)
Riverine sites					
A1	Unnamed stream	n/a	Longfordpass North	622853	659892
A2	Unnamed stream	n/a	Longfordpass North	622135	660772
A3	Unnamed stream	n/a	R639 road bridge	622188	658445
A4	Unnamed stream	n/a	Noard	622365	655435
A5	Clover River	16C04	R639 road bridge	621359	657544
A6	Clover River	16C04	Noard	621675	654968
B1	Unnamed stream	n/a	Longfordpass South	624135	658002
B2*	Drish River	16D02	Longfordpass Bridge	624845	660559
B3	Drish River	16D02	Castletown Bridge	621680	663563
B4	Cooleeny River	16C14	Killoran	620898	665459
B5	Drish River	16D02	d/s Ballyduff Bridge	619037	661227
B6	Ballygammane River	16B55	Athlummon	617128	660048
C1	Black River	16B01	Clonoura	623692	654684
C2	Black River	16B01	Derryvella	621096	652818
C3	North Glengoole River	16N28	Derryvella	621512	651948
C4	North Glengoole River	16N28	Derryvella	620969	652602
C5*	Black River	16B01	Derryhogan	619908	653512
C6	Black River	16B01	N75 crossing, Two Mile Borris	619120	657824
D1	Breegagh River	16B03	Killeen	620848	650493
D2*	Breegagh River	16B03	Ballymurreen Bridge	617399	653051
Lacustrine sites					
L1	Lake/wetland	n/a	Longfordpass South	623839	657293
L2	Lake/wetland	n/a	Bawnreagh	624150	657039
L3	Lake/wetland	n/a	Bawnreagh	624200	656995
L4	Lake/wetland	n/a	Bawnreagh	623830	656971
L5	Lake/wetland	n/a	Bawnreagh	623887	656489
L6	Lake/wetland	n/a	Bawnreagh	623764	656277
L7	Lake/wetland	n/a	Bawnreagh	623868	656219
L8	Lake/wetland	n/a	Lanespark	622641	656208
L9	Lake/wetland	n/a	Clonoura	623521	655503
L10	Lake/wetland	n/a	Clonoura	623259	655121
L11	Lake/wetland	n/a	Clonoura	623353	654846

Site no.	Watercourse	EPA code	Location	X (ITM)	Y (ITM)
L12	Lake/wetland	n/a	Noard	622697	655234
L13	Lake/wetland	n/a	Noard	622758	655209
L14	Lake/wetland	n/a	Noard	622163	654688
L15	Lake/wetland	n/a	Noard	621925	654547
L16	Lake/wetland	n/a	Derryhogan	621931	654343
L17	Lake/wetland	n/a	Lanespark	621400	651988

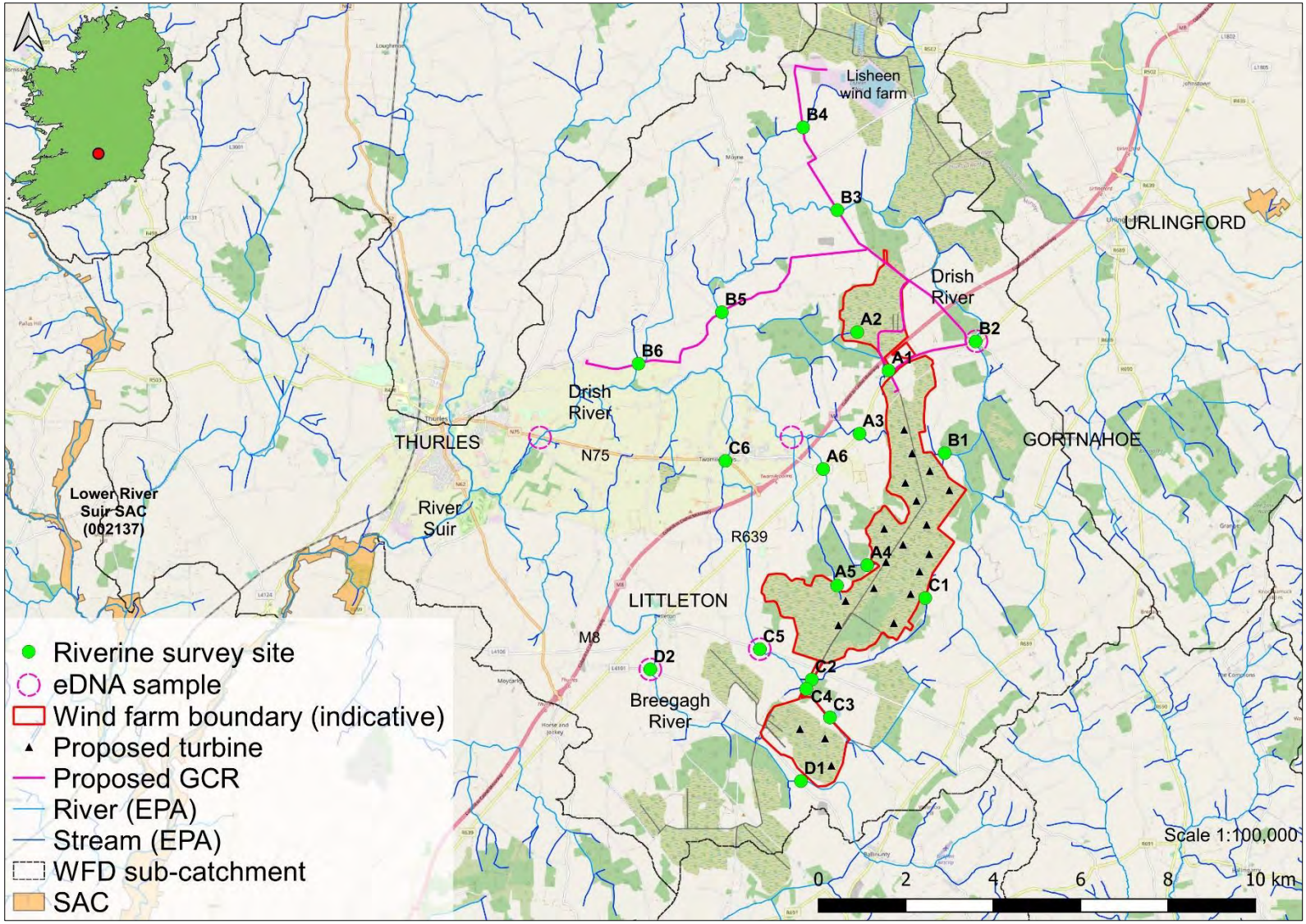


Figure 2.1 Overview of the 20 no. riverine survey sites in vicinity of the proposed Littleton wind farm project, Co. Tipperary

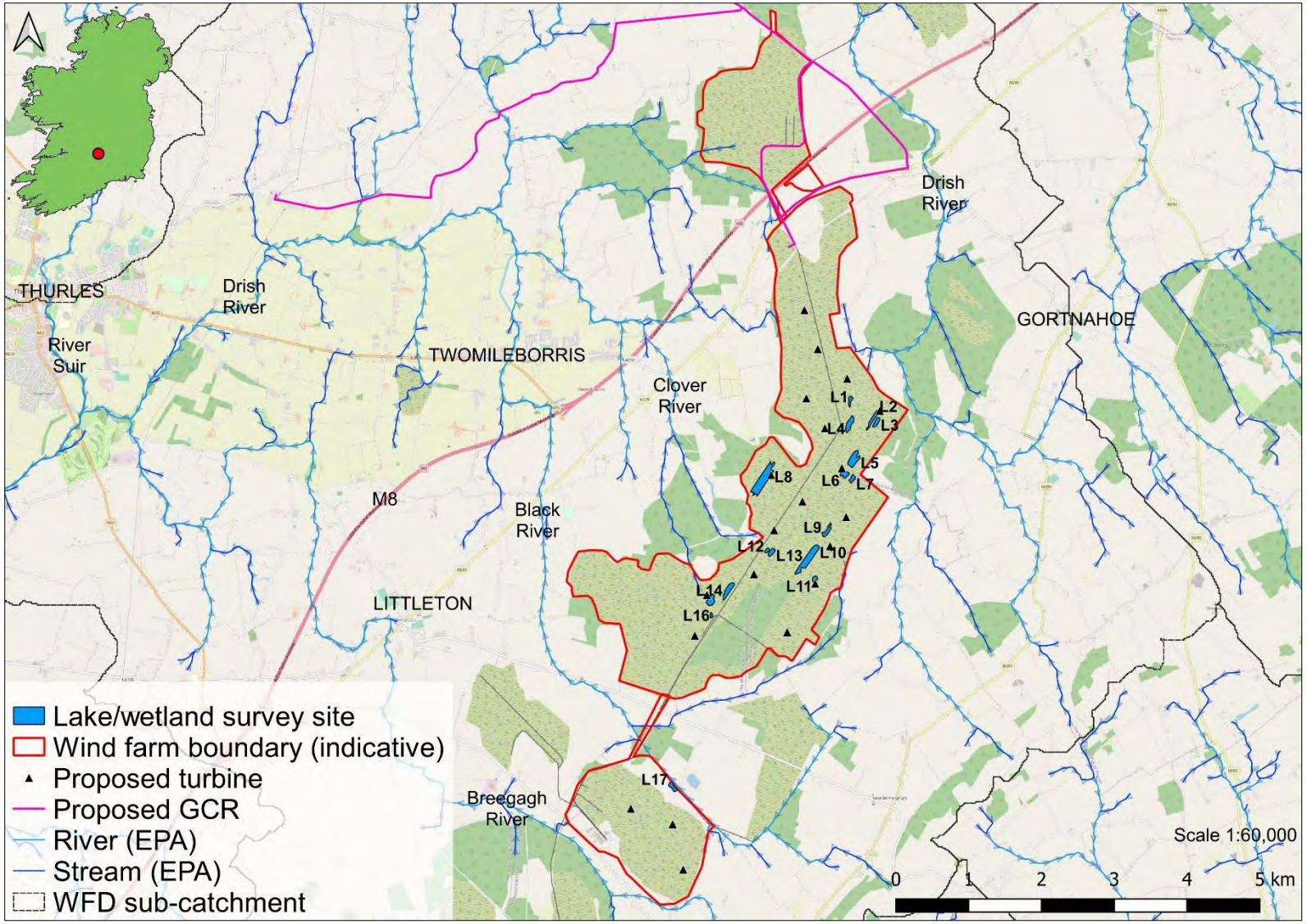


Figure 2.2 Overview of the 17 no. lacustrine survey sites in vicinity of the proposed Littleton wind farm project, Co. Tipperary

2.3 Fisheries assessment (electro-fishing) & appraisal

A single anode Smith-Root LR24 backpack (12V DC input; 300V, 100W DC output) was used to electro-fish sites on riverine watercourses in the vicinity of the proposed Littleton wind farm in September 2021 (**Table 2.1, Figure 2.1; Appendix A**), following notification to Inland Fisheries Ireland, under the conditions of a Department of the Environment, Climate and Communications (DECC) licence. The survey was undertaken in accordance with best practice (CFB, 2008; CEN, 2003) and Section 14 licencing requirements.

Furthermore, a fisheries habitat appraisal of all aquatic survey sites, including 17 no. lake/wetland habitats (**Table 2.1**), was undertaken to establish their importance for salmonid, lamprey, European eel and other fish species. The baseline assessment also considered the quality of spawning, nursery and holding habitat for salmonids and lamprey within the vicinity of the survey sites. For detailed survey methodology, please refer to accompanying fisheries assessment report in **Appendix A.**

2.4 White-clawed crayfish survey

White-clawed crayfish surveys were undertaken at the aquatic survey sites in September 2021 under a National Parks and Wildlife (NPWS) open licence (no. C145/2021), as prescribed by Sections 9, 23 and 34 of the Wildlife Act (1976-2021), to capture and release crayfish to their site of capture, under condition no. 6 of the licence. As per Inland Fisheries Ireland recommendations, the crayfish sampling started at the uppermost site(s) of the wind farm catchment/sub-catchments in the survey area to minimise the risk of transferring invasive propagules (including crayfish plague) in an upstream direction.

Hand-searching of instream refugia and sweep netting was undertaken according to Reynolds et al. (2010). An appraisal of white-clawed crayfish habitat at each site was conducted based on physical channel attributes, water chemistry and incidental records in mustelid spraint. Additionally, a desktop review of crayfish records within the wider Littleton wind farm survey area was completed.

2.5 eDNA analysis

To validate site surveys and to detect potentially cryptically low populations within the study area, 5 no. composite water samples were collected from the Clover River, Drish River (2 sites), Black River and Breegagh River and analysed for white-clawed crayfish and crayfish plague eDNA (**Figure 2.1**). The water samples were collected on 29th September 2021, with the sites strategically chosen to maximise longitudinal (instream) coverage within the catchment (i.e. facilitating a greater likelihood of species detection).

In accordance with best practice, a composite (500ml) water sample was collected from the sampling point, maximising the geographic spread at the site (20 x 25ml samples at each site), thus increasing the chance of detecting the target species' DNA. The composite sample was filtered on-site using a sterile proprietary eDNA sampling kit. The fixed sample was stored at room temperature and sent to the laboratory for analysis within 48 hours of collection. A total of n=12 qPCR replicates were analysed for the site. Given the high sensitivity of eDNA analysis, a single positive qPCR replicate is considered as proof of the species' presence (termed qPCR No Threshold, or qPCR NT). Whilst an eDNA approach is not currently quantitative, the detection of the target species' DNA indicates the presence of the

species at and or upstream of the sampling point. Please refer to **Appendix C** for full eDNA laboratory analysis methodology.

2.6 Biological water quality (Q-sampling)

A total of 12 no. riverine survey sites were assessed for biological water quality through Q-sampling in September 2021. All samples were taken with a standard kick sampling hand net (250mm width, 500µm mesh size) from areas of riffle/glide utilising a 2-minute kick sample, as per Environmental Protection Authority (EPA) methodology (Feeley et al., 2020). Large cobble was also washed at each site for 1-minute (where present) to collect attached macro-invertebrates (as per Feeley et al., 2020). Samples were elutriated and fixed in 70% ethanol for subsequent laboratory identification. Samples were converted to Q-ratings as per Toner et al. (2005) and assigned to WFD status classes (**Table 2.2**). Any rare invertebrate species were identified from the NPWS Red List publications for beetles (Foster et al., 2009), mayflies (Kelly-Quinn & Regan, 2012), stoneflies (Feeley et al., 2020) and other relevant taxa (i.e. Byrne et al., 2009; Nelson et al., 2011).

Table 2.2 Reference categories for EPA Q-ratings (Q1 to Q5)

Q value	WFD status	Pollution status	Condition
Q5 or Q4-5	High status	Unpolluted	Satisfactory
Q4	Good status	Unpolluted	Satisfactory
Q3-4	Moderate status	Slightly polluted	Unsatisfactory
Q3 or Q2-3	Poor status	Moderately polluted	Unsatisfactory
Q2, Q1-2 or Q1	Bad status	Seriously polluted	Unsatisfactory

2.7 Lacustrine macro-invertebrate communities

A subset of 10 no. lake/wetland sites were sampled for macro-invertebrates via sweep netting in October 2021. A standard lake net (250mm width, mesh size 500µm) was used to sweep macrophytes to capture macro-invertebrates. The net was also moved along the lake/lake bed to collect epibenthic and epiphytic invertebrates from the substratum (as per Cheal et al., 1993). A 3-minute sampling period was employed. To ensure appropriate habitat coverage, the sampling period was also divided amongst the range of meso-habitats present at the survey site to get a representative sample for sub-habitats.

2.8 Macrophytes and aquatic bryophytes

Surveys of the macrophyte and aquatic bryophyte community were conducted by instream wading at each of the wetted aquatic survey sites, with specimens collected (by hand, sweep nets or via grapnel) for on-site identification. An assessment of the aquatic vegetation community helped to identify any rare macrophyte species (Flora Protection Order or Wyse-Jackson et al., 2016) or habitats corresponding to the Annex I habitats, e.g., 'Water courses of plain to montane levels, with submerged or floating vegetation of the *Ranunculion fluitantis* and *Callitricho-Batrachion* (low water level during summer) or aquatic mosses [3260]' (more commonly referred to as 'floating river vegetation').

2.9 Otter signs

The presence of otter (*Lutra lutra*) at each aquatic survey site was determined through the recording of otter signs within 150m of each survey site. Notes on the age and location (ITM coordinates) were made for each otter sign recorded, in addition to the quantity and visible constituents of spraint (i.e. remains of fish, crustaceans, molluscs etc.).

2.10 Aquatic ecological evaluation

The evaluation of aquatic ecological receptors contained within this report uses the geographic scale and criteria defined in the 'Guidelines for Assessment of Ecological Impacts of National Road Schemes' (NRA, 2009).

2.11 Biosecurity

A strict biosecurity protocol following IFI (2010) and the Check-Clean-Dry approach was adhered to during surveys for all equipment and PPE used. Disinfection of all equipment and PPE before and after use with Virkon™ was conducted to prevent the transfer of pathogens or invasive propagules between survey sites. Specific consideration was given to highly virulent crayfish plague given known historical outbreaks in the connecting downstream catchments. Surveys were undertaken at sites in a downstream order to minimise the risk of upstream propagule mobilisation of pathogens and invasive species. Where feasible, equipment was also thoroughly dried (through UV exposure) between survey areas. Any aquatic invasive species or pathogens recorded within or adjoining the survey areas were geo-referenced. All Triturus staff are certified in 'Good fieldwork practice: slowing the spread of invasive non-native species' by the University of Leeds.

3. Receiving environment

3.1 Littleton wind farm catchment and survey area description

The proposed Littleton wind farm is located in an extensive area of cutover bog within the townlands of Noard, Ballybeg, Kileen, Newhill, Derryhogna, Kilmakill, Lansespark, Derryvella, Leigh, Clonoura, Longfordpass North, Longfordpass South and Bawnreagh approximately 2.5km west of Littleton, County Tipperary (**Figure 2.1**). The proposed wind farm site is within the South Eastern River Basin District and within hydrometric area 16 (Suir). The aquatic survey sites were located within the located in the Suir_SC_040 river sub-catchment. The watercourses and aquatic surveys sites in the vicinity of Littleton wind farm are typically small, historically modified lowland depositing channels (FW2; Fossitt, 2000) which flow over areas of Tournaisian and Visean limestone and calcareous shale (Geological Survey of Ireland data). Land use practices in the wider survey area comprise peat bogs (CORINE 412), transitional woodland scrub (324) with localised coniferous forests (312) and adjoining pastures (231).

3.2 Fisheries asset of the survey area

The Drish River, a tributary of the River Suir, is known to support *Lampetra* sp. (O'Connor, 2007; Kurz & Costello, 1999) as well as Atlantic salmon (*Salmo salar*), brown trout (*Salmo trutta*) and pike (*Esox lucius*) (1993 data presented in AECOM, 2020). The trout and pike in the Drish were found to be fast growing and similar to those in comparable rivers in the Irish midlands (CFB data referenced in AECOM, 2020). The river suffered significant pollution from a zinc and lead mine at Lisheen until the recent past (AECOM, 2020; O'Connor, 2007).

The Black River (Two Mile Borris) and the Breegagh River, both tributaries of the Drish River, are known to support *Lampetra* sp. (O'Connor, 2007)

Atlantic salmon are also known from the Breegagh River (Malone O'Regan, 2020).

Fisheries data for the other watercourses surveyed was not available at the time of survey.

3.3 Protected aquatic species data

A sensitive species data request was submitted to the National Parks and Wildlife Service for the 10km grid squares containing and adjoining the proposed wind farm project (i.e. S04, S05, S15, S16, S25 & S26). Furthermore, additional data held by the EPA and NBDC was also reviewed for these grid squares. Records for a low number of rare or protected aquatic species were available although none overlapped directly with the proposed wind farm.

A very high number of contemporary, white-clawed crayfish (*Austropotamobius pallipes*) records (>100) were available for the respective grid squares in the 2000-2014 period (**Figure 3.1**), with a further 50 approx. historical records. A low number of records were available for the Drish River, Clover River (single record), Black River (including at survey site C6) and Lough Doire Bhile (near lake site L17) (**Figure 3.1**).

A low number of contemporary otter (*lutra lutra*) records (2005-2015) were available for the relevant grid squares, with records from the Black River and Drish River (**Figure 3.1**).

A low number of records for freshwater pearl mussel (*Margaritifera margaritifera*) were available for the 10km grid squares S05 (Clodiagh River) and S04 (Multeen River) in the 1987-2006 period (**Figure 3.1**). However, there is no hydrological connectivity between these populations and the proposed project. No records were available in the vicinity of the proposed Littleton wind farm.

A single historical record (1985) for river lamprey (*Lampetra fluviatilis*) was available for the River Suir (grid square S04). *Lampetra* sp. are also known from a number of watercourses in vicinity of the proposed wind farm (see section 3.2 above).

Two records for Flora (Protection) Order 2022 macrophyte species opposite-leaved pondweed (*Groenlandia densa*) were available from a former pond in the vicinity of Urlingford but these were historical only (i.e. pre-1900).

Records for common frog (*Rana temporaria*) were widespread throughout 10km grid squares S04, S05, S15, S16, S25 & S26, with several records available in the vicinity of the proposed wind farm (data not shown). A single record for smooth newt (*Lissotriton vulgaris*) was available for bog habitat at Derryvella adjacent to the North Glengoole River at survey site C3 from 2010.

3.4 EPA water quality data (existing data)

The following outlines the available water quality data for the watercourses in context of the proposed wind farm project. Only recent water quality is summarised below. Contemporary EPA biological monitoring data was available for the Drish, Clover and Black Rivers only. Please note that biological water quality analysis was undertaken as part of this study, with the results presented in the **section 4** and **Appendix B** of this report.

3.4.1 Drish River

The Drish River (EPA code: 16D02) drains north and then south-west of the proposed wind farm site boundary before joining the River Suir downstream of Thurles. There was a total of 5 no. contemporary EPA biological monitoring stations on the river. The Drish River achieved **Q3** (poor status) at the four uppermost stations (RS16D020040, RS16D020070 (site B3), RS16D020100 & RS16D020200) in 2020. The lowermost station (RS16D020400) achieved **Q3-4 (moderate status)** in 2020.

The Drish_010, _020, _040 & _050 river waterbodies were all of poor status in the 2016-2021 period and were considered 'at risk' of failing to achieve good status (WFD Risk 3rd cycle),. The lower reaches (Drish_060) achieved moderate status in the same period but were also considered 'at risk'. Peat extraction, forestry and agriculture are the primary threats to water quality in these waterbodies (EPA, 2019).

3.4.2 Clover River

There were 2 no. contemporary EPA biological monitoring stations on the Clover River (16C04), a tributary of the Black River. The Clover achieved **Q3 (poor status)** at station RS16C040100 (survey site A2) in 2020 but this elevated to Q3-4 (moderate status) in the lower reaches at station RS16C040300 (also in 2020).

The upper reaches of the Clover River (Clover_010 waterbody) were of poor status in the 2016-2021 period, whilst the lower reaches (Clover_020 waterbody) were of moderate status. Both waterbodies were considered 'at risk' of not achieving good status. Peat extraction and forestry are the significant threats to water quality in these waterbodies (EPA, 2019).

3.4.3 Black River

There were 2 no. contemporary EPA biological monitoring stations on the Black River (16B01), a tributary of the Drish River. At Black River Bridge (station RS16B010030) and station RS16B010100 (near site C6) the river achieved **Q3-4 (moderate status)** in 2020.

The Black (Twomileborris)_010 waterbody (encompassing most of the river) was of moderate WFD status in the 2016-2021 period and was considered 'at risk' of achieving good status. The lower reaches of the Black River are part of the Drish_050 waterbody which was of poor status in the same period and also 'at risk'. (as outlined above). Peat extraction is the primary threat to water quality in these waterbodies (EPA, 2019).

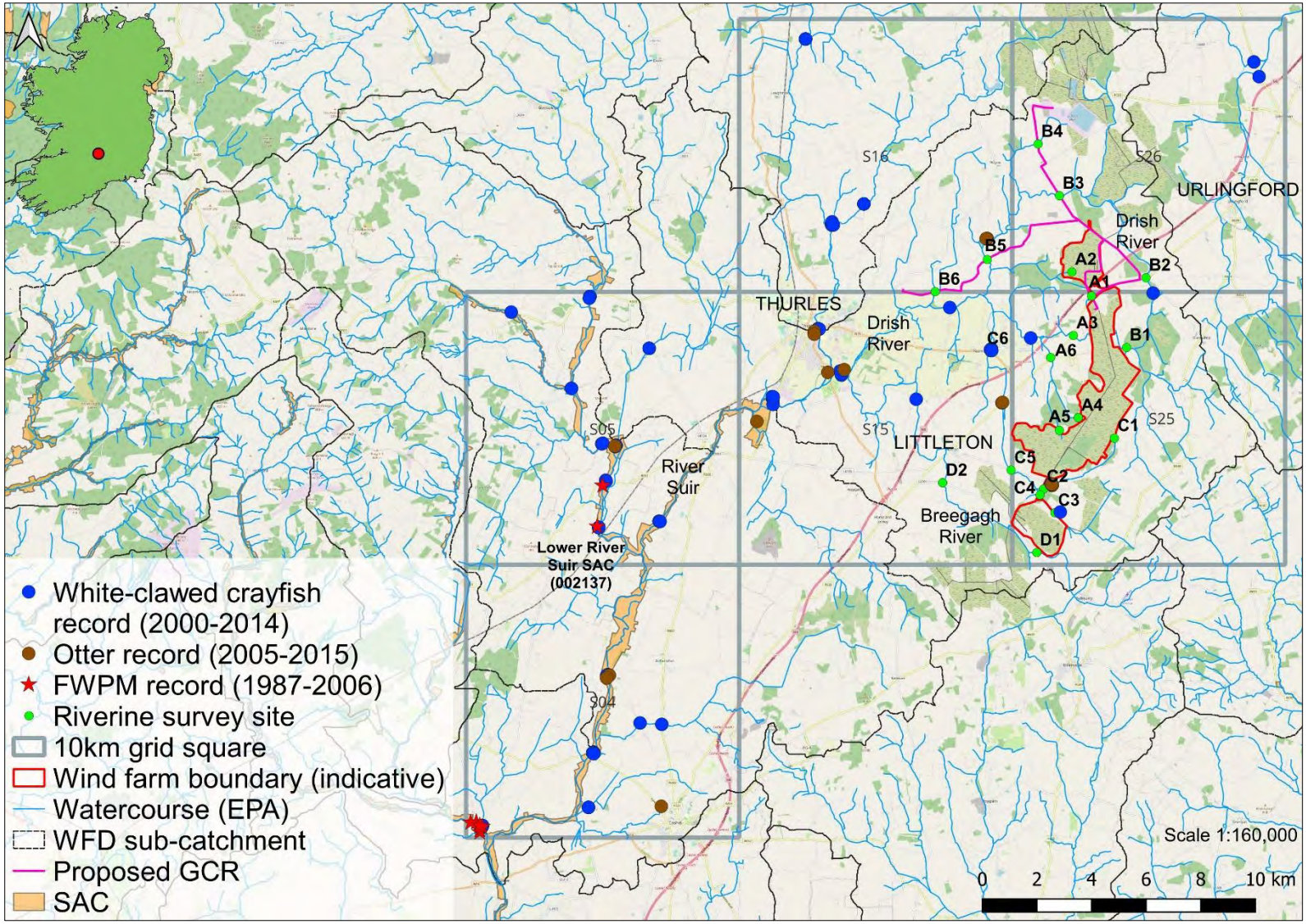


Figure 3.1 Distribution of selected protected species records in the vicinity of the proposed Littleton wind farm (source: NPWS, EPA & NBDC data)

4. Results of aquatic surveys

The following section summarises each of the 20 no. riverine and 17 no. lake/wetland survey sites in terms of aquatic habitats, physical characteristics and overall value for fish, macro-invertebrates and macrophyte/aquatic bryophyte communities. Biological water quality (Q-sample) and macro-invertebrate sweep sample results are summarised for a subset of 12 no. riverine and 10 no. lake/wetland sites, respectively, in **Appendix B**. Habitat codes are according to Fossitt (2000). Scientific names are provided at first mention only. Sites were surveyed in September 2021. Please refer to **Appendix A** (fisheries assessment report) for more detailed fisheries results. A summary of the fish species recorded at each survey site is provided in **Table 4.2**. A summary of the aquatic species and habitats of high conservation concern recorded during the surveys is provided in **Table 4.3**. An evaluation of the aquatic ecological importance of each survey site based on these aquatic surveys is provided and summarised in **Table 4.4**.

4.1 Riverine survey site results

4.1.1 Site A1 – unnamed stream, Longfordpass North

Site A1 was located on the upper reaches of an unnamed stream (no EPA code), approximately 0.4km north of a proposed substation. Although mapped by the EPA, no flowing watercourse was present at this location, situated adjacent to a Bord na Móna rail line. Whilst drainage swales were present along the rail line, these did not support flowing or standing water at the time of survey. No aquatic habitats were recorded in the vicinity of the site.

Site A1 was not of fisheries value given its dry, ephemeral nature and absence of aquatic habitats. No otter signs were recorded in the vicinity of the site.

Given the dry nature of the site, it was not possible to collected a biological water quality sample at the time of survey.

Given the absence of aquatic habitats, the aquatic ecological evaluation of site A1 was of **lower importance (lower value)** (**Table 4.4**).



Plate 4.1 Representative image of site A1 on an unnamed Drish River tributary, September 2021 (watercourse mapped by EPA but no channel or water present)

4.1.2 Site A2 – unnamed stream, Longfordpass North

Site A2 was located on the uppermost reaches of an unnamed stream (no EPA code) within the proposed site boundary. Situated in an extensive area of cutover bog (PB4), the Drish River tributary had been extensively straightened and deepened, with V-shaped banks to 4-5m in height. The homogenous channel averaged 1-1.5m wide and <0.1m deep with imperceptible flows at the time of survey (near stagnant glide and pool). The channel had been excavated with a gravel-dominated base. Occasional cobble and bolder was also present. However, these were heavily silted (flocculent deposits from peat escapement). The stream was considered likely ephemeral (seasonal) at this location. Given the low flows and high riparian shading, macrophytes were absent with the exception of very localised water horsetail (*Equisetum fluviatile*) and common reed (*Phragmites australis*) along channel margins. No aquatic bryophytes were recorded. The channel was heavily scrubbed over with high levels of terrestrial encroachment from willow (*Salix* sp.), downy birch (*Betula pubescens*) and bramble (*Rubus fruticosus* agg.). The site was bordered by dry meadow habitat (GS2) and cutover bog habitat in the wider area.

Three-spined stickleback (*Gasterosteus aculeatus*) was the only fish species recorded via electro-fishing at site A1 (**Appendix A**). With the exception of low densities of this species, the site was of very poor fisheries value at the time of survey given observed low seasonal flows (stagnant), very shallow nature, heavy siltation and historical modifications. There was no suitability for salmonids, lamprey, European eel or other fish species at the time of survey. The site had no suitability for white-clawed crayfish given very shallow water. No otter signs were recorded in vicinity of the site.

A biological water quality sample was not collected at this site.

Given the absence of aquatic species or habitats of high conservation value, the aquatic ecological evaluation of site A2 was of **local importance (lower value)** (**Table 4.4**).



Plate 4.2 Representative image of site A2 on an unnamed Drish River tributary, September 2021

4.1.3 Site A3 – Unnamed stream, Leigh

Site A3 was located on an unnamed stream (no EPA code) draining to the north-west of the proposed site boundary. The Clover River tributary (FW2) had been historically straightened and deepened at this location and was semi-dry at the time of survey, with only small localised pools of standing, stagnant rainwater and no flows. The channel featured a base of cobble and mixed gravels bedded in mud. No aquatic vegetation was present and the ephemeral channel likely only conveys water after heavy rainfall events or during floods.

Site A3 was not of fisheries value given its dry, ephemeral nature and absence of aquatic habitats. No otter signs were recorded in the vicinity of the site.

Given the semi-dry nature of the site (rainwater pools only), it was not possible to collected a biological water quality sample at the time of survey.

Given the absence of aquatic habitats, the aquatic ecological evaluation of site A3 was of **lower importance (lower value)** (**Table 4.4**).



Plate 4.3 Representative image of site A3 on an unnamed Clover River tributary, September 2021 (semi-dry, ephemeral channel)

4.1.4 Site A4 – Unnamed stream, Noard

Site A4 was located on the uppermost reaches of an unnamed stream (no EPA code) in an extensive area of cutover bog (PB4), near the proposed location of turbine T12. The lowland depositing stream (FW2) had been extensively straightened and deepened historically, with steep V-shaped banks of 3-4m high. The stream was a homogenous 2.5-3m wide and 0.2-0.3m deep. The stream suffered from low summer flows at the time of survey (glide habitat only) with very high peat staining. The substrata comprised almost exclusively deep silt (peat), with localised, heavily bedded small boulder. The over-deepened channel supported abundant common reed which covered >95% of the channel. Water mint (*Mentha aquatica*) was occasional on sloping banks. In addition to high shading from common reed, willow and birch lined the channel, resulting in local tunnelling. The site was bordered by bracken (*Pteridium aquilinum*) scrub (HH3) and willow scrub (WS1) in an area of cutover bog.

Three-spined stickleback and European eel (*Anguilla anguilla*) were the only fish recorded via electro-fishing at site A4 (**Appendix A**). With the exception of low densities of these species, the stream was of poor fisheries value at the time of survey given poor flows and heavy siltation (from peat escapement). Suitability for European eel was poor but some desirable characteristics for the species were present (e.g. instream refugia, macrophyte & fish prey base). Poor flows, heavy vegetation cover, heavy siltation and historical modifications precluded the presence of salmonids or lamprey from the site. There was poor suitability for white-clawed crayfish and none were recorded. No otter signs were recorded in the vicinity of the site.

Biological water quality, based on Q-sampling, was calculated as **Q3 (good status)** (**Appendix B**). However, it should be noted that this is a tentative rating given poor flows and lack of suitable riffle

areas for sampling (as per Toner et al., 2005). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the presence of Red-listed European eel, the aquatic ecological evaluation of site A4 was of **local importance (higher value)** (**Table 4.4**).



Plate 4.4 Representative image of site A4 on an unnamed Clover River tributary, September 2021

4.1.5 Site A5 – Clover River, Noard

Site A5 was located on the uppermost reaches of the Clover River (16C04) (also known as the Derheen River), approx. 150m downstream of a wetland area in cutover bog near proposed turbine T16. The lowland river (FW2) at this location had been historically straightened and extensively deepened, with steep V-shaped banks of 5-8m in height. Whilst flowing through a channel of up to 6-7m wide, the river itself was invariably <1m wide at the time of survey. The profile was of slow-flowing glide that averaged a homogenous 0.2-0.3m deep, with no riffle or pool areas. The substrata comprised almost exclusively deep (peat-derived) silt, often up to 0.3m in depth. Some superficial gravels were present but very heavily bedded in silt. Peat-staining was high at the time of survey. Macrophyte cover was high overall, with abundant bulrush (*Typha latifolia*) instream and frequent water mint and common reed along channel margins. Water horsetail was occasional, with bottle sedge (*Carex rostrata*) also present. Terrestrial encroachment was high given the narrow width of the channel. Scattered hawthorn (*Crataegus monoygna*), gorse (*Ulex europaeus*) and willow were present within the channel. The site was bordered by willow and bracken-dominated scrub, in a wider area of extensive cutover bog (PB4).

Three-spined stickleback was the only fish species recorded via electro-fishing at site A5 (**Appendix A**). With the exception of high densities of these species, the site was of very poor fisheries value given

its diminutive size, poor flows and heavy siltation (from peat escapement). These characteristics precluded the presence of salmonids or lamprey. Despite some suitability for European eel, none were recorded. Eel habitat was poor overall and was notably much improved in the upstream-connecting wetland system located within Littleton Bog. White-clawed crayfish habitat was poor overall (given heavy siltation) and none were recorded. No otter signs were recorded in the vicinity of the site.

Biological water quality, based on Q-sampling, was calculated as **Q3 (good status)** (**Appendix B**). However, it should be noted that this is a tentative rating given poor flows and lack of suitable riffle areas for sampling (as per Toner et al., 2005). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the absence of aquatic species or habitats of high conservation value, the aquatic ecological evaluation of site A5 was of **local importance (lower value)** (**Table 4.4**).



Plate 4.5 Representative image of site A5 on the uppermost reaches of the Clover River, September 2021

4.1.6 Site A6 – Clover River, Noard

Site A6 was located on the Clover River (16C04) at the R639 crossing, approx. 2.8km downstream of site A5. The lowland depositing river (FW2) at this location had been historically straightened and extensively deepened, with V-shaped bank heights of 5-6m. The river averaged 6-8m wide (narrower upstream of bridge) and 0.4-0.8m deep. Upstream of the bridge, shallower riffles and glide was present (0.1-0.3m deep). The profile was of slow-flowing, deep homogenous glide with riffle and shallower glide present upstream. Peat-staining was high at the time of survey. The cobble and mixed gravel substrata were very heavily silted in all but the fastest-flowing areas. Boulder was occasional, with large woody debris (LWD) frequent downstream of the bridge adding some valuable habitat

heterogeneity. Riparian shading was high, with macrophytes confined to upstream of the bridge in a more open section of channel (historical tree clearance). Here, unbranched bur-reed (*Sparganium emersum*) was occasional instream, with frequent marginal stands of fool's watercress (*Apium nodiflorum*), localised lesser water parsnip (*Berula erecta*), blue water speedwell (*Veronica anagallis-aquatica*) and water starwort (*Callitriche* sp.). Common duckweed (*Lemna minor*) was also frequent. Aquatic bryophytes were rare and limited to occasional *Leptodictyum riparium* on larger cobble and boulder. The channel was lined by mature treelines of sycamore (*Acer psuedoplatanus*), ash (*Fraxinus excelsior*) and elder (*Sambucus nigra*) with scrubby understories. The site was bordered by buildings and artificial surfaces (BL3) and improved pasture (GA1).

A total of four fish species were recorded via electro-fishing at site A6 (**Appendix A**). The site was dominated by adult brown trout (*Salmo trutta*), with low numbers of juveniles. Low numbers of perch (*Perca fluviatilis*), stone loach (*Barbatula barbatula*) and a single three-spined stickleback were also recorded. Despite significant siltation pressures, the site was evidently of good value as an adult trout habitat. Due to siltation pressures, spawning habitat was limited to a small, faster-flowing area upstream of the bridge. This also offered some moderate value for spawning lamprey but ammocoete habitat was sub-optimal (largely flocculent, humic deposits) and none were recorded. Despite some good suitability for European eel, none were recorded. Two predated white-clawed crayfish were recorded (likely otter predation), although no live crayfish were recorded. Otter spraint was recorded on marginal boulders immediately upstream of the bridge (ITM 621355, 657615).

Biological water quality, based on Q-sampling, was calculated as **Q3-4 (moderate status)** (**Appendix B**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the presence of salmonids, utilisation by otter and the possible presence of white-clawed crayfish (prey remains recorded), the aquatic ecological evaluation of site A6 was of **local importance (higher value)** (**Table 4.4**).



Plate 4.6 Representative image of site A6 on the Clover River, September 2021 (upstream of road culvert)

4.1.7 Site B1 – Unnamed stream, Longfordpass South

Site B1 was located on the upper reaches of an unnamed Drish River tributary, approx. 0.3km upstream of the Drish River confluence. The stream (FW2) had been heavily modified (straightened and deepened) and flows were intermittent at the time of survey, with frequent peat dams instream obstructing flow. The homogenous channel averaged 2m wide and <0.1m deep, with very deep silt (peat) deposits on the bed of up to 0.75m deep. Stagnant standing water was present locally, with several dry sections (between peat dams). The channel was heavily vegetated by terrestrial species and willow. However, more open areas supported abundant common duckweed and water mint. Reed canary grass (*Phalaris arundinacea*) was also frequent along the riparian zone. The site was bordered by dry meadows habitat (GS2) and recently planted immature sitka spruce (*Picea sitchensis*) woodland (WS2) with alder (*Alnus glutinosa*) borders. Mature coniferous forestry (WD4) was present along the north bank.

Three-spined stickleback was the only fish species recorded via electro-fishing at site B1 (**Appendix A**). With the exception of moderate densities of this species, the heavily-vegetated and modified channel was not of fisheries value at the time of survey given a lack of flow and very heavy siltation (peat). There was no suitability for white-clawed crayfish. No otter signs were recorded in vicinity of the site.

Biological water quality, based on Q-sampling, was calculated as **Q3 (good status)** (**Appendix B**). However, it should be noted that this is a tentative rating given poor flows and lack of suitable riffle areas for sampling (as per Toner et al., 2005). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the absence of aquatic species or habitats of high conservation value, the aquatic ecological evaluation of site B1 was of **local importance (lower value)** (**Table 4.4**).



Plate 4.7 Representative image of site B1 on an unnamed Drish River tributary, September 2021

4.1.8 Site B2 – Drish River, Longfordpass Bridge

Site B2 was located on the Drish River (16D02) at Longfordpass Bridge on the R639 road. The lowland depositing river (FW2) had been extensively straightened and deepened historically, resulting in very poor hydromorphology. The river suffered from very low water levels at the time of survey with no flows present (i.e. ponding habitat). The channel was a homogenous 10-12m wide and 0.1-0.3m deep with deep silt deposits of >0.3m locally. Near the upstream local road bridge, hard substrata were present (boulder and cobble with mixed gravels). However, elsewhere deep silt dominated. The site was very heavily vegetated (near 100% cover), with open ponding areas very localised. These supported a diverse range of macrophytes including abundant branched bur-reed (*Sparganium erectum*) with spiked water milfoil (*Myriophyllum spicatum*), lesser pondweed (*Potamogeton pusillus*), river water dropwort (*Oenanthe fluviatilis*), water-forget-me-not (*Myosotis scorpioides*), yellow water lily (*Nuphar lutea*) and fool's watercress. Cover of common duckweed and ivy-leaved duckweed (*Lemna trisulca*) was high. The aquatic moss *Fontinalis antipyretica* was present on the dry, perched bridge apron (1m fall), indicating intermittent higher flows (e.g. in winter). Filamentous algae was also present on harder substrata. The channel was lined by reed canary grass with occasional bittersweet (*Solanum dulcamara*), hedge bindweed (*Calystegia sepium*) and willowherbs (*Epilobium* spp.). The site was bordered by improved pasture (GA1).

Three-spined stickleback were the only fish recorded via electro-fishing at site B2 (**Figure 3.6**). With the exception of moderate densities of this species, the site was of very poor fisheries value at the time of survey given a seasonal lack of flow and impounding/ponding of water between stands of

instream vegetation. Whilst some suitability still remained for European eel, none were recorded. However, the Drish River at this location would have greater fisheries value for European eel and perhaps salmonids during higher flow periods (e.g. winter). Despite some habitat suitability, no white-clawed crayfish were recorded during the survey and crayfish eDNA was not detected in the sample collected from the site (**Table 4.1**). A regular otter spraint site was recorded on the upstream side of the dry bridge apron (ITM 624888, 660462) – this did not contain crayfish remains.

A biological water quality sample was not collected at this site.

Given utilisation by otter, the aquatic ecological evaluation of site B2 was of **local importance (higher value)** (**Table 4.4**).



Plate 4.8 Representative image of site B2 on the Drish River at Longfordpass Bridge, September 2021 (facing downstream to bridge)

4.1.9 Site B3 – Drish River, Castletown Bridge

Site B3 was located on the Drish River (16D02) at Castletown Bridge, a proposed GCR crossing approx. 6km downstream of site B2. The lowland alkaline river (FW2) at this location had been arterially drained historically but retained some good semi-natural features. The river suffered from very low summer flows at the time of survey. The water width was 5-6m on average in a heavily-vegetated channel up to 8-10m wide. The depth averaged 0.3-1m with deeper pool areas to 1.5m locally. The profile was of very slow-flowing glide, with localised faster runs between macrophyte beds exposing gravel substrata. The substrata were predominantly cobble and medium to coarse gravels with frequent boulder. However, these were bedded in silt and moderately calcified (compacted). The compacted bed was also moderately to heavily silted, given low flows and depositional conditions. The river at this location was very heavily vegetated (>90% cover) with abundant lesser water parsnip

and broad-leaved pondweed (*Potamogeton natans*), in addition to common reed, branched bur-reed and frequent stands of heterophyllous common clubrush (*Schoenoplectus lacustris*) in gravel-dominated areas of faster flows. Yellow lily was common, with common duckweed and ivy-leaved duckweed frequent. Reed canary grass was also frequent instream. River water dropwort was occasional. The moss *Rhynchostegium riparium* was occasional. Filamentous algae was present, locally. Adjoining the river margins was a herbaceous community supporting primarily reed canary grass, bittersweet, marsh willowherb (*Epilobium palustre*), great willowherb (*Epilobium hirsutum*), water mint and water-forget-me-not. The site was bordered by improved pasture (GA1) and, downstream, an intermittent treeline (WL2) of ash, hawthorn and sycamore.

A total of four fish species were recorded via electro-fishing at site B3 (**Appendix A**). Low numbers of stone loach and three-spined stickleback were present, with single examples of pike (*Esox lucius*) (juvenile) and European eel also recorded. Despite some suitability, no salmonids or lamprey were recorded. Salmonid and lamprey spawning habitat was present but very localised (mostly downstream of bridge) and limited in extent due to very high vegetation cover, siltation and low flows. Salmonid nursery habitat was poor, given low seasonal flows. Some good-quality holding habitat for adult salmonids was present in association with macrophyte beds and overhanging vegetation. European eel suitability was high, with ample instream refugia present. Despite some good suitability, no white-clawed crayfish were recorded, although the value of the site was reduced given compaction of substrata and poorly accessible boulder refugia. White-clawed crayfish eDNA was detected on the Drish River approx. 5.7km downstream at site B5 (see section 4.5). No otter signs were recorded in vicinity of the site, despite good foraging suitability.

Biological water quality, based on Q-sampling, was calculated as **Q3 (poor status)** (**Appendix B**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the presence of Red-listed European eel, the aquatic ecological evaluation of site B3 was of **local importance (higher value)** (**Table 4.4**).



Plate 4.9 Representative image of site B3 on the Drish River, September 2021 (facing upstream from Castletown Bridge)

4.1.10 Site B4 – Cooleeny River, Killoran

Site B4 was located on the upper reaches of the Cooleeny River (16C14) at a proposed GCR crossing. The Drish River tributary at this location was dry at the time of survey, with no flows or standing water present. As a result, there was no aquatic value. The channel featured a dry mud base and had been historically straightened and deepened. The river at this location likely only conveys water after heavy rainfall events or during floods (i.e. ephemeral).

Site B4 was not of fisheries value given its dry, ephemeral nature and absence of aquatic habitats. No otter signs were recorded in the vicinity of the site.

Given the dry, ephemeral nature of the site, it was not possible to collected a biological water quality sample at the time of survey.

Given the absence of aquatic habitats, the aquatic ecological evaluation of site B4 was of **lower importance (lower value)** (**Table 4.4**).



Plate 4.10 Representative image of site B4 on the Cooleeny River, September 2021 (dry, ephemeral channel)

4.1.11 Site B5 – Drish River, d/s Ballyduff Bridge

Site B5 was located on the Drish River (16D02) 100m downstream of Ballyduff Bridge at a proposed GCR crossing, approx. 5.7km downstream of site B3. The swift-flowing, lowland alkaline river (FW2) was largely natural at this location and averaged 10-12m wide and 0.2-0.5m deep. Localised deeper pool to 0.8m was present downstream of the bridge. The site was typified by swift, shallow glide and occasional riffle and pool. The substrata were dominated by heavily compacted and calcified cobble with occasional interstitial gravels and frequent boulder. Siltation was low overall and no soft sediment deposits were present, even in association with macrophyte beds or pool slacks (i.e., high-energy site). Given the compacted bed and high-energy nature, macrophytes were limited to infrequent water crowfoot (*Ranunculus* sp.) and marginal beds of fool's watercress, watercress and water mint, with a single stand of iris (*Iris psuedacorus*) on a mid-channel island downstream of the bridge. Ivy-leaved duckweed was present but rare given high flows. Reed canary grass with bittersweet, nettle (*Urtica dioica*) and hedge bindweed lined the channel. However, the cover of aquatic bryophytes was very high (>75%) with abundant *Fontinalis antipyretica* and frequent *Rhynchostegium riparium*. The calcicolous liverwort *Pellia endiviifolia* was occasional with *Riccardia chamedryfolia* on the bridge abutments. Filamentous algae was present (5%) cover, indicating enrichment. The site was bordered by mature treelines of sycamore and ash with occasional willow and elder.

A total of five fish species were recorded via electro-fishing at site B5 (**Appendix A**). The site was dominated by mixed cohort Atlantic salmon and brown trout, with stone loach, minnow (*Phoxinus phoxinus*), European eel and pike also captured. The site was an excellent-quality salmonid nursery

with a high density of juvenile Atlantic salmon and brown trout present in cobble-dominated zones. Deeper pools and undercuts/overhangs supported moderate numbers of adult trout, and provided some good holding habitat for migratory adults. European eel habitat was moderate-quality given natural bed compaction (high flow rates & calcification) and poorly-accessible boulder refugia. Lamprey ammocoete habitat was not present, though some localised interstitial gravels were present which provided some lower value for spawning. Despite some suitability for white-clawed crayfish (reduced due to bed compaction/calcification), none were recorded during sweep netting and hand-searching. However, white-clawed crayfish eDNA was detected at the site (**Table 4.1**). Both otter and invasive mink (*Neovison vison*) spraint was recorded on the upstream side of the bridge abutment (ITM 618948, 661308). Neither contained crayfish remains.

Biological water quality, based on Q-sampling, was calculated as **Q3-4 (moderate status)** (**Appendix B**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the presence of salmonids (including Atlantic salmon) and European eel, in addition to utilisation by otter, the aquatic ecological evaluation of site B5 was of **local importance (higher value)** (**Table 4.4**).



Plate 4.11 Representative image of site B5 on the Drish River, September 2021 (facing downstream from Ballyduff Bridge)

4.1.12 Site B6 – Ballygammane River, Athlummon

Site B6 was located on the Ballygammane River (16B55) at a local road crossing and proposed GCR crossing, approx. 0.6km upstream of the Drish River confluence. The river at this location had been straightened historically, with more recent modifications evident (e.g. pipe culvert from adjacent

house). However, some semi-natural characteristics remained. The small alkaline river (FW2) had been historically straightened and deepened but showed some good instream recovery. The river averaged 2.5-3m wide in a channel of up to 5-6m. The trapezoidal channel featured banks of 2-2.5m in height. Water levels were low at the time of survey and the site averaged 0.1-0.2m deep with only very localised pool to 0.6m near the adjoining pipe culvert. The profile comprised a series of swift-flowing, shallow glide and riffle sequences with only very localised pool. The substrata were dominated by compacted, calcified boulder and cobble, much of which was exposed during the survey. Mixed medium to coarse gravels were present locally. Siltation was light overall, though some deep deposits were present near each respective culvert (up to 0.2m deep). Due to calcification, high shading and livestock poaching, macrophytes were limited to only very occasional fool's watercress along channel margins. However, cover of submerged *Pellia endiviifolia* was high, with occasional *Brachythecium rivulare* and *Riccardia chamedryfolia* present on the tops of larger boulder. The site was lined by mature treelines of ash, hawthorn and alder with scrubby understories, and was bordered by improved pasture (GA1) and a broad-leaved plantation (WS2).

A total of four fish species were recorded via electro-fishing at site B6 (**Appendix A**). The site was dominated by mixed cohort brown trout with low numbers of Atlantic salmon, with minnow, three-spined stickleback and *Lampetra* sp. also recorded. Despite its very shallow nature, the site supported moderate densities of Atlantic salmon parr and mixed cohort brown trout. The numbers of adult trout were low given the paucity of deeper holding habitat. Spawning habitat was present but the value was reduced by both siltation and calcification pressures (spawning habitat better suited to Atlantic salmon). The site was of most value as a salmonid nursery. Whilst some soft sediment accumulations were present, these were largely flocculent and no ammocoetes were recorded. However, a low number of *Lampetra* sp. transformers (near-adults) were captured. The site had low suitability for European eel and white-clawed crayfish given the shallow depth and lack of accessible refugia - neither species was recorded. No otter signs were recorded in vicinity of the site

Biological water quality, based on Q-sampling, was calculated as **Q3 (poor status)** (**Appendix B**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the presence of salmonids (including Atlantic salmon) and *Lampetra* sp., the aquatic ecological evaluation of site B6 was of **local importance (higher value)** (**Table 4.4**).



Plate 4.12 Representative image of site B6 on the Ballygammane River, September 2021

4.1.13 Site C1 – Black River, Clonoura

Site C1 was located on the uppermost reaches of the Black River (16B01) that drained to the south of the proposed wind farm site. The site was dry at the time of survey, with no pools of standing water and a dry mud base. As a result, there was no aquatic value. The river channel had been straightened and deepened historically and averaged 1.5-2m wide with bank heights of 1-2m. Evidently, the channel was ephemeral, likely only conveying water during wetter periods. The channel was heavily scrubbed over with high levels of terrestrial encroachment and willow scrub. The site was bordered by a broad-leaved plantation (WS2) with tillage (BC3) to the east.

Site C1 was not of fisheries value given its dry, ephemeral nature and absence of aquatic habitats. No otter signs were recorded in the vicinity of the site.

Given the dry, ephemeral nature of the site, it was not possible to collected a biological water quality sample at the time of survey.

Given the absence of aquatic habitats, the aquatic ecological evaluation of site C1 was of **lower importance (lower value)** (**Table 4.4**).



Plate 4.13 Representative image of site C1 on the Black River, September 2021 (dry, ephemeral channel)

4.1.14 Site C2 – Black River, Derryvella

Site C2 was located on the Black River (16B02), approx. 3.6km downstream from site C1. The lowland depositing river (FW2) had been straightened and deepened historically, with some recovery evident. The stream was culverted underneath a Bord na Móna rail line via a large corrugated pipe culvert. Upstream, flows were low and the channel was heavily scrubbed. Downstream of the culvert, the channel narrowed and flows improved. Shallow glide and riffle predominated with occasional pool, grading to slow-flowing glide downstream. The river averaged 2-2.5m wide and 0.1-0.2m deep, with locally deeper pool to 0.3-0.5m. The substrata near the culvert were dominated by moderately-silted small cobble and medium-coarse gravels with occasional small boulder. However, downstream silt deposits became deep and frequent albeit flocculent (peat-derived with some sand). The river was heavily shaded by willow scrub. As a result, macrophytes were limited to the vicinity of the culvert. Water mint and fool's watercress were both present, in addition to localised common reed. No aquatic bryophytes were recorded, though some *Pellia* sp. liverwort grew on muddy banks. The site was bordered by an area of cutover bog (PB4) with abundant scrub (WS1).

A total of three fish species were recorded via electro-fishing at site C2 (**Appendix A**). The site supported a small population of mixed-cohort brown trout, with a single Atlantic salmon parr (0+) and three-spined stickleback also captured. Despite historical modifications, poor flows and siltation pressures (peat escapement), the site was of some moderate value as a salmonid nursery, at least in vicinity of the culvert where riffle habitat was present. The salmonid spawning value was compromised by siltation but the value likely improved during higher flows. Holding habitat was limited to the culvert pool with shallow glide dominating downstream. Whilst some limited lamprey

spawning habitat was present, ammocoete habitat was unsuitable given the flocculent nature of the silt (peat-dominated). Despite some suitability for European eel and white-clawed crayfish none were recorded (limited refugia). No otter signs were recorded in vicinity of the site.

Biological water quality, based on Q-sampling, was calculated as **Q3 (poor status)** (**Appendix B**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the presence of salmonids (including Atlantic salmon), the aquatic ecological evaluation of site C2 was of **local importance (higher value)** (**Table 4.4**).



Plate 4.14 Representative image of site C2 on the Black River, September 2021 (downstream of pipe culvert)

4.1.15 Site C3 – North Glengoole River, Derryvella

Site C3 was located on the North Glengoole River (16N28) at a local road crossing adjacent to Loch Doire Bhile, approx. 1.1km upstream of the Black River confluence. The lowland depositing river (FW2) had been historically straightened and deepened with steep V-shaped banks of 2-3m in height. The river averaged 2m wide and 0.1-0.15m deep, with localised small pools to 0.25m maximum. The profile comprised very shallow glide and riffle with limited pool. The river flowed through a perched twin-bore pipe culvert (0.3m fall). The substrata were dominated by medium to coarse gravels with small cobble and occasional small boulder. However, these were moderately compacted, with moderate to high siltation (peat-derived, plumes underfoot). The narrow channel was heavily shaded by riparian scrub and macrophytes were limited to occasional lesser water parsnip and watercress in more open areas. Common duckweed was present but scarce. Aquatic bryophytes were limited to rare *Rhynchostegium riparoides*, with *Pellia* sp. on muddy banks. The site was lined with dense bramble-

dominated scrub (WS1) with willow and gorse and adjoined an area of recolonising cutover bog (PB4). Heavy tunnelling was present upstream and downstream of the culvert.

Four fish species were recorded via electro-fishing at site C3 (**Appendix A**). The site supported a low density of juvenile brown with a single Atlantic salmon parr (1+) recorded. Two juvenile European eel were also recorded, in addition to a low density of three-spined stickleback. Salmonid spawning habitat, whilst present, was compromised by siltation and compaction of substrata. The value of the salmonid nursery habitat was reduced given low flows, shallow depth and the presence of a culvert which evidently acted as a migration barrier at base flows. Indeed, all fish recorded were confined to the pool immediately downstream of the culvert, despite some suitability for salmonids upstream. European eel were present in low densities. The site was considered unsuitable for lamprey given compaction of substrata, siltation and lack of suitable soft sediment deposits for ammocoetes (flocculent only). No white-clawed crayfish were recorded (paucity of suitable refugia). No otter signs were recorded in vicinity of the site.

A biological water quality sample was not collected at this site.

Given the presence of salmonids (including Atlantic salmon) and Red-listed European eel, the aquatic ecological evaluation of site C3 was of **local importance (higher value)** (**Table 4.4**).



Plate 4.15 Representative image of site C3 on the North Glengoole River, September 2021

4.1.16 Site C4 – North Glengoole River, Derryvella

Site C4 was located on the North Glengoole River (16N28) at a Bord na Móna rail crossing (culvert), approx. 0.8km downstream of site C3 and 0.25km upstream of the Black River confluence. The lowland depositing river (FW2) had been historically straightened and deepened with V-shaped banks of up to 4m in height and old embankments evident along the channel. The river averaged 2-2.5m wide and 0.1-0.2m deep, with locally deeper pool to 0.4m. Shallow glide and riffle predominated, with only localised pool. In shallower areas near the culvert the substrata comprised mixed gravels and small cobble with occasional boulder. However, outside of this area, depositional silt dominated (up to 0.2m deep). Hard substrata were exposed to moderate siltation and partial bedding. Siltation would have been higher if not for macrophyte growth. Cover of macrophytes was high (>75%) with abundant fool's watercress, frequent water mint and localised bulrush. Floating mats of *Agrostis* sp. grass were present along channel margins. Aquatic bryophytes were not recorded. The river channel was open with only scattered gorse, hawthorn and willow. A well-developed herbaceous layer supporting purple loosestrife (*Lythrum salicaria*), willowherbs (*Epilobium* spp.), hogweed (*Heracleum sphondylium*), reed canary grass and rank grasses was present along the channel margins. The site was bordered by dry meadows habitat (GS2) and improved pasture (GA1) in a wider landscape of cutover bog (PB4).

Brown trout and three-spined stickleback were the only two fish species recorded via electro-fishing at site C4 (**Appendix A**). The site supported a moderate density of juvenile brown trout and low numbers of small adults with a single three-spined stickleback also recorded. The site was of good value as a salmonid nursery, with good, albeit highly localised, spawning habitat present also. Holding habitat for adults was moderate, at best (largely confined to vicinity of the pipe culvert). Whilst some lamprey spawning habitat was present, ammocoete habitat was not recorded (flocculent and peat-dominated). Despite some suitability, no European eel were recorded. White-clawed crayfish habitat was moderate overall, with the value reduced due to a lack of accessible refugia or banks for burrowing (i.e. hard, excavated banks). No otter signs were recorded in vicinity of the site.

Biological water quality, based on Q-sampling, was calculated as **Q3-4 (moderate status)** (**Appendix B**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the presence of salmonids, the aquatic ecological evaluation of site C4 was of **local importance (higher value)** (**Table 4.4**).



Plate 4.16 Representative image of site C4 on the North Glengoole River, September 2021

4.1.17 Site C5 – Black River, Derryhogan

Site C5 was located on the Black River (16B01) at a local road bridge, approx. 1.5km downstream of site C2. The river had been extensively straightened and deepened, with very steep (near vertical) V-shaped banks of 4-5m in height. The river flowed under the local road via a pipe corrugated culvert (that was accessible to fish). The river averaged a homogenous 3-4m in a channel up to 5-6m wide. The depth varied from 0.2 to 0.5m, with occasional pool areas to 1m. Deep slow-flowing glide dominated the site, with occasional pool. Riffle was present upstream of the road culvert. The substrata comprised compacted and heavily silted mixed gravels and cobble, with occasional boulder (near culvert only). Bank erosion was frequent (exposed clay) and contributed to the silt loading. Siltation was high overall (largely peat-derived) with deep silt-sand deposits present along channel margins (up to 0.2m deep). The site was heavily shaded by mature treelines of ash, elder, hawthorn and cypress (Cupressaceae family) with poorly-developed understories. As a result, macrophytes were not present. Aquatic bryophytes were not recorded, with the liverworts *Pellia endiviifolia* and *Conocephalum conicum* on muddy banks. The site was bordered by improved pasture (GA1).

Brown trout and stone loach were the only two fish species recorded via electro-fishing at site C5 (**Appendix A**). Adult trout dominated, with only low numbers of juveniles present. The site was a moderate-quality salmonid habitat, with moderate-quality spawning and nursery habitat. Holding habitat, by way of deeper pools, bank undercuts and submerged tree root systems, was of good quality. Despite high siltation, soft sediment accumulations did not support lamprey ammocoetes (largely humic or clay-based in nature). Some very limited superficial spawning gravels suitable for lamprey were present in the vicinity of the culvert although spawning habitat improved upstream, where riffles were more commonplace. Aside from submerged tree root systems, suitability for

European eel and white-clawed crayfish was relatively poor given limited accessible instream refugia such as boulders and macrophytes (neither species recorded). However, white-clawed crayfish eDNA was detected at the site, in addition to crayfish plague (*Aphanomyces astaci*) (**Table 4.1**). No otter signs were recorded in vicinity of the site.

A biological water quality sample was not collected at this site.

Given the presence of salmonids and the detection of white-clawed crayfish eDNA, the aquatic ecological evaluation of site C5 was of **local importance (higher value)** (**Table 4.4**).



Plate 4.17 Representative image of site C5 on the Black River, September 2021

4.1.18 Site C6 – Black River, Two Mile Borris

Site C6 was located on the Black River (16B01) at the N75 road crossing, approx. 5km downstream of site C5. As per upstream, the lowland river (FW2) at this location had been straightened and deepened historically, flowing in a steep, 5-8m high trapezoidal channel. The river averaged 6-8m wide and 0.2-0.6m deep, with locally deeper areas to 0.9m. Slow-flowing glide predominated, with localised riffles near the road bridge and occasional pools. The substrata were dominated by cobble with frequent boulder and small interstitial patches of mixed gravels. Siltation was moderate overall (peat), given low flows, but soft sediment accumulations were localised. The substrata were relatively mobile. The site supported a diverse range of macrophytes, with frequent lesser water parsnip and occasional water starwort (*Callitriche* sp.), water mint, water crowfoot (*Ranunculus* sp.) and watercress (*Nasturtium officinale*). Curled pondweed (*Potamogeton crispus*) was present but rare. Common duckweed and ivy-leaved duckweed were both common. Coverage of aquatic bryophytes was high, with abundant *Fontinalis antipyretica* on larger cobble/boulder. Given the presence of several indicator species (EC, 2013) and the high coverage of bryophytes, the aquatic plant community was

considered representative of the Annex I habitat 'Water courses of plain to montane levels, with submerged or floating vegetation of *Ranunculion fluitantis* and *Callitricho-Batrachion* (low water level during summer) or aquatic mosses [3260]'. Riparian shading was relatively high given the presence of maturing alder treelines along the channel (both banks). The site was bordered by improved pasture (GA1) and grassy verges habitat (GS2).

A total of four fish species were recorded via electro-fishing from site C6 (**Appendix A**). The site was dominated by relatively high numbers of mixed-cohort brown trout with moderate densities of Atlantic salmon parr. *Lampetra* sp. ammocoetes were recorded at moderate densities of 3.3 per m^2. A single stone loach was also captured. The site was of excellent value as a salmonid nursery given the abundance of vegetated cobble refugia in addition to macrophyte beds (including *Ranunculus* sp.). Good-quality salmonid and lamprey spawning habitat was present but was compromised by siltation and limited in extent. Holding habitat for adult salmonids was also of good-quality given the presence of macrophyte refugia, vegetation overhangs and deeper glide areas. Small areas of soft sediment provided some locally good-quality ammocoete habitat. Despite some good suitability (i.e. ample refugia), no European eel or white-clawed crayfish were recorded. However, abundant crayfish remains were identified in otter spraint underneath the road bridge (ITM 619150, 657803; **Plate 4.38**).

Biological water quality, based on Q-sampling, was calculated as **Q4 (good status)** (**Appendix B**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the presence of salmonids (including Atlantic salmon), *Lampetra* sp., Annex I floating river vegetation [3260] and utilisation by otter, the aquatic ecological evaluation of site C6 was of **local importance (higher value)** (**Table 4.4**).



Plate 4.18 Representative image of site C6 on the Black River, September 2021

4.1.19 Site D1 – Breegagh River, Killeen

Site D1 was located on the Breegagh River (16B03) at a local road crossing, where the river flowed through a large three-bore box culvert. The small lowland river (FW2) had been straightened and deepened historically, with cobble/boulder revetments in the vicinity of the road culvert. The river averaged 2.5-3m wide and 0.3-0.7m deep in homogenous deep, slow-flowing glide. Pool was occasional. Riffles were limited to the vicinity of the culvert. Peat-staining was not present at the time of survey. The substrata were dominated by compacted cobble with occasional boulder and limited interstitial mixed gravels. The site suffered from heavy siltation, although deposits were flocculent, with only very localised, shallow accumulations. Large woody debris (LWD) was frequent instream which improved habitat heterogeneity of the straightened channel. The river flowed through a maturing broad-leaved plantation and shading was high. As a result, macrophytes were limited to occasional fool's watercress, water mint and lesser water parsnip along channel margins in more open areas. Reed canary grass was abundant along channel margins and created overhangs of high value for salmonids. Aquatic bryophytes were absent with the exception of localised *Brachythecium rivulare* on exposed boulder near the culvert. The site was bordered by a broad-leaved plantation of sycamore, wych elm (*Ulmus glabra*) and alder (WD1), with dense bramble scrub (WS1) and improved pasture (GA1).

Atlantic salmon and brown trout were the only two fish species recorded at site D1 (**Appendix A**). Brown trout dominated the site, with mixed cohorts present. A moderate number of Atlantic salmon parr (two cohorts) were also recorded. The site was of excellent value as an adult salmonid habitat, supporting a high density of adult brown trout, with some good holding habitat present (scoured banks, vegetation overhangs etc.). The site was of moderate value only as a nursery given siltation pressures and predominance of deep homogenous glide. Similarly, spawning habitat for both salmonids and lamprey was largely absent given compaction of the bed and siltation (some present upstream of farm culvert, however). Despite some good suitability (ample refugia), no European eel were recorded. No white-clawed crayfish were recorded and suitability was low overall given siltation and general lack of refugia. No otter signs were recorded in vicinity of the site.

Biological water quality, based on Q-sampling, was calculated as **Q3 (poor status)** (**Appendix B**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the presence of salmonids (including Atlantic salmon), the aquatic ecological evaluation of site D1 was of **local importance (higher value)** (**Table 4.4**).



Plate 4.19 Representative image of site D1 on the Breegagh River, September 2021 (facing upstream from culvert)

4.1.20 Site D2 – Breegagh River, Ballymurreen Bridge

Site D2 was located on the Breegagh River (16B03) at Ballymurreen Bridge, approx. 4.8km downstream of site D1. The lowland river (FW2) had been straightened historically but not deepened and retained many good semi-natural characteristics. The river averaged 4-5m wide (channel up to 7m wide in places) and 0.2-0.4m deep. Locally deeper glide and pool to 0.8m was present. The heterogenous profile comprised swift-flowing glide with occasional riffles near the bridge, and pool becoming more frequent downstream. In faster-flowing areas, the substrata were dominated by relatively mobile and clean cobble and mixed gravels, with occasional small boulder. Sand patches were also present. However, deeper glide was more depositing in nature and soft sediment deposits were abundant. Siltation was moderate overall and peat-staining was not present at the time of survey. The site supported a range of macrophytes. Lesser water parsnip was frequent, with occasional water crowfoot (*Ranunculus* sp.), watercress and localised branched bur-reed. Water forget-me-not, reed canary grass and water mint were common along channel margins. Common duckweed and filamentous algae were present, indicating enrichment. Aquatic bryophytes were limited to very occasional *Brachythecium rivulare* on larger, more stable boulder. The river was flanked on the east bank by a mature treeline of blackthorn (*Prunus spinosa*), hawthorn, ash, elder, sycamore and bramble, with the west bank open featuring improved grassland (GA1).

A total of four fish species were recorded via electro-fishing at site D2 (**Appendix A**). The site supported moderate densities of brown trout and Atlantic salmon with low numbers of stone loach and three-spined stickleback also present. *Lampetra* sp. were present in high numbers. The site was an excellent quality salmonid nursery with moderate densities of juvenile Atlantic salmon and brown

trout. A moderate density of adult brown trout was also present in deeper glide and pool. Both salmonid and lamprey spawning habitat was of good-quality, albeit threatened by siltation. The site was of most value as a lamprey nursery habitat, with excellent-quality lamprey ammocoete habitat present, particularly in association with macrophyte beds. *Lampetra* sp. ammocoetes were widespread at moderate densities (13.7 per m^2). A single *Lampetra* sp. transformer was also recorded. Despite some moderate suitability, European eel and white-clawed crayfish were not recorded. However, white-clawed crayfish eDNA was detected at the site (**Table 4.1**). Despite high suitability, no otter signs were recorded in vicinity of the site.

Biological water quality, based on Q-sampling, was calculated as **Q3 (poor status)** (**Appendix B**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the presence of salmonids (including Atlantic salmon), *Lampetra* sp. and the detection of white-clawed crayfish eDNA, the aquatic ecological evaluation of site D2 was of **local importance (higher value)** (**Table 4.4**).



Plate 4.20 Representative image of site D2 on the Breegagh River, September 2021 (facing downstream from Ballymurreen Bridge)

4.2 Lacustrine survey site results

4.2.1 Site L1 – lake/wetland, Longfordpass South

Site L1 was located within an extensive area of cutover bog (Littleton Bog), within the proposed site boundary. The open site comprised two small lake basins with associated wetland areas covering an area of c.1ha. The lakes were evidently seasonal (ephemeral) and averaged 0.1-0.2m deep with very few deeper areas. The bed was comprised entirely of soft silt (peat). Peat staining was high at the time of survey. The basins were fed by run-off from extensive cutover bog via narrow peatland drains supporting small stands of bulrush and cotton grass. These were also present in the lake basins alongside localised bottle sedge and bog pondweed. The lake was situated in cutover bog (PB4).

The cutover peat lake was not considered of fisheries value given its heavily silted, ephemeral, shallow nature and isolation from other aquatic habitats. The site was of high value for amphibians although none were recorded during the site visit. No otter signs were recorded in vicinity of the site.

No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via sweep netting (**Appendix B**).

Given the absence of aquatic habitats of high conservation value, the aquatic ecological evaluation of site L1 was of **lower importance (lower value)** (**Table 4.4**).



Plate 4.21 Representative image of site L1, October 2021

4.2.2 Site L2 – lake/wetland, Bawnreagh

Site L2 was located within an extensive area of cutover bog (Littleton Bog), within the proposed site boundary. The large, shallow linear cutover lake covered an area of c.1ha and ranged from 0.2-0.5m

deep. The bed was comprised entirely of soft silt (peat). Peat staining was high at the time of survey. Macrophyte coverage was low with only occasional bog pondweed, broad-leaved pondweed and bulbous rush (*Juncus bulbosus*). Stonewort (*Chara* sp.) and bladderwort (*Utricularia* sp.) were present along the margins but rare overall. Cottongrass and bottle sedge were abundant in the peaty littorals. The lake was situated in cutover bog (PB4) with heath and scattered pre-thicket lodgepole pine.

The cutover peat lake was not considered of fisheries value given its heavily silted, shallow nature and isolation from other aquatic habitats. The site was of high value for amphibians although none were recorded during the site visit. No otter signs were recorded in vicinity of the site.

No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via sweep netting (**Appendix B**).

Given the absence of aquatic habitats of high conservation value, the aquatic ecological evaluation of site L2 was of **lower importance (lower value)** (**Table 4.4**).



Plate 4.22 Representative image of site L2, October 2021

4.2.3 Site L3 – lake/wetland, Bawnreagh

Site L3 was located within an extensive area of cutover bog (Littleton Bog), within the proposed site boundary and adjacent to site L2. The shallow linear cutover lake covered an area of c.0.5ha and ranged from 0.2-0.6m deep. The bed was comprised entirely of soft silt (peat). Peat staining was high at the time of survey. Macrophyte coverage was low with only occasional bog pondweed, broad-leaved pondweed and bulbous rush. Cottongrass and bottle sedge were abundant in the exposed peaty littorals. The lake was situated in cutover bog (PB4) with heath and scattered pre-thicket lodgepole pine.

The cutover peat lake was not considered of fisheries value given its heavily silted, shallow nature and isolation from other aquatic habitats. The site was of high value for amphibians although none were recorded during the site visit. No otter signs were recorded in vicinity of the site.

No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via sweep netting (**Appendix B**).

Given the absence of aquatic habitats of high conservation value, the aquatic ecological evaluation of site L3 was of **lower importance (lower value)** (**Table 4.4**).



Plate 4.23 Representative image of site L3, October 2021

4.2.4 Site L4 – lake/wetland, Bawnreagh

Site L4 was located within an extensive area of cutover bog (Littleton Bog), within the proposed site boundary. The large shallow cutover lake covered an area of c.1.1ha and ranged from 0.2-1m deep. The bed was comprised entirely of soft silt (peat). Peat staining was high at the time of survey. Macrophyte growth was low with only very occasional broad-leaved pondweed and bog pondweed in the open water. Stonewort (*Nitella* sp.) was present in the peaty margins but rare overall. Abundant cotton grass was present on the peaty littorals with occasional marsh pennywort. The lake was situated in lowland blanket bog (PB3)/cutover bog (PB4) with heath and pre-thicket lodgepole pine.

The cutover peat lake was considered of poor fisheries value given its heavily silted, shallow nature and isolation from other aquatic habitats. The site was of high value for amphibians although none were recorded during the site visit. No otter signs were recorded in vicinity of the site.

No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via sweep netting (**Appendix B**).

Given the absence of aquatic habitats of high conservation value, the aquatic ecological evaluation of site L4 was of **lower importance (lower value)** (**Table 4.4**).



Plate 4.24 Representative image of site L4, October 2021

4.2.5 Site L5 – lake/wetland, Bawnreagh

Site L5 was located within an extensive area of cutover bog (Littleton Bog), within the proposed site boundary. The large shallow cutover lake covered an area of c.1.4ha and ranged from 0.2-0.4m deep in the margins to up to 1.3m in open water. The bed was comprised entirely of soft silt (peat). Peat staining was high at the time of survey. The open water supported occasional bog pondweed with small, scattered stands of common reed. Stonewort (*Chara* sp.) was also recorded as rare (indicative of higher alkalinity). Bottle sedge and cotton grass were locally abundant along the lake margins with occasional marsh pennywort (*Hydrocotyle vulgaris*). The lake was situated in cutover bog (PB4) with abundant lodgepole pine and downy birch on the shorelines.

The cutover peat lake was considered of poor fisheries value given its heavily silted, shallow nature and isolation from other aquatic habitats. The site was of high value for amphibians although none were recorded during the site visit. No otter signs were recorded in vicinity of the site.

No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via sweep netting (**Appendix B**).

Given the absence of aquatic habitats of high conservation value, the aquatic ecological evaluation of site L5 was of **lower importance (lower value)** (**Table 4.4**).



Plate 4.25 Representative image of site L5, October 2021

4.2.6 Site L6 – lake/wetland, Bawnreagh

Site L6 was located within an extensive area of cutover bog (Littleton Bog), within the proposed site boundary, adjacent to site L5. The small, shallow cutover lake covered an area of c.0.14ha and ranged from 0.2-0.4m deep. The bed was comprised entirely of soft silt (peat). Peat staining was moderate at the time of survey. Macrophyte coverage was low in open water with only occasional bog pondweed. The littorals supported abundant bottle sedge and cotton grass, with occasional stands of bulrush. The lake was situated in cutover bog (PB4) with mixed broad-leaved woodland (WD1) to the south of the site.

The cutover peat lake was considered of poor fisheries value given its heavily silted, shallow nature and isolation from other aquatic habitats. However, the occurrence of *Piscicola* sp. leech (i.e. a fish parasite) (**Appendix B**) would indicate the presence of a fish population (likely three-spined stickleback). The site was of high value for amphibians although none were recorded during the site visit. No otter signs were recorded in vicinity of the site.

No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via sweep netting (**Appendix B**).

Given the absence of aquatic habitats of high conservation value, the aquatic ecological evaluation of site L6 was of **lower importance (lower value)** (**Table 4.4**).



Plate 4.26 Representative image of site L6, October 2021

4.2.7 Site L7 – lake/wetland, Bawnreagh

Site L7 was located within an extensive area of cutover bog (Littleton Bog), within the proposed site boundary. The shallow cutover lake covered an area of c.0.25ha and ranged from 0.2-0.6m deep. The bed was comprised entirely of soft silt (peat). Peat staining was moderate at the time of survey. The lake supported frequent bladderwort (*Utricularia* sp.) with occasional bog pondweed and rare fen pondweed (*Potamogeton coloratus*) (the latter indicative of higher alkalinity). Decaying *Sphagnum cuspidatum* was also present in the lake basin. Scattered stands of bottle sedge and common reed were present on the peaty littorals alongside abundant cotton grass. The lake was situated in cutover bog (PB4) with mixed broad-leaved woodland (WD1) to the south of the site.

The cutover peat lake was not considered of fisheries value given its heavily silted, shallow nature and isolation from other aquatic habitats. The site was of high value for amphibians although none were recorded during the site visit. No otter signs were recorded in vicinity of the site.

No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via sweep netting (**Appendix B**).

Given the absence of aquatic habitats of high conservation value, the aquatic ecological evaluation of site L7 was of **lower importance (lower value)** (**Table 4.4**).



Plate 4.27 Representative image of site L6, October 2021

4.2.8 Site L8 – lake/wetland, Lanespark

Site L8 was located within an extensive area of cutover bog (Littleton Bog), within the proposed site boundary. The lake was situated in a deep depression created from historical cutover with 1.5m to 2m high banks. The large linear cutover lake covered an area of c.5ha with frequent islands, deep margins (0.7m) and an even deeper central basin (to 1.4m). The bed was comprised entirely of soft silt (peat). Peat staining was high at the time of survey. Macrophyte coverage was low with only occasional bog pondweed in open water. Cottongrass and bottle sedge were abundant and formed large tracts in the peaty littorals. The lake was situated in cutover bog (PB4) with abundant heather (*Calluna vulgaris*) and mature birch woodland. Coniferous afforestation (WD4) was present to the north of the site.

The cutover peat lake was not considered of fisheries value given its heavily silted, shallow nature and isolation from other aquatic habitats. The site was of high value for amphibians although none were recorded during the site visit. No otter signs were recorded in vicinity of the site.

No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via sweep netting (**Appendix B**).

Given the absence of aquatic habitats of high conservation value, the aquatic ecological evaluation of site L8 was of **lower importance (lower value)** (**Table 4.4**).



Plate 4.28 Representative image of site L8, October 2021

4.2.9 Site L9 – lake/wetland, Clonoura

Site L9 was located within an extensive area of cutover bog (Littleton Bog), within the proposed site boundary. The large, shallow cutover lake covered an area of c.0.8ha and ranged from 0.2m to 1m in depth with a bed comprised entirely of soft silt (peat). Peat staining was high at the time of survey. The lake supported frequent bladderwort (*Utricularia* sp.) and occasional bog pondweed, with bulrush and abundant bottle sedge around the margins. Bog pimpernel (*Lysimachia tenella*) was also recorded along the lakeshore (although this was rare). Abundant cotton grass was present on the peaty littorals. The lake was situated in cutover bog (PB4) with mixed broad-leaved woodland (WD1) dominated by willow to the east and north of the lake.

The cutover lake was of poor fisheries value given its heavily silted, generally shallow nature and isolation from other aquatic habitats. The site was of high value for amphibians although none were recorded during the site visit. No otter signs were recorded in vicinity of the site.

No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via sweep netting (**Appendix B**).

Given the absence of aquatic habitats of high conservation value, the aquatic ecological evaluation of site L9 was of **lower importance (lower value)** (**Table 4.4**).



Plate 4.29 Representative image of site L9, October 2021

4.2.10 Site L10 – lake/wetland, Clonoura

Site L10 was located within an extensive area of cutover bog (Littleton Bog), within the proposed site boundary, south of site L9. The large, shallow cutover lake covered an area of c.3.5ha and ranged from 0.2m to 1m in depth with a bed comprised entirely of soft silt (peat). The eastern margin was steeper and deeper than the western and northern margins which had more gradual sloping shorelines. Peat staining was high at the time of survey, exacerbated by significant wind fetch. Macrophyte coverage was low with only occasional bog pondweed (*Potamogeton polygonifolius*) in open water. Stands of bottle sedge and bulrush were scattered around the lake margins. Abundant cotton grass (*Eriophorum angustifolium*) was present on the peaty littorals The lake was situated in cutover bog (PB4) with localised bog woodland (WN7) support downy birch and willow (*Salix* sp.).

The cutover peat lake was of poor fisheries value given its heavily silted, generally shallow nature and isolation from other aquatic habitats. The site was of high value for amphibians although none were recorded during the site visit. No otter signs were recorded in vicinity of the site.

No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via sweep netting (**Appendix B**).

Given the absence of aquatic habitats of high conservation value, the aquatic ecological evaluation of site L10 was of **lower importance (lower value)** (**Table 4.4**).



Plate 4.30 Representative image of site L10, October 2021

4.2.11 Site L11 – lake/wetland, Clonoura

Site L11 was located within an extensive area of cutover bog (Littleton Bog), within the proposed site boundary. The small, shallow cutover lake covered an area of c.0.38ha and averaged 0.2-0.3m deep. The bed was comprised entirely of soft silt (peat). Peat staining was high at the time of survey. Macrophyte coverage was low with only occasional bog pondweed and water horsetail in open water. Frequent stands of bottle sedge and bulrush were present in the margins with abundant cotton grass on the peaty littorals. The lake was situated in cutover bog (PB4) with downy birch and willow (*Salix* sp.) growing along the low gradient and cutover shorelines.

The cutover peat lake was not considered of fisheries value given its heavily silted, shallow nature and isolation from other aquatic habitats. The site was of high value for amphibians although none were recorded during the site visit. No otter signs were recorded in vicinity of the site.

No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via sweep netting (**Appendix B**).

Given the absence of aquatic habitats of high conservation value, the aquatic ecological evaluation of site L11 was of **lower importance (lower value)** (**Table 4.4**).



Plate 4.31 Representative image of site L11, October 2021

4.2.12 Site L12 – lake/wetland, Noard

Site L12 was located within an extensive area of cutover bog (Littleton Bog), within the proposed site boundary. The small, shallow cutover lake covered an area of c.0.18ha and was 0.1-0.3m deep. The bed was comprised entirely of soft silt (peat). Peat staining was high at the time of survey. Macrophyte coverage was low with only occasional bog pondweed. The peaty littorals (including exposed lakebed) supported abundant cotton grass in addition to rushes (*Juncus* spp.). The lake was situated in cutover bog (PB4) with immature downy birch and willow (*Salix* sp.) growing along the shoreline.

The cutover peat lake was considered of poor fisheries value given its heavily silted, shallow nature and isolation from other aquatic habitats. However, there was some low potential for European eel given the presence of the species in the nearby Clover River (survey site A4). The site was of high value for amphibians although none were recorded during the site visit. No otter signs were recorded in vicinity of the site.

No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via sweep netting (**Appendix B**).

Given the absence of aquatic habitats of high conservation value, the aquatic ecological evaluation of site L12 was of **lower importance (lower value)** (**Table 4.4**).



Plate 4.32 Representative image of site L12, October 2021

4.2.13 Site L13 – lake/wetland, Noard

Site L13 was located within an extensive area of cutover bog (Littleton Bog), within the proposed site boundary, and immediately west of site L12. The small, shallow oval-shaped cutover lake covered an area of c.0.3ha and was 0.1-0.3m deep. The bed was comprised entirely of soft silt (peat). Peat staining was high at the time of survey. Macrophyte coverage was low with only occasional bog pondweed. The peaty littorals (including exposed lakebed) supported abundant cotton grass in addition to rushes (*Juncus* spp.). The lake was situated in cutover bog (PB4) with immature downy birch and willow (*Salix* sp.) growing along the shoreline.

The cutover peat lake was considered of poor fisheries value given its heavily silted, shallow nature and isolation from other aquatic habitats. However, there was some low potential for European eel given the presence of the species in the nearby Clover River (survey site A4). The site was of high value for amphibians although none were recorded during the site visit. No otter signs were recorded in vicinity of the site.

No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via sweep netting (**Appendix B**).

Given the absence of aquatic habitats of high conservation value, the aquatic ecological evaluation of site L13 was of **lower importance (lower value)** (**Table 4.4**).



Plate 4.33 Representative image of site L13, October 2021

4.2.14 Site L14 – lake/wetland, Noard

Site L14 was located within an extensive area of cutover bog (Littleton Bog), within the proposed site boundary. The shallow cutover lake and wetland covered an area of c.1.4ha and ranged from 0.1-0.3m deep. The bed was comprised entirely of soft silt (peat). Turbidity was low at the time of survey (i.e. low peat staining). The site was heavily vegetated with abundant water mint, bulrush, marsh horsetail (*Equisetum palustre*) in wetland areas and occasional bog pondweed in open water sections. Water starwort (*Callitriche* sp.) was also occasional. Spike rush (*Eleocharis palustris*), *Juncus* spp. and bottle sedge were present along the margins. Abundant cotton grass was present on the peaty littorals. The lake was situated in cutover bog (PB4) with downy birch, willow (*Salix* sp.) and lodgepole pine growing along the low gradient and cutover shorelines.

The cutover peat lake and wetland was not considered of fisheries value given its heavily silted, shallow nature and isolation from other aquatic habitats. The site was of high value for amphibians although none were recorded during the site visit. No otter signs were recorded in vicinity of the site.

No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via sweep netting (**Appendix B**).

Given the absence of aquatic habitats of high conservation value, the aquatic ecological evaluation of site L14 was of **lower importance (lower value)** (**Table 4.4**).



Plate 4.34 Representative image of site L14, October 2021

4.2.15 Site L15 – lake/wetland, Noard

Site L15 was located within an extensive area of cutover bog (Littleton Bog), within the proposed site boundary. The large, shallow cutover lake covered an area of c.2ha and averaged 0.3-0.4m deep in the margins but deepened to 0.7m in the central basin. The bed was comprised entirely of soft silt (peat). Peat staining was high at the time of survey. The lake supported frequent bladderwort (*Utricularia* sp.) with occasional bog pondweed and water starwort (*Callitriche* sp.). Water mint and bottle sedge were scattered along the margins, along with abundant rushes (*Juncus* spp.). The lake was situated in cutover bog (PB4) with downy birch and willow (*Salix* sp.) growing along the shoreline with scattered lodgepole pine (*Pinus contorta*).

The cutover lake was of poor fisheries value given its heavily silted, shallow nature and isolation from other aquatic habitats. The site was of high value for amphibians although none were recorded during the site visit. No otter signs were recorded in vicinity of the site.

No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via sweep netting (**Appendix B**).

Given the absence of aquatic habitats of high conservation value, the aquatic ecological evaluation of site L15 was of **lower importance (lower value)** (**Table 4.4**).



Plate 4.35 Representative image of site L15, October 2021

4.2.16 Site L16 – lake/wetland, Derryhogan

Site L16 was located within an extensive area of cutover bog (Littleton Bog), within the proposed site boundary adjacent to site L15. The site was a complex of pond and anastomosing wetland habitats which covered an area of c.0.2ha and ranged from 0.1-0.3m deep. The north of the basin comprised more open water but graded into wetland with channels and pools to the south west. A drain was cut along the north side of the pond that was discharging water to the pond and wetland adjoining the existing peatland track running northwest to south east. The open water and pools supported frequent bog pondweed with very localised broad-leaved pondweed (*Potamogeton natans*) and stonewort (*Chara* sp.). Bulrush was locally frequent with occasional bottle sedge. Filamentous growth was abundant. The peaty littorals supported abundant cotton grass. The lake was situated in cutover bog (PB4) with downy birch and willow (*Salix* sp.) growing along the shoreline with scattered lodgepole pine.

The cutover lake and wetland complex was of poor fisheries value given its heavily silted, shallow nature and isolation from other aquatic habitats. The site was of high value for amphibians although none were recorded during the site visit. No otter signs were recorded in vicinity of the site.

No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via sweep netting (**Appendix B**).

Given the absence of aquatic habitats of high conservation value, the aquatic ecological evaluation of site L16 was of **lower importance (lower value)** (**Table 4.4**).



Plate 4.36 Representative image of site L16, October 2021

4.2.17 Site L17 – lake/wetland, Lanespark

Site L17 was located at the southern extent of the proposed site boundary near Lanespark Bog, adjacent to Loch Doire Bhile and the North Glengoole Stream. As with Loch Doire Bhile, the site had been excavated as part of habitat creation on cutover bog. The shallow, clear-water lake covered an area of c.0.7ha and ranged from 0.2m to 1m deep. The substrata comprised gravels and clay. The lake was fringed by common reed with occasional stands of broad-leaved pondweed. Stonewort (*Chara* sp.) was abundant on the lakebed. The open, gravelly banks supported scattered willow (*Salix* sp.) with coniferous afforestation (WD4) present to the north of the site.

The artificial lake was not considered of fisheries value given its shallow nature, isolation from other aquatic habitats and absence of fish stocking history (in contrast to the nearby Loch Doire Bhile which supports stocked brown and rainbow trout). Whilst there was some good suitability for white-clawed crayfish, none were recorded. The species is known from the adjoining Loch Doire Bhile. The site was of high value for amphibians although none were recorded during the site visit. No otter signs were recorded in vicinity of the site.

No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via sweep netting (**Appendix B**).

Given the absence of aquatic habitats of high conservation value, the aquatic ecological evaluation of site L17 was of **lower importance (lower value)** (**Table 4.4**).



Plate 4.37 Representative image of site L17, October 2021

4.3 White-clawed crayfish survey

No live white-clawed crayfish were recorded via hand-searching and sweep netting of instream refugia during the surveys undertaken at 16 no. wetted riverine and 17 no. lacustrine sites in September and October 2021, respectively.

However, abundant crayfish remains (some very fresh) were identified in otter spraint at site C6 on the Black River (**Plate 4.38**). Two predated white-clawed crayfish were present at site A6 on the Clover River (likely from otter predation), although no live crayfish were recorded.

Furthermore, white-clawed crayfish eDNA was detected at sites on the Drish River, Clover River, Black River and Breegagh River (**Table 4.1**).

Crayfish plague was detected at sites on the Clover River and Black River (see section 4.4 below).



Plate 4.38 Regular otter spraint site at site C6 on the Black River with abundant remains of white-clawed crayfish, October 2021

4.4 eDNA analysis

Despite the fact that no live, white-clawed crayfish were recorded during the site surveys, composite water samples collected from the Clover River (FK180), Breegagh River (FK181), Black River (FK182) and Drish River (FK183) returned a positive result for white-clawed crayfish eDNA (**Table 4.1; Appendix C**). Particularly strong signatures were present at the Clover River and Black River sites. The sample from the Drish River at site B2 (FK184) was negative for white-clawed crayfish eDNA, i.e. freshwater crayfish eDNA not present or was present below the limit of detection in a series of 12 qPCR replicates (0 positive qPCR replicates out of 12).

Composite water samples from the Clover River (FK180) and Black River (FK183) tested positive for crayfish plague (12 & 5 of 12 qPCR replicates, respectively) (**Table 4.1; Appendix C**). No crayfish plague eDNA was detected in the Breegagh River (FK181) or Drish River (FK183 & FK184) samples.

Table 4.1 eDNA results in the vicinity of the proposed Littleton wind farm, Co. Tipperary (positive qPCR replicates out of 12 in parentheses)

Sample	Watercourse (site)	White-clawed crayfish	Crayfish plague
FK184	Drish River (site B2)	Negative (0/12)	Negative (0/12)
FK183	Drish River, N75 road crossing	**Positive (1/12)**	Negative (0/12)
FK180	Clover River, Borris	**Positive (12/12)**	**Positive (12/12)**
FK182	Black River (site C5)	**Positive (12/12)**	**Positive (5/12)**
FK181	Breegagh River (site D2)	**Positive (2/12)**	Negative (0/12)

4.5 Otter signs

A total of 4 no. otter signs were recorded across 37 no. survey sites during the course of aquatic surveys undertaken in September-October 2021. All were recorded from riverine sites.

A regular spraint site with fresh prints, was recorded underneath the road bridge at site C6 on the Black River (ITM 619150, 657803). This contained abundant (and fresh) white-clawed crayfish remains. Regular spraint sites were also recorded at site B2 on the Drish River and site A6 on the Clover River.

No otter signs were recorded in the cutover bog lake and pond sites albeit otters are likely to use them at certain times of the year (e.g. spring) when amphibians are breeding.

No breeding (holts) or resting (couch) areas were identified in the vicinity of the survey sites in July 2022.

4.6 Invasive aquatic species

The invasive pathogen crayfish plague (*Aphanomyces astaci*) was detected via eDNA analysis in the Clover River and Black River (see section 4.4 above).

American mink (*Neovison vison*) spraint was recorded at Ballyduff Bridge (site B5) on the Drish River. The species is considered a high-risk impact species in Ireland (O'Flynn et al., 2014).

4.7 Biological water quality (macro-invertebrates)

No rare or protected macro-invertebrate species (according to national red lists) were recorded in the biological water quality samples taken from a total of 12 no. riverine sites in September 2021 (**Figure 4.1, Appendix B**).

Site C6 on the Black River achieved **Q4 (good status)** water quality and thus met the target good status (≥Q4) requirements of the European Union Environmental Objectives (Surface Waters) (Amendment) Regulations 2019 and the Water Framework Directive (2000/60/EC) (**Figure 4.1**). This was given the presence of one group A taxa in fair numbers (5% of total abundance), namely the stonefly *Protonemura meyeri* (**Appendix B**).

Sites A6 on the Clover River, B5 on the Drish River and C4 on the North Glengoole Stream achieved **Q3-4 (moderate status)** water quality (**Figure 4.1**). This was given the low numbers (<5%) of group A species mayflies including *Ecdyonurus dispar* (**Appendix B**).

The remaining 8 no. sampling sites on an unnamed stream (A4), Clover River (A5), unnamed stream (B1), Drish River (B3), Ballygammane River (B6), Black River (C2) and the Breegagh River (D1 & D2) **or Q3 (poor status)** based on an absence of group A species; low numbers or an absence of group B species and a dominance of group C species such as the mayfly *Baetis rhodani*, the caseless caddis *Hydropsyche instabilis*, freshwater shrimp (*Gammarus duebeni*) and the riffle beetle *Elmis aenea* (**Appendix B**).

It should be noted that the ratings for sites A4, A5 and B1 were tentative due to low summer flows and or a lack of suitable riffle areas for sampling (Toner et al., 2005).

4.8 Lacustrine macro-invertebrates

No rare or protected macro-invertebrate species were recorded in the sweep samples taken from 10 no. lake/wetland sites in October 2021 (**Appendix B**).

The shallow, peat lakes and wetlands supported a varied diversity of species, typically dominated by baetid mayflies *Centroptilum luteolum* and *Cloeon dipterum*, bluet damselflies such as *Coenagrion* sp., water boatmen (*Hesperocorixa* spp.) and freshwater hoglouse (*Asellus aquaticus*) and a low diversity of Sphaeriidae and Planorbidae molluscan species (**Appendix B**).

4.9 Macrophytes and aquatic bryophytes

No rare or protected macrophytes or aquatic bryophyte species were recorded during the survey. The Annex I habitat 'Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation or aquatic mosses [3260]' (aka floating river vegetation) was recorded on the Black River at site C6. Several indicator species (EC, 2013) were present, such as water crowfoot (*Ranunculus* sp.) and water starwort (*Callitriche* sp.), with a particularly high coverage of aquatic bryophytes, including abundant *Fontinalis antipyretica*. This Annex habitat was not recorded at the remaining survey sites.

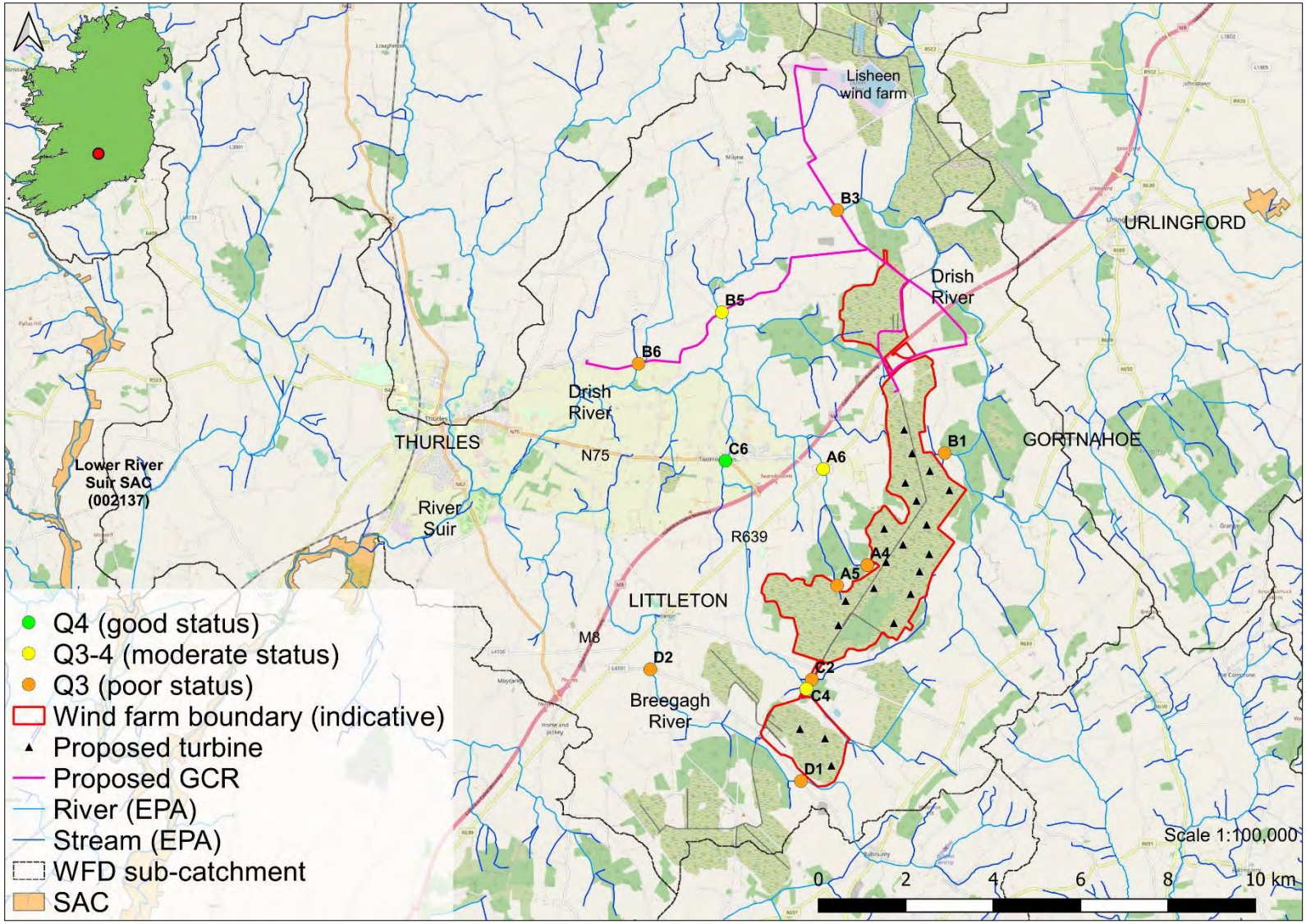


Figure 4.1 Overview of the biological water quality status in the vicinity of the proposed Littleton wind farm project, Co. Tipperary

4.10 Aquatic ecological evaluation

An aquatic ecological evaluation of each survey site was based on the results of fisheries surveys, white-clawed crayfish surveys, otter surveys, macrophyte and aquatic bryophyte surveys, eDNA analysis and biological water quality (**Table 4.4**). None of the 37 no. survey sites were evaluated as greater than **local importance (higher value)** in terms of their aquatic ecology.

A total of 13 no. sites on the Clover River (site A6) and unnamed tributary (A4), Drish River (B2, B3 & B5), Ballygammane River (B6), Black River (C2, C5 & C6), North Glengoole Stream (C3 & C4), Breegagh River (D1 & D2) were evaluated as **local importance (higher value)** in terms of their aquatic ecology due to the presence of species and or habitats of higher conservation value (**Table 4.4**).

The remaining 24 no. sites (i.e. sites A1, A2, A3, A5, B1, B4, C1, L1, L2, L3, L4, L5, L6, L7, L8, L9, L10, L11, L12, L13, L13, L14, L15, L16 & L17) were evaluated as **local importance (lower value)**, given the absence of aquatic species or habitats of high conservation value (**Table 4.4**).

Table 4.2 Summary of fish species of higher conservation value and relative abundances (low, medium, high & very high) recorded via **electro-fishing** per riverine survey site in the vicinity of the proposed Littleton wind farm, September 2021

Site	Watercourse	Relative abundance				Other species
		Atlantic salmon	Brown trout	*Lampetra* sp.	European eel	
A1	Unnamed stream					Three-spined stickleback
A2	Unnamed stream	No fish recorded – dry channel				
A3	Unnamed stream	No fish recorded – dry channel				
A4	Unnamed stream				Low	Three-spined stickleback
A5	Clover River					Three-spined stickleback
A6	Clover River		Medium			Three-spined stickleback, perch, stone loach
B1	Unnamed stream					Three-spined stickleback
B2	Drish River					Three-spined stickleback
B3	Drish River				Low	Three-spined stickleback, pike, stone loach
B4	Cooleeny River	No fish recorded – dry channel				
B5	Drish River	High	High		Low	Minnow, pike, stone loach
B6	Ballygammane River	Low	Medium	Low		Minnow, three-spined stickleback
C1	Black River	No fish recorded – dry channel				
C2	Black River	Low	Low			Three-spined stickleback
C3	North Glengoole River	Low	Low		Low	Three-spined stickleback
C4	North Glengoole River		Medium			Three-spined stickleback
C5	Black River		Low			Stone loach
C6	Black River	Medium	High		Low	Stone loach
D1	Breegagh River	Medium	High			
D2	Breegagh River	Medium	Medium	High		Three-spined stickleback, stone loach

Conservation value: Atlantic salmon (*Salmo salar*), brook lamprey (L*ampetra planeri*) and river lamprey (*Lampetra fluviatilis*) are listed under Annex II of the Habitats Directive [92/42/EEC]. Atlantic salmon and river lamprey are also listed under Annex V of the Habitats Directive [92/42/EEC]. European eel are 'critically endangered' according to most recent ICUN red list (Pike et al., 2020) and listed as 'critically engendered' in Ireland (King et al., 2011). With the exception of the Inland Fisheries Acts 1959 to 2017, brown trout and coarse fish species have no legal protection in Ireland.

Table 4.3 Summary of aquatic species & habitats of higher conservation value recorded in the vicinity of the proposed Laurclavagh wind farm, July 2022

Site	Watercourse	White-clawed crayfish	Otter signs[4]	Annex I aquatic habitats	Rare or protected macrophytes/ aquatic bryophytes	Rare or protected macro-invertebrates	Other species/habitats of high conservation value
Riverine sites							
A1	Unnamed stream	None recorded	No signs	Not present	None recorded	None recorded	None recorded
A2	Unnamed stream	None recorded	No signs	Not present	None recorded	None recorded	None recorded
A3	Unnamed stream	None recorded	No signs	Not present	None recorded	None recorded	None recorded
A4	Unnamed stream	None recorded	No signs	Not present	None recorded	None recorded	**European eel**
A5	Clover River	None recorded	No signs	Not present	None recorded	None recorded	None recorded
A6	Clover River	**None recorded but predated crayfish recorded**	**Regular spraint site**	Not present	None recorded	None recorded	None recorded
B1	Unnamed stream	None recorded	No signs	Not present	None recorded	None recorded	None recorded
B2	Drish River	None recorded; negative eDNA sample	**Regular spraint site**	Not present	None recorded	None recorded	None recorded
B3	Drish River	None recorded	No signs	Not present	None recorded	None recorded	**European eel**
B4	Cooleeny River	None recorded	No signs	Not present	None recorded	None recorded	None recorded
B5	Drish River	None recorded	No signs	Not present	None recorded	None recorded	**Atlantic salmon, European eel**
B6	Ballygammane River	None recorded	No signs	Not present	None recorded	None recorded	**Atlantic salmon, *Lampetra* sp.**
C1	Black River	None recorded	No signs	Not present	None recorded	None recorded	None recorded
C2	Black River	None recorded	No signs	Not present	None recorded	None recorded	**Atlantic salmon,**

Site	Watercourse	White-clawed crayfish	Otter signs[4]	Annex I aquatic habitats	Rare or protected macrophytes/ aquatic bryophytes	Rare or protected macro-invertebrates	Other species/habitats of high conservation value
C3	North Glengoole River	None recorded	No signs	Not present	None recorded	None recorded	**Atlantic salmon, European eel**
C4	North Glengoole River	None recorded	No signs	Not present	None recorded	None recorded	None recorded
C5	Black River	**None recorded but positive eDNA sample**	No signs	Not present	None recorded	**White-clawed crayfish (eDNA only)**	None recorded
C6	Black River	**None recorded but remains identified in otter spraint**	**Regular spraint site with prints**	**Floating river vegetation [3260]**	None recorded	**White-clawed crayfish (otter spraint)**	**Atlantic salmon, European eel**
D1	Breegagh River	None recorded	No signs	Not present	None recorded	None recorded	**Atlantic salmon**
D2	Breegagh River	**None recorded but positive eDNA sample**	No signs	Not present	None recorded	**White-clawed crayfish (eDNA only)**	**Atlantic salmon, *Lampetra* sp.**
Lacustrine sites							
L1	Lake/wetland	None recorded	No signs	Not present	None recorded	None recorded	None recorded
L2	Lake/wetland	None recorded	No signs	Not present	None recorded	None recorded	None recorded
L3	Lake/wetland	None recorded	No signs	Not present	None recorded	None recorded	None recorded
L4	Lake/wetland	None recorded	No signs	Not present	None recorded	None recorded	None recorded
L5	Lake/wetland	None recorded	No signs	Not present	None recorded	None recorded	None recorded
L6	Lake/wetland	None recorded	No signs	Not present	None recorded	None recorded	None recorded
L7	Lake/wetland	None recorded	No signs	Not present	None recorded	None recorded	None recorded
L8	Lake/wetland	None recorded	No signs	Not present	None recorded	None recorded	None recorded
L9	Lake/wetland	None recorded	No signs	Not present	None recorded	None recorded	None recorded

Site	Watercourse	White-clawed crayfish	Otter signs[4]	Annex I aquatic habitats	Rare or protected macrophytes/ aquatic bryophytes	Rare or protected macro-invertebrates	Other species/habitats of high conservation value
L10	Lake/wetland	None recorded	No signs	Not present	None recorded	None recorded	None recorded
L11	Lake/wetland	None recorded	No signs	Not present	None recorded	None recorded	None recorded
L12	Lake/wetland	None recorded	No signs	Not present	None recorded	None recorded	None recorded
L13	Lake/wetland	None recorded	No signs	Not present	None recorded	None recorded	None recorded
L14	Lake/wetland	None recorded	No signs	Not present	None recorded	None recorded	None recorded
L15	Lake/wetland	None recorded	No signs	Not present	None recorded	None recorded	None recorded
L16	Lake/wetland	None recorded	No signs	Not present	None recorded	None recorded	None recorded
L17	Lake/wetland	None recorded	No signs	Not present	None recorded	None recorded	None recorded

Conservation value: White-clawed crayfish (*Austropotamobius pallipes*), Atlantic salmon (*Salmo salar*) and Eurasian otter (*Lutra lutra*) are listed under Annex II and Annex V of the Directive on the Conservation of Natural Habitats of Wild Fauna and Flora (92/43/EEC) ('EU Habitats Directive') and white-clawed crayfish and otter are protected under the Irish Wildlife Acts 1976-2021. White-clawed crayfish (Füreder et al., 2010) are listed as 'Endangered' according to the IUCN Red List. The European Union (Invasive Alien Species) (Freshwater Crayfish) Regulations 2018 (SI 354/2018) affords further protection to native white-clawed crayfish by prohibiting the introduction and spread of five no. invasive 'Union concern' crayfish species listed under EU Regulation 1143/2014. European eel are 'critically endangered' according to most recent ICUN red list (Pike et al., 2020) and listed as 'critically engendered' in Ireland (King et al., 2011). With the exception of the Inland Fisheries Acts 1959 to 2017, brown trout and coarse fish species have no legal protection in Ireland. Six-stamened waterwort (*Elatine hexandra*) is listed as 'near threatened' in Ireland (Wyse-Jackson et al., 2016).

[4] Otter signs within 150m of the survey site

Table 4.4 Aquatic ecological evaluation summary of the Littleton wind farm survey sites according to NRA (2009) criteria

Site no.	Watercourse	EPA code	Evaluation of importance	Rationale summary
Riverine sites				
A1	Unnamed stream	n/a	Local importance (lower value)	Historically realigned stream that was dry at this location at the time of survey with an absence of aquatic habitats or species
A2	Unnamed stream	n/a	Local importance (lower value)	Uppermost reaches of heavily modified stream with poor summer flows & siltation pressures; three-spined stickleback recorded via electro-fishing; no aquatic species or habitats of high conservation value
A3	Unnamed stream	n/a	Local importance (lower value)	Historically modified ephemeral stream that was dry at this location at the time of survey with an absence of aquatic habitats or species
A4	Unnamed stream	n/a	**Local importance (higher value)**	Upper reaches of heavily modified, heavily vegetated lowland stream with very poor hydromorphology & significant siltation pressures; European eel & three-spined stickleback recorded via electro-fishing; Q3 (poor status) water quality (tentative rating)
A5	Clover River	16C04	Local importance (lower value)	Upper reaches of heavily modified lowland river with very poor hydromorphology & significant siltation pressures; three-spined stickleback recorded via electro-fishing; Q3 (poor status) water quality (tentative rating); no aquatic species or habitats of high conservation value
A6	Clover River	16C04	**Local importance (higher value)**	Historically modified lowland river with some instream recovery but significant siltation pressures; brown trout, perch, stone loach & three-spined stickleback recorded via electro-fishing; Q3-4 (moderate status) water quality
B1	Unnamed stream	n/a	Local importance (lower value)	Upper reaches of heavily modified, heavily vegetated lowland stream with very poor hydromorphology, significant siltation pressures, poor flows & poor fluvial connectivity; three-spined stickleback recorded via electro-fishing; Q3 (poor status) water quality (tentative rating); no aquatic species or habitats of high conservation value
B2	Drish River	16D02	**Local importance (higher value)**	Very heavily modified lowland river with very high coverage of aquatic vegetation, very poor hydromorphology & no summer flows; three-spined stickleback recorded via electro-fishing; regular otter spraint site recorded
B3	Drish River	16D02	**Local importance (higher value)**	Historically modified lowland alkaline river with high aquatic vegetation cover & low summer flows but some instream recovery; European eel, pike, stone loach & three-spined stickleback recorded via electro-fishing; Q3 (poor status) water quality
B4	Cooleeny River	16C14	Local importance (lower value)	Historically modified ephemeral lowland river that was dry at this location at the time of survey with an absence of aquatic habitats or species

Site no.	Watercourse	EPA code	Evaluation of importance	Rationale summary
B5	Drish River	16D02	**Local importance (higher value)**	Semi-natural, swift-flowing lowland alkaline river of high fisheries value; Atlantic salmon, brown trout, European eel, stone loach, minnow & pike recorded via electro-fishing; white-clawed crayfish eDNA detected; regular otter spraint site recorded; Q3-4 (moderate status) water quality
B6	Ballygammane River	16B55	**Local importance (higher value)**	Historically modified high-energy lowland alkaline river with some instream recovery & low summer flows; Atlantic salmon, brown trout, *Lampetra* sp., minnow & three-spined stickleback recorded via electro-fishing; Q3 (poor status) water quality
C1	Black River	16B01	Local importance (lower value)	Upper reaches of historically modified ephemeral lowland river that was dry at this location at the time of survey with an absence of aquatic habitats or species
C2	Black River	16B01	**Local importance (higher value)**	Heavily modified lowland river with poor summer flows & significant siltation pressures; Atlantic salmon, brown trout & three-spined stickleback recorded via electro-fishing; Q3 (poor status) water quality
C3	North Glengoole River	16N28	**Local importance (higher value)**	Small historically modified lowland river with poor hydromorphology & significant siltation pressures; Atlantic salmon, brown trout & European eel & three-spined stickleback recorded via electro-fishing
C4	North Glengoole River	16N28	**Local importance (higher value)**	Small historically modified lowland river with some instream recovery but siltation pressures; brown trout & three-spined stickleback recorded via electro-fishing; Q3-4 (moderate status) water quality
C5	Black River	16B01	**Local importance (higher value)**	Heavily modified lowland river with very poor hydromorphology & significant siltation pressures; brown trout & stone loach recorded via electro-fishing; white-clawed crayfish eDNA detected
C6	Black River	16B01	**Local importance (higher value)**	Historically modified lowland alkaline river with some good instream recovery & high fisheries value; Atlantic salmon, brown trout, *Lampetra* sp. & stone loach recorded via electro-fishing; regular otter spraint site recorded containing abundant white-clawed crayfish remains; Annex I floating river vegetation [3260] present; Q4 (good status) water quality
D1	Breegagh River	16B03	**Local importance (higher value)**	Heavily modified lowland river with poor hydromorphology & significant siltation pressures; Atlantic salmon & brown trout recorded via electro-fishing; Q3 (poor status) water quality
D2	Breegagh River	16B03	**Local importance (higher value)**	Historically modified lowland alkaline river with good instream recovery & high fisheries value; Atlantic salmon, brown trout, *Lampetra* sp. & three-spined stickleback recorded via electro-fishing; white-clawed crayfish eDNA detected; Q3 (poor status) water quality

Site no.	Watercourse	EPA code	Evaluation of importance	Rationale summary
Lacustrine sites				
L1	Lake/wetland	n/a	Local importance (lower value)	Small, shallow seasonal peat wetland/lake complex of 1ha in cutover bog; no aquatic species or habitats of high conservation value recorded
L2	Lake/wetland	n/a	Local importance (lower value)	Large 1ha, shallow linear peat lake in cutover bog with high peat staining & low macrophyte cover; no aquatic species or habitats of high conservation value recorded
L3	Lake/wetland	n/a	Local importance (lower value)	Small 0.5ha shallow linear peat lake in cutover bog with high peat staining & low macrophyte cover; no aquatic species or habitats of high conservation value recorded
L4	Lake/wetland	n/a	Local importance (lower value)	Large 1.1ha, shallow peat lake in cutover bog with high peat staining & low macrophyte cover; no aquatic species or habitats of high conservation value recorded
L5	Lake/wetland	n/a	Local importance (lower value)	Large 1.4ha, shallow lake with calcareous influences in cutover bog with low peat staining & moderate macrophyte cover; no aquatic species or habitats of high conservation value recorded
L6	Lake/wetland	n/a	Local importance (lower value)	Small 0.14ha shallow lake in cutover bog with moderate peat staining & low macrophyte cover; *Piscicola* sp. fish leech indicates presence of fish population; no aquatic species or habitats of high conservation value recorded
L7	Lake/wetland	n/a	Local importance (lower value)	Small 0.25ha, shallow lake with calcareous influences in cutover bog with low peat staining & moderate macrophyte cover; no aquatic species or habitats of high conservation value recorded
L8	Lake/wetland	n/a	Local importance (lower value)	Large 5ha linear shallow lake in cutover bog with high peat staining & low macrophyte cover; no aquatic species or habitats of high conservation value recorded
L9	Lake/wetland	n/a	**Local importance (higher value)**	Small 0.8ha shallow peat lake in cutover bog with high peat staining & low macrophyte cover; no aquatic species or habitats of high conservation value recorded
L10	Lake/wetland	n/a	Local importance (lower value)	Large 3.5ha, shallow peat lake in cutover bog with high peat staining & low macrophyte cover; no aquatic species or habitats of high conservation value recorded
L11	Lake/wetland	n/a	Local importance (lower value)	Small 0.38ha, shallow peat lake in cutover bog with high peat staining & low macrophyte cover; no aquatic species or habitats of high conservation value recorded
L12	Lake/wetland	n/a	Local importance (lower value)	Small 0.18ha, shallow peat lake in cutover bog with high peat staining & low macrophyte cover; no aquatic species or habitats of high conservation value recorded

Site no.	Watercourse	EPA code	Evaluation of importance	Rationale summary
L13	Lake/wetland	n/a	Local importance (lower value)	Small 0.3ha, shallow peat lake in cutover bog with high peat staining & low macrophyte cover; no aquatic species or habitats of high conservation value recorded
L14	Lake/wetland	n/a	Local importance (lower value)	Large 1.4ha shallow peat lake & wetland complex in cutover bog with high vegetation cover; no aquatic species or habitats of high conservation value recorded
L15	Lake/wetland	n/a	Local importance (lower value)	Large 2ha shallow peat lake in cutover bog with high peat staining & moderate macrophyte cover; no aquatic species or habitats of high conservation value recorded
L16	Lake/wetland	n/a	Local importance (lower value)	Small 0.2ha shallow peat lake & wetland complex in cutover bog with high vegetation cover; no aquatic species or habitats of high conservation value recorded
L17	Lake/wetland	n/a	Local importance (lower value)	Small 0.7ha, shallow clear-water artificial lake on calcareous substrata excavated as part of habitat creation works with abundant macrophytes; no aquatic species or habitats of high conservation value recorded

Conservation value: Atlantic salmon (*Salmo salar*), *Lampetra* spp. and otter (*Lutra lutra*) are all listed under Annex II of the Habitats Directive [92/42/EEC]. Furthermore, Atlantic salmon, *Lampetra* spp. are also listed under Annex V of the Habitats Directive [92/42/EEC] while otter are also listed on under Annex IV of the Habitats Directive [92/42/EEC]. Otters (along with their breeding and resting places) are also protected under provisions of the Irish Wildlife Acts 1976 to 2021. European eel are 'critically endangered' according to most recent ICUN red list (Pike et al., 2020) and listed as 'critically engendered' in Ireland (King et al., 2011). With the exception of the Inland Fisheries Acts 1959 to 2017, brown trout and coarse fish species have no legal protection in Ireland.

5. Discussion

5.1 Most valuable areas for aquatic ecology

A total of 14 no. sites on the Clover River (site A6) and unnamed tributary (A4), Drish River (B2, B3 & B5), Ballygammane River (B6), Black River (C2, C5 & C6), North Glengoole Stream (C3 & C4), Breegagh River (D1 & D2) and a peat lake at site L9 were evaluated as **local importance (higher value)** in terms of their aquatic ecology due to the presence of species and or habitats of higher conservation value (**Table 4.4**). This was due to the presence of higher conservation value species such as Atlantic salmon (7 no. sites), lamprey (*Lampetra* sp.) (2 no. sites), European eel (5 no. sites), otter (3 no. sites), white-clawed crayfish (4 no. sites, eDNA & in otter spraint), protected macrophytes (1 no. site) and or Annex I aquatic habitats (2 no. sites) (**Table 4.4**).

The remaining 23 no. sites (i.e. sites A1, A2, A3, A5, B1, B4, C1, L1, L2, L3, L4, L5, L6, L7, L8, L10, L11, L12, L13, L13, L14, L15, L16 & L17) were evaluated as **local importance (lower value)**, given the absence of aquatic species or habitats of high conservation value (**Table 4.4**). Sites on two unnamed Clover River tributaries (A2 & A3), Cooleeny River (B4) and the Black River (C1) were dry at the time of survey (September 2021) and did not support aquatic habitats or species.

5.1.1 Fish species of high conservation value

Atlantic salmon were recorded from a total of 7 no. sites (Table 4.2; **Appendix A**). These were located on the Drish River (site B5), Ballygammane River (B6), Black River (C2 & C6) and its North Glengoole River tributary (C3) and the Breegagh River (D1 & D2). Brown trout were also recorded at these sites, in addition to site A6 on the Clover River, North Glengoole River (V4) and the Black River (C5). The highest relative densities of salmonids and better quality salmonid habitats were present at sites on the Drish River[1], Black River and Breegagh River, although abundances of both Atlantic salmon and brown trout were typically low across the survey area (**Appendix A**). The quality of salmonid was typically poor due to significant hydromorphological pressures resulting from arterial drainage (i.e. extensive straightening & deepening).

Lamprey ammocoetes (*Lampetra* sp.) were recorded from 2 no. sites on the Black River (C6, low density) and Breegagh River (D2, high density) during targeted electro-fishing, *Lampetra* sp. transformers were also recorded at site B6 on the Ballygammane River. This highly restricted distribution was considered to reflect the paucity of suitable nursery (soft sediment) habitat within the vicinity of the proposed project, in addition to the presence of sub-optimal or absence of spawning habitat, primarily due to significant arterial drainage pressures (**Appendix A**).

European eel were only recorded in low densities at a total of 5 no. sites on an unnamed Clover River tributary (A4), Drish River (B3 & B5), North Glengoole River (C3) and the Black River (C6) (**Table 4.1; Appendix A**). The paucity of eel recorded during the electro-fishing surveys was considered to reflect

[1] The Drish River was heavily polluted by zinc and lead mine at Lisheen in the recent past (AECOM, 2020; O'Connor, 2007), with fish life significantly affected. However, good recovery is now evident in this watercourse despite other pressures, including siltation and hydromorphology.

a combination sub-optimal habitat resulting from historical modifications and low summer flows at numerous survey sites and the large instream distance from marine habitats (**Appendix A**).

Whilst some of the more mature cutover lake survey sites had inherently more aquatic value, none were considered of significant fisheries value due to their generally very shallow nature, peat substrata, lower pH and poor connectivity or isolation from other aquatic habitats supporting fish populations. There was some low European eel potential in those lakes situated in close proximity to the riverine watercourses found to support the species (e.g. lake site L12 & L17).

5.1.2 Otter

Despite widespread suitability, only a low number of otter signs (4 no.) were recorded during the survey. All were recorded from riverine sites with the lakes surveyed providing poor otter habitat, primarily due to insufficient prey resources. Regular spraint sites were recorded at sites A6 on the Clover River, B2 on the Drish River and C6 on the Black River.

This paucity of signs was considered to mainly reflect the influence of historical instream modifications (straightening, deepening) on the health and distribution of fish populations, the key prey resource of otter (Krawczyk et al., 2016; Ruiz-Olmo & Jiménez, 2009). Otters are food-limited and prey availability is a crucial factor in determining mortality, breeding success and the status of local populations (Sittenthaler et al., 2019; Ruiz-Olmo et al., 2002). Furthermore, otter sign marking is routinely associated with prominent features such as large instream boulders and tree root systems (Almeida et al., 2012). Historical drainage, such as that carried out historically in the vicinity of the proposed project, significantly reduces instream habitat heterogeneity (O'Grady, 2017) and the availability or marking areas (outposts), which therefore results in the deposition and detection of fewer otter signs such as spraints, irrespective of watercourse utilisation (e.g. for foraging).

No breeding (holt) or couch (resting) areas were identified in the vicinity of the survey sites in September-October 2021.

While there was suitability for otter to use the cutover bog lakes onsite these habitats were extremely numerous and otters likely use them when prey resources are optimal e.g. during the spring when amphibians breed. They may move from the adjoining river systems into Littleton Bog in accordance with the natural cyclicity of prey availability.

5.1.3 White-clawed crayfish & crayfish plague

Despite suitability at numerous sites, no live, white-clawed crayfish were recorded during targeted surveys in September-October 2022. However, abundant crayfish remains (including some very fresh) were identified in otter spraint at site C6 on the Black River (**Plate 4.38**). This would indicate the presence of crayfish in the vicinity of the site. Indeed, contemporary and historic records are available for the river at this location (**Figure 3.1**). Two predated (recently killed) white-clawed crayfish were present at site A6 on the Clover River (likely from otter predation) and the species was previously known form the river (**Figure 3.1**). In verification of site surveys, white-clawed crayfish eDNA was detected at sites on the Clover River and Black River (site C5), in addition to the Drish River (site B2 & other site) and Breegagh River (site D2) (**Table 4.1**).

Most of the 17 no. survey lakes were inherently unsuitable for the white-clawed crayfish given their unsuitable peat geologies, water chemistry (acidic) and physical habitat attributes (Demers et al., 2005; Lucey & McGarrigle, 1987). However, there was good suitability at site L17, a small artificial alkaline lake adjacent to Loch Doire Bhile, a site known to support crayfish (NPWS data). No crayfish were recorded from site L17 via hand searching or sweep netting.

Crayfish plague was detected at sites on the Clover River and Black River (12 & 5 positive qPCR replicates out of 12, respectively; **Table 4.1**), but not in the Drish or Breegagh Rivers. Whilst plague outbreaks have occurred in the wider Suir catchment since 2017 (NPWS, 2017b), these results represent the first known records of the pathogen in the Suir_SC_040 river sub-catchment (as per National Crayfish Plague Surveillance Program data of Swords & Griffin, 2022; Swords et al., 2021, 2020; White et al., 2019). Crayfish plague, which can cause up to 100% mortality in white-clawed crayfish populations (Edgerton et al., 2004), is listed as one of the world's 100 worst invasive species (GISD, 2022; Lowe et al., 2000) and is becoming highly prevalent across Ireland. *Aphanomyces astaci* is considered an obligate crayfish parasite not capable of surviving for a long period outside a crayfish host (Strand et al., 2011; Söderhäll & Cerenius, 1999). Therefore, the simultaneous detection of both crayfish plague and white-clawed crayfish signatures in the same watercourse (i.e. Clover River & Black River) is an unusual but increasingly common observation in Ireland that may suggest latent infections and some developing natural resistance in Irish crayfish populations (pers. obs.).

5.1.4 Macrophytes & aquatic bryophytes

No other rare or protected macrophytes or aquatic bryophytes species were recorded during the survey. The Annex I habitat 'Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation or aquatic mosses [3260]' (aka floating river vegetation) was recorded on the Black River at site C6. Several indicator species (EC, 2013) were present, such as water crowfoot (*Ranunculus* sp.) and water starwort (*Callitriche* sp.), with a particularly high coverage of aquatic bryophytes, including abundant *Fontinalis antipyretica*. This Annex habitat was not recorded at the remaining survey sites.

5.1.5 Macro-invertebrates & biological water quality

No rare or protected macro-invertebrate species (according to national red lists) were recorded in the biological water quality samples taken from 12 no. wetted riverine sites in September 2021 or 17 no. sweep samples from lake sites in October 2021 (**Appendix B**).

Site C6 on the Black River achieved **Q4 (good status)** water quality and thus met the target good status (≥Q4) requirements of the European Union Environmental Objectives (Surface Waters) (Amendment) Regulations 2019 and the Water Framework Directive (2000/60/EC) (**Figure 4.1**). The remaining 11 no. riverine sample sites achieved **Q3-4 (moderate status)** (sites A6, B5 & C4) or **Q3 (poor status)** (sites A4, A5, B1, B3, B6, C2, D1 & D2) in September 2021.

With the exception of site C6 on the Black River, the biological water quality in the vicinity of the proposed project was unsatisfactory and was not meeting good status targets. Peat extraction (leading to siltation) and forestry are the significant threats to water quality in the survey area (EPA, 2019).

Furthermore, low summer flows and widespread hydromorphological modifications also influenced biological water quality in September 2021.

5.2 Aquatic ecology summary

The riverine watercourses in the vicinity of the proposed Littleton wind farm were typically lowland channels which had been extensively straightened and or deepened historically as part of arterial drainage and land reclamation works, resulting in poor hydromorphology and reduced habitat heterogeneity. Whilst some good instream recovery had occurred locally (e.g. Drish River, Black River, Breegagh River), significant siltation and hydromorphological pressures were evident throughout the survey area. The lakes and wetlands located within the proposed site boundary typically originate from historical cutover bog activities and as such are shallow, highly turbid (peat stained), poorly vegetated and of lower productivity, providing relatively poor habitat for many higher conservation value species or habitats. None of these lake/wetland sites corresponded to Annex I lake habitats. (e.g. 3160).

None of the 37 no. survey sites were evaluated as greater than **local importance (higher value)** in terms of their aquatic ecology. Whilst a number of high conservation value species (e.g. Atlantic salmon, otter, white-clawed crayfish) and habitats (e.g. floating river vegetation) were recorded in September-October 2021, the majority of sites (24 no.) were evaluated as **local importance (lower value)** in terms of their aquatic ecology.

Atlantic salmon and brown trout were widespread within survey area but typically present at lower densities. Lamprey (*Lampetra* sp.) and European eel were recorded at a low number of sites, primarily reflecting sub-optimal habitats. Other fish species recorded were pike, perch, stone loach, minnow and three-spined stickleback. Although no live white-clawed crayfish were recorded, the species was detected from the Clover River and Black River (otter spraint & eDNA) as well as the Drish River and Breegagh River (eDNA only). No other rare or protected macro-invertebrates were recorded. Invasive crayfish plague was detected in the Clover and Black Rivers. A low number of otter signs were recorded in vicinity of the project (no holts or couches). Site C6 on the Black River supported Annex I floating river vegetation habitat [3260]. The highest value watercourses within vicinity of the project in terms of aquatic ecology were those with higher flow volumes and better instream recovery from arterial drainage, namely the Drish River, Black River and, to a lesser extent, the Breegagh River.

5.3 Recommendations for further surveys

Given the location and large scale of the proposed project, there are several recommendations for further study which were beyond the scope of this survey. These would include the following;

- Collect eDNA samples at lake/wetland sites in vicinity of proposed works/infrastructure to validate presence or absence of fish and amphibian populations (i.e. smooth newt & common frog)
- Collect additional eDNA sample for white-clawed crayfish at lake site L17 given habitat suitability and presence of species in nearby Loch Doire Bhile

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7. Appendix A – fisheries assessment report

Please see accompanying fisheries assessment report

8. Appendix B – Q-sample results (biological water quality)

Table 8.1 Macro-invertebrate Q-sampling results for 12 no. riverine sites in the vicinity of Littleton wind farm, September 2021

Group	Family	Species	A4	A5	A6	B1	B3	B5	B6	C2	C4	C6	D1	D2	EPA group
Ephemeroptera	Heptageniidae	*Ecdyonurus dispar*			1										A
Ephemeroptera	Heptageniidae	*Ecdyonurus* sp.									1				A
Ephemeroptera	Heptageniidae	sp. indet.						1							A
Plecoptera	Nemouridae	*Protonemura meyeri*										9			A
Ephemeroptera	Baetidae	*Alainites muticus*			1				1			1	1		B
Ephemeroptera	Baetidae	*Centroptilum luteolum*						1							B
Ephemeroptera	Baetidae	*Cloeon dipterum*		1											B
Plecoptera	Leuctridae	*Leuctra hippopus*			1					1		5	3		B
Trichoptera	Goeridae	*Silo pallipes*									1	1			B
Trichoptera	Limnephilidae	sp. indet.						1							B
Trichoptera	Sericostomatidae	*Sericostoma personatum*			1			2			1				B
Odonata	Coenagrionidae	*Coenagrion* sp.		1		2									B
Ephemeroptera	Baetidae	*Baetis rhodani*			7		21	5	2		22	1	23	9	C
Ephemeroptera	Caenidae	*Caenis luctuosa*					4								C
Trichoptera	Hydropsychidae	*Hydropsyche instabilis*			66			6	1	59	3	35	22	59	C
Trichoptera	Polycentropodidae	*Polycentropus flavomaculatus*					16	2					1	2	C
Trichoptera	Psychomyiidae	*Tinodes waeneri*			4										C
Trichoptera	Psychomyiidae	*Tinodes* sp.												6	C
Trichoptera	Rhyacophilidae	*Rhyacophila dorsalis*									2		1		C
Mollusca	Bithnyiidae	*Bithynia tentaculata*				2	13								C
Mollusca	Lymnaeidae	*Stagnicola fuscus*				1									C
Mollusca	Planorbidae	*Planorbis planorbis*				7									C
Mollusca	Sphaeriidae	sp. indet.		3	10	1	2								C
Mollusca	Tateidae	*Potamopyrgus antipodarum*										2		3	C

Group	Family	Species	A4	A5	A6	B1	B3	B5	B6	C2	C4	C6	D1	D2	EPA group
Crustacea	Gammaridae	*Gammarus duebeni*	4	2	4	1	9	5	18	35	45	20	12	37	C
Coleoptera	Dytiscidae	*Acilius canaliculatus*	1												C
Coleoptera	Dytiscidae	*Dyiscus semisulcatus*	1												C
Coleoptera	Dytiscidae	*Hydroporus tessellatus*				4									C
Coleoptera	Dytiscidae	*Hygrotus inaequalis*				1									C
Coleoptera	Dytiscidae	*Ilybius ater*				1									C
Coleoptera	Dytiscidae	*Ilybius fuliginosus*		3		1									C
Coleoptera	Dytiscidae	*Nebrioporus depressus*						4						1	C
Coleoptera	Elmidae	*Elmis aenea*			4		6	9	1	38	33	17	8	27	C
Coleoptera	Elmidae	*Limnius volckmari*						3			2			2	C
Coleoptera	Gyrinidae	sp. indet.			2						1	1	1		C
Coleoptera	Gyrinidae	*Gyrinus caspius*		2	1	3									C
Coleoptera	Haliplíidae	*Haliplus lineatocollis*					2	4				1			C
Coleoptera	Hydraenidae	*Hydraena gracilis*					1	1		1					C
Coleoptera	Hydrophilidae	*Helophorus aequalis*		3											C
Coleoptera	Hydrophilidae	*Helophorus brevipalpis*								1					C
Coleoptera	Hydrophilidae	*Helophorus grandis*				1									C
Coleoptera	Noteridae	*Laccobius minutus*				1									C
Diptera	Ceratopogonidae	sp. indet.						1			1				C
Diptera	Chauboridae	sp. indet.													C
Diptera	Chironomidae	non-*Chironomus* spp.			1		4		2	4	7	4	2		C
Diptera	Culicidae	sp. indet.												1	C
Diptera	Pediciidae	*Dicranota sp.*							3	2	4		3	2	C
Diptera	Simuliidae	sp. indet.					4				15	4			C
Diptera	Thaumleidae	sp. indet.								1					C

Group	Family	Species	A4	A5	A6	B1	B3	B5	B6	C2	C4	C6	D1	D2	EPA group
Diptera	Tipuliidae	Tipula sp.						1	2						C
Hemiptera	Corixidae	*Corixidae nymph*				1									C
Hemiptera	Corixidae	*Hesperocorixa linnaei*					1								C
Hemiptera	Corixidae	*Hesperocorixa sahlbergi*	1	9			1								C
Hemiptera	Gerridae	*Gerris* sp.				5			2	1	4	1	1		C
Hemiptera	Hydrometridae	*Hydrometra stagnorum*	1	2											C
Hirudinidae	Piscicolidae	*Piscicola* sp.											1		C
Arachnida	Hydrachnidiae	Hydrachnidiae						1			1				C
Crustacea	Asellidae	*Asellus aquaticus*	3	69	11	6	4					1		3	D
Mollusca	Lymnaeidae	*Ampullaceana balthica*						4						1	D
Mollusca	Physidae	*Physa fontinalis*					8								D
Hirudinidae	Erpobdellidae	*Erpobdella testacea*							1						D
Hirudinidae	Glossiphoniidae	*Glossiphonia complanata*			3		1			1			1	2	D
Diptera	Chironomidae	*Chironomus* sp.				3									E
Abundance			**11**	**95**	**117**	**41**	**97**	**51**	**33**	**144**	**143**	**103**	**80**	**155**	
Q-rating			Q3*	Q3*	Q3-4	Q3*	Q3	Q3-4	Q3	Q3	Q3-4	Q4	Q3	Q3	
WFD status			Poor	Poor	Mod	Poor	Poor	Mod	Poor	Poor	Mod	Good	Poor	Poor	

* tentative rating due to poor flows and or lack of suitable riffle areas for sampling (as per Toner et al., 2005)

Table 8.2 Macro-invertebrate sweep sample results for 10 no. lake/wetland sites in the vicinity of Littleton wind farm, September 2021

Group	Family	Species	L2	L4	L5	L6	L7	L9	L10	L11	L12	L13
Ephemeroptera	Baetidae	*Centroptilum luteolum*	2	12	37	22						
Ephemeroptera	Baetidae	*Cloeon dipterum*			33		75	18				
Ephemeroptera	Leptophlebiidae	*Paraleptophlebia cincta*		7							1	3
Trichoptera	Leptoceridae	sp. indet.		1								
Trichoptera	Limnephilidae	*Limnephilus marmoratus*			2			6				
Trichoptera	Phryganeidae	*Agrypnia varia*		1	1							
Odonata	Aeshnidae	*Brachytron pratense*				1						
Odonata	Coenagrionidae	*Coenagrion* sp.	1	1	4	2	4	2	3	2	19	9
Odonata	Libellulidae	*Sympetrum* sp.	7				1					
Ephemeroptera	Caenidae	*Caenis horaria*			2							
Trichoptera	Polycentropodidae	*Plectrocnemia conspersa*					3					
Trichoptera	Polycentropodidae	*Plectrocnemia geniculata*	1									
Mollusca	Lymnaeidae	*Lymnaea stagnalis*								1		
Mollusca	Planorbidae	*Bathyomphalus contortus*					14					
Mollusca	Planorbidae	*Gyraulis laevis*			1							
Mollusca	Planorbidae	*Planorbis planorbis*						2				
Mollusca	Sphaeriidae	sp. indet.		14		53						
Coleoptera	Dytiscidae	sp. indet.									2	2
Coleoptera	Dytiscidae	*Hygrotus inaequalis*							1			
Coleoptera	Dytiscidae	*Laccophilus minutus*	1									
Coleoptera	Dytiscidae	*Rhantus exsoletus*						1				
Coleoptera	Gyrinidae	*Gyrinus marinus*			1							
Coleoptera	Gyrinidae	*Gyrinus minutus*		3		1			1			1
Coleoptera	Halipliidae	*Haliplus ruficollis* group			1							

Group	Family	Species	L2	L4	L5	L6	L7	L9	L10	L11	L12	L13
Coleoptera	Halipliidae	sp. indet.			1							
Coleoptera	Hydraenidae	*Hydraena gracilis*										
Coleoptera	Hydrophilidae	*Enochrus* sp.					1					
Diptera	Chironomidae	non-*Chironomus* spp.		4	7			6		1		
Diptera	Thaumleidae	sp. indet.	2		3	1	2	3				
Diptera	Tipuliidae	Tipula sp.						1				
Hemiptera	Corixidae	*Corixa punctata*								1		
Hemiptera	Corixidae	*Hesperocorixa linnaei*		7	54			1		1	2	
Hemiptera	Corixidae	*Hesperocorixa sahlbergi*								1		
Hemiptera	Corixidae	*Hesperocorixa* sp.	7				51				204	105
Hemiptera	Notonectidae	*Notonecta marmorea viridis*						2		1		2
Hemiptera	Notonectidae	*Notonecta obliqua*										1
Hirudinidae	Piscicolidae	*Piscicola* sp.				2						
Arachnida	Hydrachnidiae	Hydrachnidiae	1		1					1	2	
Crustacea	Asellidae	*Asellus aquaticus*			3		88	26	2	1		
Mollusca	Lymnaeidae	*Ampullaceana balthica*			1	1	3			2		
Mollusca	Physidae	*Physa fontinalis*						1				
Annelida	Naididae (Tubificidae)	sp. indet.		1							1	
Annelidae	Oligochaeta	sp. indet.	1	1		2	4		3		5	
Abundance			**23**	**52**	**152**	**85**	**246**	**69**	**10**	**12**	**236**	**123**

9. Appendix C – eDNA analysis lab report

SureScreen Scientifics

Folio No: E12289
Report No: 1
Client: Triturus Environmental Limited
Contact: Ross Macklin

TECHNICAL REPORT

ANALYSIS OF ENVIRONMENTAL DNA IN WATER FOR AQUATIC SPECIES DETECTION

SUMMARY

When aquatic organisms inhabit a waterbody such as a pond, lake or river they continuously release small amounts of their DNA into the environment. By collecting and analysing water samples, we can detect these small traces of environmental DNA (eDNA) to confirm the presence or absence of the target species within the waterbody.

RESULTS

Date sample received in laboratory: 02/11/2021
Date results reported: 16/11/2021
Matters affecting result: None

SureScreen Scientifics

TARGET SPECIES: Crayfish plague *(Aphanomyces astaci)*

Lab ID	Site Name	OS Reference	SIC	DC	IC	Result	Positive Replicates
FK180	Clover River	-	Pass	Pass	Pass	Positive	12/12
FK181	Breegah River D2	-	Pass	Pass	Pass	Negative	0/12
FK182	Black River C5	-	Pass	Pass	Pass	Positive	5/12
FK183	Drish River N75 road bridge	-	Pass	Pass	Pass	Negative	0/12
FK184	Drish River B2	-	Pass	Pass	Pass	Negative	0/12

TARGET SPECIES: White-clawed crayfish *(Austropotamobius pallipes)*

Lab ID	Site Name	OS Reference	SIC	DC	IC	Result	Positive Replicates
FK180	Clover River	-	Pass	Pass	Pass	Positive	12/12
FK181	Breegah River D2	-	Pass	Pass	Pass	Positive	2/12
FK182	Black River C5	-	Pass	Pass	Pass	Positive	12/12
FK183	Drish River N75 road bridge	-	Pass	Pass	Pass	Negative	1/12
FK184	Drish River B2	-	Pass	Pass	Pass	Negative	0/12

If you have any questions regarding results, please contact us: ForensicEcology@surescreen.com

Reported by: **MSc Gabriela Danickova** Approved by: **PhD Chris Troth**

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Company Registration No. 08950940

SureScreen Scientifics

METHODOLOGY

The samples detailed above have been analysed for the presence of target species eDNA following scientifically published eDNA assays and protocols which have been thoroughly tested, developed and verified for use by SureScreen Scientifics.

The analysis is conducted in two phases. The sample first goes through an extraction process where the filter is incubated in order to obtain any DNA within the sample. The extracted sample is then tested via real time PCR (also called q-PCR) for each of the selected target species. This process uses species-specific molecular markers (known as primers) to amplify a select part of the DNA, allowing it to be detected and measured in 'real time' as the analytical process develops. qPCR combines amplification and detection of target DNA into a single step. With qPCR, fluorescent dyes specific to the target sequence are used to label targeted PCR products during thermal cycling. The accumulation of fluorescent signals during this reaction is measured for fast and objective data analysis. The primers used in this process are specific to a part of mitochondrial DNA only found in each individual species. Separate primers are used for each of the species, ensuring no DNA from any other species present in the water is amplified.

If target species DNA is present, the DNA is amplified up to a detectable level, resulting in positive species detection. If target species DNA is not present then amplification does not occur, and a negative result is recorded.

Analysis of eDNA requires scrupulous attention to detail to prevent risk of contamination. True positive controls, negative controls and spiked synthetic DNA are included in every analysis and these have to be correct before any result is declared and reported. Stages of the DNA analysis are also conducted in different buildings at our premises for added security.

SureScreen Scientifics Ltd is ISO9001 accredited and participate in Natural England's proficiency testing scheme for GCN eDNA testing. We also carry out regular inter-laboratory checks on accuracy of results as part of our quality control procedures.

SureScreen Scientifics

INTERPRETATION OF RESULTS

SIC: **Sample Integrity Check** [Pass/Fail]
When samples are received in the laboratory, they are inspected for any tube leakage, suitability of sample (not too much mud or weed etc.) and absence of any factors that could potentially lead to inconclusive results.

DC: **Degradation Check** [Pass/Fail]
Analysis of the spiked DNA marker to see if there has been degradation of the kit or sample, between the date it was made to the date of analysis. Degradation of the spiked DNA marker may indicate a risk of false negative results.

IC: **Inhibition Check** [Pass/Fail]
The presence of inhibitors within a sample are assessed using a DNA marker. If inhibition is detected, samples are purified and re-analysed. Inhibitors cannot always be removed, if the inhibition check fails, the sample should be re-collected.

Result: **Presence of eDNA** [Positive/Negative/Inconclusive]

Positive: DNA was identified within the sample, indicative of species presence within the sampling location at the time the sample was taken or within the recent past at the sampling location.

Positive Replicates: Number of positive qPCR replicates out of a series of 12. If one or more of these are found to be positive the pond is declared positive for species presence. It may be assumed that small fractions of positive analyses suggest low level presence, but this cannot currently be used for population studies. Even a score as low as 1/12 is declared positive. 0/12 indicates negative species presence.

Negative: eDNA was not detected or is below the threshold detection level and the test result should be considered as evidence of species absence, however, does not exclude the potential for species presence below the limit of detection.

Inconclusive: Controls indicate inhibition or degradation of the sample, resulting in the inability to provide conclusive evidence for species presence or absence.

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Aquatic baseline report for Littleton wind farm, Co. Tipperary

Prepared by Triturus Environmental Ltd. for Fehily Timoney & Company

March 2024

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1. Introduction

1.1 Background

Triturus Environmental Ltd. were commissioned by Fehily Timoney to conduct baseline aquatic and fisheries surveys to inform EIAR preparation for the proposed Littleton wind farm project, located near Littleton, Co. Tipperary (**Figure 2.1**). Undertaken on a sub-catchment-wide scale, this report provides a baseline assessment of the aquatic ecology including fisheries, biological water quality, protected species and habitats in the vicinity of the proposed project, inclusive of the proposed grid cable route (GCR). The surveys would serve to update previous surveys of the site (by Triturus in 2021) whilst also accounting for any changes in proposed infrastructure and site layout in the interim period. Aquatic surveys were undertaken in September and October 2023.

1.2 Project description

A full description of the proposed project will be provided in any Environmental Impact Assessment Report (EIAR) used to support consenting applications.

2. Methodology

2.1 Selection of watercourses for assessment

All freshwater watercourses which could be affected directly or indirectly by the proposed wind farm project were considered as part of the current baseline. This included sites in vicinity of the proposed site boundary in addition to watercourse crossings of the proposed grid cable route (GCR) options. A total of 30 no. riverine sites were selected for detailed aquatic assessment (see **Table 2.1, Figure 2.1** below). The flow paths and nomenclature for the watercourses surveyed followed Environmental Protection Agency (EPA) mapping.

Riverine survey sites survey sites were present on the Clover River (EPA code: 16C04), Drish River (16D02), Black River (16B01), North Glengoole River (16N28), Breegagh River (16B03), River Goul (15G02), Ardreagh River (15A03), Lisduff Stream (15L08), Tincashel River (15T05), Clomantanagh Lower Stream (15C91), Gorteenahilla River (15G08), Lismaine Stream (15L16), Lisdowney Stream (15L02), River Nore (15N01) and several unnamed watercourses (**Table 2.1**). Additionally, a total of 17 no. lakes/wetlands located within the proposed site boundary at Littleton Bog were also surveyed in September-October 2023 (**Table 2.1; Figure 2.2**). The aquatic survey sites were located within the Suir_SC_040, Goul_SC_010 and Nore_SC_070 river sub-catchments. The proposed wind farm site boundary did not overlap with any European sites. However, there was potential downstream hydrological connectivity between the proposed project and the Lower River Suir SAC (002137), a site designated for a range of aquatic qualifying interests (NPWS, 2017a). A single GCR watercourse crossing of the River Nore (at site E9) traversed the River Barrow And River Nore SAC (2162) and River Nore SPA (4233).

Please note this aquatic report should be read in conjunction with the final Environmental Impact Assessment Report (EIAR) prepared for the proposed project. More specific aquatic methodology is outlined below and in the appendices of this report.

2.2 Aquatic site surveys

Aquatic surveys of the watercourses within the vicinity of the proposed wind farm project were conducted on the 5th, 6th, 7th and 21st September and 12th-13th October 2023. Survey effort focused on both instream and riparian habitats at each aquatic sampling location. Surveys at each of these sites included a fisheries assessment (electro-fishing and or fisheries habitat appraisal), white-clawed crayfish survey, otter survey (within 150m of the survey site), macrophyte and aquatic bryophyte survey and biological water quality (Q-sampling at riverine sites) or invertebrate sweep sampling (lacustrine sites) (**Figure 2.1**). This holistic approach informed the overall aquatic ecological evaluation of each site in context of the proposed project and ensured that any habitats and species of high conservation value would be detected to best inform mitigation.

In addition to the ecological characteristics of the site, a broad aquatic and riparian habitat assessment was conducted utilising elements of the methodology given in the Environment Agency's 'River Habitat Survey in Britain and Ireland Field Survey Guidance Manual 2003' (EA, 2003) and the Irish Heritage Council's 'A Guide to Habitats in Ireland' (Fossitt, 2000). This broad characterisation helped

define the watercourses' conformity or departure from naturalness. All sites were assessed in terms of:

- Physical watercourse/waterbody characteristics (i.e. width, depth etc.) including associated evidence of historical drainage
- Substrate type, listing substrate fractions in order of dominance (i.e. bedrock, boulder, cobble, gravel, sand, silt etc.)
- Flow type by proportion of riffle, glide and pool in the sampling area
- An appraisal of the macrophyte and aquatic bryophyte community at each site
- Riparian vegetation composition

Table 2.1 Location of 47 no. aquatic survey sites in the vicinity of Littleton wind farm, Co. Tipperary

Site no.	Watercourse	EPA code	Location	X (ITM)	Y (ITM)	GCR crossing
Riverine sites						
A1	Unnamed stream	n/a	Longfordpass North	622135	660772	
A2	Unnamed stream	n/a	Clooncleagh	619285	660881	
A3	Unnamed stream	n/a	R639 road crossing, Leigh	622188	658445	
A4	Unnamed stream	n/a	Noard	621555	656463	
A5	Clover River	16C04	Noard	621241	655973	
A6	Clover River	16C04	R639 road crossing, Leigh	621356	657637	
A7	Clover River	16C04	Noard	619601	659306	
B1	Drish River	16D02	Longfordpass South	624723	657212	
B2	Drish River	16D02	Bridge 100m u/s Longfordpass Bridge	624889	660463	Yes
B3	Drish River	16D02	Castletown Bridge	621680	663563	
B4	Drish River	16D02	Ballyduff Bridge	618961	661310	
B5	Drish River	16D02	Drish Bridge	614891	658369	
C1	Black River	16B01	Clonoura	623707	654329	
C2	Black River	16B01	Derryvella	621096	652818	
C3	North Glengoole River	16N28	Derryvella	620969	652602	
C4	Black River	16B01	Derryhogan	619908	653512	
C5	Black River	16B01	N75 crossing, Two Mile Borris	619120	657824	
D1	Breegagh River	16B03	Kileen	621369	650304	
D2	Breegagh River	16B03	Ballymurreen Bridge	617399	653051	
D3	Breegagh River	16B03	Archerstown Bridge	613950	656841	
E1	River Goul	15G02	R689 road crossing, Fennor	627891	660586	Yes
E2	Ardreagh River	15A03	Lisduff	629611	660275	Yes
E3	Lisduff Stream	15L08	Lisduff	630069	660402	Yes
E4	Tincashel River	15T05	Lisduff	630645	660666	Yes
E5	Clomantanagh Lower Stream	15C91	Clomantagh Lower	635617	663477	Yes

Site no.	Watercourse	EPA code	Location	X (ITM)	Y (ITM)	GCR crossing
E6	Unnamed stream	n/a	Kilrush	637410	665322	Yes
E7	Gorteenahilla River	15G08	Ballyguider Bridge	638977	666778	Yes
E8	Lismaine Stream	15L16	Clone	642128	667587	Yes
E9	Lisdowney Stream	15L02	Grange Bridge	643580	668665	Yes
E10	River Nore	15N01	Parksgrove	644041	671505	Yes
Lacustrine sites						
L1	Lake/wetland	n/a	Longfordpass South	623838	657293	
L2	Lake/wetland	n/a	Bawnreagh	624148	657036	
L3	Lake/wetland	n/a	Bawnreagh	624203	656996	
L4	Lake/wetland	n/a	Bawnreagh	623830	656968	
L5	Lake/wetland	n/a	Bawnreagh	623886	656483	
L6	Lake/wetland	n/a	Leigh	623554	656506	
L7	Lake/wetland	n/a	Leigh	623573	656457	
L8	Lake/wetland	n/a	Clonoura	623966	655791	
L9	Lake/wetland	n/a	Clonoura	623089	655449	
L10	Lake/wetland	n/a	Clonoura	623128	655375	
L11	Lake/wetland	n/a	Clonoura	623259	655119	
L12	Lake/wetland	n/a	Clonoura	623355	654846	
L13	Lake/wetland	n/a	Noard	622700	655234	
L14	Lake/wetland	n/a	Noard	622759	655206	
L15	Lake/wetland	n/a	Noard	622190	654897	
L16	Lake/wetland	n/a	Lanespark	622163	654688	
L17	Lake/wetland	n/a	Noard	621406	651982	

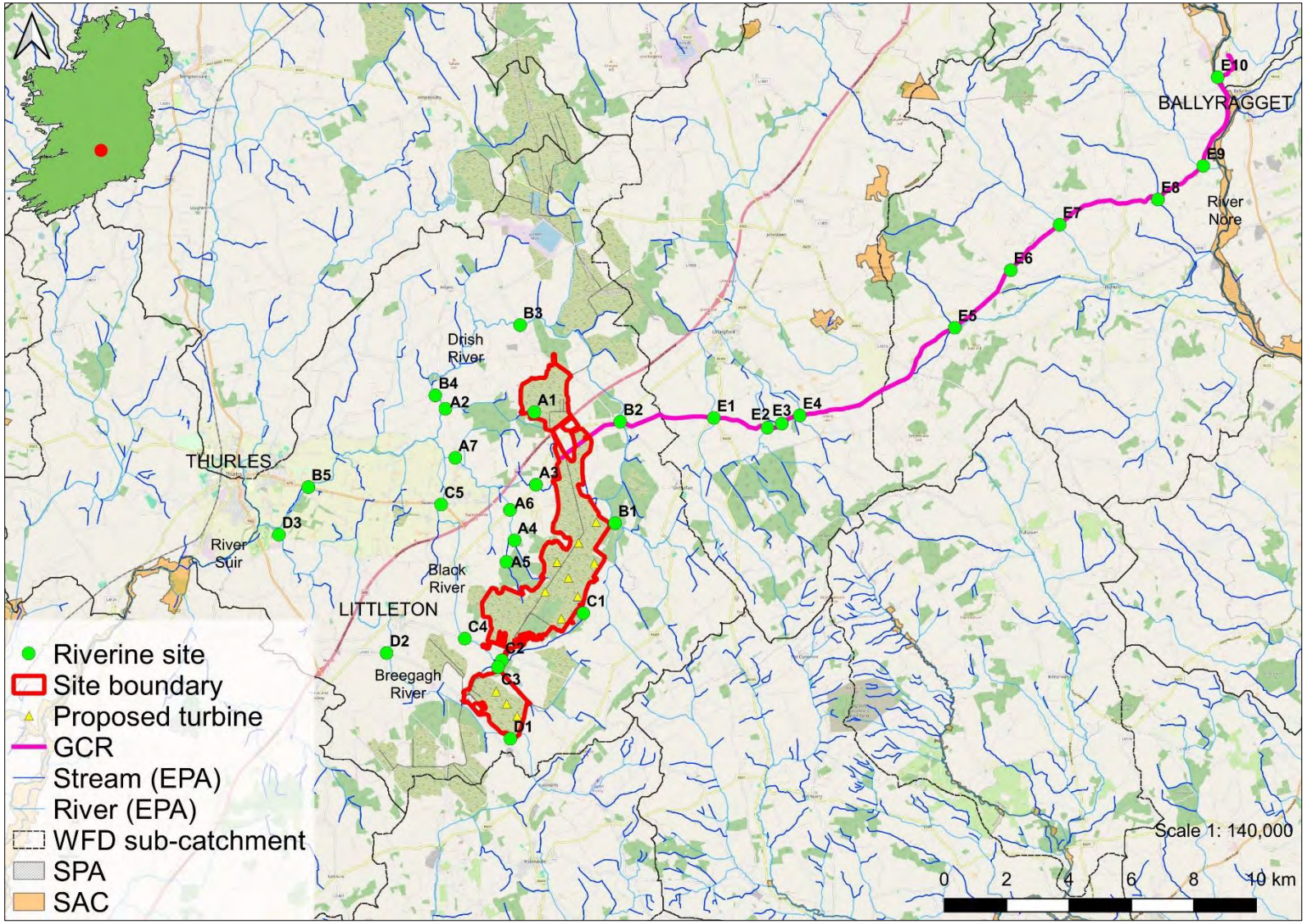


Figure 2.1 Overview of the 30 no. riverine survey sites in vicinity of the proposed Littleton wind farm project, Co. Tipperary

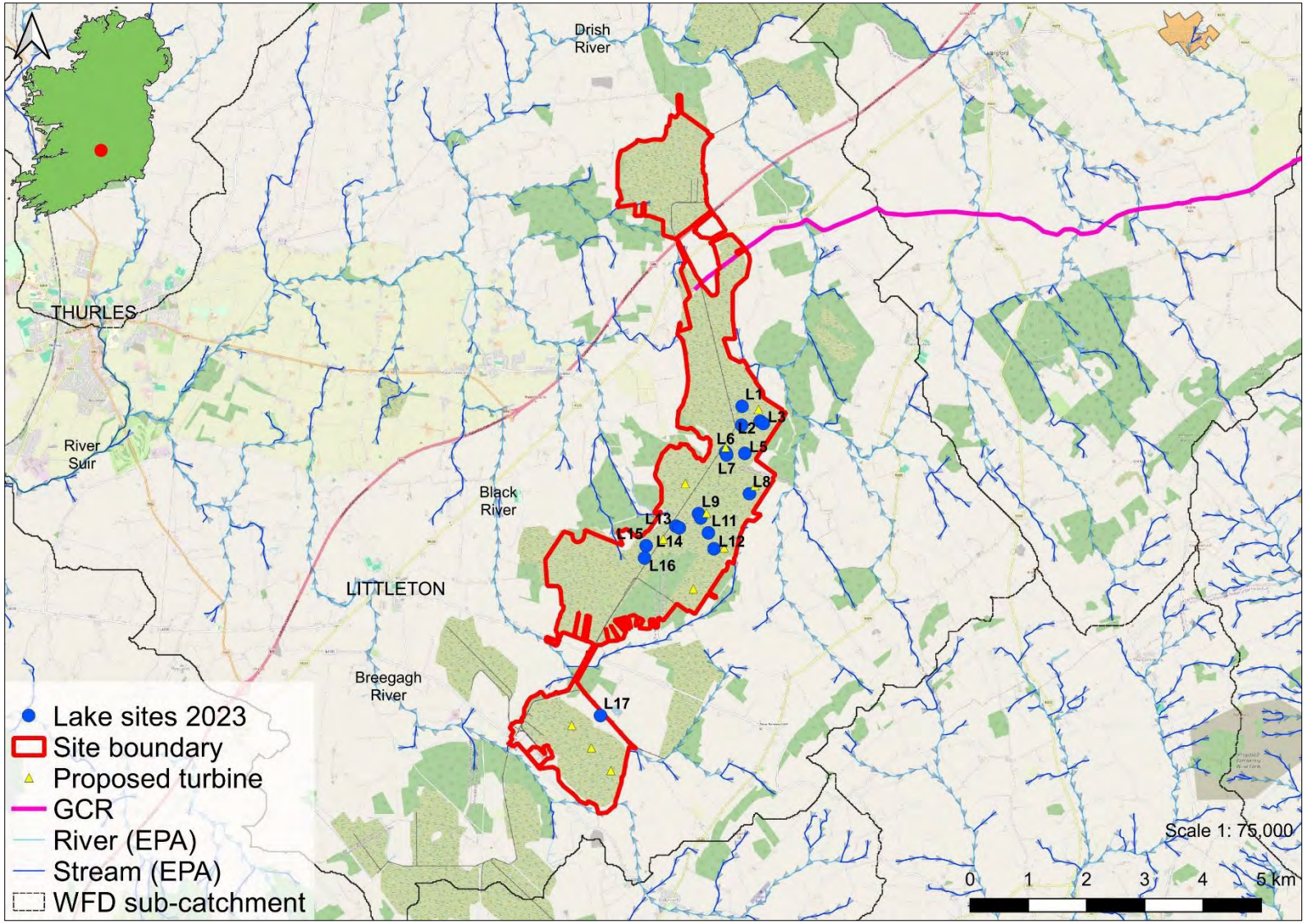


Figure 2.2 Overview of the 17 no. lacustrine survey sites in vicinity of the proposed Littleton wind farm project, Co. Tipperary

2.3 Fisheries assessment (electro-fishing) & appraisal

A single anode Smith-Root LR24 backpack (12V DC input; 300V, 100W DC output) was used to electro-fish sites on riverine watercourses in the vicinity of the proposed Littleton wind farm in September 2023 (**Table 2.1, Figure 2.1; Appendix A**), following notification to Inland Fisheries Ireland, under the conditions of a Department of the Environment, Climate and Communications (DECC) licence. The survey was undertaken in accordance with best practice (CFB, 2008; CEN, 2003) and Section 14 licencing requirements.

Furthermore, a fisheries habitat appraisal of all aquatic survey sites, including 17 no. lake/wetland habitats (**Table 2.1**), was undertaken to establish their importance for salmonid, lamprey, European eel and other fish species. The baseline assessment also considered the quality of spawning, nursery and holding habitat for salmonids and lamprey within the vicinity of the survey sites. For detailed survey methodology, please refer to accompanying fisheries assessment report in **Appendix A.**

2.4 White-clawed crayfish survey

White-clawed crayfish (*Austropotamobius pallipes*) surveys were undertaken at the aquatic survey sites in September-October 2023 under a National Parks and Wildlife (NPWS) open national licence (no. C24/2023), as prescribed by Sections 9, 23 and 34 of the Wildlife Act (1976 to 2023), to capture and release crayfish to their site of capture. As per Inland Fisheries Ireland aquatic biosecurity recommendations, the crayfish sampling started at the uppermost site(s) of the wind farm catchment/sub-catchments in the survey area to minimise the risk of transfer invasive propagules (including crayfish plague) in an upstream direction. Hand-searching of instream refugia and sweep netting was undertaken according to Reynolds et al. (2010). An appraisal of white-clawed crayfish habitat at each site was conducted based on physical habitat attributes, water chemistry and incidental records in mustelid spraint. Additionally, a desktop review of crayfish records within the wider survey area was completed.

2.5 Biological water quality (Q-sampling)

A total of 30 no. riverine survey sites were assessed for biological water quality through Q-sampling in September 2023. All samples were taken with a standard kick sampling hand net (250mm width, 500µm mesh size) from areas of riffle/glide utilising a 2-minute kick sample, as per Environmental Protection Authority (EPA) methodology (Feeley et al., 2020). Large cobble was also washed at each site for 1-minute (where present) to collect attached macro-invertebrates (as per Feeley et al., 2020). Samples were elutriated and fixed in 70% ethanol for subsequent laboratory identification. Samples were converted to Q-ratings as per Toner et al. (2005) and assigned to WFD status classes (**Table 2.2**). Any rare invertebrate species were identified from the NPWS Red List publications for beetles (Foster et al., 2009), mayflies (Kelly-Quinn & Regan, 2012), stoneflies (Feeley et al., 2020) and other relevant taxa (i.e. Byrne et al., 2009; Nelson et al., 2011).

Table 2.2 Reference categories for EPA Q-ratings (Q1 to Q5)

Q value	WFD status	Pollution status	Condition
Q5 or Q4-5	High status	Unpolluted	Satisfactory
Q4	Good status	Unpolluted	Satisfactory
Q3-4	Moderate status	Slightly polluted	Unsatisfactory
Q3 or Q2-3	Poor status	Moderately polluted	Unsatisfactory
Q2, Q1-2 or Q1	Bad status	Seriously polluted	Unsatisfactory

2.6 Lacustrine macro-invertebrate communities

A subset of 17 no. lake/wetland sites were sampled for macro-invertebrates via sweep netting in September-October 2023. A standard lake net (250mm width, mesh size 500µm) was used to sweep macrophytes to capture macro-invertebrates. The net was also moved along the lake/lake bed to collect epibenthic and epiphytic invertebrates from the substratum (as per Cheal et al., 1993). A 3-minute sampling period was employed. To ensure appropriate habitat coverage, the sampling period was also divided amongst the range of meso-habitats present at the survey site to get a representative sample for sub-habitats.

2.7 Macrophytes and aquatic bryophytes

Surveys of the macrophyte and aquatic bryophyte community were conducted by instream wading at each of the wetted aquatic survey sites, with specimens collected (by hand, sweep nets or via grapnel) for on-site identification. An assessment of the aquatic vegetation community helped to identify any rare macrophyte species (Flora Protection Order or Wyse-Jackson et al., 2016) or habitats corresponding to the Annex I habitats, e.g., 'Water courses of plain to montane levels, with submerged or floating vegetation of the *Ranunculion fluitantis* and *Callitricho-Batrachion* (low water level during summer) or aquatic mosses [3260]' (more commonly referred to as 'floating river vegetation').

2.8 Otter signs

The presence of otter (*Lutra lutra*) at each aquatic survey site was determined through the recording of otter signs within 150m of each survey site. Notes on the age and location (ITM coordinates) were made for each otter sign recorded, in addition to the quantity and visible constituents of spraint (i.e. remains of fish, crustaceans, molluscs etc.).

2.9 Aquatic ecological evaluation

The evaluation of aquatic ecological receptors contained within this report uses the geographic scale and criteria defined in the 'Guidelines for Assessment of Ecological Impacts of National Road Schemes' (NRA, 2009).

2.10 Biosecurity

A strict biosecurity protocol following IFI (2010) and the Check-Clean-Dry approach was adhered to during surveys for all equipment and PPE used. Disinfection of all equipment and PPE before and after use with Virkon™ was conducted to prevent the transfer of pathogens or invasive propagules between survey sites. Surveys were undertaken at sites in a downstream order to minimise the risk of upstream propagule mobilisation. Care was given towards preventing the spread or introduction of highly virulent crayfish plague (*Aphanomyces astaci*). Furthermore, staff did not undertake any work in a known crayfish plague catchment for a period of <72hrs in advance of the survey. Where feasible, equipment was also thoroughly dried (through UV exposure) between survey areas. Any aquatic invasive species or pathogens recorded within or adjoining the survey areas were geo-referenced. All Triturus staff are certified in 'Good fieldwork practice: slowing the spread of invasive non-native species' by the University of Leeds.

3. Desktop review

3.1 Survey area description

The proposed Littleton wind farm is located in an extensive area of cutover bog within the townlands of Noard, Ballybeg, Kileen, Newhill, Derryhogna, Kilmakill, Lansespark, Derryvella, Leigh, Clonoura, Longfordpass North, Longfordpass South and Bawnreagh approximately 2.5km west of Littleton, County Tipperary (**Figure 2.1**). The proposed wind farm site is within the South Eastern River Basin District and within hydrometric areas 15 (Nore) and 16 (Suir). The watercourses and aquatic surveys sites in the vicinity of Littleton wind farm are typically small, historically modified lowland depositing channels (FW2; Fossitt, 2000) which flow over areas of Tournaisian and Visean limestone and calcareous shale (Geological Survey of Ireland data). Land use practices in the wider survey area comprise peat bogs (CORINE 412), transitional woodland scrub (324) with localised coniferous forests (312) and adjoining pastures (231).

3.2 Fisheries

The Drish River, a tributary of the River Suir, is known to support *Lampetra* sp. (O'Connor, 2007; Kurz & Costello, 1999) as well as Atlantic salmon (*Salmo salar*), brown trout (*Salmo trutta*) and pike (*Esox lucius*) (1993 data presented in AECOM, 2020). The trout and pike in the Drish were found to be fast growing and similar to those in comparable rivers in the Irish midlands (CFB data referenced in AECOM, 2020). The river suffered significant pollution from a zinc and lead mine at Lisheen until the recent past (AECOM, 2020; O'Connor, 2007).

The Clover River, a tributary of the Drish River, is known to support brown trout, three-spined stickleback (*Gasterosteus aculeatus*), perch (*Perca fluviatilis*) and stone loach (*Barbatula barbatula*) (Triturus 2021 data). The Breegagh River, another Drish River tributary, also supports brown trout, stone loach and three-spined stickleback in addition to Atlantic salmon and *Lampetra* sp. (Triturus 2021 data). The Black River (Two Mile Borris) is known to support Atlantic salmon, brown trout, European eel and stone loach (Triturus 2021 data) in addition to lamprey *Lampetra* sp. (O'Connor, 2007). The North Glengoole River, a Black River tributary, supports Atlantic salmon, brown trout, European eel and three-spined stickleback (Triturus 2021 data).

In terms of the proposed GCR option, the route crosses the River Goul and several tributaries (Ardreagh River, Lisduff Stream & Tincashel River) which are known to support Atlantic salmon, brown trout, stone loach and three-spined stickleback (IFI 2021 data). The Gorteenahilla River, a tributary of the Nuenna River, supports Atlantic salmon, brown trout, *Lampetra* sp. and three-spined stickleback (Triturus 2021-2022 data). The Lismaine Stream frequently runs dry and provides poor quality fisheries habitat (Triturus data). The Lisdowney Stream, a River Nore tributary, supports Atlantic salmon, brown trout, European eel and three-spined stickleback (Triturus 2021 data; IFI 2021 data). The River Nore in the vicinity of Ballyragget supports a range of fish species including Atlantic salmon, brown trout, *Lampetra* sp., European eel, minnow (*Phoxinus phoxinus*), stone loach and rudd (*Scardinius erythropthalmus*) (Triturus 2021 data).

Fisheries data for the other watercourses surveyed was not available at the time of survey.

3.3 Protected aquatic species data

A comprehensive desktop review of available data from the National Parks and Wildlife Service (NPWS), National Biodiversity Data Centre (NBDC), Inland Fisheries Ireland (IFI), Botanical Society of Britain and Ireland (BSBI), National Crayfish Plague Surveillance Programme (NCPSP), Environmental Protection Agency (EPA) and Triturus databases for the 10km grid squares containing and adjoining the project (i.e. S15, S16, S25, S26, S36, S46 & S47) identified records for a low number of rare and or protected aquatic species within the vicinity of the proposed wind farm.

A high number of contemporary white-clawed crayfish (*Austropotamobius pallipes*) records (>100) were available for the respective grid squares in the 1996-2014 period (**Figure 3.1**), with a further 50 approx. historical records. A low number of records were available for the Drish River, Clover River (single record), Black River, River Goul, River Nore and Lough Doire Bhile (near lake site L17) (**Figure 3.1**).

A low number of contemporary otter (*lutra lutra*) records (2005-2022) were available for the relevant grid squares, with records from the Black River, Drish River and River Nore (**Figure 3.1**). Otter signs were recorded during previous surveys for the project on the Clover River, Black River and Drish River (Triturus 2021 data).

A low number of records were available for freshwater pearl mussel (M*argaritifera margaritifera*) for the River Nore located between the River Erkina confluence and Ballyragget in the 1993 to 2007 period (i.e. downstream of the proposed project). However, no live mussel have been recorded in this area of the River Nore since 2007 (Pascal Sweeney pers. comm.), including during a survey completed in May 2023 (Triturus data).

A low number of records for lamprey (*Lampetra* sp.) (reported as brook lamprey) were available for the River Nore downstream of Durrow (data not shown). *Lampetra* sp. are also known from the Nuenna River (Gordon et al., 2021; Matson et al., 2018) and several survey watercourses (see section 3.2 above).

Historical records (1968 & 1972) for spawning sea lamprey (*Petromyzon marinus*) were available for the River Nore in the vicinity of Ballyragget (data not shown).

Two records for Flora (Protection) Order 2022 macrophyte species opposite-leaved pondweed (*Groenlandia densa*) were available from a former pond in the vicinity of Urlingford but these were historical only (i.e. pre-1900, data not shown).

A single record for smooth newt (*Lissotriton vulgaris*) was available for bog habitat at Derryvella adjacent to the North Glengoole River at survey site C3 from 2010 (data not shown).

3.4 EPA water quality data (existing data)

The following outlines the available water quality data for the watercourses in context of the proposed wind farm site boundary. Only recent water quality is summarised below. Contemporary EPA biological monitoring data was available for the Drish, Clover and Black Rivers only. Please note that biological water quality analysis was undertaken as part of this study, with the results presented in the **section 4** and **Appendix B** of this report.

3.4.1 Drish River

The Drish River (EPA code: 16D02) drains north and then south-west of the proposed wind farm site boundary before joining the River Suir downstream of Thurles. There was a total of 4 no. contemporary EPA biological monitoring stations on the river in the vicinity of the proposed project. The Drish River achieved Q3 (poor status) at the two uppermost stations (RS16D020040 (site B2), RS16D020070 (site B3)), **Q3-4 (moderate status)** at station RS16D020100 and **Q4 (good status)** at station RS16D020200 in 2023.

The Drish_010, _020, _040 & _050 river waterbodies were all of poor status in the 2016-2021 period and were considered 'at risk' of failing to achieve good status (WFD Risk 3rd cycle). The lower reaches (Drish_060) achieved moderate status in the same period but were also considered 'at risk'. Peat extraction, forestry and agriculture are the primary threats to water quality in these waterbodies (EPA, 2019).

3.4.2 Clover River

There were 2 no. contemporary EPA biological monitoring stations on the Clover River (16C04), a tributary of the Black River. The Clover achieved **Q3 (poor status)** at station RS16C040100 (survey site A3) in 2023 but this elevated to **Q3-4 (moderate status)** in the lower reaches at station RS16C040300 (also in 2023).

The upper reaches of the Clover River (Clover_010 waterbody) were of poor status in the 2016-2021 period, whilst the lower reaches (Clover_020 waterbody) were of moderate status. Both waterbodies were considered 'at risk' of not achieving good status. Peat extraction and forestry are the significant threats to water quality in these waterbodies (EPA, 2019).

3.4.3 Black River

There were 2 no. contemporary EPA biological monitoring stations on the Black River (16B01), a tributary of the Drish River. At Black River Bridge (station RS16B010030) and station RS16B010100 the river achieved **Q3 (poor status)** in 2023.

The Black (Twomileborris)_010 waterbody (encompassing most of the river) was of moderate WFD status in the 2016-2021 period and was considered 'at risk' of achieving good status. The lower reaches of the Black River are part of the Drish_050 waterbody which was of poor status in the same period and also 'at risk'. (as outlined above). Peat extraction is the primary threat to water quality in these waterbodies (EPA, 2019).

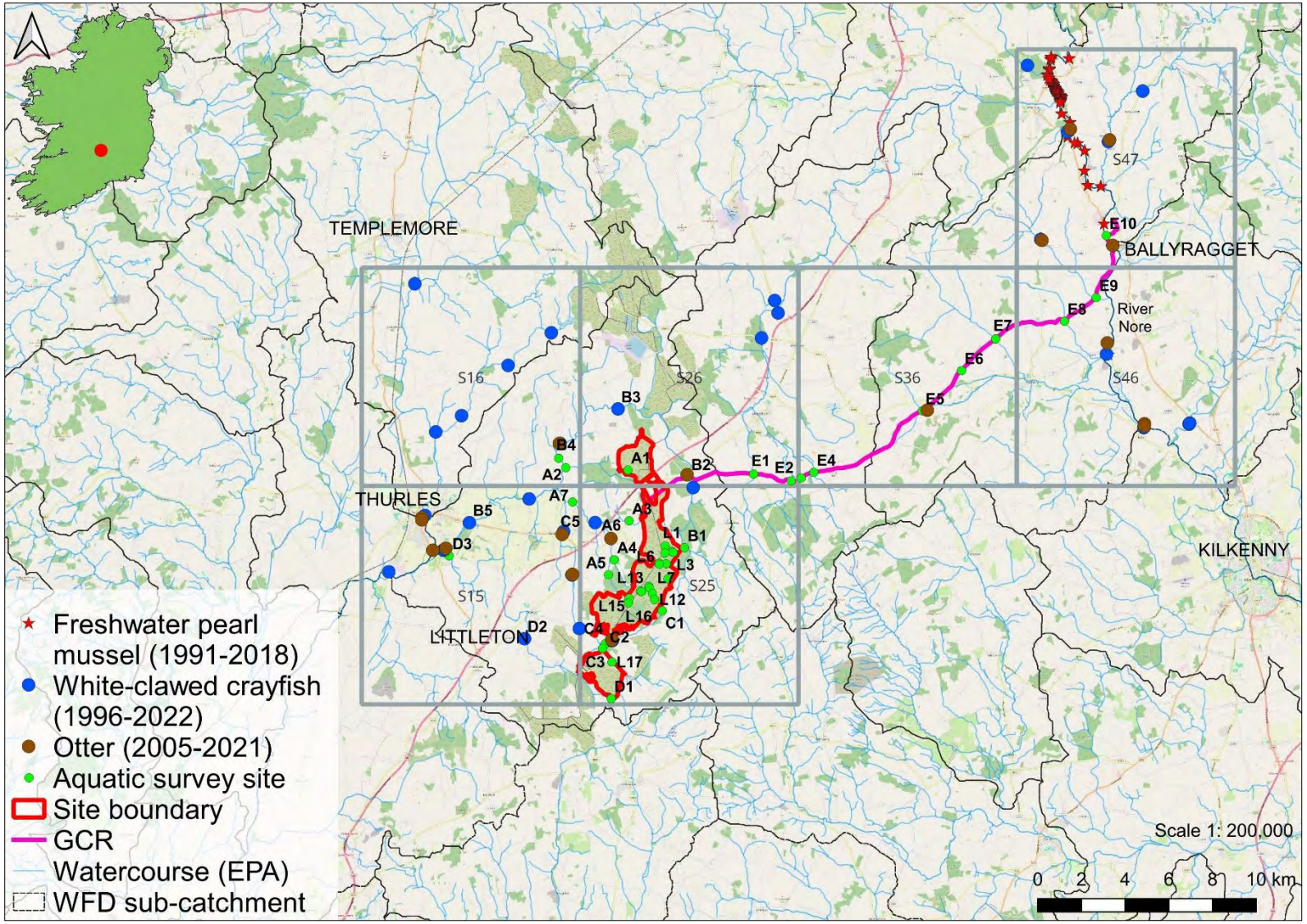


Figure 3.1 Distribution of selected protected species records in the vicinity of the proposed Littleton wind farm (source: NPWS, EPA, NBDC & Triturus data)

4. Results of aquatic surveys

The following section summarises each of the 30 no. riverine and 17 no. lake/wetland survey sites in terms of aquatic habitats, physical characteristics and overall value for fish, macro-invertebrates and macrophyte/aquatic bryophyte communities. Biological water quality (Q-sample) and macro-invertebrate sweep sample results are summarised for each site and provided in full in **Appendix B**. Habitat codes are according to Fossitt (2000). Scientific names are provided at first mention only. Sites were surveyed in September-October 2023. Please refer to **Appendix A** (fisheries assessment report) for more detailed fisheries results. A summary of the fish species recorded at each survey site is provided in **Table 4.1**. A summary of the aquatic species and habitats of high conservation concern recorded during the surveys is provided in **Table 4.2**. An evaluation of the aquatic ecological importance of each survey site based on these aquatic surveys is provided and summarised in **Table 4.3**.

4.1 Riverine survey site results

4.1.1 Site A1 – unnamed stream, Longfordpass North

Site A1 was located on the uppermost reaches of an unnamed Drish River tributary (no EPA code) within the proposed site boundary. Situated in an extensive area of cutover bog (PB4), the Drish River tributary had been extensively straightened and deepened, with V-shaped banks to 4-5m in height. The homogenous channel was 1-1.5m wide and <0.1m deep with imperceptible flows at the time of survey (near stagnant glide and pool). The channel had been excavated with a gravel-dominated base. Occasional cobble and bolder was also present. However, these were heavily silted (flocculent deposits from peat escapement). The stream was considered likely ephemeral (seasonal) at this location. Given the low flows and high riparian shading, macrophytes were absent with the exception of very localised water horsetail (*Equisetum fluviatile*) and common reed (*Phragmites australis*) along channel margins. No aquatic bryophytes were recorded. The channel was heavily scrubbed over with high levels of terrestrial encroachment from willow (*Salix* sp.), downy birch (*Betula pubescens*) and bramble (*Rubus fruticosus* agg.). The site was bordered by dry meadow habitat (GS2) and cutover bog (PB4) habitat in the wider area.

Three-spined stickleback (*Gasterosteus aculeatus*) was the only fish species recorded via electro-fishing at site A1 (**Appendix A**). With the exception of low densities of this species, the site was of very poor fisheries value at the time of survey given observed low seasonal flows (stagnant), very shallow nature, heavy siltation and historical modifications. There was no suitability for white-clawed crayfish given very shallow water. No otter signs were recorded in vicinity of the site.

Biological water quality, based on Q-sampling, was calculated as **Q3 (poor status)** (**Appendix B**). However, it should be noted that this is a tentative rating given poor flows and lack of suitable riffle areas for sampling (as per Toner et al., 2005). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the absence of aquatic species or habitats of high conservation value, the aquatic ecological evaluation of site A1 was of **local importance (lower value)** (**Table 4.3**).



Plate 4.2 Representative image of site A1 on an unnamed Drish River tributary, September 2023

4.1.2 Site A2 – unnamed stream, Clooncleagh

Site A2 was located on the lower reaches of an unnamed Drish River tributary at a local road crossing, approximately 3.2km downstream of site A1. The stream (FW2) had been straightened and deepened throughout, resulting in a V-shaped channel with 2-3m high banks and very poor hydromorphology. The stream was culverted under the local road almost as far as the Drish confluence. Where open at the road crossing, the stream was <1.5m wide and was semi-dry at the time of survey, with only remnant, shallow pools of stagnant water (no flows). The channel featured a base of cobble and mixed gravels bedded in mud. No aquatic vegetation was present and the ephemeral channel likely only conveys water after heavy rainfall events or during floods. The stream was very heavily tunnelled by nitrophilous vegetation dominated by nettle (*Urtica dioica*) and bramble, with a dense stock-proof hawthorn (*Crataegus monogyna*) hedgerow along the south bank. The site was bordered by the Ballybeg Farm Co-op (BL3) and heavily improved pasture (GA1).

Site A2 was not of fisheries value given its dry, ephemeral nature and absence of aquatic habitats. No otter signs were recorded in the vicinity of the site.

Biological water quality, based on Q-sampling, was calculated as **Q2-3 (poor status)** (**Appendix B**). However, it should be noted that this is a tentative rating given poor flows and lack of suitable riffle areas for sampling (as per Toner et al., 2005). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the absence of aquatic species or habitats of high conservation value, the aquatic ecological evaluation of site A2 was of **local importance (lower value)** (**Table 4.3**).



Plate 4.2 Representative image of site A2 on an unnamed Drish River tributary, September 2023 (semi-dry, ephemeral channel)

4.1.3 Site A3 – unnamed stream, Leigh

Site A3 was located on an unnamed stream (no EPA code) draining to the west of the proposed site boundary. The Clover River tributary (FW2) had been historically straightened and deepened along field boundaries and was semi-dry at the time of survey, with only localised ponding of 0.1m deep stagnant water between debris dams and no flows. The stream passed under the local road via a pipe culvert that was dry at the time of survey. The channel featured a base of cobble and mixed gravels bedded in silt/mud. Leaf litter and woody debris was abundant on the bed. No aquatic vegetation was present in the ephemeral channel, which was very heavily shaded by mature treelines and hedgerows supporting bramble, ivy (Hedera helix), ash (*Fraxinus excelsior*) and elder (*Sambucus nigra*). Non-native snowberry (*Symphoricarpos albus*) was recorded at the road crossing. The site was bordered by heavily improved pasture (GA1).

No fish were recorded via electro-fishing at site A3. The site was not of fisheries value given its semi-dry, ephemeral nature and poor quality aquatic habitats with no flows. There was no suitability for white-clawed crayfish. No otter signs were recorded in the vicinity of the site.

Biological water quality, based on Q-sampling, was calculated as **Q2-3 (poor status)** (**Appendix B**). However, it should be noted that this is a tentative rating given poor flows and lack of suitable riffle areas for sampling (as per Toner et al., 2005). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the absence of aquatic species or habitats of high conservation value, the aquatic ecological evaluation of site A3 was of **local importance (lower value)** (**Table 4.3**).



Plate 4.3 Representative image of site A3 on an unnamed Clover River tributary, September 2023

4.1.4 Site A4 – unnamed stream, Noard

Site A4 was located on an unnamed tributary of the Clover River. The lowland depositing channel (FW2) had been extensively straightened and deepened throughout, resulting in a deep trapezoidal channel with 2-3m high banks and poor hydromorphology. The stream was 3-4m wide and 0.4-0.6m deep with a profile dominated by deep, slow-flowing glide with occasional pool. Riffle was absent. The substrata were dominated by deep peat/silt and sands with scattered boulder. Cobble was present but highly localised and bedded in silt. Peat staining was very high at the time of survey. Macrophyte cover was high with frequent branched bur-reed (*Sparganium erectum*) and lesser pondweed (Potamogeton pusillus). Localised stands of bulrush (*Typha latifolia*), broad-leaved pondweed (*Potamogeton natans*) and common reed were present with frequent bent grass (*Agrostis* sp.) encroachment of the margins. Aquatic bryophytes were not recorded. The steep banks supported abundant bramble scrub and intermittent treelines of grey willow (*Salix cinerea*), dog rose (*Rosa canina*), hawthorn and ash. The site was bordered by coniferous afforestation (WD4), scrub (WS1), reclaimed wet grassland (GS4) and improved pasture (GA1).

Brown trout (*Salmo trutta*), stone loach (*Barbatula barbatula*), three-spined stickleback (*Gasterosteus aculeatus*) and perch (*Perca fluviatilis*) were recorded via electro-fishing at site A4 (**Appendix A**). The site was of poor value for salmonids, supporting only a low density of adult trout present in deeper holding pools. Spawning habitat was absent given very significant siltation, with slow-flowing glide resulting in poor quality nursery habitat. Despite abundant soft sediment accumulations, the site was unsuitable for lamprey given the flocculent, humic nature of the sediment and absence of suitable

spawning gravels. The site was also of poor suitability for European eel and white-clawed crayfish with none recorded. A regular otter spraint site (containing fish remains) was recorded on a marginal cobble bar (ITM 621499, 656663).

Biological water quality, based on Q-sampling, was calculated as **Q3 (poor status)** (**Appendix B**). However, it should be noted that this is a tentative rating given poor flows and lack of suitable riffle areas for sampling (as per Toner et al., 2005). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the presence of salmonids and utilisation by otter, the aquatic ecological evaluation of site A4 was of **local importance (higher value)** (**Table 4.3**).



Plate 4.4 Representative image of site A4 on an unnamed Clover River tributary, September 2023

4.1.5 Site A5 – Clover River, Noard

Site A5 was located on the upper reaches of the Clover River (16C04). The small lowland channel (FW2) had been straightened and deepened throughout, resulting in a trapezoidal channel with very poor hydromorphology and low flows. The river had been excavated in the recent past and was 2m wide and 0.3-0.4m deep with a bed comprised of soft silt (often up to 0.2m deep) underlain by compacted gravels and clay. The narrow channel was heavily vegetated with a relatively high diversity of vegetation including abundant common duckweed (*Lemna minor*), locally frequent common reed and broad-leaved pondweed, water mint (*Mentha aquatica*) and lesser pondweed. Blue water speedwell (*Veronica anagallis-aquatica*), bottle sedge (*Carex rostrata*) and watercress (*Nasturtium officinale*) were also present locally. The liverwort *Riccia fluitans* was abundant on the sloping clay banks and instream as floating mats. The banks had been historically cleared and were fenced to the banktop with only rank grass vegetation. The site was bordered by improved pasture (GA1) with coniferous

afforestation (and alder borders) present upstream.

No fish were recorded via electro-fishing at site A5. The river was not of fisheries value at this location given siltation and enrichment pressures, very poor hydromorphology (maintained channel), poor flows and intermittent connectivity with downstream habitats (instream blockages). White-clawed crayfish habitat was poor overall (given heavy siltation) and none were recorded. No otter signs were recorded in the vicinity of the site.

Biological water quality, based on Q-sampling, was calculated as **Q3 (poor status)** (**Appendix B**). However, it should be noted that this is a tentative rating given poor flows and lack of suitable riffle areas for sampling (as per Toner et al., 2005). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the absence of aquatic species or habitats of high conservation value, the aquatic ecological evaluation of site A5 was of **local importance (lower value)** (**Table 4.3**).



Plate 4.5 Representative image of site A5 on the upper reaches of the Clover River, September 2023

4.1.6 Site A6 – Clover River, Leigh

Site A6 was located on the Clover River (16C04) at the R639 crossing, approx. 1.7km downstream of site A5. The lowland depositing river (FW2) at this location had been historically straightened and extensively deepened, with V-shaped bank heights of 5-6m. The river was 6-8m wide (narrower upstream of bridge) and 0.4-0.8m deep. Upstream of the bridge, shallower riffles and glide was present (0.1-0.3m deep). The profile was of slow-flowing, deep homogenous glide with riffle and shallower glide present only upstream. Peat-staining was high at the time of survey. The cobble and mixed gravel substrata were very heavily silted. Boulder was occasional, with large woody debris

(LWD) frequent downstream of the bridge adding some valuable habitat heterogeneity. Riparian shading was high, with macrophytes confined to upstream of the bridge in a more open section of channel (historical tree clearance). Here, unbranched bur-reed (*Sparganium emersum*) was occasional instream, with frequent marginal stands of fool's watercress (*Apium nodiflorum*), localised lesser water parsnip (*Berula erecta*), blue water speedwell and water starwort (*Callitriche* sp.). Common duckweed was also frequent. Aquatic bryophytes were rare and limited to occasional *Leptodictyum riparium* on larger cobble and boulder. The channel was lined by mature treelines of sycamore (*Acer psuedoplatanus*), ash and elder with scrubby understories. The site was bordered by buildings and artificial surfaces (BL3) and improved pasture (GA1).

Brown trout, stone loach and three-spined stickleback were recorded via electro-fishing at site A6 (**Appendix A**). Despite significant siltation pressures, the site was evidently of good value as an adult trout habitat. However, due to significant siltation pressures salmonid spawning habitat was limited to a small, faster-flowing area upstream of the bridge. This also offered some moderate value for spawning lamprey but ammocoete habitat was sub-optimal (largely flocculent, humic deposits) and none were recorded. Despite some good suitability for European eel, none were recorded. No white-clawed crayfish were recorded (moderate suitability) although the remains of predated crayfish were recorded at this site previously (Triturus 2021 data). An otter spraint site was recorded on marginal boulders upstream of the bridge (ITM 621353, 657617).

Biological water quality, based on Q-sampling, was calculated as **Q3 (poor status)** (**Appendix B**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the presence of salmonids and utilisation by otter, the aquatic ecological evaluation of site A6 was of **local importance (higher value)** (**Table 4.3**).



Plate 4.6 Representative image of site A6 on the Clover River, September 2023

4.1.7 Site A7 – Clover River, Noard

Site A7 was located on the lower reaches of the Clover River (16C04) at a local road crossing approximately 2.8km downstream of site A6. The lowland river (FW2) had been deepened and locally straightened although some good hydromorphological recovery was evident. The river averaged 3-4m wide and 0.2-0.4m deep, with very localised deeper areas to 0.6m. The profile comprised peat-stained slow-flowing glide with localised riffle and pool. Large woody debris (LWD) was abundant instream and contributed to habitat heterogeneity. The substrata were dominated by mixed gravels and sands with localised boulder and cobble only. Soft sediment accumulations were present but shallow and flocculent. Siltation was high overall (peat-derived). Given high shading, macrophyte growth was sparse with localised fool's watercress and ivy-leaved duckweed (*Lemna trisulca*) along channel margins. Bittersweet (*Solanum dulcamara*) and reed canary grass (*Phalaris arundinacea*) were locally abundant in open areas of channel. Small stands of branched bur-reed were present locally. Aquatic bryophyte coverage was low with rare *Fontinalis antipyretica* and *Leptodictyum riparium*. The river was typically well shaded by dense grey willow and ash with abundant bramble scrub on the steep banks. The site was bordered by residential property and improved pasture (GA1).

Atlantic salmon, brown trout, stone loach, lamprey (*Lampetra* sp.) and pike (*Esox lucius*) were recorded via electro-fishing at site A7 (**Appendix A**). The site was a moderate quality salmonid habitat only given evident siltation pressures which impacted the spawning potential of the river at this location. The generally shallow nature of the site also reduced the value as a nursery habitat. Some moderate quality holding habitat was present locally due to undercut banks, overhanging vegetation and pools associated with LWD. Whilst a low density of *Lampetra* sp. ammocoetes were recorded, the site was considered sub-optimal due to the flocculent and humic nature of the soft sediment deposits. Despite some good suitability for European eel and white-clawed crayfish, none were recorded. Recent otter prints were recorded in marginal sand/mud under the dry bridge arch (ITM 619607, 659303).

Biological water quality, based on Q-sampling, was calculated as **Q3-4 (moderate status)** (**Appendix B**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the presence of salmonids (including Atlantic salmon) and lamprey (*Lampetra* sp.), in addition to utilisation by otter, the aquatic ecological evaluation of site A7 was of **local importance (higher value)** (**Table 4.3**).



Plate 4.7 Representative image of site A7 on the Clover River, September 2023

4.1.8 Site B1 – Drish River, Longfordpass South

Site B1 was located on the upper reaches of the Drish River (16D02). The lowland river (FW2) had been extensively straightened and deepened throughout, resulting in a homogenous trapezoidal channel with very poor hydromorphology and low summer flows. The channelized river was 3-4m wide and 0.5-0.8m deep, with locally deeper glide to >1.2m. The profile was of stagnant glide at the time of survey. The substrata were dominated by sand and heavily silted mixed gravels. Cobble and small boulder were scattered. The site was very heavily vegetated with near total cover of macrophytes. Fool's watercress was abundant with frequent common duckweed, ivy-leaved duckweed and lesser water parsnip. Blue water speedwell and water mint were occasional. Submerged macrophytes were dominated by river water dropwort (*Oenanthe fluviatilis*) with occasional spiked water milfoil (*Myriophyllum spicatum*). Localised stands of branched bur-reed were present with sparse growth of common reed. Semi-floating mats of reed canary grass were abundant along the channel margins and sloping banks. The banks had been cleared historically and supported scattered grey willow, blackthorn (*Prunus spinosa*) and downy birch. The site was bordered by dry meadow habitat (GS2) with intermittent treelines of ash, grey willow and Scot's pine (*Pinus sylvestris*).

Three-spined stickleback was the only fish species recorded via electro-fishing at site B1 (**Appendix A**). The river at this location was of very poor value for salmonids given heavy siltation, poor hydromorphology, poor flows and heavy macrophyte cover. Despite some good suitability for European eel, none were recorded (although the species was present downstream). There was some low suitability for white-clawed crayfish although none were recorded. No otter signs were recorded in vicinity of the site (although there were few marking opportunities).

Biological water quality, based on Q-sampling, was calculated as **Q3 (poor status)** (**Appendix B**). However, it should be noted that this is a tentative rating given poor flows and lack of suitable riffle areas for sampling (as per Toner et al., 2005). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the absence of aquatic species or habitats of high conservation value, the aquatic ecological evaluation of site B1 was of **local importance (lower value)** (**Table 4.3**).



Plate 4.7 Representative image of site B1 on the Drish River, September 2023

4.1.9 Site B2 – Drish River, Longfordpass North

Site B2 was located on the Drish River (16D02) at a local road crossing upstream of Longfordpass Bridge. The lowland depositing river (FW2) had been extensively straightened and deepened historically, resulting in very poor hydromorphology. The river suffered from low water levels at the time of survey with slight flows and ponding of water between macrophyte beds. However, downstream of the bridge strong flows emanated from a pipe culvert which diverts flow from upstream of the bridge (i.e. navigates the perched, dry apron). The channel was a homogenous 10-12m wide and 0.1-0.3m deep with deep silt deposits of >0.3m locally. Near the upstream local road bridge, hard substrata were present (boulder and cobble with mixed gravels). However, elsewhere deep silt dominated. The site was very heavily vegetated (near 100% cover), with open ponding areas very localised. These supported a diverse range of macrophytes including abundant spiked water milfoil, branched bur-reed, lesser water parsnip, fool's watercress and both common and ivy-leaved duckweed. Blue water speedwell and yellow water lily were locally frequent with more occasional lesser pondweed, river water dropwort and water-forget-me-not (*Myosotis scorpioides*). *Cinclidotus fontinaloides* was abundant on instream boulder and the dry bridge apron. The mosses *Fontinalis antipyretica*, *Leptodictyum riparium* and *Hygroamblystegium* sp. were present but rare. The channel

was lined and encroached by reed canary grass with frequent bittersweet, purple loosestrife (*Lythrum salicaria*), hedge bindweed (*Calystegia sepium*) and willowherbs (*Epilobium* spp.). Given the presence of numerous indicator species (EC, 2013; Devaney et al., 2013), the herb community was representative of the Annex I habitat 'Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430]'. The site was bordered by improved pasture (GA1) with narrow buffers.

Atlantic salmon (*Salmo salar*), European eel (*Anguilla anguilla*) and three-spined stickleback were recorded via electro-fishing at site B2 (**Appendix A**). The site was of poor salmonid value given known flow issues in addition to poor hydromorphology and poor connectivity with downstream habitats (i.e. the site is typically stagnant pond-like glide). However, a single Atlantic salmon parr was recorded in fast glide of an inflowing channel downstream of the bridge. Boulder dominated areas in vicinity of the bridge apron provided good suitability for European eel and supported a low density. There was some low suitability for white-clawed crayfish although none were recorded. No otter signs were recorded in vicinity of the site (although the species is known to utilise the site).

Biological water quality, based on Q-sampling, was calculated as **Q2-3 (poor status)** (**Appendix B**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the presence of Annex I hydrophilous tall herb habitat [6430], the aquatic ecological evaluation of site B2 was of **county importance** (**Table 4.3**).



Plate 4.9 Representative image of site B2 on the Drish River facing downstream to Longfordpass Bridge, September 2023

4.1.10 Site B3 – Drish River, Castletown Bridge

Site B3 was located on the Drish River (16D02) at Castletown Bridge, approximately 6km downstream of site B2. The lowland alkaline river (FW2) at this location had been deepened historically but retained some good semi-natural features. Recent clearance of adjoining drains has occurred upstream of the bridge. The river was 5-6m wide in a heavily-vegetated channel up to 8-10m wide. The depth ranged 0.5-1m with deeper pool areas to 1.5m locally. The profile was of slow-flowing glide, with localised faster runs between macrophyte beds exposing gravel substrata. The substrata were dominated by cobble and mixed gravels with scattered boulder. However, these were bedded in silt and moderately calcified (compacted). The compacted bed was also moderately silted with soft sediment deposits frequent. The site was very heavily vegetated (>90% cover) with abundant heterophyllous common clubrush (*Schoenoplectus lacustris*), common duckweed, ivy-leaved duckweed and fool's watercress. Yellow lily, river dropwort, branched bur-reed, lesser water parsnip and broad-leaved pondweed were occasional with localised common reed and mare's-tail (*Hippuris vulgaris*). The moss *Rhynchostegium riparium* was occasional. Filamentous algae was present, locally. Adjoining the river margins was a sparse herbaceous community supporting reed canary grass, bittersweet, marsh willowherb (*Epilobium palustre*), great willowherb (*Epilobium hirsutum*), water mint and water-forget-me-not. The site was bordered by improved pasture (GA1) and, downstream, an intermittent treeline (WL2) of ash, hawthorn and sycamore.

Brown Trout, Lamprey (*Lampetra* sp.), stone loach, three-spined stickleback and pike were recorded via electro-fishing at site B3 (**Appendix A**). The quality of salmonid nursery and spawning habitat was poor with evident water quality pressures. Some very limited salmonid and lamprey spawning habitat was present (but sup-optimal). Deeper glide areas provided some good suitability as adult holding habitat. Soft sediment deposits were shallow and provided poor quality lamprey nursery habitat although a low density were recorded. Despite some good suitability, no European eel or white-clawed crayfish were recorded, although the value of the site was reduced given compaction of substrata and poorly accessible boulder refugia. No otter signs were recorded in vicinity of the site.

Biological water quality, based on Q-sampling, was calculated as **Q2-3 (poor status)** (**Appendix B**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the presence of lamprey (*Lampetra* sp.), the aquatic ecological evaluation of site B3 was of **local importance (higher value)** (**Table 4.3**).



Plate 4.10 Representative image of site B3 on the Drish River at Castletown Bridge, September 2023 (facing upstream)

4.1.11 Site B4 – Drish River, Ballyduff Bridge

Site B4 was located on the Drish River (16D02) at Ballyduff Bridge approximately 5.7km downstream of site B3. The swift-flowing, lowland alkaline river (FW2) was largely natural at this location and was 10-12m wide and 0.2-0.5m deep. Localised deeper pool to 0.8m was present downstream of the bridge. The site was typified by swift, shallow glide and occasional riffle and pool. The substrata were dominated by heavily compacted and calcified cobble with occasional interstitial gravels and frequent boulder. Siltation was low overall and no soft sediment deposits were present, even in association with macrophyte beds or pool slacks (i.e., high-energy site). Heterophyllous fool's watercress was locally abundant in open areas with sparse stands of water crowfoot (*Ranunculus* sp.) and marginal beds of watercress and water mint. A single stand of iris (*Iris psuedacorus*) was present on a mid-channel island downstream of the bridge. Ivy-leaved duckweed was present but rare. Aquatic bryophytes dominated the site with abundant Leptodictyum riparium and Fontinalis antipyretica, and more occasional *Ricardia chamedryfolia*, *Pellia endiviifolia* and *Rhynchostegium riparium*. Filamentous algae was present (<1% cover). Reed canary grass with bittersweet, nettle and hedge bindweed lined the channel. The site was bordered by mature treelines of sycamore and ash with occasional willow and elder.

Atlantic salmon, brown trout and stone loach were recorded via electro-fishing at site B4 (**Appendix A**). The site was an excellent quality salmonid nursery, with abundant fast-flowing bryophyte-rich glide supporting a high density of juvenile Atlantic salmon and, less so, brown trout. Good quality spawning habitat (especially for Atlantic salmon) was widespread with abundant mixed gravels and cobbles (including upstream of bridge). Overhanging marginal vegetation and trees in addition to larger

boulder and bank scours provided valuable thermal refugia for adult salmonids. Despite some good suitability, no European eel or white-clawed crayfish were recorded. The high energy site was unsuitable for lamprey ammocoetes although some localised spawning habitat was present. No otter signs were recorded in vicinity of the site (although a regular spraint site is known upstream of the bridge; Triturus data).

Biological water quality, based on Q-sampling, was calculated as **Q3 (poor status)** (**Appendix B**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the presence of salmonids (including Atlantic salmon), the aquatic ecological evaluation of site B4 was of **local importance (higher value)** (**Table 4.3**).



Plate 4.11 Representative image of site B4 on the Drish River at Ballyduff Bridge, September 2023

4.1.12 Site B5 – Drish River, Drish Bridge

Site B5 was located on the Drish River at Drish Bridge (N75) approximately 6.7km downstream of site B4. The swift-flowing lowland depositing river (FW2) had been locally straightened historically with some local bank works but good instream recovery was evident. The river was 6-8m wide (channel up to 10m) and 0.3-0.7m deep, with locally deeper areas to 1.5m. The profile comprised swift deep glide and pool with only very localised riffle upstream of the bridge crossing. The substrata were dominated by clean, mobile carse gravels and cobble, with frequent boulder. Sands and finer gravels were also present locally in pool slacks and along channel margins. Soft sediment accumulations were sand-dominated where present (rare overall). Siltation was low overall. Macrophyte cover was relatively high with locally abundant common clubrush, water crowfoot (*Ranunculus* sp.) and ivy-leaved duckweed. The deep margins also supported occasional heterophyllus fool's watercress, blue water

speedwell, water mint and scattered iris and branched bur-reed. The sloping margins supported abundant reed canary grass which typically overhung the margins (providing valuable refugia for fish). Aquatic bryophyte coverage was locally high with *Fontinalis antipyretica* and *Fissidens* sp. on larger boulder. However, given the fragmented nature of the aquatic vegetation community, the site *did not* represent Annex I floating river vegetation [3260]. Filamentous algae was present, further indicating enrichment. The historically modified and or grazed banks supported abundant reed canary grass with scattered bramble scrub, grey willow and immature oak (*Quercus* sp.). The site was bordered by semi-improved pasture (GA1).

Atlantic salmon, brown trout, European eel, lamprey (*Lampetra* sp.), minnow (*Phoxinus phoxinus*) and stone loach were recorded via electro-fishing at site B5 (**Appendix A**). The site was of very high value for salmonids with excellent quality nursery habitat present (especially for Atlantic salmon) given an abundance of macrophyte beds in swift glide. The site also provided excellent quality holding habitat by way of deeper pool (e.g. under bridge) and overhanging marginal vegetation. Such areas, in addition to frequent large boulder, were also of high suitability for European eel. Although localised, high quality salmonid and lamprey spawning habitat was present upstream of the bridge. The site was also of value for *Lampetra* sp. with a low density recorded in sub-optimal (sand-dominated) soft sediment deposits associated with macrophyte beds. Despite some good suitability for white-clawed crayfish, none were recorded. No otter signs were recorded in vicinity of the site although marking opportunities were poor.

Biological water quality, based on Q-sampling, was calculated as **Q4 (good status)** (**Appendix B**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the presence of salmonids (including Atlantic salmon), *Lampetra* sp. and Red-listed European eel, in addition to Q4 (good status) water quality, the aquatic ecological evaluation of site B5 was of **local importance (higher value)** (**Table 4.3**).



Plate 4.12 Representative image of site B5 on the Drish River upstream of Drish Bridge, September 2023

4.1.13 Site C1 – Black River, Clonoura

Site C1 was located on the uppermost reaches of the Black River (16B01) that drained to the south of the proposed wind farm site. The site was dry at the time of survey, with no pools of standing water and a dry mud base in a remnant channel. The river channel had been straightened and deepened historically and was 1.5-2m wide with bank heights of 1-2m. Evidently, the channel was ephemeral, likely only conveying water during wetter periods. The channel was heavily scrubbed over with high levels of terrestrial encroachment and willow scrub. The site was bordered by a broad-leaved plantation (WS2) with arable crops (BC1) to the east.

Site C1 was not of fisheries value given its dry, ephemeral nature and absence of aquatic habitats. No otter signs were recorded in the vicinity of the site.

Given the dry, ephemeral nature of the site, it was not possible to collected a biological water quality sample at the time of survey.

Given the absence of aquatic habitats, the aquatic ecological evaluation of site C1 was of **lower importance (lower value)** (**Table 4.3**).



Plate 4.13 Representative image of site C1 on the Black River, September 2023 (dry, ephemeral channel)

4.1.14 Site C2 – Black River, Derryvella

Site C2 was located on the upper reaches of the Black River (16B01) within Derryvella Bog, approximately 3.2km downstream from site C1. The lowland depositing river (FW2) had been straightened and deepened historically, with some recovery evident. The river was 2-2.5m wide and 0.1-0.2m deep, with locally deeper pool to 0.3-0.5m. The stream was culverted underneath a Bord na Móna rail line via a large corrugated pipe culvert. Upstream, flows were low and the channel was heavily scrubbed. Downstream of the culvert, shallow slow-flowing glide and localised riffle was present with occasional pool, grading to slow-flowing glide downstream. The substrata were dominated by humic silt deposits (peat) with scattered heavily-silted small cobble and mixed gravels with occasional small boulder. The river was very heavily shaded by willow and bramble scrub. As a result, macrophytes were limited to water mint and fool's watercress, in addition to localised iris and common reed. Some *Pellia* sp. liverwort grew on muddy banks. The site was bordered by an area of cutover bog (PB4) and semi-improved pasture (GA1) with abundant scrub (WS1).

Brown trout and three-spined stickleback were the only fish species recorded via electro-fishing at site C2 (**Appendix A**). Although recorded previously at the site (Triturus 2021 data), no Atlantic salmon were captured. Despite historical modifications, poor flows and siltation pressures (peat escapement), the site was of some moderate value as a salmonid nursery, at least in vicinity of the culvert where riffle habitat was present. The salmonid spawning value was compromised by siltation but the value likely improved during higher flows. Submerged tree roots and bank scours provided valuable holding areas for adult salmonids. Whilst some limited lamprey spawning habitat was present, ammocoete habitat was unsuitable given the flocculent nature of the silt (peat-dominated). Despite some

suitability for European eel and white-clawed crayfish none were recorded (limited refugia). No otter signs were recorded in vicinity of the site.

Biological water quality, based on Q-sampling, was calculated as **Q3 (poor status)** (**Appendix B**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the presence of salmonids, the aquatic ecological evaluation of site C2 was of **local importance (higher value)** (**Table 4.3**).



Plate 4.14 Representative image of site C2 on the Black River, September 2023

4.1.15 Site C3 – North Glengoole River, Derryvella

Site C3 was located on the North Glengoole River (16N28) at a Bord na Móna rail crossing (culvert), some 0.25km upstream of the Black River confluence. The lowland depositing river (FW2) had been historically straightened and deepened with V-shaped banks of up to 4m in height and old embankments evident along the channel. The river was 2-2.5m wide and 0.1-0.2m deep, with locally deeper pool to 0.4m. Shallow glide predominated, with only localised riffle associated with macrophyte beds and rare pool. In shallower areas near the culvert the substrata comprised mixed gravels and small cobble with occasional boulder. However, outside of this area, depositional silt dominated (up to 0.2m deep). Hard substrata were exposed to moderate siltation and partial bedding. Cover of macrophytes was high (>75%) with abundant fool's watercress, frequent water mint and brooklime (*Veronica beccabunga*) and localised bulrush. Aquatic bryophytes were not recorded. The river channel became heavily shaded downstream of the culvert with grey willow, hawthorn and gorse (*Ulex europaeus*). A narrow and fragmented herbaceous layer supporting purple loosestrife, hedge bindweed, willowherbs (*Epilobium* spp.), hogweed (*Heracleum sphondylium*), reed canary grass and

rank grasses was present along the channel margins. The site was bordered by dry meadows habitat (GS2) and improved pasture (GA1) in a wider landscape of cutover bog (PB4).

Brown trout and three-spined stickleback were the only fish species recorded via electro-fishing at site C3 (**Appendix A**). Although recorded previously (Triturus 2021 data), no Atlantic salmon were captured. The site was of moderate value for salmonids only, supporting a low density of mixed cohort brown trout, given significant siltation pressures. The shallow stream provided some suitable spawning habitat (exposed gravels) although these were heavily silted. Localised small pools associated with the culvert, bank scours and macrophyte stands provided some holding habitat for adult salmonids. Despite some suitability for European eel and white-clawed crayfish, none were recorded. No otter sign were recorded in vicinity of the site (few marking opportunities).

Biological water quality, based on Q-sampling, was calculated as **Q3 (poor status)** (**Appendix B**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the presence of salmonids, the aquatic ecological evaluation of site C3 was of **local importance (higher value)** (**Table 4.3**).



Plate 4.16 Representative image of site C3 on the North Glengoole River, September 2023

4.1.16 Site C4 – Black River, Derryhogan

Site C4 was located on the Black River (16B01) at a local road bridge, approx. 1.5km downstream of site C2. The river had been extensively straightened and deepened, with very steep (near vertical) trapezoidal banks of 4-5m in height. The river flowed under the local road via a corrugated pipe culvert (fish passable). The homogenous river section was 3-4m in a channel up to 5-6m wide. The depth

varied from 0.2 to 0.5m, with occasional pool areas to 1m. Deep slow-flowing glide dominated the site, with occasional pool. Riffle was present upstream of the road culvert. The substrata comprised compacted and heavily silted mixed gravels and cobble, with occasional boulder (near culvert only). Bank erosion was frequent (exposed clay) and contributed to the silt loading. Siltation was high overall (largely peat-derived) with deep silt-sand deposits present along channel margins (up to 0.2m deep). The site was heavily shaded by mature treelines of ash, elder, hawthorn and cypress (Cupressaceae family). As a result, macrophytes were absent. Aquatic bryophytes were not recorded, with the liverworts *Pellia endiviifolia* and *Conocephalum conicum* on muddy banks. The site was bordered by improved pasture (GA1).

Brown trout and stone loach were the only two fish species recorded via electro-fishing at site C4 (**Appendix A**). Adult trout dominated, with only low numbers of juveniles present. The site was a moderate quality salmonid spawning and nursery habitat. Holding habitat, by way of deeper pools, bank undercuts and submerged tree root systems, was of good quality. Despite high siltation, soft sediment accumulations did not support lamprey ammocoetes (largely humic or clay-based in nature). Some very limited superficial spawning gravels suitable for lamprey were present in the vicinity of the culvert although spawning habitat improved upstream, where riffles were more commonplace. Aside from submerged tree root systems, suitability for European eel and white-clawed crayfish was relatively poor given limited accessible instream refugia (neither species recorded). No otter signs were recorded in vicinity of the site.

Biological water quality, based on Q-sampling, was calculated as **Q3 (poor status)** (**Appendix B**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the presence of salmonids, the aquatic ecological evaluation of site C4 was of **local importance (higher value)** (**Table 4.3**).



Plate 4.16 Representative image of site C4 on the Black River, September 2023 (downstream of culvert)

4.1.17 Site C5 – Black River, Two Mile Borris

Site C5 was located on the Black River (16B01) at the N75 road crossing, approx. 5km downstream of site C4. As per upstream, the lowland river (FW2) at this location had been straightened and deepened historically, flowing in a steep, 5-8m high trapezoidal channel. The river was 6-8m wide and 0.2-0.6m deep, with locally deeper areas to 1m. Slow-flowing glide predominated, with localised riffles near the road bridge and occasional pools. The substrata were dominated by cobble with frequent boulder and small interstitial patches of mixed gravels. Siltation was moderate overall (peat) but soft sediment accumulations were localised. The substrata were relatively mobile. The site supported a diverse range of macrophytes, with frequent lesser water parsnip and occasional water starwort (*Callitriche* sp.), water mint, water crowfoot (*Ranunculus* sp.) and watercress. Curled pondweed (*Potamogeton crispus*) was present but rare. Common duckweed and ivy-leaved duckweed were both frequent. Coverage of aquatic bryophytes was high, with abundant *Fontinalis antipyretica* on larger cobble/boulder. Filamentous algae was present (1% cover). Given the presence of several indicator species (EC, 2013) and the high coverage of bryophytes, the aquatic plant community was considered representative of the Annex I habitat 'Water courses of plain to montane levels, with submerged or floating vegetation of *Ranunculion fluitantis* and *Callitricho-Batrachion* (low water level during summer) or aquatic mosses [3260]'. Riparian shading was relatively high given the presence of maturing alder plantations along the channel (both banks). The site was bordered by improved pasture (GA1) and grassy verges habitat (GS2).

Atlantic salmon, brown trout, European eel, lamprey (*Lampetra* sp.) and stone loach were recorded via electro-fishing at site C5 (**Appendix A**). The site was of highest value as a salmonid nursery, with

boulder-rich glide and riffle supporting a moderate density of Atlantic salmon parr and a lower number of juvenile brown trout. Deeper glide with frequent bank scours and submerged tree roots provided valuable holding areas for adult trout. Spawning substrata was sparse and impacted by siltation pressures (but nonetheless present). The site was also of high value for European eel with abundant boulder and cobble supporting a moderate density of juveniles and small adults. Soft sediment accumulations were largely confined to the road culvert and these humic areas supported a low density of small *Lampetra* sp. ammocoetes. Despite some good suitability, no white-clawed crayfish were recorded (but known from the river, Triturus 2021 data). Abundant otter prints were recorded in marginal mud under the bridge (ITM 619139, 657812).

Biological water quality, based on Q-sampling, was calculated as **Q3 (poor status)** (**Appendix**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the presence of Annex I floating river vegetation [3260], the aquatic ecological evaluation of site C5 was of **county importance** (**Table 4.3**).



Plate 4.17 Representative image of site C5 on the Black River, September 2023

4.1.18 Site D1 – Breegagh River, Killeen

Site D1 was located on the Breegagh River (16B03) at a local road crossing, where the river flowed through a stacked three-bore box culvert. The small lowland river (FW2) had been straightened and deepened historically, resulting in a homogenous channel with poor hydromorphology. Boulder revetments were present in the vicinity of the culvert. The river was 2.5-3m wide and 0.3-0.7m deep in deep, slow-flowing glide. Pool was occasional. Riffles were limited to the vicinity of the culvert. The substrata were dominated by compacted cobble with occasional boulder and limited interstitial mixed

gravels. The site suffered from heavy siltation, although deposits were flocculent, with only very localised, shallow accumulations. Large woody debris (LWD) was frequent instream which improved habitat heterogeneity of the straightened channel. The river flowed through a maturing broad-leaved plantation and shading was high. As a result, macrophytes were limited to occasional fool's watercress, water mint and lesser water parsnip along channel margins in more open areas. Reed canary grass was abundant along channel margins and created overhangs of high value for salmonids. Aquatic bryophytes were limited to localised *Brachythecium rivulare* on exposed boulder near the culvert. The site was bordered by a broad-leaved plantation of sycamore, wych elm (*Ulmus glabra*) and alder (*Alnus glutinosa*) (WD1), with dense bramble scrub (WS1) and improved pasture (GA1).

Atlantic salmon and brown trout were the only fish species recorded via electro-fishing at site D1 (**Appendix A**). The site was of good value as a salmonid nursery, supporting a moderate density of Atlantic salmon parr and juvenile trout. The site was of highest value as a holding habitat for adult trout, with frequent scoured banks and instream LWD providing valuable deeper glide and pool areas in an otherwise shallow river section. The site was of poor quality as a spawning habitat given significant siltation pressures. Despite some suitability, no European eel or white-clawed crayfish were recorded. A regular otter spraint site (with fish remains) was recorded on marginal mud in the box culvert (ITM 621359, 650301).

Biological water quality, based on Q-sampling, was calculated as **Q3-4 (moderate status)** (**Appendix B**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the presence of salmonids (including Atlantic salmon) and utilisation by otter, the aquatic ecological evaluation of site D1 was of **local importance (higher value)** (**Table 4.3**).



Plate 4.18 Representative image of site D1 on the Breegagh River, September 2023

4.1.19 Site D2 – Breegagh River, Ballymurreen Bridge

Site D2 was located on the Breegagh River (16B03) at Ballymurreen Bridge, approx. 4.8km downstream of site D1. The lowland river (FW2) had been straightened historically but not deepened and retained many good semi-natural characteristics. However, livestock poaching pressures has significantly impacted the quality of aquatic habitats since previous surveys of the site (September 2021). The river was 4-5m wide (channel up to 7m wide in places) and 0.2-0.4m deep. Locally deeper glide and pool to 0.8m was present. The profile comprised slow-flowing glide with occasional riffles near the bridge, and pool becoming more frequent downstream. The substrata were dominated by soft sediment deposits with only localised areas of exposed mixed gravels and cobbles (in contrast to 2021 when gravels were widespread). Sand patches were also present. The site supported sparse growth of macrophytes with scattered water crowfoot (*Ranunculus* sp.), lesser water parsnip, water forget-me-not, watercress and branched bur-reed. Filamentous algae were present, indicating enrichment. Aquatic bryophytes were limited to very occasional *Brachythecium rivulare* on larger, more stable boulder. The river was flanked on the east bank by a mature treeline of blackthorn, hawthorn, ash, elder, sycamore and bramble, with the west bank featuring improved grassland (GA1).

Atlantic salmon, brown trout, lamprey (*Lampetra* sp.) and stone loach were recorded via electro-fishing at site D2 (**Appendix A**). The site was a moderate quality salmonid nursery, with the value reduced in recent years due to evident siltation pressures which reduced the distribution of gravel and cobble areas. The shallow site was of relatively poor value as a holding habitat for adult salmonids although some scoured areas and overhanging vegetation provided valuable areas. Whilst some good quality nursery areas were present in association with *Ranunculus* beds, the site was poor overall given widespread siltation and low macrophyte cover. Lamprey ammocoete habitat was widespread although much of the soft sediment accumulations were clay-dominated and thus sub-optimal for *Lampetra* sp. Lamprey spawning habitat by way of finer gravels was present but highly localised. The site was of poor value for European eel given a paucity of accessible instream refugia and the shallow nature. Despite some suitability for white-clawed crayfish, none were recorded (although positive eDNA at the site in 2021). No otter signs were recorded in vicinity of the site.

Biological water quality, based on Q-sampling, was calculated as **Q3 (poor status)** (**Appendix B**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the presence of salmonids (including Atlantic salmon) and lamprey (*Lampetra* sp.), the aquatic ecological evaluation of site D2 was of **local importance (higher value)** (**Table 4.3**).



Plate 4.19 Representative image of site D2 on the Breegagh River at Ballymurreen Bridge, September 2021 (top) and September 2023 (bottom) showing evident deterioration in water quality and aquatic habitats due to livestock poaching

4.1.20 Site D3 – Breegagh River, Archerstown Bridge

Site D3 was located on the lower reaches of the Breegagh River (16B03) at Archerstown Bridge, approximately 9.6km downstream of site B2. The swift flowing lowland depositing river (FW2) was semi-natural in vicinity of the bridge, with some local bank modifications but an otherwise largely

natural channel. The river was 2-3m wide in a 4-5m channel upstream with braiding around a small island downstream of the bridge (river also wider). The river averaged 0.3-0.6m deep with locally deeper areas to 1.6m. The profile comprised riffle and swift deep glid with occasional pool. The substrata of the calcareous river were dominated by cobble and clean, mobile mixed gravels with frequent boulder. Beds of sand were present locally with flocculent soft sediment in slacks and along channel margins. Siltation was low overall given high flow rates and macrophyte cover. The site was heavily vegetated with abundant water crowfoot (*Ranunculus* sp.) and frequent heterophyllus lesser water parsnip. Fool's watercress was also frequent with occasional water mint, ivy-leaved duckweed and rare branched bur-reed. Cover of aquatic bryophytes was high with locally abundant *Fontinalis antipyretica*, *Chiloscyphus polyanthos* and *Leptodictyum riparium*. Larger boulders supported *Rhynchostegium riparioides*. The aquatic vegetation community was considered representative of the Annex I habitat floating river vegetation [3260]. Cover of filamentous algae was high (10%), despite high flow rates, indicating enrichment. The channel margins were dominated by reed canary grass with abundant bittersweet. The mature riparian zones supported treelines of sycamore, willow species and ash with abundant bramble and nettle. The site was bordered by residential properties (BL3/GA2) and improved pasture (GA1) with mature buffers.

Atlantic salmon, brown trout, European eel, minnow and stone loach were recorded via electro-fishing at site D3 (**Appendix A**). The site was of very high value for salmonids with excellent quality nursery habitat present (especially for Atlantic salmon) given an abundance of macrophyte beds in swift glide. The site also provided excellent quality holding habitat by way of deeper pool (e.g. downstream of bridge), extensive macrophyte beds and overhanging marginal vegetation. Such areas, in addition to frequent large boulder, were also of high suitability for European eel and white-clawed crayfish (the latter of which was not recorded). High quality spawning habitat for both salmonids and lamprey was present upstream and downstream of the bridge. However, there was a paucity of suitable lamprey nursery habitat with soft sediment accumulations shallow and flocculent in nature. An otter spraint site was recorded on a marginal boulder immediately downstream of the easternmost arch (ITM 613956, 656844).

Biological water quality, based on Q-sampling, was calculated as **Q3-4 (moderate status)** (**Appendix B**). No macro-invertebrate species of conservation value greater than ‘least concern’, according to national red lists, were recorded via Q-sampling.

Given the presence of Annex I floating river vegetation [3260], the aquatic ecological evaluation of site D3 was of **county importance** (**Table 4.3**).



Plate 4.20 Representative image of site D3 on the Breegagh River at Archerstown Bridge, September 2023

4.1.21 Site E1 – River Goul, Fennor

Site E1 was located on the upper reaches of the River Goul (15G02) at a local road and proposed GCR crossing. The narrow lowland depositing river (FW2) had been extensively straightened and deepened (embankments & spoil heaps evident), resulting in a typically homogenous trapezoidal channel with poor hydromorphology, especially upstream of the bridge. The heavily modified river flowed under the road via 3 x pipe culverts (fish passable). The profile comprised slow-flowing glide and pool although faster glide was located downstream of the culverts. The substrata were dominated by clay-dominated soft sediment up to 0.2m in depth with scattered angular boulder and discarded house bricks. The littorals supported silted mixed gravels and cobble but were typically exposed clay/mud. Given high riparian shading, macrophytes were limited to fool's watercress, blue water speedwell and brooklime in open areas. Aquatic bryophyte coverage was low with localised *Leptodictyum riparium* on larger substrata. Large woody debris and trash was frequent instream and resulted in a number of blockages to flow (although this increased habitat heterogeneity). The site was heavily shaded by mature grey willow, elder and hawthorn treelines with nettle, great willowherb, bindweed and bramble-dominated scrub. The site was bordered by improved pasture (GA1) and a residential property.

Brown trout, stone loach and lamprey (*Lampetra* sp.) were recorded via electro-fishing at site E1 (**Appendix A**). The site was a moderate quality salmonid habitat, at best, supporting a low density of brown trout only, given significant siltation pressures and poor hydromorphology. The quality of salmonid nursery habitat was poor with an absence of suitable spawning habitat (due to siltation). The narrow channel featured frequently undercut clay banks and these coupled with LWD and occasional

pools provided some holding habitat for small adult salmonids. European eel habitat was moderate overall although none were recorded. Whilst soft sediment accumulations were dominant, these supported only a low density of lamprey ammocoetes due to the clay nature of the sediment. Despite some low suitability for white-clawed crayfish, none were recorded and no evidence of the species (e.g. burrows in clay banks) were noted. No otter signs were recorded in vicinity of the site.

Biological water quality, based on Q-sampling, was calculated as **Q3 (poor status)** (**Appendix B**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the presence of salmonids and lamprey (*Lampetra* sp.), the aquatic ecological evaluation of site E1 was of **local importance (higher value)** (**Table 4.3**).



Plate 4.21 Representative image of site E1 on the River Goul, September 2023

4.1.22 Site E2 – Ardreagh River, Lisduff

Site E2 was located on the Ardreagh River (15A03) at a local road and proposed GCR crossing. The small swift-flowing lowland river (FW2) had been locally straightened and deepened upstream of the bridge but retained some semi-natural features downstream (e.g. meanders). The small calcareous stream was 1-2m wide and 0.1-0.2m deep, with a paucity of deeper areas. The profile comprised swift glide and riffle with only localised, small pools. The substrata were dominated by calcified cobble and coarser gravels with scattered boulder. Soft sediment accumulations were present but these were shallow and flocculent. Siltation was higher than expected for the river type. Linear stands of fool's watercress and water mint were frequent along channel margins, with occasional watercress and lesser water parsnip. Common duckweed was also present locally in slacks. Aquatic bryophyte coverage as low although some *Pellia endiviifolia* and *Chiloscyphus polyanthos* were present on larger

substrata. Downstream of the bridge the river was heavily shaded by mature treelines of hawthorn, alder and grey willow, with the banks cleared historically upstream. The site was bordered by improved pasture (GA1) with wet grassland (GS4) upstream of the bridge on the west bank.

Atlantic salmon, brown trout, European eel and three-spined stickleback were recorded via electro-fishing at site E2 (**Appendix A**). The site was a moderate quality salmonid nursery and spawning habitat due to evident siltation pressures. A low density of juvenile trout and salmon were present. Holding opportunities were typically absent given the shallow nature of the site. The site was of moderate value for European eel. Although some limited lamprey spawning habitat was present, calcification of the bed and siltation pressures and the predominance of larger substrata reduced the value overall. Suitable ammocoete habitat was absent. Despite some suitability, no white-clawed crayfish were recorded. However, a regular otter spraint site was recorded on a boulder underneath the bridge arch that contained recent crayfish remains (ITM 629612, 660282).

Biological water quality, based on Q-sampling, was calculated as **Q3 (poor status)** (**Appendix B**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the presence of salmonids (including Atlantic salmon) and European eel, utilisation by otter and the likely presence of white-clawed crayfish, the aquatic ecological evaluation of site E2 was of **local importance (higher value)** (**Table 4.3**).



Plate 4.22 Representative image of site E2 on the Ardreagh River, September 2023

4.1.23 Site E3 – Lisduff Stream, Lisduff

Site E3 was located on the Lisduff Stream (15L08), a tributary of the Ardreagh River, at a local road and proposed GCR crossing. The small calcareous lowland stream (FW2) crossed under the road via a pipe culvert and had been straightened and deepened historically, resulting in a trapezoidal channel with poor hydromorphology and steep banks of >2m in height. The stream was 1-1.5m wide and 0.05-0.1m deep and suffered from low summer flows at the time of survey. The profile comprised slow-flowing riffle and glide with an absence of pool. The substrata were dominated by heavily calcified mixed gravels and cobble with scattered small boulder. Flocculent soft sediment beds were associated with instream macrophytes. With the exception of a small area at the culvert, the stream was very heavily vegetated with near 100% cover of fool's watercress and watercress. Terrestrial encroachment of the very shallow channel was high with herbaceous vegetation also growing from the bed. Aquatic bryophytes were limited to occasional *Leptodictyum riparium* and *Pellia endiviifolia*. The stream was lined by a stockproof hedgerow of hawthorn with an open banktop to the east. The site was bordered by improved pasture (GA1).

No fish were recorded via electro-fishing at site E3. The site was not of fisheries value at the time of survey given its very shallow (possibly ephemeral) nature, historical modifications and poor quality aquatic habitats. There was no suitability for white-clawed crayfish. No otter signs were recorded in the vicinity of the site.

Biological water quality, based on Q-sampling, was calculated as **Q3 (poor status)** (**Appendix B**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the absence of aquatic species or habitats of high conservation value, the aquatic ecological evaluation of site E3 was of **local importance (lower value)** (**Table 4.3**).



Plate 4.23 Representative image of site E3 on the Lisduff Stream, September 2023

4.1.24 Site E4 – Tincashel River, Lisduff

Site E4 was located on the Tincashel Stream (15T05) at a local road and proposed GCR crossing. The small swift-flowing lowland stream (FW2) had been straightened and deepened throughout (especially upstream of road culvert), although some good instream recovery had occurred. The stream flowed in a trapezoidal channel and was 2-2.5m wide and 0.1-0.2m deep, with a paucity of deeper areas. The profile comprised swift shallow glide and riffle with only occasional small pool, typically associated with macrophyte beds or instream trash/debris. The substrata were dominated by calcified cobble and coarse gravels although fine to medium gravel patches were present locally. Small boulders were locally frequent. Soft sediment accumulations were present but were shallow and flocculent. Siltation was light overall. Linear stands of fool's watercress were frequent along the stream margins with frequent water mint and occasional brooklime and watercress. Cover of aquatic bryophytes was locally high with *Pellia endiviifolia* and *Leptodictyum riparium* on larger substrata and calcified areas of bed. Whilst the east bank had been historically cleared (along a farm access track), the west bank supported a mature treeline dominated by hawthorn, elder and sycamore. The site was bordered by improved pasture (GA1).

Brown trout was the only fish species recorded via electro-fishing at site E4 (**Appendix A**). The site was a good quality salmonid nursery, despite its generally shallow and historically modified nature. Natural bed calcification reduced the capacity of the site as a salmonid/lamprey spawning habitat although some good quality substrata were present locally. The shallow site was also of poor value as a salmonid holding habitat. Good quality lamprey spawning habitat (fine gravels) was present locally although suitable ammocoete habitat was absent in vicinity of the survey site. Despite some moderate

suitability, no European eel or white-clawed crayfish were recorded. No otter signs were recorded in vicinity of the site.

Biological water quality, based on Q-sampling, was calculated as **Q3 (poor status)** (**Appendix B**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the presence of salmonids, the aquatic ecological evaluation of site E4 was of **local importance (higher value)** (**Table 4.3**).



Plate 4.24 Representative image of site E4 on the Tincashel River, September 2023

4.1.25 Site E5 – Clomantanagh Lower Stream, Clomantanagh Lower

Site E5 was located on the Clomantagh Lower Stream (15C91) at a local road and proposed GCR crossing. In contrast to EPA mapping, the stream had been extensively realigned along field boundaries and was culverted under the local road before grading into a large, shallow drainage channel of 3m width and <0.1m depth which ran parallel to the road. Flowing water was absent (i.e. stagnant). The substrata comprised exclusively of deep, anoxic soft sediment (up to 0.3m in depth) with sands, scattered boulder and abundant woody debris. The channel supported locally frequent fool's watercress and watercress in open areas, with scattered iris. Aquatic bryophytes were absent. The channel was very heavily shaded by mature treelines dominated by alder and sycamore. The site was bordered by improved pasture (GA1).

No fish were recorded via electro-fishing at site E5. The site was not of fisheries value given its very heavily silted and modified nature, an absence of flows and poor connectivity with downstream

habitats. There was no suitability for white-clawed crayfish. No otter signs were recorded in the vicinity of the site.

Biological water quality, based on Q-sampling, was calculated as **Q2 (bad status)** (**Appendix B**). However, it should be noted that this is a tentative rating given poor flows and lack of suitable riffle areas for sampling (as per Toner et al., 2005). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the absence of aquatic species or habitats of high conservation value, the aquatic ecological evaluation of site E5 was of **local importance (lower value)** (**Table 4.3**).



Plate 4.25 Representative image of site E5 on the Clomantanagh River, September 2023

4.1.26 Site E6 – unnamed stream, Kilrush

Site E6 was located on an unnamed, unmapped tributary of the Nuenna River at a local road and proposed GCR crossing. The upland eroding watercourse (FW1) had been locally deepened and straightened along field boundaries but retained many semi-natural characteristics in vicinity of the single arch masonry bridge. The stream flowed over a moderate gradient in a trapezoidal channel with bank heights of up to 3m. The stream was 1.5-2.5m wide and 0.1-0.15m deep. The profile comprised riffle and cascades with frequent small pool. The substrata were dominated by angular boulder and cobble with frequent interstitial sands and fine gravels. Despite eroding conditions, siltation was high overall (high clay fraction) although soft sediment accumulations were absent. Given high shading and mobile substrata, macrophytes and aquatic bryophytes were absent. The stream was heavily shaded with dense scrub of grey willow, bramble, hazel (*Corylus avellana*) and ferns. The site was bordered by improved pasture (GA1).

No fish were recorded via electro-fishing at site E6. The site was of poor fisheries value given its heavily silted and shallow nature and poor connectivity with downstream habitats. The stream showed some ephemeral characteristics and may run dry, seasonally. There was no suitability for white-clawed crayfish. No otter signs were recorded in the vicinity of the site.

Biological water quality, based on Q-sampling, was calculated as **Q3 (good status)** (**Appendix B**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the absence of aquatic species or habitats of high conservation value, the aquatic ecological evaluation of site E6 was of **local importance (lower value)** (**Table 4.3**).



Plate 4.26 Representative image of site E6 on an unmapped Nuenna River tributary, September 2023

4.1.27 Site E7 – Gorteenahilla River, Ballyguider Bridge

Site E7 was located on the Gorteenahilla River (15G08) at Ballyguider Bridge, a proposed GCR crossing. The upland eroding river (FW1) had been straightened and deepened locally in vicinity of the twin arch masonry bridge (cobbled apron, perched, <0.1m) but retained some good semi-natural characteristics. The river was 4-5m wide and 0.1-0.3m deep, with occasional deeper areas to 1.2m. The profile comprised a series of riffles, deep slow-flowing glides and occasional pools. A deep pool was located immediately downstream of the bridge apron. The substrata were dominated by angular cobble and boulder with frequent mixed gravels (though no extensive areas). Patches of sand and fine gravels were present but rare overall. Soft sediment accumulations were not present given high energy characteristics although siltation was moderate and higher than expected for river type. Cover of floc[1] was high (30%). The site was well shaded and macrophyte cover was sparse with only

[1] floc is defined as an aggregation of (mostly dead) organic material, mainly from algae and diatoms, but also with potential origins from decaying macrophytes and associated decomposers (bacteria and fungi) (Moorkens & Killeen, 2020)

occasional fool's watercress present. Aquatic bryophyte coverage was also low with occasional *Fontinalis antipyretica*, *Rhynchostegium riparioides* and Fissidens sp. The red algae *Hildenbrandia* sp. was present locally on boulder. The river was lined by mature treelines of horse chestnut (*Aesculus hippocastanum*), sycamore with abundant blackthorn and bramble. The site was bordered by a residential property and improved pasture with narrow borders (GA1).

Atlantic salmon and brown trout were the only fish species recorded via electro-fishing at site E7 (**Appendix A**). The site was of very high value as a salmonid nursery, with abundant Atlantic salmon parr and a low density of brown trout. The site also provided some localised good quality holding areas for adult salmonids (e.g. pool downstream of apron). However, the site was of moderate value only as a spawning habitat given the predominance of larger substrata in addition to siltation and enrichment pressures (i.e. floc cover). The high energy site was unsuitable for lamprey. Despite some good suitability, no European eel or white-clawed crayfish were recorded. An otter spraint site was recorded on a ledge under the eastern bridge arch (ITM 638980, 666779).

Biological water quality, based on Q-sampling, was calculated as **Q4 (good status)** (**Appendix B**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the presence of salmonids (including Atlantic salmon) and utilisation by otter, in addition to Q4 (good status) water quality, the aquatic ecological evaluation of site E7 was of **local importance (higher value)** (**Table 4.3**).



Plate 4.27 Representative image of site E7 on the Gorteenahilla River, September 2023

4.1.28 Site E8 – Lismaine Stream, Clone

Site E8 was located on the Lismaine Stream (15L16), a tributary of the River Nore, at a local road and proposed GCR crossing. The stream (FW1) crossed under the road via a box culvert (rendered bed) and suffered from low flows at the time of survey. The small stream had been extensively straightened and deepened historically with poor recovery evident in the steep-sided trapezoidal channel. The stream was 2m wide and 0.05-0.1m deep. The profile comprised very slow flowing glide and riffle with occasional near stagnant pool. The banks were typically undercut/scoured, indicating spate tendencies of the modified channel. The substrata were dominated by mixed gravels and cobble which were heavily silted. Boulder was scattered throughout. Siltation was high overall (depositional habitat at time of survey). Livestock poaching was present upstream. Given high shading and poor flows, macrophytes were not present. Aquatic bryophyte coverage was also low with only very occasional *Rhynchostegium riparioides* and *Pellia epiphylla*. The liverwort *Conocephalum conicum* was locally frequent on muddy banks. The stream was lined by mature treelines of sycamore and ash with hawthorn and blackthorn. The site was bordered by improved pasture (GA1).

Three-spined stickleback were the only fish recorded via electro-fishing at site E8 (**Appendix A**). With the exception of low densities of this species, the site was not of fisheries value at the time of survey given very poor flows in addition to the shallow nature of the site and siltation pressures. However, there was some physical suitability for small salmonids (known further downstream - Triturus 2021 data). The site was unsuitable for white-clawed crayfish. No otter signs were recorded in vicinity of the site.

Biological water quality, based on Q-sampling, was calculated as **Q3 (poor status)** (**Appendix B**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the presence of salmonids (including Atlantic salmon) and utilisation by otter, the aquatic ecological evaluation of site E8 was of **local importance (higher value)** (**Table 4.3**).



Plate 4.20 Representative image of site E8 on the Lismaine Stream, September 2023

4.1.29 Site E9 – Lisdowney Stream, Grange Bridge

Site E9 was located on the Lisdowney Stream (15L02), a tributary of the River Nore at Grange Bridge, a proposed GCR crossing. The high energy lowland river (FW1) had been historically straightened and deepened, with bank modifications in vicinity of the bridge, but demonstrated some good instream recovery. The river was 6-8m wide and 0.3-0.5m deep, with localised deeper areas to >1m. The profile comprised swift glide and pool. A small weir was present under the bridge with a larger weir (1.5m fall) located 50m downstream of the bridge. Given high energy conditions, the substrata were dominated by compacted and calcified cobble and boulder with more localised mixed gravels. Larger boulder were scattered. Cyanobacterial deposits were widespread on larger substrata. This resulted in low coverage of aquatic vegetation. Macrophytes were limited to occasional marginal stands of fool's watercress. Aquatic bryophyte coverage was low with only very occasional *Leptodictyum riparium* and *Rhynchostegium riparioides*. The river was shaded by mature mixed woodland and treelines supporting hawthorn, sycamore, ash, beech (*Fagus sylvatica*) and holly (*Ilex aquifolium*). The site was bordered by improved pasture (GA1) and a residential property upstream.

Atlantic salmon, brown trout, European eel and three-spined stickleback were recorded via electro-fishing at site E9 (**Appendix A**). The site was of good value for salmonids supporting moderate densities of Atlantic salmon and brown trout. The site was of highest value as a salmonid nursery with frequent swift glide although the paucity of instream refugia reduced the value overall. Localised pool and deep glide/undercuts provided some valuable holding habitat for adult salmonids (especially downstream of the large weir). The site was of some value for spawning salmonids and lamprey but high calcification/compaction rates reduced the capacity of the site. The high energy site was unsuitable as a lamprey nursery habitat. European eel suitability was locally good in deep pools/glide

with a low density recorded. Despite some suitability, no white-clawed crayfish were recorded. A regular otter spraint site was recorded on boulder revetment under the bridge (ITM643579, 668675).

Biological water quality, based on Q-sampling, was calculated as **Q4 (good status)** (**Appendix B**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the presence of salmonids (including Atlantic salmon) and European eel, in addition to utilisation by otter and Q4 (good status) water quality, the aquatic ecological evaluation of site E9 was of **local importance (higher value)** (**Table 4.3**).



Plate 4.29 Representative image of site E9 on the Lisdowney Stream, September 2023

4.1.30 Site E10 – River Nore, Parksgrove

Site E10 was located on the River Nore (15N01) at a proposed GCR crossing approximately 0.7km upstream of Ballyragget Bridge. The large lowland depositing river (FW2) had been historically modified and was 15-20m wide and >1.5m deep, with a profile dominated by deep glide with associated pool (no riffles). The substrata comprised abundant compacted sands with scattered, bedded boulder and cobble. Small patches of mixed gravels were present along the steep margins of the channel, alongside some depositional soft sediment areas. Siltation was high. Given the high average depth, macrophyte coverage was low with intermittent linear stands of branched bur-reed and rare common clubrush. Aquatic bryophytes were limited to rare *Fontinalis antipyretica* and *Rhynchostegium riparioides*. Cover of filamentous algae (*Cladophora* sp.) was high, indicating significant enrichment. The steep, near vertical margins were lined by abundant reed canary grass with only scattered grey willow and hawthorn. The site was bordered by dry meadow habitat on the

west bank (GS2) with heavily improved pasture (GA1) on the east.

Electro-fishing was not undertaken at site E10 due to prohibitive depths and water volumes. However, the river in the vicinity of Ballyragget is known to support Atlantic salmon, brown trout, *Lampetra* sp., European eel, minnow, stone loach and rudd (*Scardinius erythropthalmus*) (Triturus 2021 data). The deep glide at the proposed crossing was of value only as a salmonid holding habitat, with little suitability as spawning or nursery areas. Lamprey spawning habitat was also largely absent although marginal soft sediment deposits provided some moderate quality nursery areas. Suitability for white-clawed crayfish was low. Whilst of value as an occasional foraging habitat, no otter signs were recorded in vicinity of the site (few marking opportunities).

Biological water quality, based on Q-sampling, was calculated as **Q3 (good status)** (**Appendix B**). However, it should be noted that this is a tentative rating given poor flows and lack of suitable riffle areas for sampling (as per Toner et al., 2005). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the location of the site within the River Barrow and River Nore SAC (002162) and River Nore SPA (004233), the aquatic ecological evaluation of site E10 was of **international importance** (**Table 4.3**).



Plate 4.30 Representative image of site E10 on the River Nore, September 2023

4.2 Lacustrine survey site results

4.2.1 Site L1 – lake/wetland, Longfordpass South

Site L1 was a small, interconnected twin-basin lake of c.1ha located in the vicinity of proposed turbine T1 in Littleton Bog. The small heavily peat-stained lake was shallow, averaging <0.5m deep with very

shallow sloping margins and a base comprised exclusively of peat (often deep, >0.2m). The open waterbody, which evidently reduced in area and depth during dry periods, supported sparse macrophyte growth with scattered bottle sedge and bulrush, rare bog pondweed (*Potamogeton polygonifolius*) and a single stand (in north basin) of common reed. Small stands of bent grass (*Agrostis* sp.) were frequent around the margins and extended into the basins. The exposed peat littorals supported abundant spike-rush (*Eleocharis palustris*), bog cotton (*Eriophorum angustifolium*) and deer grass (*Trichophorum cespitosum*) with scattered rushes (*Juncus* spp.) and stunted downy birch, lodgepole pine (*Pinus contorta*) and willow (*Salix* sp.). The lake was bordered by extensive, heavily degraded cutover bog (PB4) with multiple (maintained) drainage channels adjoining the lake.

With the exception of three-spined stickleback (recorded via sweep sampling), site L1 was of poor fisheries value given its shallow, fluctuating and peat nature. However, there was high suitability for amphibians (albeit none were recorded). No otter signs were recorded in vicinity of the site.

No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via sweep netting (**Appendix B**). The water stick insect *Ranatra linearis*, a recent discovery in Ireland (Nelson, 2018), was recorded in the sample (**Plate 4.49**).

Given the absence of aquatic species or habitats of high conservation value, the aquatic ecological evaluation of site L1 was of **local importance (lower value)** (**Table 4.3**).



Plate 4.31 Representative image of site L1, October 2023

4.2.2 Site L2 – lake/wetland, Bawnreagh

Site L2 was located within an extensive area of cutover bog (Littleton Bog), within the proposed site boundary. The large, shallow linear cutover lake covered an area of c.1ha and ranged from 0.2-0.5m deep. The bed was comprised entirely of bare soft silt (peat). Peat staining was high at the time of

survey. Macrophyte coverage was low with scattered stands of bog pondweed, broad-leaved pondweed, bulbous rush (*Juncus bulbosus*). Stonewort (*Chara* sp.), *Sphagnum* sp. mosses and bladderwort (*Utricularia* sp.) were present along the margins but rare overall. Cottongrass and bottle sedge were abundant in the peaty littorals. The southern part of the lake was more of a wetland habitat (likely dries out, on occasion) and supported abundant *Sphagnum cuspidatum*, broad-leaved and bog pondweed, cotton grass and frequent bottle sedge. The lake was situated in cutover bog (PB4) with heath and scattered pre-thicket lodgepole pine.

With the exception of three-spined stickleback (considered likely present), site L2 was of poor fisheries value given its very shallow, peat nature and lack of connectivity to superior fisheries habitats (e.g. flowing watercourses). However, the site was of high suitability for amphibians, although none were recorded during the site visit. No otter signs were recorded in vicinity of the site.

No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via sweep netting (**Appendix B**).

Given the absence of aquatic species or habitats of high conservation value, the aquatic ecological evaluation of site L2 was of **local importance (lower value)** (**Table 4.3**).



Plate 4.32 Representative image of site L2, October 2023

4.2.3 Site L3 – lake/wetland, Bawnreagh

Site L3 was located within an extensive area of cutover bog (Littleton Bog), within the proposed site boundary and adjacent to site L2. The shallow linear cutover lake covered an area of c.0.5ha and ranged from 0.2-0.6m deep. The bed was comprised entirely of bare soft silt (peat). Peat staining was high at the time of survey. Given the typically flocculent bed, macrophyte growth was sparse with very scattered stands of bog pondweed and broad-leaved pondweed and rare bulbous rush. Cottongrass,

Sphagnum cuspidatum and bottle sedge were abundant in the exposed peaty littorals. The shallow sloping, bare peat littorals, supported sparse but widespread bladderwort (*Utricularia* sp.) and more localised stonewort (*Nitella* sp.). The lake was bordered by (locally regenerating) cutover bog (PB4) with abundant lodgepole pine, downy birch, purple moor grass (*Molinia caerulea*) and heather (*Calluna vulgaris*).

With the exception of three-spined stickleback (considered likely present), site L3 was of poor fisheries value given its very shallow, peat nature and lack of connectivity to superior fisheries habitats (e.g. flowing watercourses). However, the site was of high suitability for amphibians, although none were recorded during the site visit. No otter signs were recorded in vicinity of the site.

No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via sweep netting (**Appendix B**).

Given the absence of aquatic species or habitats of high conservation value, the aquatic ecological evaluation of site L3 was of **local importance (lower value)** (**Table 4.3**).



Plate 4.33 Representative image of site L3, October 2023

4.2.4 Site L4 – lake/wetland, Bawnreagh

Site L4 was a small lake located between proposed turbines T1 & T2. The 1.3ha heavily peat-stained lake was shallow, averaging <0.5m deep with shallow sloping margins and a base comprised exclusively of peat (often compacted but locally deep, >0.2m). The waterbody was somewhat sheltered from prevailing winds but supported sparse macrophyte growth with scattered small stands of common reed, bulrush, broad-leaved pondweed and bog pondweed, typically in marginal areas, with abundant bog cotton in the inundated littorals. These areas also supported occasional

bladderwort (*Utricularia* sp.). The lake was bordered by cutover bog (PB4) supporting abundant heather and stunted lodgepole pine with frequent downy birch and scattered gorse.

With the exception of three-spined stickleback (considered likely present), site L4 was of poor fisheries value given its very shallow, peat nature and lack of connectivity to superior fisheries habitats (e.g. flowing watercourses). However, there was high suitability for amphibians, although none were recorded during the site visit. No otter signs were recorded in vicinity of the site.

No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via sweep netting (**Appendix B**).

Given the absence of aquatic species or habitats of high conservation value, the aquatic ecological evaluation of site L4 was of **local importance (lower value)** (**Table 4.3**).



Plate 4.34 Representative image of site L4, October 2023

4.2.5 Site L5 – lake/wetland, Bawnreagh

Site L5 was a small, irregularly shaped cutover lake located in the vicinity of proposed turbine T2. The 1.4ha heavily peat-stained lake was shallow, averaging 0.5-1m deep with quickly shelving margins and a base comprised exclusively of peat (often compacted but locally deep, >0.3m). The largely open waterbody supported sparse macrophyte growth with scattered small stands of broad-leaved pondweed and common reed throughout the lake. Bog pondweed was rare. The northern shoreline supported a large bed of water horsetail (*Equisetum fluviatile*) with bottle sedge frequent along all margins. The shallow bare peat littorals supported frequent stonewort (*Chara* sp.) with rare bladderwort (*Utricularia* sp.). Bottle sedge and cotton grass were locally abundant along the lake margins with occasional marsh pennywort (*Hydrocotyle vulgaris*). The lake was bordered by cutover

bog (PB4) supporting abundant heather, stunted lodgepole pine and downy birch with abundant purple moor grass.

With the exception of three-spined stickleback (recorded in sweep sample), site L5 was of poor fisheries value given its shallow, peat nature and lack of connectivity to superior fisheries habitats (e.g. flowing watercourses). However, there was some low suitability for European eel and the site was of high suitability for amphibians, although none were recorded during the site visit. No otter signs were recorded in vicinity of the site. Mute swan (*Cygnus olor*) were present on the lake.

No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via sweep netting (**Appendix B**).

Given the absence of aquatic species or habitats of high conservation value, the aquatic ecological evaluation of site L5 was of **local importance (lower value)** (**Table 4.3**).



Plate 4.35 Representative image of site L5, October 2023

4.2.6 Site L6 – lake/wetland, Bawnreagh

Site L6 was a large wetland complex with a small central ponding area. Although the pond held water at the time of survey, the depth was <0.05m with a bed comprised entirely of flocculent peat (up to 0.3m in depth). The depth was often greater in the surrounding wetland (although this too was shallow, <0.1m). The ephemeral pond featured sparse macrophyte growth with scattered bulrush and water mint with rare bladderwort (*Utricularia* sp.) on the exposed peat bed. The wetland was dominated by bottle sedge and was fringed by abundant cotton grass and purple moor grass with scattered downy birch, willow and heather.

The site was not of fisheries value given its very shallow, peat nature, lack of connectivity to superior fisheries habitats (e.g. flowing watercourses) and likely ephemeral nature. However, there was some good suitability in the wider wetland for amphibians (although none were recorded). No otter signs were recorded in vicinity of the site.

No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via sweep netting (**Appendix B**).

Given the absence of aquatic species or habitats of high conservation value, the aquatic ecological evaluation of site L6 was of **local importance (lower value)** (**Table 4.3**).



Plate 4.36 Representative image of site L6, October 2023

4.2.7 Site L7 – lake/wetland, Bawnreagh

Site L7 was a small pond located adjacent to site L6. The small 200m^2 pond was situated in a larger wetland area. The depth averaged <0.1m (wetland was often deeper) with a bed comprised entirely of soft, often flocculent peat up to a depth of 0.5m. The pond basin supported frequent bog pondweed, occasional bulrush and dominant bottle sedge. Bladderwort (*Utricularia* sp.) was locally abundant in the shallow littorals of the pond and wetland, with occasional water mint and marsh pennywort and rare stonewort (*Nitella* sp.). The wetland was dominated by bottle sedge with abundant cotton grass and was bordered by wet areas of purple moor grass with localised tussock sedge (*Carex* sp.), downy birch and grey willow.

The site was not of fisheries value given its very shallow, peat nature, lack of connectivity to superior fisheries habitats (e.g. flowing watercourses) and likely ephemeral nature. However, there was some good suitability in the wider wetland for amphibians (although none were recorded). No otter signs were recorded in vicinity of the site.

No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via sweep netting (**Appendix B**).

Given the absence of aquatic species or habitats of high conservation value, the aquatic ecological evaluation of site L7 was of **local importance (lower value)** (**Table 4.3**).



Plate 4.37 Representative image of site L7, October 2023

4.2.8 Site L8 – lake/wetland, Lanespark

Site L8 was a small pond and wetland complex located approximately 150m south of proposed turbine T3. A small pond of c. 40m^2 was situated in a larger (0.2ha) seasonally flooded wetland area. The pond was 0.2-0.3m deep with a bed of compacted peat (as per the adjoining wetland). The pond supported sparse growth of broad-leaved pondweed with rare bog pondweed and bladderwort (*Utricularia* sp.). Filamentous algal and floc cover was very high (>70% of the bed). The surrounding wetland was dominated by bottle sedge with scattered small stands of bulrush. Common duckweed was present locally in the flooded wetland. The pond and wetland adjoined wet areas supporting abundant lodgepole pine and downy birch with scattered willow (*Salix* sp.). The site was bordered by cutover bog (PB4), some of which was regenerating locally.

Given the small, shallow size of the pond and seasonal nature of the supporting wetland area, site L8 was not of fisheries value. However, the site was of high suitability for amphibians, although none were recorded during the site visit. No otter signs were recorded in vicinity of the site.

No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via sweep netting (**Appendix B**).

Given the absence of aquatic species or habitats of high conservation value, the aquatic ecological evaluation of site L8 was of **local importance (lower value)** (**Table 4.3**).



Plate 4.38 Representative image of site L8, October 2023

4.2.9 Site L9 – lake/wetland, Clonoura

Site L9 was a small seasonal cutover peatland pool c. 120m^2 with a small pocket of open water 0.1-0.2m deep. Located adjacent to proposed turbine T5, the oligotrophic pool had an exposed peat base with no *Sphagnum* mosses or macrophytes. It was bordered exclusively by bog cotton that formed extensive swards in the historical cutover recess. The bordering areas of pest embankments supported scattered downy birch and lodgepole pine.

Given the small, shallow size of the pond and seasonal nature of the supporting wetland area, site L9 was not of fisheries value. However, the site was of high suitability for amphibians, although none were recorded during the site visit. No otter signs were recorded in vicinity of the site.

No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via sweep netting (**Appendix B**).

Given the absence of aquatic species or habitats of high conservation value, the aquatic ecological evaluation of site L9 was of **local importance (lower value)** (**Table 4.3**).



Plate 4.39 Representative image of site L9, October 2023

4.2.10 Site L10 – lake/wetland, Clonoura

Site L10 was located adjacent to proposed turbine T5. The small lake covered c. 0.1ha and ranged from 0.2m to 0.5m in depth with a bed comprised entirely of soft silt (peat). The cutover peatland basin had shallow sloping margins and a peat base supporting occasional bulrush with abundant bog cotton and occasional *Juncus* species. The peat embankments and margins supported scattered downy birch and lodgepole pine.

The site was not of fisheries value given its shallow, peat nature and lack of connectivity to superior fisheries habitats (e.g. flowing watercourses. As the pond supported no submerged macrophytes it had poor suitability for smooth newt. However it had good suitability for common frog (none recorded) given the species breeds in a broad range of wetlands. No otter signs were recorded in vicinity of the site.

No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via sweep netting (**Appendix B**).

Given the absence of aquatic species or habitats of high conservation value, the aquatic ecological evaluation of site L10 was of **local importance (lower value)** (**Table 4.3**).



Plate 4.40 Representative image of site L10, October 2023

4.2.11 Site L11 – lake/wetland, Clonoura

Site L11 was located within the proposed site boundary, 250m south of site proposed turbine T5. The large, shallow cutover lake covered an area of c.3.5ha and ranged from 0.2m to 1m in depth with a bed comprised entirely of soft silt (peat). The eastern margin was steeper and deeper than the western and northern margins which had more gradual sloping shorelines. Peat staining was high at the time of survey, exacerbated by significant wind fetch. Macrophyte coverage was low with only occasional bog pondweed in open water. Stands of bottle sedge and bulrush were scattered around the lake margins. Abundant cotton grass was present on the peaty littorals The lake was situated in cutover bog (PB4) with localised bog woodland (WN7) support downy birch and willow (*Salix* sp.).

The cutover peat lake was of poor fisheries value given its heavily silted, generally shallow nature and isolation from other aquatic habitats. The site was of high value for amphibians although none were recorded during the site visit. No otter signs were recorded in vicinity of the site.

No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via sweep netting (**Appendix B**).

Given the absence of aquatic species or habitats of high conservation value, the aquatic ecological evaluation of site L11 was of **local importance (lower value)** (**Table 4.3**).



Plate 4.41 Representative image of site L11

4.2.12 Site L12 – lake/wetland, Noard

Site L12 was located within the proposed site boundary 175m west of proposed turbine T6. The small, shallow cutover lake covered an area of c.0.4ha and averaged 0.2-0.3m deep. The bed was comprised entirely of bare soft silt (peat). Peat staining was high at the time of survey. Macrophyte coverage was low with only occasional bog pondweed and water horsetail in open water. Frequent stands of bottle sedge and bulrush were present in the margins with abundant cotton grass on the peaty littorals. The lake was situated in cutover bog (PB4) with downy birch and willow (*Salix* sp.) growing along the low gradient and cutover shorelines.

The cutover peat lake was not considered of fisheries value given its heavily silted, shallow nature and isolation from other aquatic habitats. The site was of high value for amphibians although none were recorded during the site visit. No otter signs were recorded in vicinity of the site.

No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via sweep netting (**Appendix B**).

Given the absence of aquatic species or habitats of high conservation value, the aquatic ecological evaluation of site L12 was of **local importance (lower value)** (**Table 4.3**).



Plate 4.42 Representative image of site L12

4.2.13 Site L13 – lake/wetland, Noard

Site L13 was located within the proposed site boundary <300m north of proposed turbine T7. The small, shallow cutover lake covered an area of c.0.2ha and was 0.1-0.3m deep. The bed was comprised entirely of bare soft silt (peat). Peat staining was high at the time of survey. Macrophyte coverage was low with only occasional bog pondweed. The peaty littorals (including exposed lakebed) supported abundant cotton grass in addition to rushes (*Juncus* spp.). The lake was situated in cutover bog (PB4) with immature downy birch and willow (*Salix* sp.) growing along the shoreline.

The cutover peat lake was considered of poor fisheries value given its heavily silted, shallow nature and isolation from other aquatic habitats. However, there was some low potential for European eel given the presence of the species in the nearby tributary of the Clover River (recorded in 2021). The site was of high value for amphibians although none were recorded during the site visit. No otter signs were recorded in vicinity of the site.

No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via sweep netting (**Appendix B**).

Given the absence of aquatic species or habitats of high conservation value, the aquatic ecological evaluation of site L13 was of **local importance (lower value)** (**Table 4.3**).



Plate 4.43 Representative image of site L13

4.2.14 Site L14 – lake/wetland, Noard

Site L14 was located within the proposed site boundary and immediately west of site L13. The small, shallow elliptical cutover lake covered an area of c.0.3ha and was 0.1-0.3m deep. The bed was comprised entirely of bare soft silt (peat). Peat staining was high at the time of survey. Macrophyte coverage was low with only occasional bog pondweed. The peaty littorals (including exposed lakebed) supported abundant cotton grass in addition to rushes (*Juncus* spp.). The lake was situated in cutover bog (PB4) with immature downy birch and willow (*Salix* sp.) growing along the shoreline.

The cutover peat lake was considered of poor fisheries value given its heavily silted, shallow nature and isolation from other aquatic habitats. However, there was some low potential for European eel given the presence of the species in the nearby tributary of the Clover River (recorded in 2021). The site was of high value for amphibians although none were recorded during the site visit. No otter signs were recorded in vicinity of the site.

No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via sweep netting (**Appendix B**).

Given the absence of aquatic species or habitats of high conservation value, the aquatic ecological evaluation of site L14 was of **local importance (lower value)** (**Table 4.3**).



Plate 4.44 Representative image of site L14

4.2.15 Site L15 – lake/wetland, Noard

Site L15 was a small 200m^2 cutover peat basin waterbody located 300m south-west of proposed turbine T7. The lake was a homogenous 0.3 to 0.4m deep with shallow sloping margins. The site was bordered by abundant bog cotton and bottle sedge but supported no submerged macrophytes apart from bulbosus rush due to the heavily peat stained water. Small pockets of *Sphagnum cuspidatum* were present in the margins. The pond was bordered by extensive bog cotton on exposed peat with immature birch woodland on the peatland escarpments.

The cutover lake was of poor fisheries value given its heavily silted, shallow nature and isolation from other aquatic habitats. The site was of high value for common frog but not smooth newt due to sparse macrophyte cover. No otter signs were recorded in vicinity of the site.

No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via sweep netting (**Appendix B**).

Given the absence of aquatic species or habitats of high conservation value, the aquatic ecological evaluation of site L15 was of **local importance (lower value)** (**Table 4.3**).



Plate 4.45 Representative image of site L15, October 2023

4.2.16 Site L16 – lake/wetland, Derryhogan

Site L16 was located within the proposed site boundary approximately 300m south of turbine T7. The shallow linear cutover lake and wetland covered an area of c.1.4ha and ranged from 0.1-0.3m deep. The bed was comprised entirely of bare soft silt (peat). Turbidity was low at the time of survey (i.e. low peat staining). The site was heavily vegetated with abundant water mint, bulrush, marsh horsetail (*Equisetum palustre*) in wetland areas and occasional bog pondweed in open water sections. Water starwort (*Callitriche* sp.) was also occasional. Spike rush, rushes (*Juncus* spp.) and bottle sedge were present along the margins. Abundant cotton grass was present on the peaty littorals. The lake was situated in cutover bog (PB4) with downy birch, willow (*Salix* sp.) and lodgepole pine growing along the low gradient shorelines.

The site was not considered of fisheries value given its heavily silted, shallow nature and isolation from other aquatic habitats. However, the site was of high value for amphibians although none were recorded during the site visit. No otter signs were recorded in vicinity of the site.

No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via sweep netting (**Appendix B**).

Given the absence of aquatic species or habitats of high conservation value, the aquatic ecological evaluation of site L16 was of **local importance (lower value)** (**Table 4.3**).



Plate 4.46 Representative image of site L16

4.2.17 Site L17 – lake/wetland, Lanespark

Site L17 was located at the southern extent of the proposed site boundary near Lanespark Bog, adjacent to Loch Doire Bhile and the North Glengoole Stream, and approximately 500m from both proposed turbine T9 and T10. As with Loch Doire Bhile, the site had been excavated as part of habitat creation on cutover bog. The shallow, clear-water lake covered an area of c.0.7ha and ranged from 0.2m to 1m deep. The substrata comprised gravels and clay. The lake was fringed by common reed with occasional stands of broad-leaved pondweed. Stonewort (*Chara* sp.) was abundant on the lakebed. The open, gravelly banks supported scattered willow (*Salix* sp.) with coniferous afforestation (WD4) present to the north of the site.

The artificial lake was not considered of fisheries value given its shallow nature, isolation from other aquatic habitats and absence of fish stocking history (in contrast to the nearby Loch Doire Bhile which supports stocked brown and rainbow trout). Whilst there was some good suitability for white-clawed crayfish, none were recorded. The species is known from the adjoining Loch Doire Bhile. The site was of high value for amphibians although none were recorded during the site visit. No otter signs were recorded in vicinity of the site.

No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via sweep netting (**Appendix B**).

Given the absence of aquatic species or habitats of high conservation value, the aquatic ecological evaluation of site L17 was of **local importance (lower value)** (**Table 4.3**).



Plate 4.47 Representative image of site L17

4.3 White-clawed crayfish survey

No live white-clawed crayfish were recorded via hand-searching and sweep netting of instream refugia during the surveys undertaken at 30 no. riverine and 17 no. lacustrine sites in September and October 2023, respectively.

However, recent crayfish remains were recorded in otter spraint at site E2 on the Ardreagh River (proposed GCR crossing) (**Plate 4.48**).



Plate 4.48 White-clawed crayfish remains identified in otter spraint site at site E2 on the Ardreagh River, September 2023

4.4 Otter signs

A total of 7 no. otter signs were recorded across 47 no. survey sites during the course of aquatic surveys undertaken in September-October 2023. All were recorded from riverine sites. Spraint sites (mostly regular) were recorded at sites on the Clover River (A6) and unnamed tributary (A4), Breegagh River (D1 & D3), Ardreagh River (E2), Gorteenahilla River (E7) and the Lisdowney Stream (E9).

No breeding (holts) or resting (couch) areas were identified in the vicinity of the survey sites in September and October 2023.

4.5 Invasive aquatic species

No aquatic invasive species were recorded in vicinity of the survey sites in September and October 2023.

4.6 Biological water quality (macro-invertebrates)

No rare or protected macro-invertebrate species (according to national red lists) were recorded in the biological water quality samples taken from a total of 28 no. wetted riverine sites in September 2023 (**Figure 4.1, Appendix B**).

Sites B5 on the Drish River, E7 on the Gorteenahilla River and E9 on the Lisdowney Stream achieved **Q4 (good status)** water quality and thus met the target good status (≥Q4) requirements of the European Union Environmental Objectives (Surface Waters) (Amendment) Regulations 2019 and the Water Framework Directive (2000/60/EC) (**Figure 4.1**). This was given the presence of one group A

taxa in fair numbers (5% of total abundance), namely the mayflies *Ecdyonurus dispar* or *Heptagenia sulphurea* (**Appendix B**).

Sites A7 on the Clover River, D1 on the Drish River, D3 on the Breegagh River and E10 on the River Nore achieved **Q3-4 (moderate status)** water quality (**Figure 4.1**). This was given the low numbers (<5%) of group A species mayflies *Ecdyonurus dispar* or *Heptagenia sulphurea* (**Appendix B**).

A total of 21 no. sites on the Clover River (A5 & A6) and unnamed tributaries (A1, A2, A3 & A4), Drish River (B1, B2, B3 & B4), Black River (C2, C4 & C5), North Glengoole River (C3), Breegagh River (D2), Goul River (E1), Ardreagh River (E2), Lisduff River (E3), Tincashel River (E4), unnamed Nuenna River tributary (E6) and the Lismaine Stream (E8) achieved **Q2-3 or Q3 (poor status)** based on an absence of group A species, low numbers or an absence of group B species and a dominance of group C species such as the mayfly *Baetis rhodani*, freshwater shrimp (*Gammarus duebeni*), New Zealand mud snail (*Potamopyrgus antipodarum*) and blackfly larvae (Simuliidae) (**Appendix B**).

Site E5 on the historically realigned Clomantanagh Lower Stream achieved Q2 (bad status) given the dominance of pollution tolerant group D and E taxa such as *Asellus aquaticus* and *Chironomus* sp. (**Appendix B**).

It should be noted that the ratings for sites A1, A2, A3, A4, A5, B1, E5 and E10 were tentative due to low flows and or a lack of suitable riffle areas for sampling (Toner et al., 2005).

4.7 Lacustrine macro-invertebrates

No rare or protected macro-invertebrate species were recorded in the sweep samples taken from 17 no. lake/wetland sites in October 2023 (**Appendix B**). However, whilst not protected, the nationally uncommon water stick insect *Ranatra linearis*, a recent discovery in Ireland (Nelson, 2018), was recorded at site L1 (**Plate 4.49**).

The shallow, peat lakes and wetlands supported a varied diversity of species, typically dominated by mayflies (*Cloeon* sp.), bluet damselflies (Coenagrionidae), water boatmen (*Hesperocorixa* spp.) and freshwater hoglouse (*Asellus aquaticus*) and a low diversity of Sphaeriidae and Planorbidae molluscan species (**Appendix B**).

4.8 Macrophytes and aquatic bryophytes

No rare or protected macrophytes or aquatic bryophytes were recorded at the 47 no. riverine and lacustrine survey sites in September-October 2023.

The Annex I habitat 'Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation or aquatic mosses [3260]' (aka floating river vegetation) was recorded on the Black River at site C5 and the Breegagh River at site D3. Several indicator species (EC, 2013) were present, such as water crowfoot (*Ranunculus* sp.) with a particularly high coverage of aquatic bryophytes, including abundant *Fontinalis antipyretica*, *Chiloscyphus polyanthos* and or *Leptodictyum riparium*.



Plate 4.49 The water stick insect (*Ranatra linearis*) recorded from lake site L1, October 2023



Plate 4.50 A darter dragonfly (*Sympetrum* sp.) ovipositing at site L2, October 2023

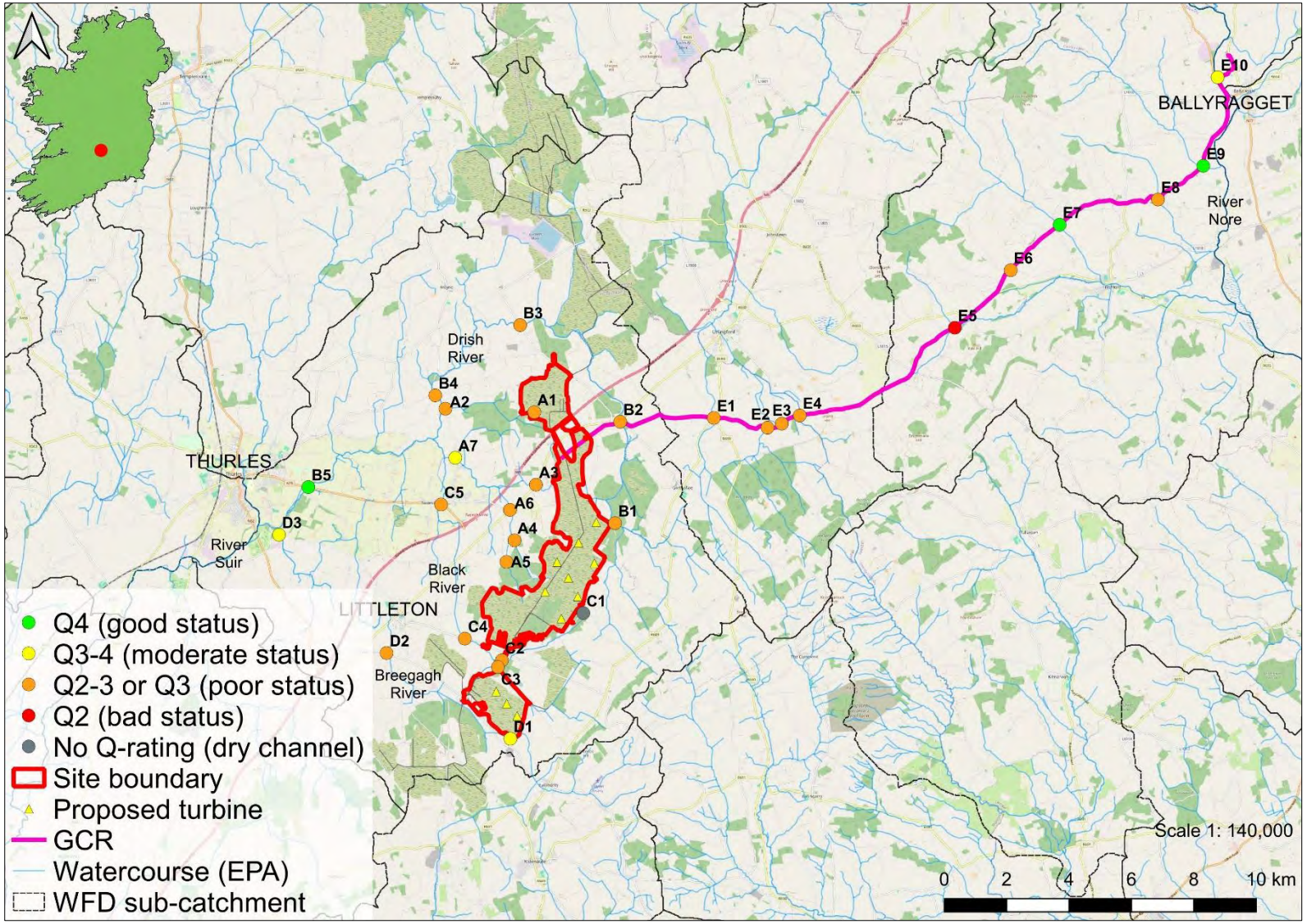


Figure 4.1 Overview of the biological water quality status in the vicinity of the proposed Littleton wind farm project, September 2023

4.9 Aquatic ecological evaluation

An aquatic ecological evaluation of each survey site was based on the results of fisheries surveys, white-clawed crayfish surveys, otter surveys, macrophyte and aquatic bryophyte surveys, macroinvertebrate surveys and biological water quality (**Table 4.3**).

Site E10 on the River Nore (proposed GCR crossing) was evaluated as **international importance** given its location with both the River Barrow and River Nore SAC (002162) and River Nore SPA (004233), sites designated for a range of aquatic species and habitats (NPWS, 2022, 2011).

Sites B2 on the Drish River, C5 on the Black River and D3 on the Breegagh River were evaluated as **county importance** given the presence of the Annex I habitats 'Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430]' (site B2) and 'Water courses of plain to montane levels, with submerged or floating vegetation of *Ranunculion fluitantis* and *Callitricho-Batrachion* (low water level during summer) or aquatic mosses [3260]' (sites C5 & D3).

A total of 17 no. sites on the Clover River (A6 & A7) and unnamed tributary (A4), Drish River (B3, B4 & B5), Black River (C2 & C4), North Glengoole River (C3), Breegagh River (D1 & D2), River Goul (E1), Ardreagh River (E2), Tincashel River (E4), Gorteenahilla River (E7), Lismaine Stream (E8) and Lisdowney Stream (E9) were evaluated as **local importance (higher value)** in terms of their aquatic ecology due to the presence of species of higher conservation value (**Table 4.3**).

The remaining 9 no. riverine sites (i.e. sites A1, A2, A3, A5, B1, C1, E3, E5 & E6) as well as all 18 no. lake/wetland sites were evaluated as **local importance (lower value)** given the absence of aquatic species or habitats of high conservation value (**Table 4.3**).

Table 4.1 Summary of fish species of higher conservation value and relative abundances (low, medium, high & very high) recorded via **electro-fishing** per riverine survey site in the vicinity of the proposed Littleton wind farm, September 2023

Site	Watercourse	Relative abundance				Other species
		Atlantic salmon	Brown trout	*Lampetra* sp.	European eel	
A1	Unnamed stream	No fish recorded				
A2	Unnamed stream	No fish recorded				
A3	Unnamed stream	No fish recorded				
A4	Unnamed stream		Low			Perch, stone loach, three-spined stickleback
A5	Clover River					Three-spined stickleback
A6	Clover River		Medium			Perch, stone loach, three-spined stickleback
A7	Clover River	Low	Medium	Low		Pike, stone loach
B1	Drish River					Three-spined stickleback
B2	Drish River	Low			Low	Three-spined stickleback
B3	Drish River		Low	Low		Pike, stone loach, three-spined stickleback
B4	Drish River	Very high	High			Stone loach
B5	Drish River	High	Low	Medium	Low	Minnow, stone loach
C1	Black River	No fish recorded – dry channel				
C2	Black River		Low			Three-spined stickleback
C3	North Glengoole River		Low			Three-spined stickleback
C4	Black River		Low			Stone loach
C5	Black River	Medium	Medium	Medium	Medium	Stone loach
D1	Breegagh River	Medium	High			
D2	Breegagh River	Medium	Medium	Medium		Stone loach
D3	Breegagh River	High	Very high		Low	Minnow, stone loach
E1	River Goul		Low	Low		Stone loach
E2	Ardreagh River	Low	Low		Low	Three-spined stickleback
E3	Lisduff Stream	No fish recorded				
E4	Tincashel River		Medium			
E5	Clomantanagh Lower Stream	No fish recorded				
E6	Unnamed stream	No fish recorded				

Site	Watercourse	Relative abundance				Other species
		Atlantic salmon	Brown trout	*Lampetra* sp.	European eel	
E7	Gorteenahilla River	Very high	Medium			
E8	Lismaine Stream					Three-spined stickleback
E9	Lisdowney Stream	High	Medium		Low	Three-spined stickleback
E10	River Nore	Fisheries appraisal only				

Conservation value: Atlantic salmon (*Salmo salar*), brook lamprey (L*ampetra planeri*) and river lamprey (*Lampetra fluviatilis*) are listed under Annex II of the Habitats Directive [92/42/EEC]. Atlantic salmon and river lamprey are also listed under Annex V of the Habitats Directive [92/42/EEC]. European eel are 'critically endangered' according to most recent ICUN red list (Pike et al., 2020) and listed as 'critically engendered' in Ireland (King et al., 2011). With the exception of the Inland Fisheries Acts 1959 to 2017, brown trout and coarse fish species have no legal protection in Ireland.

Table 4.2 Summary of aquatic species & habitats of higher conservation value recorded in the vicinity of the proposed Laurclavagh wind farm, July 2022

Site	Watercourse	White-clawed crayfish	Otter signs[4]	Annex I aquatic habitats	Rare or protected macrophytes/ aquatic bryophytes	Rare or protected macro-invertebrates	Other species/habitats of high conservation value
Riverine sites							
A1	Unnamed stream	None recorded	No signs	Not present	None recorded	None recorded	None recorded
A2	Unnamed stream	None recorded	No signs	Not present	None recorded	None recorded	None recorded
A3	Unnamed stream	None recorded	No signs	Not present	None recorded	None recorded	None recorded
A4	Unnamed stream	None recorded	**Regular spraint site**	Not present	None recorded	None recorded	None recorded
A5	Clover River	None recorded	No signs	Not present	None recorded	None recorded	None recorded
A6	Clover River	None recorded	**Regular spraint site**	Not present	None recorded	None recorded	None recorded
A7	Clover River	None recorded	No signs	Not present	None recorded	None recorded	**Atlantic salmon, lamprey (*Lampetra* sp.)**
B1	Drish River	None recorded	No signs	Not present	None recorded	None recorded	None recorded
B2	Drish River	None recorded	No signs	Not present	None recorded	None recorded	**Atlantic salmon, European eel**
B3	Drish River	None recorded	No signs	Not present	None recorded	None recorded	**Lamprey (*Lampetra* sp.)**
B4	Drish River	None recorded	No signs	Not present	None recorded	None recorded	**Atlantic salmon**
B5	Drish River	None recorded	No signs	Not present	None recorded	None recorded	**Atlantic salmon, lamprey (*Lampetra* sp.), European eel**
C1	Black River	None recorded	No signs	Not present	None recorded	None recorded	None recorded
C2	Black River	None recorded	No signs	Not present	None recorded	None recorded	None recorded
C3	North Glengoole River	None recorded	No signs	Not present	None recorded	None recorded	None recorded
C4	Black River	None recorded	No signs	Not present	None recorded	None recorded	None recorded

Site	Watercourse	White-clawed crayfish	Otter signs[4]	Annex I aquatic habitats	Rare or protected macrophytes/ aquatic bryophytes	Rare or protected macro-invertebrates	Other species/habitats of high conservation value
C5	Black River	None recorded	No signs	**Floating river vegetation [3260]**	None recorded	None recorded	**Atlantic salmon, lamprey (*Lampetra* sp.), European eel**
D1	Breegagh River	None recorded	**Regular spraint site**	Not present	None recorded	None recorded	**Atlantic salmon**
D2	Breegagh River	None recorded	No signs	Not present	None recorded	None recorded	**Atlantic salmon, lamprey (*Lampetra* sp.)**
D3	Breegagh River	None recorded	**Regular spraint site**	**Floating river vegetation [3260]**	None recorded	None recorded	**Atlantic salmon, European eel**
E1	River Goul	None recorded	No signs	Not present	None recorded	None recorded	**Lamprey (*Lampetra* sp.)**
E2	Ardreagh River	**None recorded but crayfish remains in otter spraint**	**Regular spraint site**	Not present	None recorded	None recorded	**Atlantic salmon, European eel**
E3	Lisduff Stream	None recorded	No signs	Not present	None recorded	None recorded	None recorded
E4	Tincashel River	None recorded	No signs	Not present	None recorded	None recorded	None recorded
E5	Clomantanagh Lower Stream	None recorded	No signs	Not present	None recorded	None recorded	None recorded
E6	Unnamed stream	None recorded	No signs	Not present	None recorded	None recorded	None recorded
E7	Gorteenahilla River	None recorded	**Regular spraint site**	Not present	None recorded	None recorded	**Atlantic salmon**
E8	Lismaine Stream	None recorded	No signs	Not present	None recorded	None recorded	None recorded
E9	Lisdowney Stream	None recorded	**Regular spraint site**	Not present	None recorded	None recorded	**Atlantic salmon, European eel**
E10	River Nore	None recorded	No signs	Not present	None recorded	None recorded	None recorded but Atlantic salmon, *Lampetra* sp. & European eel known
Lacustrine sites							
L1	Lake/wetland	None recorded	No signs	Not present	None recorded	None recorded	None recorded
L2	Lake/wetland	None recorded	No signs	Not present	None recorded	None recorded	None recorded

Site	Watercourse	White-clawed crayfish	Otter signs[4]	Annex I aquatic habitats	Rare or protected macrophytes/ aquatic bryophytes	Rare or protected macro-invertebrates	Other species/habitats of high conservation value
L3	Lake/wetland	None recorded	No signs	Not present	None recorded	None recorded	None recorded
L4	Lake/wetland	None recorded	No signs	Not present	None recorded	None recorded	None recorded
L5	Lake/wetland	None recorded	No signs	Not present	None recorded	None recorded	None recorded
L6	Lake/wetland	None recorded	No signs	Not present	None recorded	None recorded	None recorded
L7	Lake/wetland	None recorded	No signs	Not present	None recorded	None recorded	None recorded
L8	Lake/wetland	None recorded	No signs	Not present	None recorded	None recorded	None recorded
L9	Lake/wetland	None recorded	No signs	Not present	None recorded	None recorded	None recorded
L10	Lake/wetland	None recorded	No signs	Not present	None recorded	None recorded	None recorded
L11	Lake/wetland	None recorded	No signs	Not present	None recorded	None recorded	None recorded
L12	Lake/wetland	None recorded	No signs	Not present	None recorded	None recorded	None recorded
L13	Lake/wetland	None recorded	No signs	Not present	None recorded	None recorded	None recorded
L14	Lake/wetland	None recorded	No signs	Not present	None recorded	None recorded	None recorded
L15	Lake/wetland	None recorded	No signs	Not present	None recorded	None recorded	None recorded
L16	Lake/wetland	None recorded	No signs	Not present	None recorded	None recorded	None recorded
L17	Lake/wetland	None recorded	No signs	Not present	None recorded	None recorded	None recorded

Conservation value: White-clawed crayfish (*Austropotamobius pallipes*), Atlantic salmon (*Salmo salar*), brook lamprey (L*ampetra planeri*), river lamprey (*Lampetra fluviatilis*) and Eurasian otter (*Lutra lutra*) are listed under Annex II and Annex V of the Directive on the Conservation of Natural Habitats of Wild Fauna and Flora (92/43/EEC) ('EU Habitats Directive'). White-clawed crayfish and otter are also protected under the Irish Wildlife Acts 1976-2023. White-clawed crayfish (Füreder et al., 2010) are listed as 'Endangered' according to the IUCN Red List. European eel are 'critically endangered' according to most recent ICUN red list (Pike et al., 2020) and listed as 'critically engendered' in Ireland (King et al., 2011). With the exception of the Inland Fisheries Acts 1959 to 2017, brown trout and coarse fish species have no legal protection in Ireland.

[4] Otter signs within 150m of the survey site

Table 4.3 Aquatic ecological evaluation summary of the Littleton wind farm survey sites according to NRA (2009) criteria

Site no.	Watercourse	EPA code	Evaluation of importance	Rationale summary
Riverine sites				
A1	Unnamed stream	n/a	Local importance (lower value)	No aquatic species or habitats of high conservation value; Q3 (poor status) water quality (tentative)
A2	Unnamed stream	n/a	Local importance (lower value)	No aquatic species or habitats of high conservation value; Q2-3 (poor status) water quality (tentative)
A3	Unnamed stream	n/a	Local importance (lower value)	No aquatic species or habitats of high conservation value; Q2-3 (poor status) water quality (tentative)
A4	Unnamed stream	n/a	**Local importance (higher value)**	Salmonids recorded; site utilised by otter
A5	Clover River	16C04	Local importance (lower value)	No aquatic species or habitats of high conservation value; Q3 (poor status) water quality (tentative)
A6	Clover River	16C04	**Local importance (higher value)**	Salmonids recorded; site utilised by otter
A7	Clover River	16C04	**Local importance (higher value)**	Salmonids (including Atlantic salmon) & lamprey (*Lampetra* sp.) recorded; site utilised by otter
B1	Drish River	16D02	Local importance (lower value)	No aquatic species or habitats of high conservation value; Q3 (poor status) water quality (tentative)
B2	Drish River	16D02	**County importance**	Annex I hydrophilous tall herb [6430] present
B3	Drish River	16D02	**Local importance (higher value)**	Salmonids & lamprey (Lampetra sp.) recorded
B4	Drish River	16D02	**Local importance (higher value)**	Salmonids (including Atlantic salmon) recorded
B5	Drish River	16D02	**Local importance (higher value)**	Salmonids (including Atlantic salmon), lamprey (*Lampetra* sp.) & Red-listed European eel recorded; site utilised by otter; Q4 (good status) water quality
C1	Black River	16B01	Local importance (lower value)	No aquatic species or habitats of high conservation value (dry ephemeral site)
C2	Black River	16B01	**Local importance (higher value)**	Salmonids recorded
C3	North Glengoole River	16N28	**Local importance (higher value)**	Salmonids recorded

Site no.	Watercourse	EPA code	Evaluation of importance	Rationale summary
C4	Black River	16B01	**Local importance (higher value)**	Salmonids recorded
C5	Black River	16B01	**County importance**	Annex I floating river vegetation [3260] present
D1	Breegagh River	16B03	**Local importance (higher value)**	Salmonids (including Atlantic salmon) recorded; site utilised by otter
D2	Breegagh River	16B03	**Local importance (higher value)**	Salmonids (including Atlantic salmon) & lamprey (*Lampetra* sp.) recorded
D3	Breegagh River	16B03	**County importance**	Annex I floating river vegetation [3260] recorded
E1	River Goul	15G02	**Local importance (higher value)**	Salmonids (including Atlantic salmon) & lamprey (*Lampetra* sp.) recorded
E2	Ardreagh River	15A03	**Local importance (higher value)**	Salmonids (including Atlantic salmon) & Red-listed European eel recorded; site utilised by otter; white-clawed crayfish likely present (based on inclusion in otter spraint)
E3	Lisduff Stream	15L08	Local importance (lower value)	No aquatic species or habitats of high conservation value; Q3 (poor status) water quality
E4	Tincashel River	15T05	**Local importance (higher value)**	Salmonids recorded
E5	Clomantanagh Lower Stream	15C91	Local importance (lower value)	No aquatic species or habitats of high conservation value; Q2 (bad status) water quality (tentative)
E6	Unnamed stream	n/a	Local importance (lower value)	No aquatic species or habitats of high conservation value; Q3 (poor status) water quality

Site no.	Watercourse	EPA code	Evaluation of importance	Rationale summary
E7	Gorteenahilla River	15G08	**Local importance (higher value)**	Salmonids (including Atlantic salmon) recorded; site utilised by otter; Q4 (good status) water quality
E8	Lismaine Stream	15L16	**Local importance (higher value)**	Salmonids (including Atlantic salmon) recorded; site utilised by otter
E9	Lisdowney Stream	15L02	**Local importance (higher value)**	Salmonids (including Atlantic salmon) & Red-listed European eel recorded; site utilised by otter; Q4 (good status) water quality
E10	River Nore	15N01	**International importance**	Located within the River Barrow and River Nore SAC (002162) and River Nore SPA (004233)
Lacustrine sites				
L1	Lake/wetland	n/a	Local importance (lower value)	No aquatic species or habitats of high conservation value
L2	Lake/wetland	n/a	Local importance (lower value)	No aquatic species or habitats of high conservation value
L3	Lake/wetland	n/a	Local importance (lower value)	No aquatic species or habitats of high conservation value
L4	Lake/wetland	n/a	Local importance (lower value)	No aquatic species or habitats of high conservation value
L5	Lake/wetland	n/a	Local importance (lower value)	No aquatic species or habitats of high conservation value
L6	Lake/wetland	n/a	Local importance (lower value)	No aquatic species or habitats of high conservation value
L7	Lake/wetland	n/a	Local importance (lower value)	No aquatic species or habitats of high conservation value
L8	Lake/wetland	n/a	Local importance (lower value)	No aquatic species or habitats of high conservation value
L9	Lake/wetland	n/a	Local importance (lower value)	No aquatic species or habitats of high conservation value
L10	Lake/wetland	n/a	Local importance (lower value)	No aquatic species or habitats of high conservation value

Site no.	Watercourse	EPA code	Evaluation of importance	Rationale summary
L11	Lake/wetland	n/a	Local importance (lower value)	No aquatic species or habitats of high conservation value
L12	Lake/wetland	n/a	Local importance (lower value)	No aquatic species or habitats of high conservation value
L13	Lake/wetland	n/a	Local importance (lower value)	No aquatic species or habitats of high conservation value
L14	Lake/wetland	n/a	Local importance (lower value)	No aquatic species or habitats of high conservation value
L15	Lake/wetland	n/a	Local importance (lower value)	No aquatic species or habitats of high conservation value
L16	Lake/wetland	n/a	Local importance (lower value)	No aquatic species or habitats of high conservation value
L17	Lake/wetland	n/a	Local importance (lower value)	No aquatic species or habitats of high conservation value

Conservation value: White-clawed crayfish (*Austropotamobius pallipes*), Atlantic salmon (*Salmo salar*), brook lamprey (L*ampetra planeri*), river lamprey (*Lampetra fluviatilis*) and Eurasian otter (*Lutra lutra*) are listed under Annex II and Annex V of the Directive on the Conservation of Natural Habitats of Wild Fauna and Flora (92/43/EEC) ('EU Habitats Directive'). White-clawed crayfish and otter are also protected under the Irish Wildlife Acts 1976-2023. White-clawed crayfish (Füreder et al., 2010) are listed as 'Endangered' according to the IUCN Red List. European eel are 'critically endangered' according to most recent ICUN red list (Pike et al., 2020) and listed as 'critically engendered' in Ireland (King et al., 2011). With the exception of the Inland Fisheries Acts 1959 to 2017, brown trout and coarse fish species have no legal protection in Ireland.

5. Discussion

The riverine watercourses in the vicinity of the proposed Littleton wind farm, inclusive of those crossed by the proposed GCR, were typically lowland channels which had been extensively straightened and or deepened historically as part of arterial drainage and land reclamation works, resulting in poor hydromorphology and reduced habitat heterogeneity. Whilst some good instream recovery had occurred locally (e.g. Drish River, Black River, Breegagh River, Lisdowney Stream), significant siltation and hydromorphological pressures were evident throughout the survey area. Nevertheless, the majority of the riverine survey sites were evaluated as at least **local importance (higher value)** in terms of their aquatic ecology due to the presence of high conservation value species (including Atlantic salmon, lamprey (*Lampetra* sp.), European eel and otter) or habitats (i.e. sites B2, C5 & D3) (**Table 4.2**). Site E10 on the River Nore (proposed GCR crossing) was evaluated as **international importance** given its location with both the River Barrow and River Nore SAC (002162) and River Nore SPA (004233).

The lakes and wetlands located within the proposed site boundary typically originate from historical cutover bog activities and as such are shallow, highly turbid (peat stained), poorly vegetated and of lower productivity, providing relatively poor habitat for many higher conservation value species or habitats. Nevertheless these sites supported a range of macroinvertebrate species and many were of high suitability for amphibians[2]. None of these lake/wetland sites corresponded to Annex I lake habitats (e.g. natural dystrophic lakes and ponds, 3160). All 18 no. lacustrine sites were of **local importance (lower value)** given the absence of aquatic species or habitats of high conservation value[2].

5.1 Fisheries

A typical diversity of fish species for Irish midland rivers – namely Atlantic salmon, brown trout, lamprey (*Lampetra* sp.), European eel, stone loach, minnow, pike, perch and three-spined stickleback – were recorded during the electro-fishing survey (**Table 4.1; Appendix A**). The recorded assemblages were in keeping with previous surveys of the area (Triturus, 2023).

Salmonid populations were widespread with the survey area, being present at 19 no. riverine sites. Atlantic salmon were recorded from a total of 11 no. sites[3] on the Clover River (A7), Drish River (B2, B4, B5), Black River (C5), Breegagh River (D1, D2, D3), Ardreagh River (E2), Gorteenahilla River (E7) and the Lisdowney Stream (E9). The quality of salmonid habitat was typically poor due to significant hydromorphological pressures resulting from arterial drainage (i.e. extensive straightening & deepening). However, particularly high densities of juvenile salmonids were recorded at sites B4, D3 and E7 (excellent quality salmonid nurseries) (**Appendix A**).

Lamprey ammocoetes (*Lampetra* sp.) were recorded from 6 no. sites on the Clover River (A7), Drish River (B3 & B5), Black River (C5), Breegagh River (D2) and River Goul (E1) during targeted electro-fishing (low to medium densities only). An early stage *Lampetra* sp. transformer were also recorded

[2] Many sites had high suitability for amphibians although a dedicated survey for smooth newt and common frog was beyond the scope of this survey. An environmental DNA approach would help to clarify the status of amphibians in these sites

[3] Atlantic salmon are also known from the River Nore in the vicinity of Ballyragget but electro-fishing was not feasible at site E10 due to prohibitive depths

at site A7. The restricted distribution of lamprey reflected the paucity of suitable nursery and or spawning habitat, primarily due to significant arterial drainage pressures (**Appendix A**).

Red-listed European eel were recorded in low densities at a total of 6 no. sites on the Drish River (B2 & B5), Black River (C5), Breegagh River (D3), Ardreagh River (E2) and the Lisdowney Stream (E9) (**Table 4.1; Appendix A**). The paucity of eel recorded during the electro-fishing surveys was considered to reflect a combination sub-optimal habitat and widespread migration barriers in the survey catchments (**Appendix A**).

Whilst some of the more mature cutover lake/wetland survey sites had inherently more aquatic value, none were considered of significant fisheries value (stickleback only) due to their generally very shallow nature, peat substrata, lower pH and poor connectivity or isolation from other aquatic habitats supporting fish populations. There was some low European eel potential in those lakes situated in close proximity to the riverine watercourses found to or known to support the species (e.g. sites L13, L14, L17).

5.2 Otter

Despite widespread suitability, only a low number of otter signs (7 no.) were recorded across 47 no. survey sites. All were recorded from riverine sites with the lakes surveyed providing poor otter habitat, primarily due to insufficient prey resources. Spraint sites (mostly regular) were recorded at sites on the Clover River (A6) and unnamed tributary (A4), Breegagh River (D1 & D3), Ardreagh River (E2), Gorteenahilla River (E7) and the Lisdowney Stream (E9).

This paucity of signs was considered to mainly reflect the influence of historical instream modifications (straightening, deepening) on the health and distribution of fish populations, the key prey resource of otter (Krawczyk et al., 2016; Ruiz-Olmo & Jiménez, 2009). Otters are food-limited and prey availability is a crucial factor in determining mortality, breeding success and the status of local populations (Sittenthaler et al., 2019; Ruiz-Olmo et al., 2002). Furthermore, otter sign marking is routinely associated with prominent features such as large instream boulders and tree root systems (Almeida et al., 2012). Historical drainage, such as that carried out historically in the vicinity of the proposed project, significantly reduces instream habitat heterogeneity (O'Grady, 2017) and the availability or marking areas (outposts), which therefore results in the deposition and detection of fewer otter signs such as spraints, irrespective of watercourse utilisation (e.g. for foraging).

No breeding (holt) or couch (resting) areas were identified in the vicinity of the survey sites in September-October 2023.

5.3 White-clawed crayfish

Despite suitability at numerous sites, no live white-clawed crayfish were recorded during targeted surveys in September-October 2023. However, recent crayfish remains were identified in otter spraint at site E2 on the Ardreagh River, a tributary of the River Goul (**Plate 4.48**). This would indicate the presence of crayfish in the vicinity of the site. Indeed, contemporary and historic records are available for the downstream-connecting River Goul, including the capture of a juvenile crayfish downstream of Urlingford in 2022 (Triturus data) (**Figure 3.1**). Incidentally, white-clawed crayfish eDNA was

detected at sites on the Clover River, Black River, Drish River and Breegagh River in 2021 (Triturus, 2023).

Most of the 17 no. survey lakes/wetlands were inherently unsuitable for the white-clawed crayfish given their unsuitable peat geologies, water chemistry (humic/acidic) and physical habitat attributes (Demers et al., 2005; Lucey & McGarrigle, 1987). However, there was good suitability at site L17, a small artificial alkaline lake adjacent to Loch Doire Bhile, a site known to support crayfish (NPWS data). No crayfish were recorded from site L17 via hand searching or sweep netting in the current survey.

5.4 Macrophytes and Annex I habitats

No rare or protected macrophytes or aquatic bryophytes were recorded at the riverine or lacustrine survey sites in September-October 2023.

Sites C5 on the Black River and D3 on the Breegagh River supported the Annex I habitat 'Water courses of plain to montane levels, with submerged or floating vegetation of *Ranunculion fluitantis* and *Callitricho-Batrachion* (low water level during summer) or aquatic mosses [3260]' (aka floating river vegetation, FRV). This was based on the presence of several key indicator species including water crowfoot (*Ranunculus* sp.), water starwort (*Callitriche* sp.) and a high coverage of aquatic bryophytes such as *Fontinalis antipyretica* and *Chiloscyphus polyanthos.* Numerous studies have shown that both *Ranunculus*-dominated and bryophyte-rich areas provide particularly valuable habitat for juvenile salmonids (e.g. Marsh et al., 2020) and this was observed at this site during the survey.

Based on the presence of several indicator species (EC, 2013; Devaney, 2013), including *Lythrum salicaria, Epilobium hirsutum, Solanum dulcamara*, *Calystegia sepium, Myosotis scorpioides, Mentha aquatica* and *Galium palustre,* the heavily modified Drish River at site B2 supported the Annex I habitat 'Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430]'. This habitat often forms along unmanaged margins of lowland rivers (Devaney et al., 2013).

The presence of these Annex I habitats resulted in the evaluation of these sites as **county importance** (as per NRA, 2009).

5.5 Macroinvertebrates & biological water quality

No rare or protected macro-invertebrate species (according to national red lists) were recorded in the biological water quality samples taken from 28 no. wetted riverine sites in September 2023 or 17 no. sweep samples from lake sites in October 2023 (**Appendix B**). Whilst not protected, the nationally uncommon water stick insect *Ranatra linearis*, a recent discovery in Ireland (Nelson, 2018), was recorded at site L1 (**Plate 4.49**).

A total of 3 no. sites on the Drish River (B5), Gorteenahilla River (E7) and Lisdowney Stream (E9) achieved **Q4 (good status)** water quality and thus met the target good status (≥Q4) requirements of the European Union Environmental Objectives (Surface Waters) (Amendment) Regulations 2019 and the Water Framework Directive (2000/60/EC) (**Figure 4.1**). The remaining 25 no. riverine sample sites achieved **Q3-4 (moderate status)** (sites A7, D1, D3 & E10), **Q2-3 or Q3 (poor status)** (sites A1, A2, A3,

A4, A5, A6, B1, B2, B3, B4, C2, C3, C4, C5, D2, E1, E2, E3, E4, E6 &E8) or Q2 (bad status) (site E5) in September 2023.

With the exception of sites B5, E7 and E9, the biological water quality in the vicinity of the proposed project was unsatisfactory and was not meeting good status targets. Peat extraction (leading to siltation) and forestry are the significant threats to water quality in the survey area (EPA, 2019). Furthermore, low summer flows and widespread hydromorphological modifications also influenced biological water quality in September 2023.

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7. Appendix A – fisheries assessment report

Please see accompanying fisheries assessment report

8. Appendix B – Q-sample results (biological water quality) & lacustrine macroinvertebrates

Table 8.1 Macro-invertebrate Q-sampling results for riverine sites A1-A7 & B1-B5 in the vicinity of Littleton wind farm, September 2023

Group	Family	Species	A1	A2	A3	A4	A5	A6	A7	B1	B2	B3	B4	B5	EPA group
Ephemeroptera	Heptageniidae	*Heptagenia sulphurea*							2					14	**A**
Ephemeroptera	Baetidae	*Alainites muticus*							2				5	10	**B**
Plecoptera	Leuctridae	*Leuctra fusca*						2	8					12	**B**
Trichoptera	Cased caddis pupa	sp. indet.	1						2						**B**
Trichoptera	Glossosomatidae	*Agapetus fuscipes*											22	1	**B**
Trichoptera	Goeridae	*Silo pallipes*							1				1		**B**
Trichoptera	Lepidostomatidae	*Lepidostoma hirtum*											13		**B**
Trichoptera	Limnephilidae	*Halesus radiatus*							1						**B**
Trichoptera	Limnephilidae	*Limnephilus marmoratus*	2				6								**B**
Trichoptera	Limnephilidae	*Potamophylax cingulatus*						5	18	1	1				**B**
Trichoptera	Phryganeidae	*Agrypnia obsoleta*								2	1				**B**
Trichoptera	Sericostomatidae	*Sericostoma personatum*						22					5	10	**B**
Odonata	Calopterygidae	*Calopteryx splendens*				3									**B**
Odonata	Coenagrionidae	sp. indet.	5			6	8			4	2				**B**
Odonata	Libellulidae	*Orthetrum cancellatum*								3	1				**B**
Ephemeroptera	Baetidae	*Baetis rhodani*		3				16	7				62	79	**C**
Ephemeroptera	Ephemerellidae	*Serratella ignita*						6	1				18	1	**C**
Trichoptera	Hydropsychidae	*Hydropsyche instabilis*						13	11				8		**C**
Trichoptera	Polycentropodidae	*Polycentropus flavomaculatus*							6					1	**C**
Trichoptera	Polycentropodidae	*Polycentropus kingi*							6						**C**
Trichoptera	Rhyacophilidae	*Rhyacophila dorsalis*											1	1	**C**
Crustacea	Gammaridae	*Gammarus duebeni*	6			26		55	14	102	181	77	82	76	**C**
Coleoptera	Dytiscidae	*Colymbetes fuscus*					1								**C**
Coleoptera	Dytiscidae	Dytiscidae larva	1			1					3				**C**
Coleoptera	Dytiscidae	*Hyphydrus ovatus*									1				**C**

Group	Family	Species	A1	A2	A3	A4	A5	A6	A7	B1	B2	B3	B4	B5	EPA group
Coleoptera	Dytiscidae	*Ilybius fuliginosus*								1	1				**C**
Coleoptera	Dytiscidae	*Stictotarsus duodecimpustulatus*				1									C
Coleoptera	Elmidae	*Brychius elevatus*									2		24		C
Coleoptera	Elmidae	*Elmis aenea*							8				10	4	**C**
Coleoptera	Elmidae	*Limnius volckmari*							5				9	18	C
Coleoptera	Gyrinidae	Gyrinidae larva		1		2			2						C
Coleoptera	Gyrinidae	*Gyrinus substriatus*	2	2		5					1				C
Coleoptera	Halipliidae	*Haliplus ruficollis* group				9	2								**C**
Coleoptera	Hydrophilidae	*Helophorus grandis*					1								C
Diptera	Chironomidae	Non-*Chironomus* spp.	1	2	4	14			6					1	C
Diptera	Dixidae	sp. indet.			8		1								C
Diptera	Tipulidae	*Tipula* sp.	1	3											C
Diptera	Simuliidae	sp. indet.			16				37					5	C
Hemiptera	Corixidae	Corixidae nymph				1									C
Hemiptera	Corixidae	*Hesperocorixa linnaei*	3			9									C
Hemiptera	Gerridae	*Gerris* sp.	3	3		1			1	6				1	C
Hemiptera	Gerridae	Gerridae nymph		1						1			1		C
Hemiptera	Hydrometridae	*Hydrometra stagnorum*					1								C
Hemiptera	Nepidae	*Nepa cinerea*				2	3								C
Hemiptera	Notonectidae	*Notonecta viridis*									12				C
Gastropoda	Lymnaeidae	*Stagnicola fuscus*				6				1					C
Gastropoda	Lymnaeidae	*Lymnaea stagnalis*									4	2			C
Gastropoda	Planorbidae	*Bathyomphalus contortus*				1									C
Gastropoda	Planorbidae	*Planorbis planorbis*	1			15	31			41	11	5			C
Gastropoda	Planorbidae	*Ancylus fluviatilis*											8	3	C
Gastropoda	Tateidae	*Potamopyrgus antipodarum*				16		34	87		1	2	12	10	C
Platyhelminthes	Tricladida	sp. indet.		1								142	1		C

Group	Family	Species	A1	A2	A3	A4	A5	A6	A7	B1	B2	B3	B4	B5	EPA group
Arachnida	Hydrachnidiae	sp. indet.	5			1	1								**C**
Crustacea	Asellidae	*Asellus aquaticus*	1	17	25	7	22		6		84	103	1		**D**
Mollusca	Lymnaeidae	*Ampullacaena balthica*				18	6	4					3	6	**D**
Mollusca	Physidae	*Physa fontinalis*								64	54	32			**D**
Mollusca	Sphaeriidae	sp. indet.	3	2				12	5		1	21			**D**
Hirudinidae	Glossiphoniidae	*Glossiphonia complanata*					1	4			2				**D**
Hirudinidae	Glossiphoniidae	sp. indet.		1					1						**D**
Megaloptera	Sialidae	*Sialis lutaria*									3				**D**
Diptera	Chironomidae	*Chironomus* spp.			8	5						2			**E**
Annelidae	Oligochaeta	sp. indet.			2								10	7	**n/a**
Abundance			**35**	**36**	**63**	**149**	**84**	**173**	**237**	**226**	**366**	**386**	**296**	**260**	
Q-rating			*Q3	*Q2-3	*Q2-3	*Q3	*Q3	Q3	Q3-4	*Q3	Q2-3	Q2-3	Q3	Q4	
WFD status			Poor	Poor	Poor	Poor	Poor	Poor	Mod	Poor	Poor	Poor	Poor	Good	

* tentative rating due to poor flows and or lack of suitable riffle areas for sampling (as per Toner et al., 2005)

Table 8.2 Macro-invertebrate Q-sampling results for riverine sites C2-C5, D1-D3 & E1-E5 in the vicinity of Littleton wind farm, September 2023

Group	Family	Species	C2	C3	C4	C5	D1	D2	D3	E1	E2	E3	E4	E5	EPA group
Ephemeroptera	Heptageniidae	*Ecdyonurus dispar*					4		1						**A**
Ephemeroptera	Baetidae	*Alainites muticus*				2	6	6	6				5		**B**
Plecoptera	Leuctridae	*Leuctra fusca*					4								**B**
Trichoptera	Cased caddis pupa	sp. indet.						1					1		**B**
Trichoptera	Glossosomatidae	*Agapetus fuscipes*					16	39	46	32			12		**B**
Trichoptera	Goeridae	*Silo pallipes*					1	3	2	1			23		**B**
Trichoptera	Lepidostomatidae	*Lepidostoma hirtum*									1				**B**
Trichoptera	Limnephilidae	*Drusus annulatus*					4					1			**B**
Trichoptera	Limnephilidae	*Halesus radiatus*				2									**B**
Trichoptera	Limnephilidae	*Limnephilus marmoratus*							1						**B**
Trichoptera	Limnephilidae	*Potamophylax cingulatus*	6	1	3	1				1	1				**B**
Trichoptera	Limnephilidae	*Stenophylax permistus*											11		**B**
Trichoptera	Sericostomatidae	*Sericostoma personatum*	5	13	1			5	9	9	5				**B**
Ephemeroptera	Baetidae	*Baetis rhodani*		66	21	32	59	39	81	18	12	8	55		**C**
Ephemeroptera	Ephemerellidae	*Serratella ignita*					12	1	14	5			6		**C**
Trichoptera	Hydropsychidae	*Hydropsyche instabilis*	7	2	2	6	11	8							**C**
Trichoptera	Polycentropodidae	*Plectrocnemia conspersa*				2									**C**
Trichoptera	Polycentropodidae	*Polycentropus kingi*				1			1						**C**
Trichoptera	Rhyacophilidae	*Rhyacophila dorsalis*		4					1		3		2		**C**
Crustacea	Gammaridae	*Gammarus duebeni*	24	31	23	42	25	92	42	16	48	3	35		**C**
Coleoptera	Dytiscidae	Dytiscidae larva			1										**C**
Coleoptera	Dytiscidae	*Ilybius fuliginosus*									1				**C**
Coleoptera	Elmidae	*Brychius elevatus*							2						**C**
Coleoptera	Elmidae	*Elmis aenea*		9	2	12	20	12	4		10		14		**C**
Coleoptera	Elmidae	*Limnius volckmari*						5	1		2		12		**C**

Group	Family	Species	C2	C3	C4	C5	D1	D2	D3	E1	E2	E3	E4	E5	EPA group
Coleoptera	Gyrinidae	Gyrinidae larva			1	2									C
Diptera	Chironomidae	Non-*Chironomus* spp.			2			3	2			4	1	1	C
Diptera	Dixidae	sp. indet.										1		2	C
Diptera	Tipulidae	*Tipula* sp.									1	1			C
Diptera	Limoniidae	*Antocha sp.*		3							4				C
Diptera	Pediciidae	*Dicranota sp.*					5	1					1		C
Diptera	Simuliidae	sp. indet.	10		14	223	5	48	29	13	18	14	2		C
Hemiptera	Gerridae	*Gerris* sp.				2			10	4				2	C
Hemiptera	Gerridae	Gerridae nymph								1					C
Gastropoda	Planorbidae	*Planorbis planorbis*			1										C
Gastropoda	Planorbidae	*Ancylus fluviatilis*	2								3				C
Gastropoda	Tateidae	*Potamopyrgus antipodarum*	44	41	12	65	5	21	26		11	6	10		C
Platyhelminthes	Tricladida	sp. indet.			1										C
Arachnida	Hydrachnidiae	sp. indet.			2	4		5		3					C
Crustacea	Asellidae	*Asellus aquaticus*			2	4		1		15		23	4	12	D
Mollusca	Sphaeriidae	sp. indet.	8	1	13	2								3	D
Hirudinidae	Glossiphoniidae	*Glossiphonia complanata*		2	1					9				1	D
Hirudinidae	Glossiphoniidae	sp. indet.											1		D
Diptera	Chironomidae	*Chironomus* spp.		1	1	4	1	3						14	E
Annelidae	Oligochaeta	sp. indet.	4	4	3	1	7	8	1		2	2	3	4	n/a
Abundance			**110**	**178**	**106**	**407**	**185**	**301**	**279**	**127**	**122**	**63**	**198**	**39**	
Q-rating			Q3	Q3	Q3	Q3	Q3-4	Q3	Q3-4	Q3	Q3	Q3	Q3	*Q2	
WFD status			Poor	Poor	Poor	Poor	Mod	Poor	Mod	Poor	Poor	Poor	Poor	Bad	

* tentative rating due to poor flows and or lack of suitable riffle areas for sampling (as per Toner et al., 2005)

Table 8.3 Macro-invertebrate Q-sampling results for riverine sites E6, E7, E8 & E9 in the vicinity of Littleton wind farm, September 2023

Group	Family	Species	E6	E7	E8	E9	E10	EPA group
Ephemeroptera	Heptageniidae	*Ecdyonurus dispar*		7		4		**A**
Ephemeroptera	Heptageniidae	*Rhithrogena semicolorata*		1			1	**A**
Ephemeroptera	Baetidae	*Alainites muticus*		1			1	**B**
Plecoptera	Leuctridae	*Leuctra fusc*		4	2	3	6	**B**
Trichoptera	Cased caddis pupa	sp. indet.	2					**B**
Trichoptera	Glossosomatidae	*Agapetus fuscipes*	11	2				**B**
Trichoptera	Goeridae	*Silo pallipes*	4	5	4			**B**
Trichoptera	Limnephilidae	*Drusus annulatus*		1				**B**
Trichoptera	Limnephilidae	*Potamophylax cingulatus*			6			**B**
Trichoptera	Sericostomatidae	*Sericostoma personatum*	2	2	10	4	3	**B**
Odonata	Coenagrionidae	sp. indet.					1	**B**
Ephemeroptera	Baetidae	*Baetis rhodani*	16	23	12	14	21	**C**
Ephemeroptera	Caenidae	*Caenis rivulorum*		1		1	1	**C**
Ephemeroptera	Ephemerellidae	*Serratella ignita*	1	2		1	4	**C**
Trichoptera	Hydropsychidae	*Hydropsyche instabilis*	1			2		**C**
Trichoptera	Hydropsychidae	*Hydropsyche siltalai*		1			2	**C**
Trichoptera	Rhyacophilidae	*Rhyacophila dorsalis*		5				**C**
Crustacea	Gammaridae	*Gammarus duebeni*		5	21	16	16	**C**
Coleoptera	Elmidae	*Elmis aenea*		3		4		**C**
Diptera	Dixidae	sp. indet.	1					**C**
Diptera	Pediciidae	*Dicranota sp.*		1		2		**C**
Diptera	Simuliidae	sp. indet.	65	22	15			**C**
Hemiptera	Gerridae	Gerridae nymph		1				**C**
Gastropoda	Lymnaeidae	*Stagnicola fuscus*			3			**C**
Gastropoda	Lymnaeidae	*Lymnaea stagnalis*					2	**C**

Group	Family	Species	E6	E7	E8	E9	E10	EPA group
Gastropoda	Planorbidae	*Bathyomphalus contortus*			3		1	**C**
Gastropoda	Tateidae	*Potamopyrgus antipodarum*	11	1	8		9	**C**
Platyhelminthes	Tricladida	sp. indet.	2					**C**
Arachnida	Hydrachnidiae	sp. indet.			2		1	**C**
Crustacea	Asellidae	*Asellus aquaticus*			10	2	6	**D**
Mollusca	Lymnaeidae	*Ampullacaena balthica*			5			**D**
Mollusca	Sphaeriidae	sp. indet.			3		6	**D**
Annelidae	Oligochaeta	sp. indet.	2		3			**n/a**
Abundance			**118**	**88**	**107**	**53**	**81**	
Q-rating			Q3	Q4	Q3	Q4	Q3-4	
WFD status			Poor	Good	Poor	Good	Mod	

Table 8.4 Macro-invertebrate sweep sample results for lake sites L1-L10 no. lake/wetland sites in the vicinity of Littleton wind farm, October 2023

Group	Family	Species	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10
Ephemeroptera	Baetidae	*Cloeon* sp.	8		21	16			14		21	4
Ephemeroptera	Caenidae	*Caenis horaria*					3					
Ephemeroptera	Caenidae	*Caenis rivulorum*	1									
Trichoptera	Leptoceridae	*Athripsodes aterrimus*					5					1
Trichoptera	Leptoceridae	*Mystacides longicornis*					2					
Trichoptera	Limnephilidae	sp. indet. (early instar)			4		1					
Trichoptera	Phryganeidae	*Agrypnia obsoleta*	1	19	1	3						3
Trichoptera	Polycentropodidae	*Plectrocnemia conspersa*	5		2	6						
Odonata	Aeshnidae	*Anax imperator*	3	4	5				1			
Odonata	Libellulidae	*Sympetrum* sp.	4	4	3	4			4			3
Odonata	Coenagrionidae	sp. indet.	54	73	64	41	21	2	29	8	2	8
Coleoptera	Dytiscidae	*Acilius canaliculatus*							1			
Coleoptera	Dytiscidae	Dytiscidae larva	2			1						
Coleoptera	Dytiscidae	*Hydroporus palustris*							1			
Coleoptera	Dytiscidae	*Hyphydrus ovatus*	3				2					
Coleoptera	Dytiscidae	*Nebrioporus depressus*					2					
Coleoptera	Gyrinidae	*Gyrinus aeratus*	2	6			3					2
Coleoptera	Gyrinidae	*Gyrinus substriatus*		2				3		4		
Coleoptera	Halipliidae	*Haliplus ruficollis* group					6		1			
Coleoptera	Hydrophilidae	*Helophorus brevipalpis*							1	1		
Coleoptera	Hydrophilidae	*Laccobius minutus*							1			
Coleoptera	Noteridae	*Noterus clavicornis*					4		3			
Diptera	Chaoboridae	sp. indet.				22		2				
Diptera	Chironomidae	*Chironomus* spp.		8	6	16	10	16	4	8		6
Diptera	Chironomidae	Non-*Chironomus* spp.		3	1	5	4	1			2	2

Group	Family	Species	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10
Diptera	Dixidae	sp. indet.							18			1
Mollusca	Lymnaeidae	*Ampullacaena balthica*	7		3		2	109	46			
Mollusca	Lymnaeidae	*Galba truncatula*			6		1					
Mollusca	Planorbidae	*Gyraulis crista*							1			
Mollusca	Planorbidae	*Planorbis planorbis*								8		
Mollusca	Sphaeriidae	sp. indet.	11	42	104	108		2	20	5		
Mollusca	Tateidae	*Potamopyrgus antipodarum*							39			
Hemiptera	Corixidae	*Corixa panzeri*								53		
Hemiptera	Corixidae	*Corixa punctata*							4			
Hemiptera	Corixidae	*Cymatia bonsdorfii*	3	26								
Hemiptera	Corixidae	*Hesperocorixa linnaei*	19		53	42	16		32	1		3
Hemiptera	Corixidae	*Hesperocorixa sahlbergi*								1	8	
Hemiptera	Gerridae	*Gerris* sp.								1		1
Hemiptera	Nepidae	*Ranatra linearis*	2									
Arachnida	Hydrachnidiae	sp. indet.					7					
Arachnida	Dictynidae	*Argyroneta aquatica*					2		1			1
Hirudinidae	Glossiphoniidae	sp. indet.			1							
Crustacea	Asellidae	*Asellus aquaticus*	22				1		1			
Abundance			**147**	**187**	**274**	**264**	**92**	**135**	**222**	**90**	**33**	**35**

Table 8.5 Macro-invertebrate sweep sample results for lake sites L11-L17 no. lake/wetland sites in the vicinity of Littleton wind farm, October 2023

Group	Family	Species	L11	L12	L13	L14	L15	L16	L17
Ephemeroptera	Baetidae	*Centroptilum luteolum*							13
Ephemeroptera	Baetidae	*Cloeon simile*							2
Ephemeroptera	Baetidae	*Cloeon* sp.			3		38		
Ephemeroptera	Caenidae	*Caenis horaria*							19
Trichoptera	Limnephilidae	*Limnephilus marmoratus*							
Odonata	Aeshnidae	*Aeshna* sp.							1
Odonata	Aeshnidae	*Anax imperator*							2
Odonata	Libellulidae	*Sympetrum* sp.		6	2		1	2	5
Odonata	Coenagrionidae	sp. indet.	6	12	16	5	8	26	11
Coleoptera	Dytiscidae	Dytiscidae larva				3			
Coleoptera	Dytiscidae	*Graptodytes pictus*							
Coleoptera	Dytiscidae	*Nebrioporus depressus*		1					
Coleoptera	Gyrinidae	*Gyrinus aeratus*	6			1			
Coleoptera	Gyrinidae	*Gyrinus substriatus*			3	1		1	
Coleoptera	Haliplidae	*Haliplus ruficollis* group	1					4	1
Coleoptera	Noteridae	*Noterus clavicornis*			1				
Diptera	Chaoboridae	sp. indet.	2	1					
Diptera	Chironomidae	*Chironomus* spp.		1	3		2		3
Diptera	Chironomidae	Non-*Chironomus* spp.	6	9			2	16	1
Mollusca	Lymnaeidae	*Ampullacaena balthica*		4					
Mollusca	Lymnaeidae	*Lymnaea stagnalis*		2					
Mollusca	Sphaeriidae	sp. indet.							1
Mollusca	Tateidae	*Potamopyrgus antipodarum*							7
Hemiptera	Notonectidae	*Notonecta marmorea viridis*				2	1	3	
Hemiptera	Corixidae	*Corixa panzeri*					2	1	

Group	Family	Species	L11	L12	L13	L14	L15	L16	L17
Hemiptera	Corixidae	*Corixa punctata*		2					
Hemiptera	Corixidae	*Hesperocorixa linnaei*						1	
Hemiptera	Corixidae	*Hesperocorixa sahlbergi*	3	1	14	12	5	1	
Hemiptera	Corixidae	*Sigara* sp.							
Hemiptera	Gerridae	*Gerris* sp.				2			
Arachnida	Hydrachnidiae	sp. indet.		2	3	6		6	
Arachnida	Dictynidae	*Argyroneta aquatica*	2					2	
Crustacea	Asellidae	*Asellus aquaticus*	9	6					
Abundance			**35**	**47**	**45**	**32**	**59**	**63**	**66**



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Prepared by Triturus Environmental Ltd. for Fehily Timoney

November 2025

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1. Introduction

1.1 Background

Triturus Environmental Ltd. were commissioned by Fehily Timoney to undertake baseline aquatic surveys to inform EIAR preparation for the proposed Littleton wind farm project, located near Littleton, Co. Tipperary (**Figure 2.1**).

Undertaken on a catchment-wide scale, this report provides a baseline assessment of the aquatic ecology, including fisheries and biological water quality as well as protected species and habitats in the vicinity of the proposed project, inclusive of the proposed grid cable route (GCR). The surveys would serve to update previous surveys of the site (by Triturus in 2021 and 2023) whilst also accounting for any changes in proposed infrastructure and site layout in the interim period. Aquatic surveys were undertaken in September 2025.

1.2 Project description

A full description of the proposed project will be provided in any Environmental Impact Assessment Report (EIAR) used to support consenting applications.

2. Methodology

2.1 Selection of watercourses for assessment

All freshwater watercourses which could be affected directly or indirectly by the proposed wind farm project and associated infrastructure were considered as part of the current baseline. This included sites in the vicinity of the proposed turbine array, in addition to watercourse crossings of the proposed grid cable route (GCR). Thus, a total of 35 no. individual sites were selected for detailed aquatic assessment (see **Table 2.1, Figure 2.1** below). The courses and nomenclature for the watercourses surveyed followed Environmental Protection Agency (EPA) mapping.

Riverine survey sites survey sites were present on the Clover River (EPA code: 16C04), Drish River (16D02), River Suir (16S02), Black River (16B01), North Glengoole River (16N28), Breegagh River (16B03), River Goul (15G02), Ardreagh River (15A03), Borrisbeg River (15B18), Clomantagh Lower Stream (15C91), Gorteenahilla River (15G08), Lismaine Stream (15L16), Lisdowney Stream (15L02), River Nore (15N01) and several unnamed watercourses (**Table 2.1**). Additionally, a total of 4 no. lakes/wetlands located at Littleton Bog were also surveyed in September 2025 (**Table 2.1; Figure 2.3**). The aquatic survey sites were located within the Suir_SC_040, Goul_SC_010 and Nore_SC_070 river sub-catchments. The proposed wind farm site did not overlap with any European sites. However, there was potential downstream hydrological connectivity between the proposed project and the Lower River Suir SAC (002137), a site designated for a range of aquatic qualifying interests. A single GCR watercourse crossing of the River Nore (at site G11) traversed the River Barrow and River Nore SAC (002162) and River Nore SPA (004233).

Please note that this aquatic report should be read in conjunction with the final Environmental Impact Assessment Report (EIAR) prepared for the proposed project.

2.2 Aquatic site surveys

Aquatic surveys of the watercourses within the vicinity of the proposed wind farm project were conducted on the 2nd , 3rd, 4th and 19th September 2025. Survey effort focused on both instream and riparian habitats at each aquatic sampling location and included a fisheries habitat appraisal, white-clawed crayfish survey, otter survey (within 150m of the survey site), macrophyte and aquatic bryophyte survey and biological water quality (Q-sampling at riverine sites) or invertebrate sweep sampling (lacustrine sites). This holistic approach informed the overall aquatic ecological evaluation of each site in the context of the proposed project and ensured that any habitats and species of high conservation value would be detected to best inform mitigation.

In addition to the ecological characteristics of the site, a broad aquatic and riparian habitat assessment was conducted utilising elements of the methodology given in the Environment Agency's 'River Habitat Survey in Britain and Ireland Field Survey Guidance Manual 2003' (EA, 2003) and the Irish Heritage Council's 'A Guide to Habitats in Ireland' (Fossitt, 2000). This broad characterisation helped define the watercourses' conformity or departure from naturalness. All sites were assessed in terms of:

- Physical watercourse/waterbody characteristics (i.e. width, depth, channel form), including associated evidence of historical drainage

- Substrate type, listing substrate fractions in order of dominance (i.e. bedrock, boulder, cobble, gravel, sand, silt, etc.)
- Flow type by proportion of riffle, glide and pool in the sampling area
- An appraisal of the macrophyte and aquatic bryophyte community at each site
- Riparian vegetation composition and bordering land use practices

Table 2.1 Summary of *n*=20 riverine survey sites in the vicinity of the proposed Littleton wind farm

2023 site no.	2025 site no.	Watercourse	EPA code	Location	X (ITM)	Y (ITM)
A4	A1	Unnamed stream	n/a	Noard	621499	656663
A5	A2	Clover River	16C04	Noard	621241	655973
A6	A3	Clover River	16C04	R639 road crossing, Leigh	621356	657637
A3	A4	Unnamed stream	n/a	R639 road crossing, Leigh	622188	658445
A7	A5	Clover River	16C04	Noard	619601	659306
B1	B1	Drish River	16D02	Longfordpass South	624723	657212
n/a	B2	Unnamed stream	n/a	Longfordpass South	623872	658080
B2	B3	Drish River	16D02	Bridge 100m u/s Longfordpass Bridge	624889	660463
B3	B4	Drish River	16D02	Castletown Bridge	621680	663563
B5	B5	Drish River	16D02	Drish Bridge	614891	658369
n/a	B6	River Suir	16S02	Thurles Bridge	613217	656936
C1	C1	Black River	16B01	Clonoura	623707	654329
C2	C2	Black River	16B01	Derryvella	621096	652818
n/a	C3	Unnamed stream	n/a	Lanespark	621774	650932
C3	C4	North Glengoole River	16N28	Derryvella	620969	652602
C4	C5	Black River	16B01	Derryhogan	619908	653512
C5	C6	Black River	16B01	N75 crossing, Two Mile Borris	619148	657810
D1	D1	Breegagh River	16B03	Kileen	621369	650304
D2	D2	Breegagh River	16B03	Ballymurreen Bridge	617399	653051
D3	D3	Breegagh River	16B03	Archerstown Bridge	613950	656841

Table 2.2 Summary of *n*=11 watercourse crossings along the proposed grid cable route (GCR)

2023 site no.	2025 site no.	Watercourse	EPA code	Location	X (ITM)	Y (ITM)
B2	G1	Drish River	16D02	Bridge 100m u/s Longfordpass Bridge	624889	660463
n/a	G2	River Goul	15G02	Urlingford	627557	662814
n/a	G3	Ardreagh River	15A03	Urlingford	628129	663283
n/a	G4	Borrisbeg River	15B18	R693 road crossing, Borrismore	630026	663573
n/a	G5	Borrisbeg River	15B18	R693 road crossing, Borrismore	631586	663278

2023 site no.	2025 site no.	Watercourse	EPA code	Location	X (ITM)	Y (ITM)
n/a	G6	Clomantagh Lower Stream	15C91	R693 road crossing, Clomantagh Lower	635291	663867
n/a	G7	Gorteenahilla River	15G08	R693 road crossing, Freshford	640307	664969
n/a	G8	Unmapped stream	n/a	R694 road crossing	640626	665400
E8	G9	Lismaine Stream	15L16	L694 road crossing	642120	667578
E9	G10	Lisdowney Stream	15L02	Grange Bridge	643572	668666
n/a	G11	River Nore	15N01	Moatpark	643930	671951

Table 2.3 Summary of *n*=4 lake/wetland survey sites in the vicinity of the proposed Littleton wind farm (sites not previously covered in 2023 surveys)

2023 site no.	2025 site no.	Watercourse	EPA code	Location	X (ITM)	Y (ITM)
n/a	L18	Lake/wetland	n/a	Bawnreagh	623852	656260
n/a	L19	Lake/wetland	n/a	Clonoura	623732	655408
n/a	L20	Lake/wetland	n/a	Clonoura	623482	655235
n/a	L21	Lake/wetland	n/a	Clonoura	623580	655191

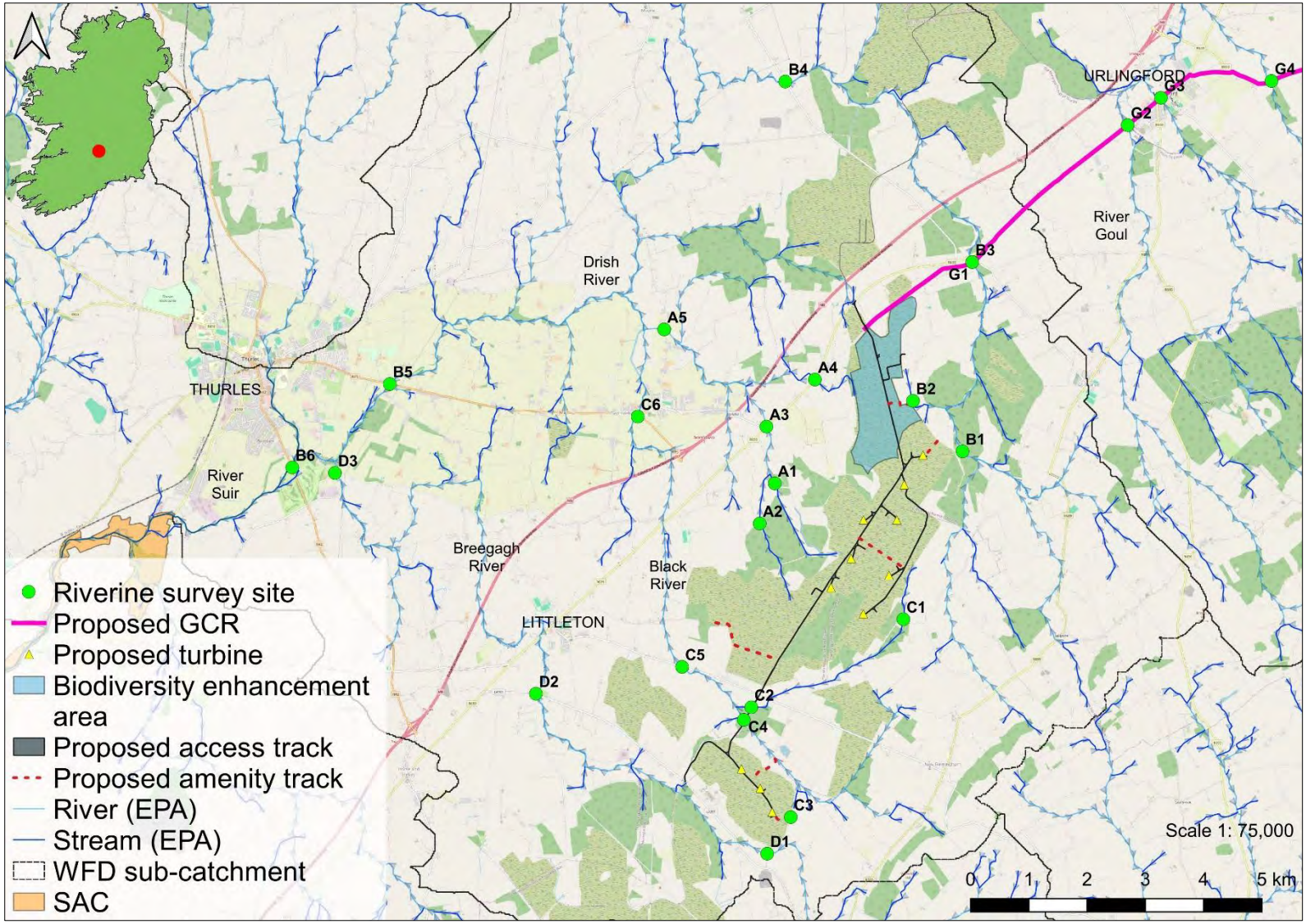


Figure 2.1 Overview of the riverine survey sites in the vicinity of the proposed Littleton wind farm, 2025

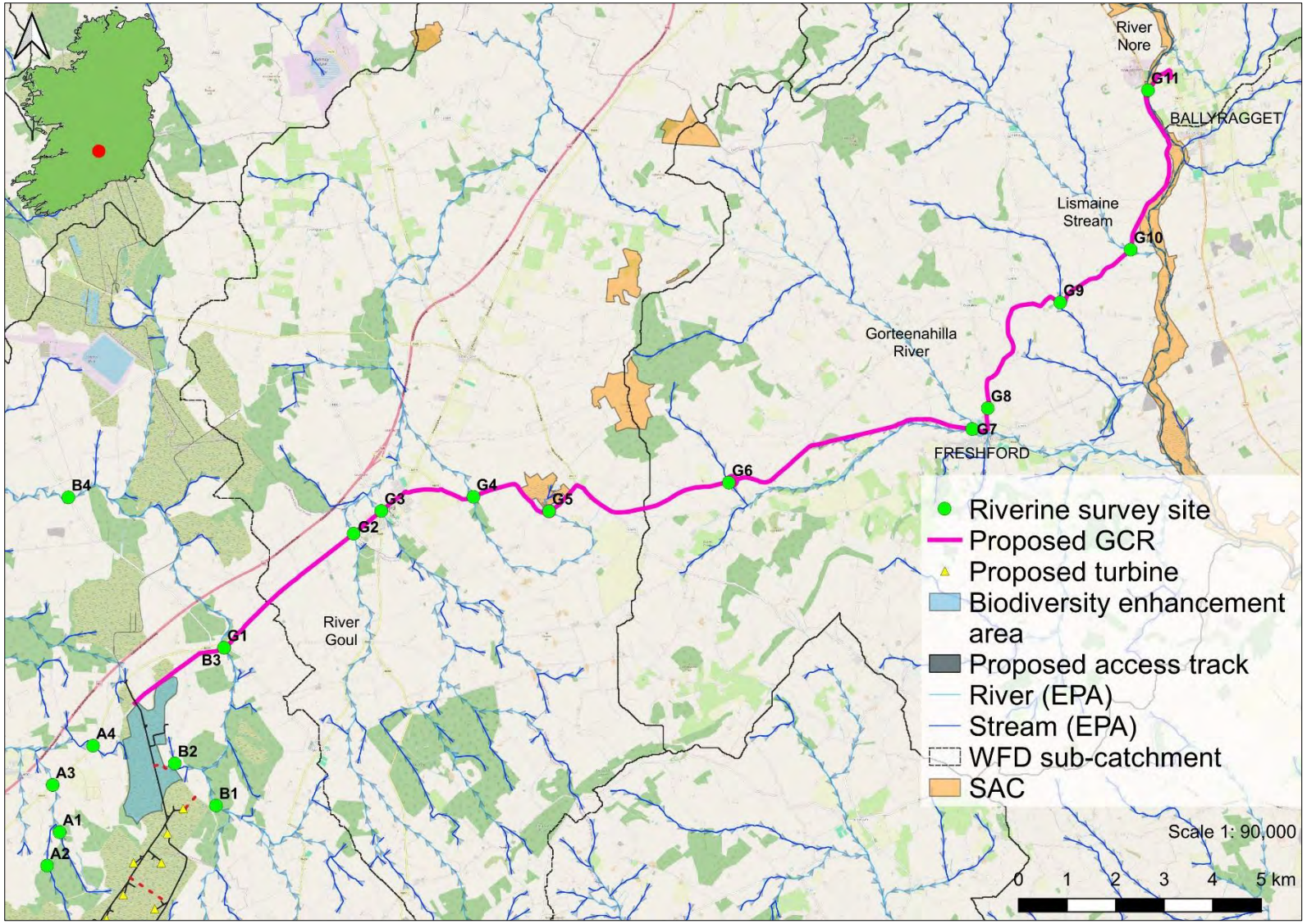


Figure 2.2 Overview of the GCR survey sites (watercourse crossings), 2025

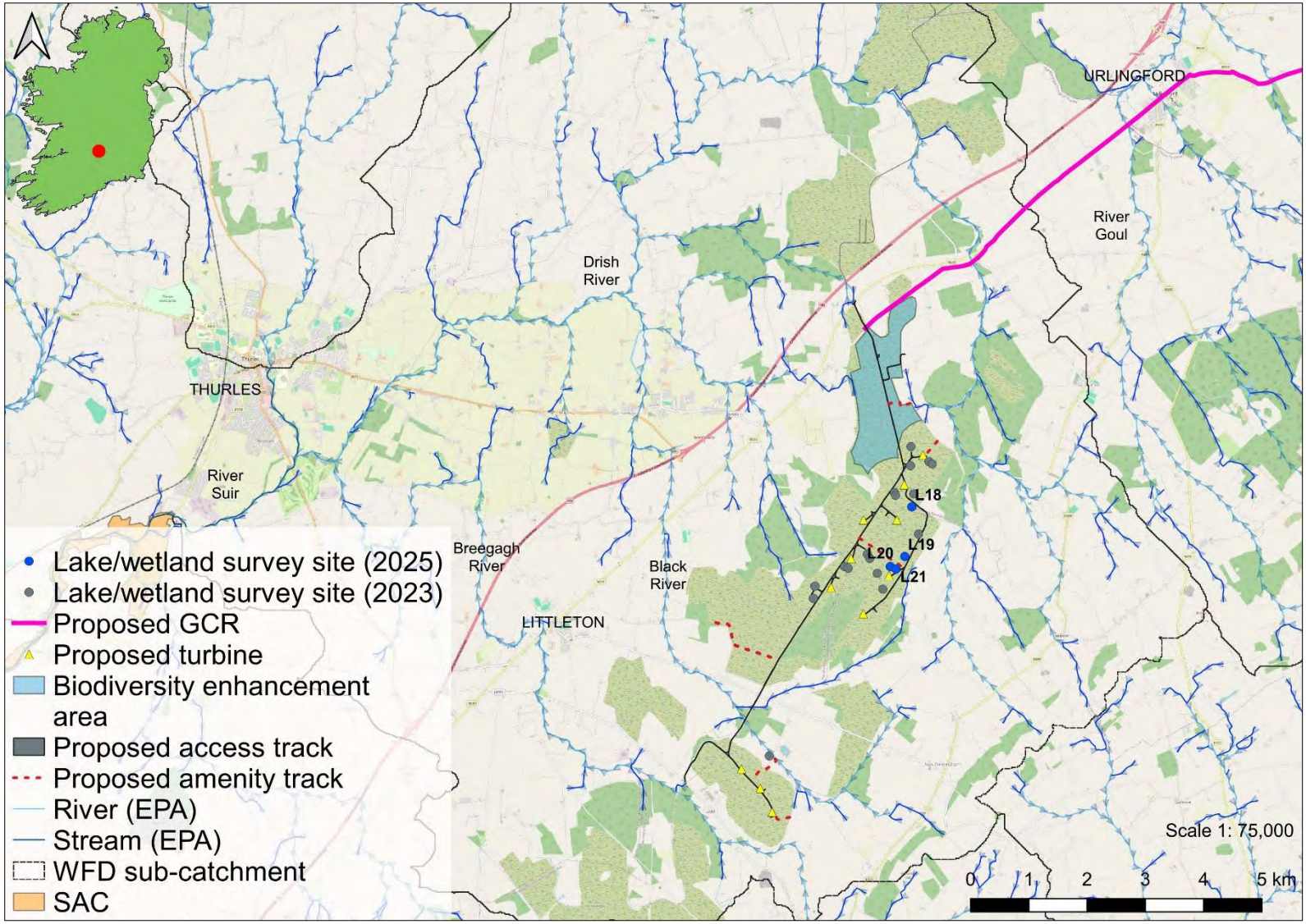


Figure 2.3 Overview of the lacustrine survey sites in the vicinity of Littleton wind farm, 2025

2.3 Fisheries habitat appraisal

A fisheries habitat appraisal of the 34 no. individual riverine and lacustrine sites was undertaken to establish their importance for salmonid, lamprey, European eel and other fish species in terms of spawning, nursery and or holding habitat. The appraisals of salmonids and lamprey were cognisant of species-specific habitat requirements and preferences as outlined in O'Grady (2006), Hendry et al. (2003), Armstrong et al. (2003), Harvey & Cowx (2003), Maitland (2003) and Hendry & Cragg-Hine (1997). River habitat surveys and fisheries assessments were also carried out utilising elements of the approaches in the River Habitat Survey Methodology (EA, 2003) and Fishery Assessment Methodology (O'Grady, 2006) to broadly characterise the channel (i.e. profile, substrata etc.).

2.4 White-clawed crayfish survey

White-clawed crayfish (*Austropotamobius pallipes*) surveys were undertaken at the aquatic survey sites in September 2025 under a National Parks and Wildlife (NPWS) open national licence (no. C164/2025), as prescribed by Sections 9, 23 and 34 of the Wildlife Act (1976-2023), to capture and release crayfish to their site of capture. As per Inland Fisheries Ireland aquatic biosecurity recommendations, the crayfish sampling started at the uppermost site(s) of the wind farm catchment/sub-catchments in the survey area to minimise the risk of transferring invasive propagules (including crayfish plague) in an upstream direction.

Hand-searching of instream refugia and sweep netting was undertaken according to Reynolds et al. (2010). An appraisal of white-clawed crayfish habitat at each site was conducted based on physical habitat attributes (Gammell et al., 2021; Peay, 2003), water chemistry and incidental records in mustelid spraint. Additionally, a desktop review of crayfish records within the wider survey area was completed.

2.5 Biological water quality (Q-sampling)

A total of 30 no. individual riverine survey sites were assessed for biological water quality through Q-sampling in September 2025 (**Table 2.1, 2.2**). All samples were taken with a standard kick sampling hand net (250mm width, 500µm mesh size) from areas of riffle/glide utilising a 2-minute kick sample, as per Environmental Protection Authority (EPA) methodology (Feeley et al., 2020). Large cobble was also washed at each site for 1 minute (where present) to collect attached macro-invertebrates (as per Feeley et al., 2020). Samples were elutriated and fixed in 70% ethanol for subsequent laboratory identification. Samples were converted to Q-ratings as per Toner et al. (2005) and assigned to WFD status classes (**Table 2.4**). Any rare invertebrate species were identified from the NPWS Red List publications for beetles (Foster et al., 2009), mayflies (Kelly-Quinn & Regan, 2012), stoneflies (Feeley et al., 2020) and other relevant taxa (i.e. Byrne et al., 2009; Nelson et al., 2011).

Table 2.4 Reference categories for EPA Q-ratings (Q1 to Q5)

Q value	WFD status	Pollution status	Condition
Q5 or Q4-5	High status	Unpolluted	Satisfactory
Q4	Good status	Unpolluted	Satisfactory
Q3-4	Moderate status	Slightly polluted	Unsatisfactory
Q3 or Q2-3	Poor status	Moderately polluted	Unsatisfactory
Q2, Q1-2 or Q1	Bad status	Seriously polluted	Unsatisfactory

2.6 Lacustrine macro-invertebrate communities

The 4 no. lake/wetland sites were sampled for macro-invertebrates via sweep netting in September 2025. A standard lake net (250mm width, mesh size 500µm) was used to sweep macrophytes to capture macro-invertebrates. The net was also moved along the lake/lake bed to collect epibenthic and epiphytic invertebrates from the substratum (as per Cheal et al., 1993). A 3-minute sampling period was employed. To ensure appropriate habitat coverage, the sampling period was also divided amongst the range of meso-habitats present at the survey site to get a representative sample for sub-habitats.

2.7 Macrophytes and aquatic bryophytes

Surveys of the macrophyte and aquatic bryophyte community were conducted by instream wading at each of the survey sites, with specimens collected (by hand or via grapnel) for on-site identification. An assessment of the aquatic vegetation community helped to identify any rare macrophyte species listed under the Flora (Protection) Order, 2022, Irish Red list for vascular plants (Wyse-Jackson et al., 2016) and or aquatic bryophytes (Lockhart et al., 2012), or habitats corresponding to Annex I habitats, such as floating river vegetation (3260) or hydrophilous tall herb (6430).

2.8 Otter signs

The presence of otter (*Lutra lutra*) was determined through the recording of otter signs within 150m radius of each survey site. Notes on the age and location of signs (ITM coordinates) were made, in addition to the quantity and visible constituents of spraint (i.e. remains of fish, crustaceans, molluscs etc.).

2.9 Aquatic ecological evaluation

The evaluation of aquatic ecological receptors contained within this report uses the geographic scale and criteria defined in the 'Guidelines for Assessment of Ecological Impacts of National Road Schemes' (NRA, 2009).

2.10 Biosecurity

A strict biosecurity protocol following IFI (2010) and the Check-Clean-Dry approach was adhered to during surveys for all equipment and PPE used. Disinfection of all equipment and PPE before and after use with Virkon™ was conducted to prevent the transfer of pathogens or invasive propagules between survey sites. Surveys were undertaken at sites in a downstream order to minimise the risk of upstream propagule mobilisation. Care was given towards preventing the spread or introduction of highly virulent crayfish plague (*Aphanomyces astaci*). Any aquatic invasive species or pathogens recorded within or adjoining the survey areas were geo-referenced. All Triturus staff are certified in 'Good fieldwork practice: slowing the spread of invasive non-native species' by the University of Leeds.

3. Desktop review

3.1 Survey area description

The proposed Littleton wind farm is located in an extensive area of cutover bog within the townlands of Noard, Kileen, Derryhogan, Lanespark, Derryvella, Leigh, Clonoura, Longfordpass South, Two Mile Borris, Ballymurreen, Archerstown, Urlingford, Borrismore, Clomantagh Lower, Freshford and Moatpark (**Figure 2.1**). The proposed wind farm site is within the South Eastern River Basin District and within hydrometric areas 15 (Nore) and 16 (Suir). The watercourses and aquatic surveys sites in the vicinity of Littleton wind farm are typically small, historically modified lowland depositing channels (FW2; Fossitt, 2000) which flow over areas of Tournaisian and Visean limestone and calcareous shale (Geological Survey of Ireland data). Land use practices in the wider survey area comprise peat bogs (CORINE 412), transitional woodland scrub (324) with localised coniferous forests (312), adjoining pastures (231) and built land (BL3).

3.2 Fisheries

The Drish River, a tributary of the River Suir, is known to support *Lampetra* sp. (O'Connor, 2007; Kurz & Costello, 1999) as well as Atlantic salmon (*Salmo salar*), brown trout (*Salmo trutta*), European eel (*Anguilla anguilla*), pike (*Esox lucius*), stone loach (*Barbatula barbatula*), minnow (*Phoxinus phoxinus*) and three-spined stickleback (*Gasterosteus aculeatus*) (Triturus 2023 data). The trout and pike in the Drish were found to be fast-growing and similar to those in comparable rivers in the Irish midlands (CFB data referenced in AECOM, 2020). The river suffered significant pollution from a zinc and lead mine at Lisheen until the recent past (AECOM, 2020; O'Connor, 2007).

The Clover River, a tributary of the Drish River, is known to support brown trout, lamprey (*Lampetra* sp.), three-spined stickleback, pike, perch (*Perca fluviatilis*) and stone loach (Triturus 2021 & 2023 data). The Breegagh River, another Drish River tributary, also supports Atlantic salmon, brown trout, lamprey (*Lampetra* sp.), European eel, minnow, stone loach and three-spined stickleback (Triturus 2021 & 2023 data). The Black River (Two Mile Borris) is known to support Atlantic salmon, brown trout, lamprey (*Lampetra* sp.), European eel and stone loach (Triturus 2021 & 2023 data; O'Connor, 2007). The North Glengoole River, a Black River tributary, supports Atlantic salmon, brown trout, European eel and three-spined stickleback (Triturus 2021 & 2023 data).

In terms of the proposed GCR option, the route crosses the River Nore, Drish River, River Goul, Borrisbeg River, Gorteenahilla River, Lisdowney Stream and the Ardreagh River, which are known to support Atlantic salmon, brown trout, stone loach and three-spined stickleback (Triturus 2021 & 2023 data; IFI 2021 data). The Gorteenahilla River, a tributary of the Nuenna River, supports Atlantic salmon, brown trout, *Lampetra* sp. and three-spined stickleback (Triturus 2021-2023 data). The Clomantagh Lower Stream and the Lismaine Stream frequently run dry and provide poor-quality fisheries habitat, often only supporting

three-spined stickleback (Triturus data). The Lisdowney Stream, a River Nore tributary, supports Atlantic salmon, brown trout, European eel and three-spined stickleback (Triturus 2021 & 2023 data; IFI 2021 data). The River Nore in the vicinity of Ballyragget supports a range of fish species, including Atlantic salmon, brown trout, *Lampetra* sp., European eel, minnow (*Phoxinus phoxinus*), stone loach and rudd (*Scardinius erythropthalmus*) (Triturus 2021 & 2023 data).

Fisheries data for the lake/wetland waterbodies surveyed was not available prior to this survey.

3.3 Protected & rare aquatic species

A comprehensive desktop review of available data from the National Parks and Wildlife Service (NPWS), National Biodiversity Data Centre (NBDC), Inland Fisheries Ireland (IFI), Botanical Society of Britain and Ireland (BSBI), National Crayfish Plague Surveillance Programme (NCPSP), Environmental Protection Agency (EPA) and Triturus databases for the 10km grid squares containing and adjoining the project (i.e. S15, S16, S25, S26, S36, S46 & S47) identified records for a low number of rare and or protected aquatic species within the vicinity of the proposed wind farm.

A high number of contemporary white-clawed crayfish (*Austropotamobius pallipes*) records (>75) were available for the respective grid squares in the 2005-2023 period (**Figure 3.1**), with a further c.50 historical records (pre-2005). A low number of records were available for the Drish River, Clover River (single record), Black River, River Goul, and the River Nore (**Figure 3.1**). The previous 2023 surveys (Triturus, 2024) did not record live crayfish although crayfish remains were identified in otter spraint on the Ardreagh River at the currently proposed GCR crossing.

A low number of contemporary otter (*Lutra lutra*) records (2005-2023) were available for the relevant grid squares, with records from the Black River, Drish River and River Nore (**Figure 3.1**). Otter signs were recorded during the 2023 surveys at sites on the Clover River and unnamed tributary, Breegagh River, Ardreagh River, Gorteenahilla River and the Lisdowney Stream (Triturus, 2024).

A low number of records were available for freshwater pearl mussel (M*argaritifera margaritifera*) for the River Nore located between the River Erkina confluence and Ballyragget in the 1993 to 2007 period (i.e. downstream of the proposed project). However, no live mussel have been recorded in this area of the River Nore since 2007 (Pascal Sweeney pers. comm.), including during a survey completed in May 2023 (Triturus data).

A low number of records for lamprey (*Lampetra* sp.) (reported as brook lamprey) were available for the River Nore downstream of Durrow (data not shown). *Lampetra* sp. are also known from the Nuenna River (Gordon et al., 2021; Matson et al., 2018) and several survey watercourses (see section 3.2 above).Historical records (1968 & 1972) for spawning sea lamprey (*Petromyzon marinus*) were available for the River Nore in the vicinity of Ballyragget (data not shown).

Two records for Flora (Protection) Order 2022 macrophyte species opposite-leaved pondweed (*Groenlandia densa*), were available from a former pond in the vicinity of Urlingford, but these were historical only (i.e. pre-1900, data not shown). No contemporary NPWS records for macrophytes or aquatic bryophytes protected under the Flora (Protection) Order, 2022 were available for the respective grid squares.

A single record for smooth newt (*Lissotriton vulgaris*) was available for bog habitat at Derryvella, adjacent to the North Glengoole River from 2010 (data not shown).

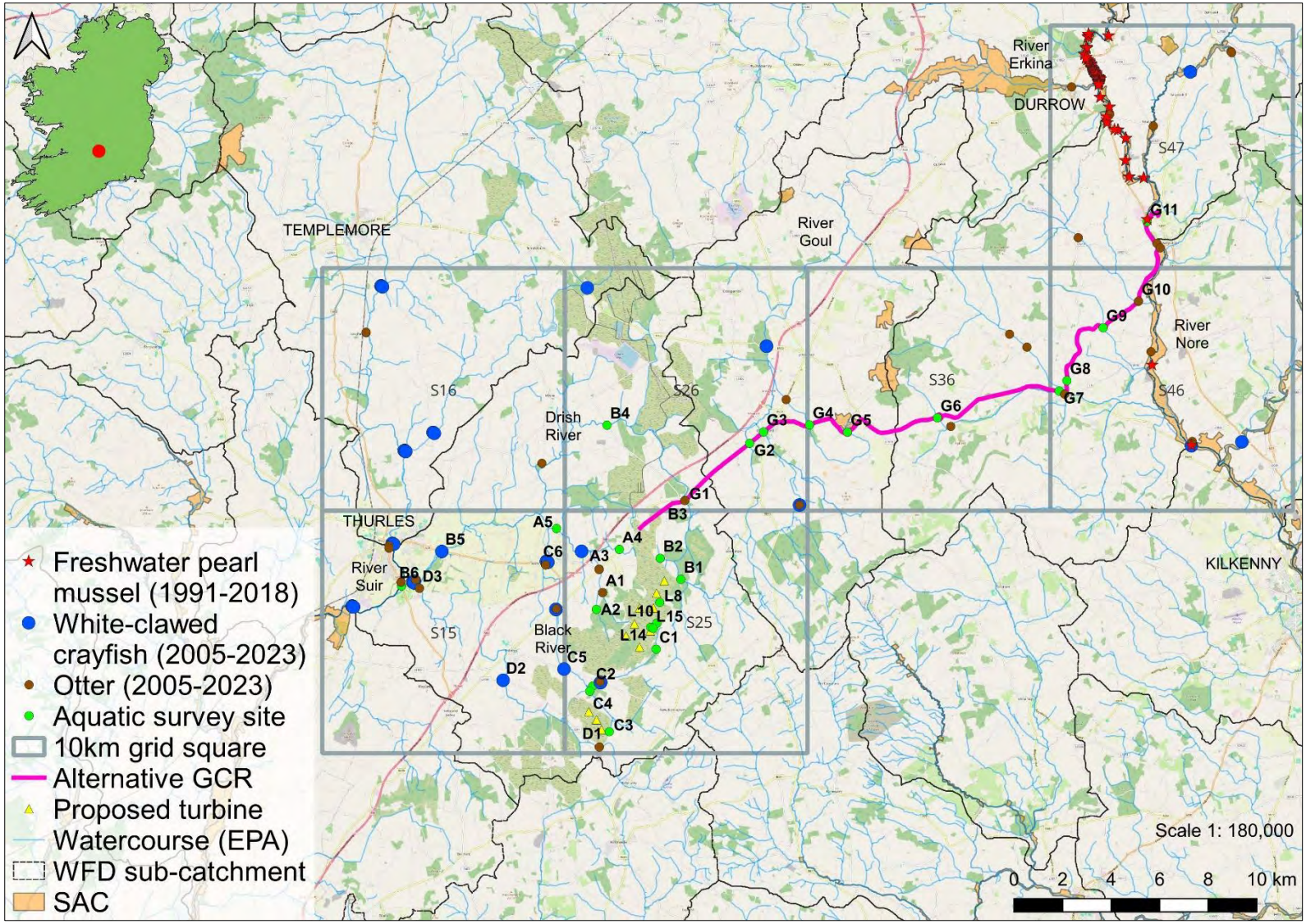


Figure 3.1 Distribution of selected protected species records in the vicinity of the proposed Littleton wind farm (source: NPWS, EPA, NBDC & Triturus data)

4. Results of aquatic surveys

The following section summarises each of the 30 no. riverine and 4 no. lake/wetland survey sites in terms of aquatic habitats, physical characteristics and overall value for fish, white-clawed crayfish, otter and macrophyte/aquatic bryophyte communities. Biological water quality (Q-sample) and macro-invertebrate sweep sample results are summarised for each site and provided in full in **Appendix A**. A summary of the aquatic species and habitats of high conservation concern recorded during the surveys is provided in **Table 4.2**. An evaluation of the aquatic ecological importance of each survey site based on these aquatic surveys is provided and summarised in **Table 4.3**.Habitat codes are according to Fossitt (2000). Scientific names are provided at first mention only. Sites were surveyed in September 2025. Where relevant, survey site numbers from the 2023 survey have been provided for context and are also outlined in **Tables 2.1-2.3** above.

4.1 Riverine survey site results

4.1.1 Site A1 – unnamed stream, Noard

Site A1 (2023 site code: A4) was located on an unnamed tributary of the Clover River (no EPA code) near the proposed turbine array. The lowland depositing channel (FW2) had been extensively straightened and deepened throughout, resulting in a deep trapezoidal channel with 2-3m high banks and poor hydromorphology. The stream was 3-4m wide and 0.4-0.6m deep with a profile of deep, slow-flowing glide with occasional pool. Riffle was absent. The substrata were dominated by deep peat/silt and sands with scattered boulder. Cobble was present but highly localised and bedded in silt. Peat staining was present at the time of the survey. Macrophyte cover was high with frequent branched bur-reed (*Sparganium erectum*) and lesser pondweed (*Potamogeton pusillus*). Localised stands of bulrush (*Typha latifolia*), broad-leaved pondweed (*Potamogeton natans*) and common reed (*Phragmites australis*) were present with frequent encroachment of floating sweet-grass (*Glyceria fluitans*) along the margins. Aquatic bryophytes were absent. The steep banks supported abundant bramble (*Rubus fruticosus* agg.) scrub and intermittent treelines of grey willow (*Salix cinerea* subsp. *oleifolia*), dog rose (*Rosa canina*), hawthorn (*Crataegus monogyna*) and ash (*Fraxinus excelsior*). The site was bordered by coniferous afforestation (WD4), scrub (WS1), reclaimed wet grassland (GS4) and improved pasture (GA1).

In the previous 2023 survey (2023 site code: A4) a low density of adult brown trout (*Salmo trutta*) were recorded via electro-fishing (Triturus, 2024). Spawning habitat was absent, given very significant siltation, with slow-flowing glide resulting in poor quality nursery habitat. Despite abundant soft sediment accumulations, the site was unsuitable for lamprey, given the flocculent, humic nature of the sediment and absence of suitable spawning gravels. The site was also of poor suitability for European eel and white-clawed crayfish, with no crayfish recorded. No otter signs were recorded in vicinity of the site although the species is known to utilise the area for sprainting (Triturus, 2024).

Biological water quality, based on Q-sampling, was calculated as **Q3 (poor status)** (**Appendix A**). However, it should be noted that this is a tentative rating given poor flows and lack of suitable riffle areas for sampling (as per Toner et al., 2005). No macro-invertebrate species of conservation value

greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the known presence of salmonids and utilisation by otter, the aquatic ecological evaluation of site A1 was of **local importance (higher value)** (**Table 4.3**).



Plate 4.1 Representative image of site A1 on an unnamed Clover River tributary, September 2025

4.1.2 Site A2 – Clover River, Noard

Site A2 (2023 site code: A5) was located on the upper reaches of the Clover River (16C04) near the proposed turbine array. The small lowland channel (FW2) had been extensively straightened and deepened, resulting in a trapezoidal channel with very poor hydromorphology. The 2m wide channel was dry at the time of survey with a base of argillaceous mud on top of compacted gravels. The ephemeral channel supported scattered water mint (*Mentha aquatica*) blue water speedwell (*Veronica anagallis-aquatica*), bottle sedge (*Carex rostrata*) and watercress (*Nasturtium officinale*). The banks had been historically cleared and were fenced to the bank top with only rank grass vegetation. The site was bordered by improved pasture (GA1) with coniferous afforestation (WD4) upstream.

The site was not of fisheries value at this location, given its ephemeral nature in addition to siltation and enrichment pressures, very poor hydromorphology (maintained channel and intermittent connectivity with downstream habitats (instream blockages). There was no suitability for white-clawed crayfish. No otter signs were recorded in the vicinity of the site.

It was not possible to collect a biological water quality sample due to the dry nature of the channel.

Given the absence of aquatic species or habitats of higher conservation value, the aquatic ecological evaluation of site A2 was of **local importance (lower value)** (**Table 4.3**).



Plate 4.2 Representative image of site A2 on the upper reaches of the Clover River, September 2025 (ephemeral channel)

4.1.3 Site A3 – Clover River, Leigh

Site A3 (2023 site code: A6) was located on the Clover River (16C04) at the R639 crossing, c. 1.7km downstream of site A2. The lowland depositing river (FW2) at this location had been historically straightened and extensively deepened, with steep bank of 5-6m in height. The river was 6-8m wide (narrower upstream of bridge) and 0.3-0.7m deep and suffered from low summer flows at the time of survey. Upstream of the bridge, shallower riffles and glide was present (0.1-0.2m deep). The profile was of slow-flowing, deep, homogenous glide with riffle and shallower glide present only upstream. The substrata were dominated by cobble and mixed gravels with scattered boulder. These were heavily silted (exacerbated by low flows). Large woody debris (LWD) dams were frequent, improving habitat heterogeneity. Riparian shading was high, with macrophytes restricted to more open areas of channel. Unbranched bur-reed (*Sparganium emersum*) was occasional, with frequent marginal stands of fool's watercress (*Helosciadium nodiflorum*), localised lesser water parsnip (*Berula erecta*), blue water speedwell and common water starwort (*Callitriche stagnalis*). Common duckweed (*Lemna minor*) was also frequent. Aquatic bryophytes were rare and limited to occasional *Leptodictyum riparium* on larger substrata. The channel was lined by mature treelines of sycamore (*Acer psuedoplatanus*), ash and elder (*Sambucus nigra*) with scrubby understories. The site was bordered by buildings and artificial surfaces (BL3) and improved pasture (GA1).

The previous survey recorded brown trout, stone loach (*Barbatula barbatula*) and three-spined stickleback (*Gasterosteus aculeatus*) via electro-fishing (Triturus, 2024). Despite significant siltation

pressures, the site was of value for salmonids. However, due to significant siltation pressures, salmonid spawning habitat was highly localised but nonetheless present. Although suitable lamprey spawning areas were located upstream of the bridge, no suitable nursery habitat was identified. There as some moderate suitability for European eel with ample instream refugia. Despite some suitability for white-clawed crayfish none were recorded although remains of the species have been identified at this site previously (Triturus 2021 data). No otter signs were recorded in vicinity of the site although the species is known to utilise the area for sprainting (Triturus, 2024).

Biological water quality, based on Q-sampling, was calculated as **Q3 (poor status)** (**Appendix A**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the known presence of salmonids and utilisation by otter, the aquatic ecological evaluation of site A3 was of **local importance (higher value)** (**Table 4.3**).



Plate 4.3 Representative image of site A3 on the Clover River, September 2025

4.1.4 Site A4 – unnamed stream, Leigh

Site A4 (2023 site code: A3) was located on an unnamed Clover River tributary (no EPA code) draining to the north-west of the proposed turbine array. The small lowland channel (FW2) had been historically straightened and deepened along field boundaries and was dry at the time of survey (as per 2023 survey). The stream passed under the local road via a pipe culvert. The channel featured a base of cobble and mixed gravels bedded in silt/mud. Leaf litter and woody debris was abundant on the bed. No aquatic vegetation was present in the ephemeral channel, which was very heavily shaded by mature treelines and hedgerows supporting bramble, ivy (*Hedera helix*), ash and elder. Non-native snowberry (*Symphoricarpos albus*) was frequent along the banks near the culvert. The site was bordered by heavily improved pasture (GA1).

The site was not of fisheries value, given its dry, ephemeral nature and poor quality aquatic habitats with no flows. There was no suitability for white-clawed crayfish. No otter signs were recorded in the vicinity of the site.

It was not possible to collect a biological water quality sample due to the dry nature of the channel.

Given the absence of aquatic species or habitats of higher conservation value, the aquatic ecological evaluation of site A4 was of **local importance (lower value)** (**Table 4.3**).



Plate 4.4 Representative image of site A4 on an unnamed Clover River tributary, September 2025 (dry, ephemeral channel)

4.1.5 Site A5 – Clover River, Noard

Site A5 (2023 site code: A7) was located on the lower reaches of the Clover River (16C04) at a local road crossing c. 2.8km downstream of site A3. The lowland river (FW2) had been historically straightened and, although some good instream recovery was evident. The river was 3-4m wide and 0.2-0.4m deep, with very localised deeper areas to 0.75m. The profile comprised peat-stained slow-flowing glide with localised riffle and pool. Woody debris dams were frequent instream.. The substrata were dominated by mixed gravels and sands with localised boulder and cobble only. Soft sediment accumulations were present but shallow and flocculent. Siltation was high overall (peat-derived). Given high shading, macrophyte growth was sparse with localised fool's watercress (and ivy-leaved duckweed (*Lemna trisulca*) along channel margins. Small stands of branched bur-reed were present locally. Bittersweet (*Solanum dulcamara*) and reed canary grass (*Phalaris arundinacea*) were locally abundant in open areas of the channel. Aquatic bryophyte coverage was low, with rare *Fontinalis antipyretica* and *Leptodictyum riparium*. The river was well shaded by dense grey willow and ash with abundant bramble scrub on the steep banks. The site was bordered by a residential property (BL3,

GA2) and improved pasture (GA1).

Atlantic salmon (*Salmo salar*), brown trout, stone loach, lamprey (*Lampetra* sp.) and pike (*Esox lucius*) were recorded via electro-fishing at site A5 (2023 site code: A7) during the previous survey (Triturus, 2024). The site was of moderate value for salmonids given evident siltation pressures which impacted the quality of spawning habitat. The generally shallow nature of the site also reduced the value as a nursery habitat. Some moderate quality holding habitat was present locally due to undercut banks, overhanging vegetation and pools associated with debris dams. Whilst a low density of *Lampetra* sp. ammocoetes were recorded in a previous survey (Triturus, 2024), the site was considered sub-optimal due to the flocculent and humic nature of the soft sediment deposits. The site offered some good suitability for European eel and white-clawed crayfish. However, no crayfish were recorded via hand-searching and sweep netting. No otter signs were recorded in vicinity of the site although the species is known to utilise the area (Triturus, 2024).

Biological water quality, based on Q-sampling, was calculated as **Q3 (poor status)** (**Appendix A**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the known presence of salmonids (including Atlantic salmon) and lamprey (*Lampetra* sp.), in addition to utilisation by otter, the aquatic ecological evaluation of site A5 was of **local importance (higher value)** (**Table 4.3**).



Plate 4.5 Representative image of site A5 on the lower reaches of the Clover River, September 2025

4.1.6 Site B1 – Drish River, Longfordpass South

Site B1 (2023 site code: B1) was located on the upper reaches of the Drish River (16D02). The lowland river (FW2) had been extensively straightened and deepened throughout, resulting in a homogenous trapezoidal channel with very poor hydromorphology and low summer flows. The channelised river was 3-4m wide and 0.5-0.8m deep, with locally deeper glide to >1m. The profile was of stagnant glide and pool at the time of survey. The substrata were dominated by sand and heavily silted mixed gravels. Cobble and small boulder were scattered. The site was very heavily vegetated with near total cover of macrophytes. Fool's watercress and branched bur-reed was abundant with frequent common duckweed, ivy-leaved duckweed and lesser water parsnip (*Berula erecta*). Spiked water milfoil (*Myriophyllum spicatum*), blue water speedwell and water mint were occasional. River water dropwort (*Oenanthe fluviatilis*) Semi-floating mats of reed canary grass were abundant along the channel margins and sloping banks. The banks had been cleared historically and supported scattered grey willow, alder (*Alnus glutinosa*), blackthorn (*Prunus spinosa*) and downy birch (*Betula pubescens*). The site was bordered by dry meadow habitat (GS2) and scrub (WS1) with intermittent treelines of ash, grey willow and alder.

Three-spined stickleback was the only fish species recorded via electro-fishing at site B1 during the previous survey (Triturus, 2024). The river at this location was of very poor value for salmonids, given heavy siltation, poor hydromorphology, poor flows and noxious macrophyte cover. The site exhibited some good suitability for European eel with scattered boulder and abundant macrophyte refugia. There was some low suitability for white-clawed crayfish, although none were recorded. No otter signs were recorded in vicinity of the site (although there were few marking opportunities).

Biological water quality, based on Q-sampling, was calculated as **Q3 (poor status)** (**Appendix A**). However, it should be noted that this is a tentative rating given poor flows and lack of suitable riffle areas for sampling (as per Toner et al., 2005). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the absence of aquatic species or habitats of high conservation value, the aquatic ecological evaluation of site B1 was of **local importance (lower value)** (**Table 4.3**).



Plate 4.6 Representative image of site B1 on the Drish River, September 2025

4.1.7 Site B2 – Unnamed stream, Longfordpass South

Site B2 (not surveyed in 2023) was located on the uppermost reaches of an unnamed Drish River tributary adjacent to the proposed biodiversity enhancement area. The heavily modified, lowland depositing stream (FW2 was dry at the time of survey, with a mud base covered in leaf litter. The channel was broadly U-shaped and was 1.5-2m wide with bank heights of 1-2m. The channel was heavily scrubbed over with dense scrub vegetation (WS1), which included grey willow bramble and gorse (*Ulex europaeus*). The site was bordered by a broad-leaved plantation (WS2) with cutover bog (PB4) to the west and improved pasture (GA1) to the north.

Site B2 was not of fisheries value given its dry, ephemeral nature and absence of aquatic habitats. No otter signs were recorded in the vicinity of the site.

It was not possible to collect a biological water quality sample due to the dry nature of the channel.

Given the absence of aquatic species or habitats of higher conservation value, the aquatic ecological evaluation of site B2 was of **local importance (lower value)** (**Table 4.3**).



Plate 4.7 Representative image of site B2 on an unnamed stream, September 2025 (dry, ephemeral channel)

4.1.8 Site B3/G1 – Drish River, Longfordpass North

Site B3/G1 (2023 site code: B2) was located on the Drish River (16D02) at a local road and proposed GCR crossing upstream of Longfordpass Bridge. The lowland depositing river (FW2) had been extensively straightened and deepened historically, resulting in very poor hydromorphology. The river suffered from low water levels at the time of survey (typical of this location, pers. obs.), with an imperceptible flow and ponding of water between macrophyte beds. The channel was a homogenous 10-12m wide and 0.1-0.4m deep with deep silt deposits of >0.3m locally. Boulder and cobble with mixed gravels were present near the bridge but absent elsewhere. The site was very heavily vegetated (near 100% cover), with open ponding areas very localised. These supported a diverse range of macrophytes, including abundant spiked water milfoil, branched bur-reed, lesser water parsnip, fool's watercress and both common and ivy-leaved duckweed. Blue water speedwell and yellow water lily (*Nuphar lutea*) were locally frequent, with more occasional lesser pondweed, river water dropwort (*Oenanthe fluviatilis*) and water-forget-me-not (*Myosotis scorpioides*). The moss *Cinclidotus fontinaloides* was abundant on instream boulder and the dry bridge apron. The mosses *Fontinalis antipyretica*, *Leptodictyum riparium* and *Hygroamblystegium* sp. were present but rare. The channel was lined and encroached by reed canary grass with frequent bittersweet, purple loosestrife (*Lythrum salicaria*), hedge bindweed (*Calystegia sepium*) and willowherbs (*Epilobium* spp.). Given the presence of numerous indicator species (EC, 2013; Devaney et al., 2013), the littoral herb community downstream of the crossing was representative of the Annex I hydrophilous tall herb (6430) habitat. The site was bordered by amenity grassland (GA2) and improved pasture (GA1) with narrow buffers.

Atlantic salmon, European eel and three-spined stickleback were recorded via electro-fishing at site B3/G1 (2023 site code: B2) during the previous survey (Triturus, 2024). The site was of poor salmonid value given known flow issues in addition to poor hydromorphology and poor connectivity with downstream habitats (i.e. the site is typically stagnant in the summer months). Boulder-dominated areas in vicinity of the bridge apron provided good suitability for European eel. There was some low suitability for white-clawed crayfish, although none were recorded. No otter signs were recorded in vicinity of the site (although the species is known to utilise the site, Triturus data).

Biological water quality, based on Q-sampling, was calculated as **Q3 (poor status)** (**Appendix A**). However, it should be noted that this is a tentative rating given poor flows and lack of suitable riffle areas for sampling (as per Toner et al., 2005). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the presence of Annex I hydrophilous tall herb habitat (6430), the aquatic ecological evaluation of site B3/G1 was of **county importance** (**Table 4.3**).



Plate 4.8 Representative image of site B3/G1 on the Drish River facing upstream, September 2025

4.1.9 Site B4 – Drish River, Castletown Bridge

Site B4 (2023 site code: B3) was located on the Drish River (16D02) at Castletown Bridge, c. 6km downstream of site B3. The lowland alkaline river (FW2) at this location had been deepened historically but retained some good semi-natural features. Recent clearance of adjoining drains has occurred upstream of the bridge. The river was 5-6m wide in a heavily vegetated channel up to 8-10m wide. The depth ranged 0.5-1m with deeper pool areas to 1.5m locally. The profile was of slow-flowing glide, with localised faster runs between macrophyte beds exposing gravel substrata. The substrata were dominated by cobble and mixed gravels with scattered boulder. However, these were bedded

in silt and moderately calcified (compacted). The compacted bed was also moderately silted with soft sediment deposits frequent. The site was very heavily vegetated (>90% cover) with abundant heterophyllous common clubrush (*Schoenoplectus lacustris*), common duckweed, ivy-leaved duckweed and fool's watercress. Yellow lily, various-leaved water starwort (*Callitriche platycarpa*), river dropwort, branched bur-reed, lesser water parsnip and broad-leaved pondweed were occasional with localised common reed and mare's-tail (*Hippuris vulgaris*). The moss *Rhynchostegium riparium* was occasional. Filamentous algae was present locally. Adjoining the river margins was a sparse herbaceous community supporting reed canary grass, bittersweet, marsh willowherb (*Epilobium palustre*), great willowherb (*Epilobium hirsutum*), water mint and water-forget-me-not. The site was bordered by improved pasture (GA1) and, downstream, an intermittent treeline (WL2) of ash, hawthorn and sycamore (*Acer pseudoplatanus*).

Brown trout, lamprey (*Lampetra* sp.), pike, stone loach and three-spined stickleback were recorded via electro-fishing at site B4 (2023 site code: B3) during the previous survey (Triturus, 2024). Salmonid nursery and spawning habitat quality was poor with evident water quality pressures. Some very limited salmonid and lamprey spawning habitat was present (but sub-optimal). Deeper glide areas provided some good suitability as holding habitat for adult salmonids. Soft sediment deposits were shallow and provided poor quality lamprey nursery habitat (although a low density were recorded in the previous survey (Triturus, 2024)). The site provided good suitability for European eel (i.e. glide, pool and scattered boulder). Despite some good suitability, no white-clawed crayfish were recorded, although the value of the site was reduced given compaction of substrata and poorly accessible boulder refugia. No otter signs were recorded in vicinity of the site.

Biological water quality, based on Q-sampling, was calculated as **Q3 (poor status)** (**Appendix A**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the known presence of salmonids and lamprey (*Lampetra* sp.), the aquatic ecological evaluation of site B4 was of **local importance (higher value)** (**Table 4.3**).



Plate 4.9 Representative image of site B3 on the Drish River at Castletown Bridge, September 2025

4.1.10 Site B5 – Drish River, Drish Bridge

Site B5 (2023 site code: B5) was located on the Drish River (16D02) at Drish Bridge (N75), c.12km downstream of site B4. The swift-flowing lowland depositing river (FW2) had been locally straightened historically with some local bank works, but good instream recovery was evident. The river was 6-8m wide (channel up to 10m) and 0.3-0.8m deep, with locally deeper areas to 1.5m. The profile comprised swift, deep glide and pool with only very localised riffle upstream of the bridge. The substrata were dominated by relatively clean, mobile coarse gravels and cobble, with frequent boulder. Sands and finer gravels were also present locally in pool slacks and along channel margins. Soft sediment accumulations were sand-dominated where present (rare overall). Siltation was low to moderate. Macrophyte cover was relatively high with locally abundant common clubrush, water crowfoot (*Ranunculus* sp.) and ivy-leaved duckweed. The margins also supported occasional fool's watercress, blue water speedwell and water mint with scattered iris (*Iris pseudacorus*) and branched bur-reed. The sloping margins supported abundant reed canary grass. Aquatic bryophyte coverage was locally high with *Fontinalis antipyretica* and *Fissidens* sp. on larger boulder. However, given the fragmented nature of the aquatic vegetation community, the site *did not* represent Annex I floating river vegetation (3260). Filamentous algae was present, indicating eutrophication pressures. The historically modified and grazed banks supported abundant reed canary grass with scattered bramble scrub, grey willow, osier (*Salix viminalis*) and immature oak (*Quercus* sp.). The site was bordered by semi-improved pasture (GA1).

Atlantic salmon, brown trout, European eel, lamprey (*Lampetra* sp.), minnow and stone loach were recorded via electro-fishing at site B5 (2023 site code: B5) during the previous survey (Triturus, 2024). The site was of very high value for salmonids with excellent quality nursery habitat present (especially

for Atlantic salmon), given an abundance of refugia. The site also provided excellent quality holding habitat for salmonids by way of deeper pool (e.g. under bridge) and overhanging marginal vegetation. Such areas, in addition to frequent large boulder, were also of high suitability for European eel. Although localised, good quality salmonid and lamprey spawning habitat was present upstream of the bridge. The site was also of value as a lamprey nursery with soft sediment deposits (sand-dominated) associated with macrophyte beds, providing some suitability (although sub-optimal). Despite some good suitability for white-clawed crayfish, none were recorded. No otter signs were recorded in vicinity of the site, although marking opportunities were poor.

Biological water quality, based on Q-sampling, was calculated as **Q3 (poor status)** (**Appendix A**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the known presence of salmonids (including Atlantic salmon), *Lampetra* sp. and Red-listed European eel,, the aquatic ecological evaluation of site B5 was of **local importance (higher value)** (**Table 4.3**).



Plate 4.10 Representative image of site B5 on the Drish River upstream of Drish Bridge, September 2025

4.1.11 Site B6 – River Suir, Thurles Bridge

Site B6 (not surveyed in 2023) was located on the River Suir (16S02) at Thurles Bridge, downstream of the Drish River confluence. The swift-flowing lowland depositing river (FW2) was semi-natural in character. The river was 10m-12m wide, 0.3-0.6m deep, with banks ranging from 0.3m to 2m high on the southern bank. The flow profile was of fast-flowing glide with localised pool. Siltation was low. The substrata comprised occasional partially bedded boulder and frequent cobble with mixed gravels and

sand. Finer sandy deposits were also occasional in the margins. Siltation was low overall but present. Common club-rush and branched bur-reed was occasional. Depositing margins supported rare yellow water lily. The moss *Fontinalis antipyretica* was frequent on boulder and cobble,. The banks supported reed canary grass, with the southern bank also supporting gorse, bramble, nettle (*Urtica dioica*), snowberry and dog rose. Treeline on both banks supported willow species (*Salix* spp.), ash, horse chestnut (*Aesculus hippocastanum*) and beech (*Betula* sp.).

Site B6 was a moderate-quality salmonid spawning habitat with mixed gravels offering some spawning opportunities (though quality reduced by siltation). The site was a good quality salmonid nursery habitat with boulder and cobble providing refugia for juveniles. Deeper glide and pool areas were limited but of value as holding habitat for adult salmonids. Physical suitability was present for white-clawed crayfish, but was compromised by the partially bedded nature of larger substrata. The site had some suitability for European eel; however, as with crayfish, the presence of bedded larger substrata reduced the overall suitability. Marginal sand deposits provided some sub-optimal nursery habitat for lamprey ammocoetes. No otter signs were recorded in vicinity of the site.

Biological water quality, based on Q-sampling, was calculated as **Q3 (poor status)** (**Appendix A**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the importance of the River Suir as an ecological corridor in a regional context, the aquatic ecological evaluation of site B6 was of **county importance** (**Table 4.3**).



Plate 4.11 Representative image of site B6 on the River Suir upstream of Thurles Bridge, September 2025

4.1.12 Site C1 – Black River, Clonoura

Site C1 (2023 site code: C1) was located on the uppermost reaches of the Black River (16B01) that drained to the south of the proposed wind farm site. As per previous surveys, the river was dry at this location at the time of survey, with no pools of standing water and a dry mud base in a remnant channel. The channel had been straightened and deepened historically and was 1.5-2m wide with bank heights of 1-2m. Evidently, the channel was ephemeral, likely only conveying water during wetter periods. The channel was heavily scrubbed over with high levels of terrestrial plant encroachment and willow scrub. The site was bordered by a broad-leaved plantation (WS2) with arable crops (BC1) to the east.

Site C1 was not of fisheries value given its dry, ephemeral nature and absence of aquatic habitats. No otter signs were recorded in the vicinity of the site.

It was not possible to collect a biological water quality sample due to the dry nature of the channel.

Given the absence of aquatic species or habitats of higher conservation value, the aquatic ecological evaluation of site C1 was of **local importance (lower value)** (**Table 4.3**).



Plate 4.12 Representative image of site C1 on the Black River, September 2025 (dry, ephemeral channel)

4.1.13 Site C2 – Black River, Derryvella

Site C2 (2023 site code: C2) was located on the upper reaches of the Black River (16B01) within Derryvella Bog, c. 3km downstream from site C1. The lowland depositing river (FW2) had been straightened and deepened historically but showed some instream recovery. The river was 2-2.5m

wide and 0.1-0.5m deep with a profile of slow-flowing glide and riffle with occasional pool. The stream was culverted underneath a Bord na Móna rail line via a large corrugated pipe culvert. The substrata were dominated by humic silt deposits (peat) with scattered heavily-silted small cobble and mixed gravels with occasional small boulder. The river was very heavily shaded by willow and bramble scrub. As a result, macrophytes were limited to water mint and fool's watercress, in addition to localised iris and common reed. Some *Pellia* sp. liverwort grew on sections of muddy bank. The site was bordered by an area of cutover bog (PB4) and semi-improved pasture (GA1) with abundant scrub (WS1).

Brown trout and three-spined stickleback were recorded via electro-fishing at site C2 (2023 site code: C2) during previous surveys (Triturus, 2024). Atlantic salmon were also recorded in the 2021 survey (Triturus, 2021). Despite historical modifications, poor flows and siltation pressures (peat escapement), the site was of some moderate value as a salmonid nursery. The quality of salmonid spawning habitat was significantly reduced by siltation, but the value likely improved during higher flows. Submerged tree roots and bank scours provided valuable holding areas for adult salmonids. Whilst some limited lamprey spawning habitat was present, ammocoete habitat was unsuitable given the humic, flocculent nature of the silt. The site offered some suitability for European eel and white-clawed crayfish. However, no crayfish were recorded via hand searching and sweep netting (limited refugia). No otter signs were recorded in vicinity of the site.

Biological water quality, based on Q-sampling, was calculated as **Q3 (poor status)** (**Appendix A**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the known presence of salmonids, the aquatic ecological evaluation of site C2 was of **local importance (higher value)** (**Table 4.3**).



Plate 4.13 Representative image of site C2 on the Black River, September 2025

4.1.14 Site C3 – Unnamed Stream, Lanespark

Site C3 (not surveyed in 2023) was located on a heavily modified tributary of the Glengoole North River adjacent to the proposed turbine array. The small lowland depositing stream (FW2) was <1m wide and broadly U-shaped with 2-3m high banks. The channel was dry at the time of survey, with a mud base covered with leaf litter. The instream vegetation comprised occasional common reed and wild angelica (*Angelica sylvestris*). The riparian areas supported dense scrub vegetation (WS1). This included abundant grey willow, bramble, gorse , and bracken (*Pteridium aquilinum*). The site was bordered by improved pasture (GA1) and cutover bog (PB4).

The site was not of fisheries value, given its dry, ephemeral nature and absence of aquatic habitats. There was no suitability for white-clawed crayfish. No otter signs were recorded in the vicinity of the site.

It was not possible to collect biological water quality due to the dry nature of the channel.

Given the absence of aquatic species or habitats of higher conservation value, the aquatic ecological evaluation of site C3 was of **local importance (lower value)** (**Table 4.3**).



Plate 4.14 Representative image of site C3 on an unnamed stream, September 2025 (dry, ephemeral channel)

4.1.15 Site C4 – North Glengoole River, Derryvella

Site C4 (2023 site code: C3) was located on the North Glengoole River (16N28) at a Bord na Móna rail crossing (culvert), 250m upstream of the Black River confluence. The lowland depositing river (FW2) had been historically straightened and deepened with trapezoidal banks of up to 4m in height and old embankments evident along the channel. The river was 2-2.5m wide and 0.1-0.4m deep,. Shallow glide predominated with only localised riffle and pool. In shallower areas near the culvert, the substrata comprised mixed gravels and small cobble with occasional boulder. However, outside of this area, depositional silt dominated (up to 0.2m deep). Hard substrata were exposed to moderate siltation and partial bedding. Cover of macrophytes was locally high in open areas of channel with abundant fool's watercress, frequent water mint and brooklime (*Veronica beccabunga*) and localised bulrush (*Typha latifolia*). Aquatic bryophytes were not present. The river channel became heavily shaded downstream of the culvert with grey willow, hawthorn and gorse. The site was bordered by dry meadows habitat (GS2) and improved pasture (GA1) in a wider landscape of cutover bog (PB4).

Brown trout and three-spined stickleback were recorded via electro-fishing at site C4 (2023 site code: C3) in the previous survey (Triturus, 2024). Atlantic salmon were also recorded in the 2021 survey (Triturus, 2021). The site was of moderate value only for salmonids due to significant siltation pressures. The shallow stream provided some suitable spawning habitat (exposed gravels), although these were heavily silted. Localised small pools associated with the culvert, bank scours and macrophyte stands provided some holding habitat for adult salmonids. Soft sediment accumulations whilst widespread were humic in nature and poorly suited for lamprey ammocoetes. The site provided some suitability for European eel with occasional boulder, bank sours and pool providing refugia. Despite some suitability for white-clawed crayfish, none were recorded. No otter sign were recorded in vicinity of the site (few marking opportunities).

Biological water quality, based on Q-sampling, was calculated as **Q3 (poor status)** (**Appendix A**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the known presence of salmonids, the aquatic ecological evaluation of site C4 was of **local importance (higher value)** (**Table 4.3**).



Plate 4.16 Representative image of site C4 on the North Glengoole River, September 2025

4.1.16 Site C5 – Black River, Derryhogan

Site C5 (2023 site code: C4) was located on the Black River (16B01) at a local road crossing, c. 1.5km downstream of site C2. The river had been extensively straightened and deepened historically, resulting in a characteristic trapezoidal channel with steep banks of up to 5m in height. The river flowed under the local road via a corrugated pipe culvert (fish passable). The homogenous river section was 3-4m wide and 0.2m to 0.5m deep, with occasional pool areas to 1m. The profile was of deep, slow-flowing glide with riffle restricted to upstream of the culvert. The substrata comprised compacted and heavily silted mixed gravels and cobble, with occasional boulder (near culvert only). Bank erosion was frequent (exposed clay) and contributed to the silt loading. Siltation was high overall (largely peat-derived) with deep silt-sand deposits present along channel margins (up to 0.2m deep). The site was heavily shaded by mature treelines of ash, elder, hawthorn and cypress (*Cupressaceae* family). As a result, macrophytes were absent. Aquatic bryophytes were not recorded, with the liverworts *Pellia endiviifolia* and *Conocephalum conicum* on muddy banks. The site was bordered by improved pasture (GA1).

Brown trout and stone loach were recorded via electro-fishing at site C5 (2023 site code: C3) during previous surveys (Triturus, 2021, 2024). Due to significant siltation and hydromorphological pressures, the site was of moderate value only for salmonids. However, some good quality holding areas for adult salmonids were present in deeper glide and pool. Soft sediment accumulations were largely humic or argillaceous in nature and were sub-optimal for lamprey ammocoetes. Some very limited superficial spawning gravels suitable for lamprey were present in the vicinity of the culvert, although spawning habitat improved upstream, where riffles were more frequent. Aside from submerged tree root

systems, suitability for European eel and white-clawed crayfish was relatively poor, given limited accessible instream refugia (no crayfish recorded). No otter signs were recorded in vicinity of the site.

Biological water quality, based on Q-sampling, was calculated as **Q3-4 (moderate status)** (**Appendix A**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the known presence of salmonids, the aquatic ecological evaluation of site C4 was of **local importance (higher value)** (**Table 4.3**).



Plate 4.16 Representative image of site C5 on the Black River (downstream of culvert), September 2025

4.1.17 Site C6 – Black River, Two Mile Borris

Site C6 (2023 site code: C5) was located on the Black River (16B01) at the N75 road crossing, c. 5km downstream of site C5. The lowland river (FW2) had been extensively straightened and deepened historically with only very localised instream recovery. The river flowed in a steep, 5-8m high trapezoidal channel. The river was 6-8m wide and 0.2-0.6m deep, with locally deeper areas to 1m. The river suffered from low summer flows at the time of survey. Slow-flowing glide predominated, with localised riffles near the road bridge and occasional pools. The substrata were dominated by cobble with frequent boulder and small interstitial patches of mixed gravels. Siltation was moderate overall (peat) but soft sediment accumulations were localised. The substrata were relatively mobile. The site supported frequent lesser water parsnip and occasional common water starwort, water mint, water crowfoot (*Ranunculus* sp.) and watercress. Curled pondweed (*Potamogeton crispus*) was present but rare. Common duckweed and ivy-leaved duckweed were both frequent. Coverage of aquatic bryophytes was high, with abundant *Fontinalis antipyretica* on larger cobble/boulder. Filamentous

algae was present, despite shading. Riparian shading was relatively high given the presence of maturing alder plantations (WS2) along the channel (both banks). The site was bordered by improved pasture (GA1) and grassy verges (GS2).

Atlantic salmon, brown trout, European eel, lamprey (*Lampetra* sp.) and stone loach were recorded via electro-fishing at site C6 (2023 site code: C5) during the previous survey (Triturus, 2024). Despite evident impacts and low summer flows, the site was of good value as a salmonid nursery, with slow-flowing glide and riffle providing suitable habitat for Atlantic salmon parr and juvenile brown trout. Deeper glide with frequent bank scours and submerged tree roots provided valuable holding areas for adult trout in the typically homogenous channel. Salmonid and lamprey spawning substrata were sparse and impacted by siltation pressures. The site was of high value for European eel, with abundant boulder and cobble offering good refuge potential. Soft sediment accumulations were largely confined to the road culvert and provided some suitability as lamprey nursery habitat. Despite some good suitability, no white-clawed crayfish were recorded, though the species is known from the wider river system (Triturus data). A spraint site and abundant otter prints were recorded under the bridge (ITM 619156, 657813).

Biological water quality, based on Q-sampling, was calculated as **Q3 (poor status)** (**Appendix A**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the utilisation by otter and the known presence of salmonids, lamprey (*Lampetra* sp.) and Red-listed European eel, the aquatic ecological evaluation of site C6 was of **local importance (higher value)** (**Table 4.3**).



Plate 4.17 Representative image of site C6 on the Black River, September 2025

4.1.18 Site D1 – Breegagh River, Killeen

Site D1 (2023 site code: D1) was located on the Breegagh River (16B03) at a local road crossing, where the river flowed through a stacked three-bore box culvert. The small lowland river (FW2) had been straightened and deepened historically, resulting in a homogenous channel with poor hydromorphology and little instream recovery. Boulder revetments were present in the vicinity of the culvert. The river was 2.5-3m wide and 0.3-0.8m deep in deep, slow-flowing glide. Pool was occasional. Riffles were limited to the vicinity of the culvert. The substrata were dominated by compacted cobble with occasional boulder and limited interstitial mixed gravels. The site suffered from heavy siltation, although deposits were flocculent, with only very localised, shallow accumulations. Woody debris was frequent instream, which improved habitat heterogeneity. The river flowed through a maturing broad-leaved plantation, and shading was high. As a result, macrophytes were limited to occasional fool's watercress, water mint and lesser water parsnip along channel margins in more open areas. Reed canary grass was abundant along channel margins. Aquatic bryophytes were limited to localised *Rhynchostegium riparioides* on exposed boulder near the culvert. The site was bordered by a broad-leaved plantation of sycamore, wych elm (*Ulmus glabra*) and alder (WD1), with dense bramble scrub (WS1) and improved pasture (GA1).

Atlantic salmon and brown trout were recorded via electro-fishing at site D1 (2023 site code: D1) during the previous survey (Triturus, 2024). Despite impacts, the site was of good value for salmonids especially as a holding habitat for adult trout, with frequent scoured banks and instream woody debris providing valuable refugia. The site was of poor quality as a salmonid or lamprey spawning habitat given significant siltation pressures. The site was of some suitability for European eel with occasional boulder and scoured banks providing refugia. Despite some suitability, no white-clawed crayfish were recorded. A regular otter spraint site (with fish remains) was recorded under the box culvert (ITM 621364,650303).

Biological water quality, based on Q-sampling, was calculated as **Q3 (poor status)** (**Appendix A**). However, it should be noted that this is a tentative rating given poor flows and lack of suitable riffle areas for sampling (as per Toner et al., 2005). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the utilisation by otter and the known presence of salmonids (including Atlantic salmon) , the aquatic ecological evaluation of site D1 was of **local importance (higher value)** (**Table 4.3**).



Plate 4.18 Representative image of site D1 on the Breegagh River, September 2025

4.1.19 Site D2 – Breegagh River, Ballymurreen Bridge

Site D2 (2023 site code: D2) was located on the Breegagh River (16B03) at Ballymurreen Bridge, c.5km downstream of site D1. The lowland river (FW2) had been straightened historically but not deepened and retained many good semi-natural characteristics. However, livestock poaching pressures have significantly impacted the quality of aquatic habitats since previous surveys of the site (September 2021 & September 2023; Plate 4.19). The river was 4-5m wide (channel up to 7m wide in places) and 0.2-0.4m deep. Locally deeper glide and pool to 0.8m was present. The profile comprised slow-flowing glide with occasional riffles near the bridge, with pool becoming more frequent downstream. The substrata were dominated by silt with only localised areas of exposed mixed gravels and cobbles (in contrast to 2021, when gravels were widespread). Sand accumulations were also present. The site supported sparse growth of macrophytes with scattered water crowfoot (*Ranunculus* sp.), lesser water parsnip, water forget-me-not, watercress and branched bur-reed. Filamentous algae were present, indicating eutrophication. Aquatic bryophytes were limited to very occasional *Rhynchostegium riparioides* and *Leptodictyum riparium* on larger substrata.. The river was bordered on the east bank by a mature treeline of blackthorn, hawthorn, ash, elder, sycamore and bramble, with improved pasture (GA1) on the west.

Atlantic salmon, brown trout, lamprey (*Lampetra* sp.),stone loach and three-spined stickleback were recorded via electro-fishing at site D2 (2023 site code: D2) during the previous surveys (Triturus, 2021, 2024). Despite evident declines in habitat quality due to livestock poaching and siltation, the site remained of moderate value for salmonids with swift glide and riffle areas providing moderate quality nursery areas. The shallow site was of relatively poor value as a holding habitat for adult salmonids, although some areas were present in bank scours and under overhanging trees. Lamprey ammocoete

habitat was widespread, although much of the soft sediment accumulations were argillaceous in nature and thus sub-optimal. Lamprey spawning habitat by way of finer gravels was present but highly localised (and much reduced over previous surveys). The site was of poor value for European eel, given a paucity of accessible instream refugia and the shallow nature. Despite some suitability for white-clawed crayfish, none were recorded (although positive eDNA recorded at the site in 2021). No otter signs were recorded in vicinity of the site.

Biological water quality, based on Q-sampling, was calculated as **Q3 (poor status)** (**Appendix A**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the known presence of salmonids (including Atlantic salmon) and lamprey (*Lampetra* sp.), the aquatic ecological evaluation of site D2 was of **local importance (higher value)** (**Table 4.3**).



Plate 4.19 Representative image of site D2 on the Breegagh River at Ballymurreen Bridge, September 2023 (top) and September 2025 (bottom), showing evident deterioration in water quality and aquatic habitats due to livestock poaching

4.1.20 Site D3 – Breegagh River, Archerstown Bridge

Site D3 (2023 site code: D3) was located on the lower reaches of the Breegagh River (16B03) at Archerstown Bridge, c.9km downstream of site D2. The lowland depositing river (FW2) was semi-natural in vicinity of the bridge, with some local bank modifications but an otherwise largely natural channel. The river suffered from low summer flows at the time of survey and was 2-3m wide in a 4-5m channel upstream, with braiding around a small island downstream of the bridge (river also wider). The river was 0.2-0.5m deep with locally deeper areas to 1.5m. The profile comprised riffle and deep glide with occasional pool. The substrata of the calcareous river were dominated by cobble and clean, mobile mixed gravels with frequent boulder. Beds of sand were present locally with flocculent soft sediment in slacks and along channel margins. Siltation was low overall.. The site was heavily vegetated with frequent water crowfoot (*Ranunculus* sp.) and lesser water parsnip. Fool's watercress was also frequent with occasional water mint, ivy-leaved duckweed and rare branched bur-reed. Cover of aquatic bryophytes was high with locally abundant *Fontinalis antipyretica*, *Chiloscyphus polyanthos* and *Leptodictyum riparium*. Larger boulders supported *Rhynchostegium riparioides*. Cover of filamentous algae was high (c.10%), indicating enrichment. The channel margins were dominated by reed canary grass with abundant bittersweet. The mature riparian zones supported treelines of sycamore, willow species and ash with abundant bramble and nettle. The site was bordered by residential properties (BL3/GA2) and improved pasture (GA1) with mature buffers.

Atlantic salmon, brown trout, European eel, minnow and stone loach were recorded via electro-fishing at site D3 (2023 site code: D3) during the previous survey (Triturus, 2024). Despite low summer flows (site normally of higher energy), the site was of high value for salmonids with good quality nursery habitat present (especially for Atlantic salmon), given an abundance of macrophyte beds in swift glide. The site also provided high quality holding habitat by way of deeper pool (e.g. downstream of bridge), extensive macrophyte beds and overhanging marginal vegetation. Such areas, in addition to frequent large boulder, were also of high suitability for European eel and white-clawed crayfish (the latter of which was not recorded). Some good quality spawning habitat for both salmonids and lamprey was present upstream and downstream of the bridge. However, there was a paucity of suitable lamprey nursery habitat with soft sediment accumulations, shallow and flocculent in nature. No otter signs were recorded in vicinity of the site although the species is known to utilise the area for sprainting (Triturus, 2024).

Biological water quality, based on Q-sampling, was calculated as **Q3 (poor status)** (**Appendix A**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the known presence of salmonids (including Atlantic salmon) and Red-listed eel, in addition to utilisation by otter, the aquatic ecological evaluation of site D3 was of **local importance (higher value)** (**Table 4.3**).



Plate 4.20 Representative image of site D3 on the Breegagh River at Archerstown Bridge, September 2025

4.1.21 Site G2 – River Goul, Urlingford

Site G2 (not surveyed in 2023) was located on the River Goul (15G02) at the R639 road and proposed GCR crossing (double pipe culverts with rendered apron). The lowland depositing river (FW2) had been deepened but not straightened historically The river was 1-1.5m wide and 0.5-0.6m deep, with bank heights of 2-3m. The profile was composed exclusively of deeper, slow-flowing glide. The substrata were dominated by heavily silted and compacted mixed gravels. The site featured a low coverage of macrophytes comprising occasional fool's watercress, *common* water starwort and common duckweed. Aquatic bryophytes were absent. The steep banks supported abundant common reed, with occasional reed canary grass, great willowherb, nettle and bramble.. The site was bordered by improved pasture (GA1) and wet grassland (GS4).

The site was of poor value for salmonids given extensive modifications and poor flows. However, deep glide habitat was of some value as holding areas for adult salmonids. However, a concrete apron at the downstream side of the culvert created a barrier to upstream fish passage at low flows. The site supported high numbers of three-spined stickleback (recorded during sweep netting). Suitability for lamprey was also poor with an absence of suitable nursery areas. There was no suitability for white-clawed crayfish given the absence of suitable refugia. No otter signs were recorded in the vicinity of the site.

Biological water quality, based on Q-sampling, was calculated as **Q3 (poor status)** (**Appendix A**). However, it should be noted that this is a tentative rating given poor flows and lack of suitable riffle areas for sampling (as per Toner et al., 2005). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the absence of aquatic species or habitats of high conservation value, the aquatic ecological evaluation of site G2 was of **local importance (lower value)** (**Table 4.3**).



Plate 4.21 Representative image of site G2 on the River Goul, September 2025

4.1.22 Site G3 – Ardreagh River, Urlingford

Site G3 (not surveyed in 2023) was located on the Ardreagh River (15A01) at the R639 road and proposed GCR crossing (double box culvert) in Urlingford. The lowland channel (FW2) was highly modified (held between retaining walls) and had been straightened historically. The river flowed over a low gradient and was 4-5m wide and 0.2-0.5m deep. The profile comprised predominantly shallow slow slow-flowing glide with occasional riffle and pool. The substrata comprised frequent mixed gravels with occasional small to medium boulder. Larger boulder were also present directly upstream of the road crossing. Siltation was moderate to high, with significant flocculent accumulations covering instream vegetation. Filamentous algae cover was considerable in open water areas, indicating eutrophication. Directly upstream of the crossing, the site featured a relatively high coverage of macrophytes, which included abundant curled pondweed, water forget-me-not, fool's watercress, water mint, common water starwort and common duckweed. Reed canary grass and branched burr-reed were present between larger instream boulders. Aquatic bryophytes were limited to *Leptodictyum riparium* on larger instream boulder and retaining walls, with *Cratoneuron filicinum* also present in the splash zone.. Further upstream, the river comprised predominantly deeper glide (c. 0.5m deep) which was heavily shaded by overhanging sycamore, ash, alder, hawthorn and non-native Himalayan honeysuckle (*Leycesteria formosa*). The site was immediately bordered by sub-urban areas and buildings (BL3).

Despite evident impacts, the site was of some value for salmonids with mixed gravels offering moderate-quality salmonid spawning habitat (but impacted by siltation).. The site was of moderate

quality as a salmonid nursery habitat, with instream vegetation and occasional boulders providing some refugia. The upstream shaded section offered some holding habitat for larger salmonids, but its nursery value was reduced by the presence of only very limited refugia (occasional small boulders). This shaded section also offered some suitability for European eel. The silted margins directly upstream of the road crossing provided some nursery suitability for lamprey ammocoetes. White-clawed crayfish suitability was low due to limited available refugia; however, a single crayfish was recorded. No otter signs were recorded in the vicinity of the site.

Biological water quality, based on Q-sampling, was calculated as **Q3 (poor status)** (**Appendix A**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the presence of white-clawed crayfish, the aquatic ecological evaluation of site G3 was of **local importance (higher value)** (**Table 4.3**).



Plate 4.22 Representative image of site G3 on the Ardreagh River, facing downstream, September 2025



Plate 4.23 Representative image of the upstream section of site G3 on the Ardreagh River, facing upstream, September 2025

4.1.23 Site G4 – Borrisbeg River, Borrismore

Site G4 (not surveyed in 2023) was located on the Borrisbeg River (15B18) at the R693 road and proposed GCR crossing. The upland eroding channel (FW1), which had been straightened historically, was 2.5-3m wide and 0.1m-0.2m deep, with deeper pool (0.5m deep) located directly below the road crossing. Bank heights were 1-1.5m. The profile was of slow-flowing, shallow riffle and glide with deeper localised pool. The substrata comprised partially bedded small boulder and cobble with frequent sand accumulations along the littorals and in pools. Some calcification of the bed was evident. Siltation was low. Macrophytes were confined to the pool area where abundant fools watercress, common duckweed and ivy-leaved duckweed were present along with water mint in the margins. Aquatic bryophytes were absent. The watercourse was heavily shaded by bordering trees and scrubby vegetation, which included sycamore, holly (*Ilex aquifolium*), hawthorn, ash, bramble and grey willow. The site was bordered by improved pasture (GA1).

The site was a lower-quality salmonid spawning habitat, given the bedded nature of the substrata and lack of suitable gravels (sand only). Salmonid nursery habitat was of moderate quality with shallow glide and deeper pool with macrophytes providing some refugia. Adult salmonid holding habitat was limited, being confined to the deeper pool downstream of the road crossing. This deeper pool also provided some suitability for European eel, with larger boulder providing refugia. The sand accumulations were of some value as lamprey ammocoete habitat. Suitability for white-clawed crayfish was moderate although none were recorded. No otter signs were recorded in the vicinity of the site.

Biological water quality, based on Q-sampling, was calculated as **Q3 (poor status)** (**Appendix A**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the presence of suitable salmonid and lamprey habitat, the aquatic ecological evaluation of site G4 was of **local importance (higher value)** (**Table 4.3**).



Plate 4.24 Representative image of site G4 on the Borrisbeg River, September 2025

4.1.24 Site G5 - Borrisbeg River, Borrismore

Site G5 (not surveyed in 2023) was located on the uppermost reaches of the Borrisbeg River (15B18) at the R693 road and proposed GCR crossing immediately south of the Loughans SAC (000407), a large turlough. The lowland channel had been extensively straightened and deepened historically and was dry at the time of the survey (as per previous surveys). Contained in a deep U-shaped channel, the dry river was a homogenous 3m wide with bank heights of up to 2m. The bed comprised damp mud with scattered boulder. This and the presence of *Fontinalis antipyretica* on larger substrata indicated occasional water flows (e.g. winter months). The channel was heavily shaded by mature ash, willow and sycamore treelines. The site was bordered by improved pasture (GA1).

Site G5 was not of fisheries value given its dry, ephemeral nature and absence of aquatic habitats. Under wetted conditions, the river would still provide poor (if any) suitability for fish species or white-clawed crayfish. No otter signs were recorded in the vicinity of the site.

It was not possible to collect a biological water quality sample due to the dry nature of the channel.

Given the absence of aquatic species or habitats of higher conservation value, the aquatic ecological evaluation of site G5 was of **local importance (lower value)** (**Table 4.3**).



Plate 4.25 Representative image of site G5 on the Borrisbeg River, September 2025 (dry channel)

4.1.25 Site G6 – Clomantagh Lower Stream, Clomantagh Lower

Site G6 (not surveyed in 2023) was located on the Clomantagh Lower Stream (15C91) at a local road and proposed GCR crossing. In contrast to EPA mapping, the stream had evidently been historically realigned and, despite extensive searching, no trace of a watercourse could be identified (likely culverted underground). The mapped course of the stream was located in heavily improved pasture (GA1) with hedgerows dominated by bramble and hawthorn.

Site G6 was not of fisheries value given its dry nature and absence of aquatic habitats. No otter signs were recorded in the vicinity of the site.

It was not possible to collect a biological water quality sample due to the dry nature of the channel.

Given the absence of aquatic species or habitats of higher conservation value, the aquatic ecological evaluation of site G6 was of **local importance (lower value)** (**Table 4.3**).



Plate 4.26 Representative image of site G6 on the Clomantagh Lower Stream, September 2025 (no watercourse identified)

4.1.26 Site G7 – Gorteenahilla River, Freshford

Site G7 (not surveyed in 2023) was located on the lowermost reaches of the Gorteenahilla River (15G08) at the R693 road and proposed GCR crossing immediately upstream of the Nuenna River confluence. The river was dry at this location at the time of survey. The lower reaches of the karstic river frequently flow underground in the summer months (pers. obs.). No remnant pools were present and natural gradients prevented water entering the dry channel from the connecting Nuenna River. The semi-natural upland eroding river (FW1) was 4-6m wide with steep banks of up to 3m in vicinity of the road crossing (a perched cobbled apron). Typical of a spate channel, the substrata were dominated by cobble with frequent small boulder and localised coarse gravels. Sand-dominated sediment accumulations were evident on meanders and adjoining putative pool areas. Macrophytes and aquatic bryophytes were not present. The river was lined by mature treelines dominated by ash and sycamore. The site was bordered by improved pasture (GA1) and the peri-urban area of Freshford (BL3).

Site G7 was not of fisheries value given its dry, ephemeral nature and absence of aquatic habitats. No otter signs were recorded in the vicinity of the site.

It was not possible to collect a biological water quality sample due to the dry nature of the channel.

Given the absence of aquatic species or habitats of higher conservation value, the aquatic ecological evaluation of site G7 was of **local importance (lower value)** (**Table 4.3**).



Plate 4.28 Representative image of site G7 on the Gorteenahilla River, September 2025

4.1.27 Site G8 - unmapped stream, R694 road crossing

Site G8 (not surveyed in 2023) was located on an unmapped stream at the R694 road and proposed GCR crossing north of Freshford. The highly modified seasonal channel was dry at the time of survey. The channel was 2m wide with bank heights of 1.5m and was historically straightened. The bed comprised small boulder and cobble, with mixed gravels. The dry bed was strewn with twigs and leaves from bordering trees and did not support any macrophytes. The semi-aquatic bryophyte *Leptodictyum riparium* was present on larger cobble and boulders, with *Pellia* sp. present on embankments. The channel was extensively tunnelled by bordering trees, which included beech (*Betula* sp.), hawthorn, ash and cypress (*Cupressus* sp.). The site was bordered by pasture (GA1), grazed by sheep and built land (BL3).

The highly modified seasonal channel did not contain any water at the time of survey and therefore, was not of fisheries value. Additionally, there was no suitability for species such as otter and white-clawed crayfish.

It was not possible to collect a biological water quality sample due to the dry nature of the channel.

Given the absence of aquatic species or habitats of higher conservation value, the aquatic ecological evaluation of site G8 was of **local importance (lower value)** (**Table 4.3**).



Plate 4.29 Representative image of site G8, September 2025 (dry, ephemeral channel)

4.1.28 Site G9 – Lismaine Stream, Clone

Site G9 (2023 site code: E8) was located on the Lismaine Stream (15L16), a tributary of the River Nore, at a local road and proposed GCR crossing. The stream (FW1) crossed under the road via a box culvert (rendered bed) and was dry at the time of survey. The small stream had been extensively straightened and deepened historically, with poor recovery evident in the steep-sided trapezoidal channel. The stream was 2m wide. The banks were typically undercut/scoured, indicating spate tendencies of the modified channel. The substrata were dominated by mixed gravels and cobble, with scattered boulder. Given high shading, macrophytes were not present. Aquatic bryophyte coverage was also low, with only very occasional *Rhynchostegium riparioides* and *Pellia epiphylla*. The liverwort *Conocephalum conicum* was locally frequent on muddy banks. The stream was lined by mature treelines of sycamore and ash with hawthorn and blackthorn. The site was bordered by improved pasture (GA1).

The site was not of fisheries value at the time of survey given its dry, ephemeral nature . However, there was some physical suitability for salmonids (known further downstream - Triturus 2021 data) and the site (2023 site code: E8) was found to support three-spined stickleback during the previous survey when it supported flowing water (Triturus, 2024). The site was unsuitable for white-clawed crayfish. No otter signs were recorded in vicinity of the site.

It was not possible to collect a biological water quality sample due to the dry nature of the channel.

Given the absence of aquatic species or habitats of higher conservation value, the aquatic ecological evaluation of site G9 was of **local importance (lower value)** (**Table 4.3**).



Plate 4.30 Representative image of site G9 on the Lismaine Stream, September 2025 (dry, ephemeral channel)

4.1.29 Site G10 – Lisdowney Stream, Grange Bridge

Site G10 (2023 site code: E9) was located on the Lisdowney Stream (15L02), a tributary of the River Nore at Grange Bridge, a proposed GCR crossing. The lowland depositing river (FW2) had been historically straightened and deepened, with bank modifications in vicinity of the bridge, but demonstrated some good instream recovery. The river was 6-8m wide and 0.2-0.4m deep, with localised deeper areas to >1m. The stream suffered from very low summer flows at the time of survey with a profile of very slow-flowing glide (i.e. imperceptible flow). A small weir was present under the bridge with a larger weir (1.5m fall) located 50m downstream of the bridge. The substrata were dominated by compacted and calcified cobble and boulder with more localised mixed gravels. Larger boulder were scattered. Bed calcification was widespread. and resulted in low coverage of aquatic vegetation. Macrophytes were limited to occasional marginal stands of fool's watercress. Aquatic bryophyte coverage was low, with only very occasional *Leptodictyum riparium* and *Rhynchostegium riparioides*. The river was shaded by mature mixed woodland and treelines supporting hawthorn, sycamore, ash, beech and holly. The site was bordered by improved pasture (GA1) and a residential property upstream (BL3).

Atlantic salmon, brown trout, European eel and three-spined stickleback were recorded via electro-fishing at site G10 (2023 site code: E9) during the previous survey (Triturus, 2024). Despite low summer flows, the site was of good value for salmonids. The site was of highest value as a salmonid nursery (being more evident in normal flows when swift glide habitat predominates). However, the paucity of instream refugia reduced the value overall. Localised pool and deep glide/undercuts provided some valuable holding habitat for adult salmonids (especially downstream of the large fish passable weir). The site was of some value for spawning salmonids and lamprey, but high calcification/compaction

rates reduced the potential of the site. The compacted bed with limited soft sediment deposition created unsuitable lamprey nursery conditions (none known from site). European eel suitability was locally good in deep pools/glide. Despite some moderate suitability, no white-clawed crayfish were recorded. A regular otter spraint site was recorded under the bridge (ITM 643578, 668668).

Biological water quality, based on Q-sampling, was calculated as **Q3 (poor status)** (**Appendix A**). However, it should be noted that this is a tentative rating given poor flows and lack of suitable riffle areas for sampling (as per Toner et al., 2005). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given utilisation by otter, in addition to the known presence of salmonids (including Atlantic salmon) and Red-listed European eel, the aquatic ecological evaluation of site G10 was of **local importance (higher value)** (**Table 4.3**).



Plate 4.31 Representative image of site G10 on the Lisdowney Stream, September 2025 during low summer flows

4.1.30 Site G11 – River Nore, Moatpark

Site G11 (not surveyed in 2023) was located on the River Nore (15N01) at a proposed GCR crossing upstream of Ballyragget. The large lowland river (FW2) had been historically deepened and was 0.4-1.5m deep with 3m high banks. Although short riffle sections were present immediately downstream of a river island, the 12-15m wide river soon graded into homogenous deep glide and pool with depositing margins. The substrata comprised compacted boulder and cobble with localised areas of sand and silt. Extensive areas of mobile gravels and cobbles were present upstream near the island. Significant eutrophication and siltation was evident. Macrophyte cover was low with only scattered water mint, blue water speedwell and branched bur-reed. Water crowfoot (*Ranunculus* sp.) was rare.

Larger substrata supported occasional *Fontinalis antipyretica*. The riparian areas supported intermittent and narrow treelines of mature crack willow (*Salix fragilis*), grey willow, ash and alder with abundant bramble and reed canary grass. The site was bordered by heavily improved pasture (GA1) and dry meadow areas (GS2).

The River Nore at this location was of good value for salmonids with the riffle and shallow glide areas at the island upstream of the proposed crossing representing a highly valuable salmonid and lamprey spawning area (rare in the wider survey area). However, deep glide downstream (surveyed in 2023, site code: E10) was not of value as a spawning habitat and was a poor quality salmonid nursery. Such habitat was, though, of good value as a holding area for adult salmonids, in addition to coarse fish species and European eel. Soft sediment accumulations along the margins, although often sand dominated, were of some value to lamprey ammocoetes. There was moderate potential for white-clawed crayfish, although bed compaction and modifications reduced suitability – none were recorded. No otter signs were recorded in vicinity of the site although foraging suitability was high.

Biological water quality, based on Q-sampling, was calculated as **Q3 (poor status)** (**Appendix A**). No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via Q-sampling.

Given the location of the site within the River Barrow and River Nore SAC (002162) and the River Nore SPA (004233), the aquatic ecological evaluation of site G11 was of **international importance** (**Table 4.4**).



Plate 4.32 Representative image of site G11 on the River Nore, August 2025

4.2 Lacustrine survey site results

4.2.1 Site L18- lake/wetland, Bawnreagh

Site L18 was an oligotrophic cutover peatland bog lake. The lake was c. 0.8 hectares in size and between 0.3-1m deep. The lake had a fibrous peat base. It supported abundant bog cotton (*Eriophorum angustifolium*) and bottle sedge in the littorals with locally frequent broad-leaved pondweed and bog pondweed (*Potamogeton polygonifolius*). Fen pondweed (*Potamogeton coloratus*) was rare. Bulbous rush (*Juncus bulbosus*) was also locally frequent in the littorals with bog pimpernel (*Lysimachia tenella*). Pockets of *Sphagnum cuspidatum* were also present, submerged in the littorals. *Sphagnum tenellum* and *Sphagnum papillosum* were present on wet hummocks with marsh pennywort (*Hydrocotyle vulgaris*) and extensive bog cotton bordering the littorals. The survey area was bordered by cutover bog (PB4) and heath.

The site was typically too shallow to support significant fish populations apart from likely three spined stickleback. Geographic isolation and a lack of connectivity from other fisheries habitats would further reduce the fisheries potential of the site. No smooth newt (*Lissotriton vulgaris*) were recorded during the survey.

No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via sweep netting (**Appendix A**).

Given the absence of aquatic species or habitats of high conservation value, the aquatic ecological evaluation of site L18 was of **local importance (lower value)** (**Table 4.3**).



Plate 4.33 Representative image of site L18, September 2025

4.2.2 Site L19 - lake/wetland, Clonoura

Site L19 comprised a mosaic of small interconnected lakes in historical cutover peatland. The wetland complex was c. 0.08 hectares in size and between 0.1 to 0.3m deep. The site had a bed composed exclusively of fibrous peat. The oligotrophic ponds within the wetland complex supported a moderate diversity of macrophytes, including broad-leaved pondweed in open water with expansive bog cotton in the littorals. Shallow pockets of open water also supported occasional *Chara vulgaris* and small pondweed (*Potamogeton berchtoldii*). Common duckweed was locally frequent in standing water. Pockets of bulrush were scattered throughout. The wetland supported scattered downy birch and grey willow in the margins with exposed tracts of bare peat. Immature native woodland (WS2) was present on the escarpments of higher ground.

The site was too shallow to support fish. Geographic isolation and a lack of connectivity from other fisheries habitats would further reduce the fisheries potential of the site. While it had high suitability for smooth newt and frog, none were recorded.

No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via sweep netting (**Appendix A**).

Given the absence of aquatic species or habitats of high conservation value, the aquatic ecological evaluation of site L19 was of **local importance (lower value)** (**Table 4.3**).



Plate 4.34 Representative image of site L19, September 2025

4.2.3 Site L20 - lake/wetland, Clonoura

Site L20 comprised a large area of open water c. 0.5hectares in size with bordering wetland in a historical peatland cutover hollow between exposed peat. The oligotrophic lake basin was between

0.1m and 0.6m deep. It had a bed composed exclusively of fibrous peat. The lake supported a low diversity of macrophytes characteristic of lowland cutover bog (PB4). This included open water supporting occasional broadleaved pondweed and bog pondweed. The littorals supported expansive bog cotton with tracts of bottle sedge and water horsetail on deeper littorals fronting bog cotton. The lake also supported pockets of emergent bulrush reed swamp (FS1). It was bordered by bare peat with revegetating cutover bog (PB4) with immature native woodland (WS2) on higher ground.

The site was too shallow and silted to support salmonids, but three spined stickleback were recorded via sweep sampling. While it had high suitability for smooth newt and frog, none were recorded.

No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via sweep netting (**Appendix A**).

Given the absence of aquatic species or habitats of high conservation value, the aquatic ecological evaluation of site L20 was of **local importance (lower value)** (**Table 4.3**).



Plate 4.35 Representative image of site L20, September 2025

4.2.4 Site L21 - lake/wetland, Clonoura

Site L21 comprised a small pocket of open water, c.0.1 hectares in size with bordering wetland in a historical peatland cutover hollow. Located adjacent to site L20, the oligotrophic lake was between 0.1m and 0.3m deep. It had a bed composed exclusively of fibrous peat. The lake supported a low diversity of macrophytes characteristic of lowland cutover bog (PB4). This included open water supporting broadleaved pondweed and bog pondweed. The littorals supported expansive bog cotton with locally frequent bottle sedge on softer peat. The lake also supported pockets of emergent bulrush reed swamp (FS1). It was bordered by bare peat tracks with revegetating cutover bog (PB4) with immature native woodland (WS2) on higher ground.

The pond was typically too shallow to support fish. Geographic isolation and a lack of connectivity from other fisheries habitats would further reduce the fisheries potential of the site. While it had high suitability for smooth newt and common frog none were observed.

No macro-invertebrate species of conservation value greater than 'least concern', according to national red lists, were recorded via sweep netting (**Appendix A**).

Given the absence of aquatic species or habitats of high conservation value, the aquatic ecological evaluation of site L21 was of **local importance (lower value)** (**Table 4.3**).



Plate 4.36 Representative image of site L21, September 2025

4.3 White-clawed crayfish survey

White-clawed crayfish was recorded from site G3on the Ardreagh River, where a single adult was captured via hand searching. No other live crayfish were recorded in the surveys undertaken at 29 no. other riverine or 4 no. lacustrine sites in September 2025.

Furthermore, inspection of otter spraints at 3 no. sites on the Black River, Breegagh River and Lisdowney Stream did not reveal the presence of crayfish remains.



Plate 4.37 White-clawed crayfish captured during sweep netting at site G3 on the Ardreagh River, September 2025

4.4 Biological water quality (macro-invertebrates)

The whirligig beetle *Gyrinus urinator* was recorded from site C6 on the Black River (**Appendix A**). This species is listed as 'Near threatened' on the Irish Red list (Foster et al., 2009).

No other rare or protected macro-invertebrate species (according to national red lists) were recorded in the biological water quality samples collected from the 19 no. other wetted riverine sites in September 2025 (**Figure 4.1**, **Appendix A**).

None of the survey sites achieved **Q4 (good status)** water quality (**Figure 4.1**). This was due to the absence of EPA group A species and or their presence at <5% of the total sample abundance (**Appendix A**).

All of the sites, with exception of site C5, achieved **Q3 (poor status)** biological water quality. This was given an absence of EPA group A (the cleanest water indicators), low numbers of EPA group B and a dominance of EPA group C (moderate water quality indicators). The group B species recorded included the mayflies *Alainites muticus* and *Paraleptophlebia cincta* and the stonefly *Leuctra fusca*. The dominant group C species included the mayfly *Baetis rhodani*, the caseless caddis species *Polycentropus kingi* and freshwater shrimp (*Gammarus duebenii*).

A single site, C5 on the Black River, achieved **Q3-4 (moderate status)** water quality (**Figure 4.1**). Despite the presence of the EPA group A mayfly *Ecdyonurus dispar*, this was only recorded in low numbers (<5% of total sample) and thus did not meet the qualifying criteria for good status as set out by Toner et al. (2005).

It should be noted that it was not possible to collected biological water quality samples for sites A2, A4, B2, B3, C1, C3 and sites G5-G9 due to the dry nature of the channels at the time of survey. The Q-ratings for sites A1, B1, B4, B3/G1, D1, G2 and G10 were tentative due to low summer flows and or a lack of suitable riffle areas for sampling (as per Toner et al., 2005).

4.5 Lacustrine macro-invertebrates

No protected macro-invertebrate species were recorded in the sweep samples taken from the four no. lake/wetland sites in September 2025 (**Appendix A**). All species recorded were of least concern when cross-referenced against national red lists, where lists exist for each species group.

The shallow peat lakes and wetlands supported a wide diversity of species, supporting mayflies such as *Cloeon dipterum* and *Caenis horaria*, two species that are widespread in silty lake margins. No dragonflies were recorded. However, the ubiquitous damselfly genus *Coenagrion* was present. The pigmy backswimmer (*Plea minutissima*) has a sparse distribution in Ireland but is known to be spreading northwards in recent decades (Anderson, 2010). A single specimen was recorded at lake survey site L20 (**Appendix A**). A second species of note was the dytiscid (diving) beetle, *Hyphydrus ovatus,* that was recorded a site L18. This beetle species has a sparse distribution in Ireland (NBDC data), despite being of least concern on the national red list for water beetles (Foster et al. 2009).

4.6 Otter signs

Whilst a full otter survey was beyond the scope of this survey, signs were recorded within a 150m radius of the survey sites in September 2025.

A total of 3 no. otter signs were recorded across 34 no. individual survey sites during the course of aquatic surveys undertaken in September 2025. All were recorded from riverine sites. Spraint sites (all regular) were recorded at sites on the Black River (C6), Breegagh River (D1) and the Lisdowney Stream (G10).

No breeding (holts) or resting (couch) areas were identified in the vicinity of the survey sites in September 2025 or during the previous 2023 surveys (Triturus, 2024).

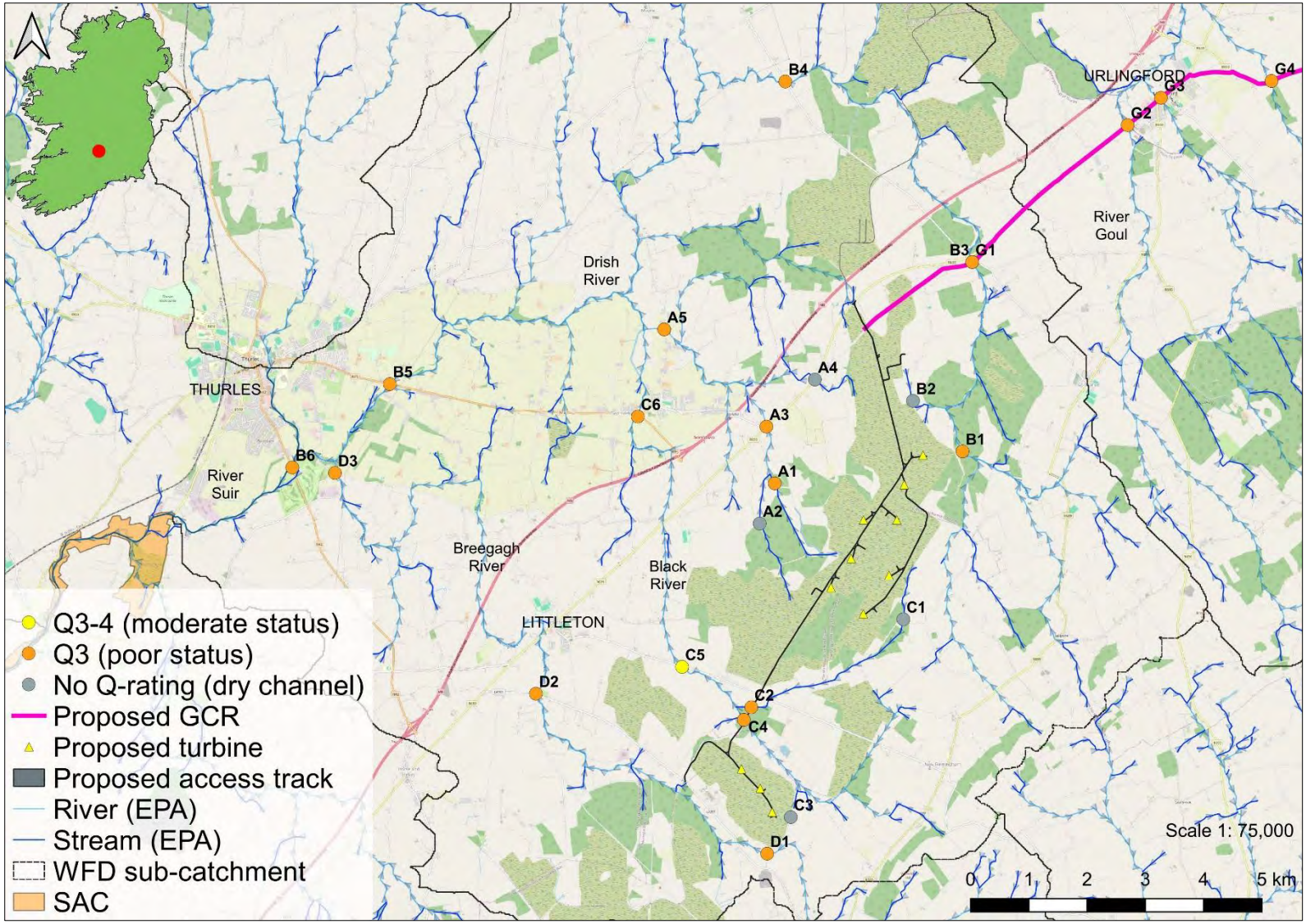


Figure 4.1 Overview of the biological water quality status in the vicinity of the proposed Littleton wind farm project, September 2025

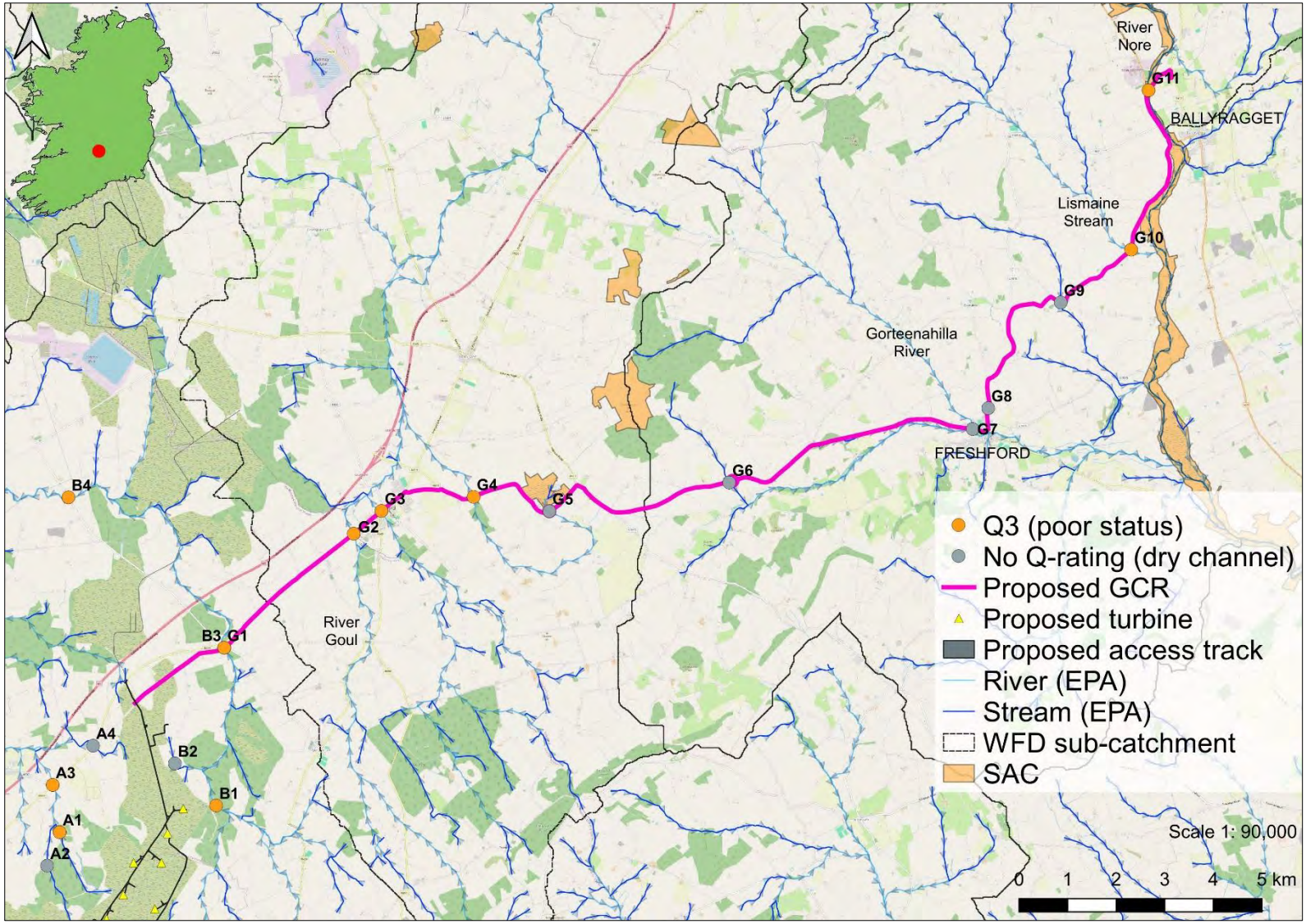


Figure 4.2 Overview of the biological water quality status in the vicinity of the proposed GCR crossings, September 2025

Table 4.1 Comparison of 2023 and 2025 biological water quality (Q-ratings) at sites in vicinity of Littleton wind farm

Site no.	Watercourse	EPA code	September 2023		September 2025	
			Q-rating	WFD status	Q-rating	WFD status
A1	Unnamed stream	n/a	Q3*	Poor	Q3*	Poor
A2	Clover River	16C04	Q3*	Poor	n/a - dry channel	
A3	Clover River	16C04	Q3	Poor	Q3	Poor
A4	Unnamed stream	n/a	Q2-3*	Poor	n/a - dry channel	
A5	Clover River	16C04	Q3-4	Mod.	Q3	Poor
B1	Drish River	16D02	Q3*	Poor	Q3*	Poor
B2	Unnamed stream	n/a	Not surveyed		n/a - dry channel	
B3/G1	Drish River	16D02	Q2-3	Poor	Q3*	Poor
B4	Drish River	16D02	Q2-3	Poor	Q3*	Poor
B5	Drish River	16D02	Q4	Good	Q3	Poor
B6	River Suir	16S02	Not surveyed		Q3	Poor
C1	Black River	16B01	n/a - dry channel		n/a - dry channel	
C2	Black River	16B01	Q3	Poor	Q3	Poor
C3	Unnamed stream	n/a	Not surveyed		n/a - dry channel	
C4	North Glengoole River	16N28	Q3	Poor	Q3*	Poor
C5	Black River	16B01	Q3	Poor	Q3-4	Mod.
C6	Black River	16B01	Q3	Poor	Q3	Poor
D1	Breegagh River	16B03	Q3-4	Mod.	Q3*	Poor
D2	Breegagh River	16B03	Q3	Poor	Q3*	Poor
D3	Breegagh River	16B03	Q3-4	Mod.	Q3	Poor
G2	River Goul	15G02	Not surveyed		Q3*	Poor
G3	Ardreagh River	15A03	Not surveyed		Q3	Poor
G4	Borrisbeg River	15B18	Not surveyed		Q3	Poor
G5	Borrisbeg River	15B18	Not surveyed		n/a – dry channel	
G6	Clomantagh Lower Stream	15C91	Not surveyed		n/a – dry channel	
G7	Gorteenahilla River	15G08	Not surveyed		n/a – dry channel	
G8	Unmapped stream	n/a	Not surveyed		n/a – dry channel	
G9	Lismaine Stream	15L16	Q3	Poor	n/a – dry channel	
G10	Lisdowney Stream	15L02	Q4	Good	Q3*	Poor
G11	River Nore	15N01	Not surveyed		Q3	Poor

* tentative rating given poor flows and the absence of suitable riffle areas for sampling (as per Toner et al., 2005)

Table 4.2 Summary of aquatic species & habitats of higher conservation value recorded in the vicinity of the proposed Littleton wind farm, September 2025

Site		White-clawed crayfish	Otter signs[4]	Annex I aquatic habitats	Rare or protected macrophytes/ aquatic bryophytes	Rare or protected macro-invertebrates	Other species/habitats of high conservation value
Riverine sites							
A1	Unnamed stream	None recorded	No signs	None recorded	None recorded	None recorded	None recorded
A2	Clover River	None recorded	No signs	None recorded	None recorded	None recorded	None recorded
A3	Clover River	None recorded	No signs	None recorded	None recorded	None recorded	None recorded
A4	Unnamed stream	None recorded	No signs	None recorded	None recorded	None recorded	None recorded
A5	Clover River	None recorded	No signs	None recorded	None recorded	None recorded	**Atlantic salmon & *Lampetra* sp. recorded in 2023**
B1	Drish River	None recorded	No signs	None recorded	None recorded	None recorded	None recorded
B2	Unnamed stream	None recorded	No signs	None recorded	None recorded	None recorded	None recorded
B3/G1	Drish River	None recorded	No signs	**Hydrophilous tall herb (6430)**	None recorded	None recorded	**Atlantic salmon & European eel recorded in 2023**
B4	Drish River	None recorded	No signs	None recorded	None recorded	None recorded	***Lampetra* sp. recorded in 2023**
B5	Drish River	None recorded	No signs	None recorded	None recorded	None recorded	**Atlantic salmon, *Lampetra* sp. & European eel recorded in 2023**
B6	River Suir	None recorded	No signs	None recorded	None recorded	None recorded	None recorded
C1	Black River	None recorded	No signs	None recorded	None recorded	None recorded	None recorded
C2	Black River	None recorded	No signs	None recorded	None recorded	None recorded	**Atlantic salmon recorded in 2023**
C3	Unnamed stream	None recorded	No signs	None recorded	None recorded	None recorded	None recorded
C4	North Glengoole River	None recorded	No signs	None recorded	None recorded	None recorded	None recorded

Site		White-clawed crayfish	Otter signs[4]	Annex I aquatic habitats	Rare or protected macrophytes/ aquatic bryophytes	Rare or protected macro-invertebrates	Other species/habitats of high conservation value
C5	Black River	None recorded	No signs	None recorded	None recorded	None recorded	None recorded
C6	Black River	None recorded	**Regular spraint site**	None recorded	None recorded	***Gyrinus urinator* (Near threatened; Foster et al., 2009)**	**Atlantic salmon, *Lampetra* sp. & European eel recorded in 2023**
D1	Breegagh River	None recorded	**Regular spraint site**	None recorded	None recorded	None recorded	**Atlantic salmon recorded in 2023**
D2	Breegagh River	None recorded	No signs	None recorded	None recorded	None recorded	**Atlantic salmon & *Lampetra* sp. recorded in 2023**
D3	Breegagh River	None recorded	No signs	None recorded	None recorded	None recorded	**Atlantic salmon & European eel recorded in 2023**
G2	River Goul	None recorded	No signs	None recorded	None recorded	None recorded	None recorded
G3	Ardreagh River	**Single crayfish captured**	No signs	None recorded	None recorded	None recorded	None recorded
G4	Borrisbeg River	None recorded	No signs	None recorded	None recorded	None recorded	None recorded
G5	Borrisbeg River	None recorded	No signs	None recorded	None recorded	None recorded	None recorded
G6	Clomantagh Lower Stream	None recorded	No signs	None recorded	None recorded	None recorded	None recorded
G7	Gorteenahilla River	None recorded	No signs	None recorded	None recorded	None recorded	None recorded
G8	Unmapped stream	None recorded	No signs	None recorded	None recorded	None recorded	None recorded
G9	Lismaine Stream	None recorded	No signs	None recorded	None recorded	None recorded	None recorded
G10	Lisdowney Stream	None recorded	**Regular spraint site**	None recorded	None recorded	None recorded	**Atlantic salmon & European eel recorded in 2023**
G11	River Nore	None recorded	No signs	None recorded	None recorded	None recorded	None recorded
Lacustrine sites							
L18	Lake/wetland	No signs	Not present	None recorded	None recorded	None recorded	None recorded
L19	Lake/wetland	No signs	Not present	None recorded	None recorded	None recorded	None recorded

Site		White-clawed crayfish	Otter signs[4]	Annex I aquatic habitats	Rare or protected macrophytes/ aquatic bryophytes	Rare or protected macro-invertebrates	Other species/habitats of high conservation value
L20	Lake/wetland	No signs	Not present	None recorded	None recorded	None recorded	None recorded
L21	Lake/wetland	No signs	Not present	None recorded	None recorded	None recorded	None recorded

Conservation value: White-clawed crayfish (*Austropotamobius pallipes*), Atlantic salmon (*Salmo salar*), brook lamprey (L*ampetra planeri*), river lamprey (*Lampetra fluviatilis*) and Eurasian otter (*Lutra lutra*) are listed under Annex II and Annex V of the Directive on the Conservation of Natural Habitats of Wild Fauna and Flora (92/43/EEC) ('EU Habitats Directive'). White-clawed crayfish and otter are also protected under the Irish Wildlife Acts 1976-2023. White-clawed crayfish (Füreder et al., 2010) are listed as 'Endangered' according to the IUCN Red List. European eel are 'critically endangered' according to most recent ICUN red list (Pike et al., 2020) and listed as 'critically engendered' in Ireland (King et al., 2011).

Table 4.3 Aquatic ecological evaluation summary of the Littleton wind farm survey sites according to NRA (2009) criteria

Site no.	Watercourse	EPA code	Evaluation of importance	Rationale summary
Riverine sites				
A1	Unnamed stream	n/a	**Local importance (higher value)**	Brown trout recorded in 2023; site utilised by otter
A2	Clover River	16C04	Local importance (lower value)	No aquatic species or habitats of high conservation value (dry, ephemeral channel)
A3	Clover River	16C04	**Local importance (higher value)**	Brown trout recorded in 2023; site utilised by otter
A4	Unnamed stream	n/a	Local importance (lower value)	No aquatic species or habitats of high conservation value (dry, ephemeral channel)
A5	Clover River	16C04	**Local importance (higher value)**	Atlantic salmon, brown trout & lamprey (*Lampetra* sp.) recorded 2023; site utilised by otter
B1	Drish River	16D02	Local importance (lower value)	No aquatic species or habitats of high conservation value
B2	Unnamed stream	n/a	Local importance (lower value)	No aquatic species or habitats of high conservation value (dry, ephemeral channel)
B3/G1	Drish River	16D02	**County importance**	Annex I hydrophilous tall herb (6430) habitat present
B4	Drish River	16D02	**Local importance (higher value)**	Brown trout & lamprey (*Lampetra* sp.) recorded in 2023
B5	Drish River	16D02	**Local importance (higher value)**	Atlantic salmon, brown trout, lamprey (*Lampetra* sp.) & Red-listed European eel recorded in 2023
B6	River Suir	16S02	**County importance**	Regionally important ecological corridor
C1	Black River	16B01	Local importance (lower value)	No aquatic species or habitats of high conservation value (dry, ephemeral channel)
C2	Black River	16B01	**Local importance (higher value)**	Atlantic salmon recorded in 2023
C3	Unnamed stream	n/a	Local importance (lower value)	No aquatic species or habitats of high conservation value (dry, ephemeral channel)
C4	North Glengoole River	16N28	**Local importance (higher value)**	Brown trout recorded in 2023
C5	Black River	16B01	**Local importance (higher value)**	Brown trout recorded in 2023

Site no.	Watercourse	EPA code	Evaluation of importance	Rationale summary
C6	Black River	16B01	**Local importance (higher value)**	Red-listed beetle *Gyrinus urinator* recorded (2025); Atlantic salmon, brown trout, European eel & lamprey (*Lampetra* sp.) recorded in 2023
D1	Breegagh River	16B03	**Local importance (higher value)**	Salmonids (including Atlantic salmon) recorded; site utilised by otter
D2	Breegagh River	16B03	**Local importance (higher value)**	Otter signs recorded (2025)
D3	Breegagh River	16B03	**Local importance (higher value)**	Atlantic salmon, European eel & otter signs recorded in 2023
G2	River Goul	15G02	Local importance (lower value)	No aquatic species or habitats of high conservation value
G3	Ardreagh River	15A01	**Local importance (higher value)**	White-clawed crayfish recorded (2025)
G4	Borrisbeg River	15B18	**Local importance (higher value)**	Suitable salmonid and lamprey habitat present
G5	Borrisbeg River	15B18	Local importance (lower value)	No aquatic species or habitats of high conservation value (dry, ephemeral channel)
G6	Clomantagh Lower Stream	15C91	Local importance (lower value)	Watercourse not present (possibly culverted underground)
G7	Gorteenahilla River	15G08	Local importance (lower value)	No aquatic species or habitats of high conservation value (dry, ephemeral channel)
G8	Unmapped stream	n/a	Local importance (lower value)	No aquatic species or habitats of high conservation value (dry, ephemeral channel)
G9	Lismaine Stream	15L16	Local importance (lower value)	No aquatic species or habitats of high conservation value (dry, ephemeral channel)
G10	Lisdowney Stream	15L02	**Local importance (higher value)**	Site utilised by otter (2025)
G11	River Nore	15N01	**International importance**	Site located in River Barrow and River Nore SAC (002162) and the River Nore SPA (004233)
Lacustrine sites				
L18	Lake/wetland	n/a	Local importance (lower value)	No aquatic species or habitats of high conservation value
L19	Lake/wetland	n/a	Local importance (lower value)	No aquatic species or habitats of high conservation value
L20	Lake/wetland	n/a	Local importance (lower value)	No aquatic species or habitats of high conservation value

Site no.	Watercourse	EPA code	Evaluation of importance	Rationale summary
L21	Lake/wetland	n/a	Local importance (lower value)	No aquatic species or habitats of high conservation value

Conservation value: White-clawed crayfish (*Austropotamobius pallipes*), Atlantic salmon (*Salmo salar*), brook lamprey (L*ampetra planeri*), river lamprey (*Lampetra fluviatilis*) and Eurasian otter (*Lutra lutra*) are listed under Annex II and Annex V of the Directive on the Conservation of Natural Habitats of Wild Fauna and Flora (92/43/EEC) ('EU Habitats Directive'). White-clawed crayfish and otter are also protected under the Irish Wildlife Acts 1976-2023. White-clawed crayfish (Füreder et al., 2010) are listed as 'Endangered' according to the IUCN Red List. European eel are 'critically endangered' according to most recent ICUN red list (Pike et al., 2020) and listed as 'critically engendered' in Ireland (King et al., 2011). With the exception of the Inland Fisheries Acts 1959 to 2017, brown trout and coarse fish species have no legal protection in Ireland.

5. Discussion

The riverine watercourses in the vicinity of the proposed Littleton wind farm, inclusive of those crossed by the proposed GCR, were typically lowland channels which had been extensively straightened and or deepened historically as part of drainage and land reclamation works, resulting in poor hydromorphology and reduced habitat heterogeneity. Whilst some good instream recovery had occurred locally (e.g. Drish River, Black River, Breegagh River, Lisdowney Stream), significant siltation and hydromorphological pressures were evident throughout much of the survey area. Furthermore, low summer flows, characteristic of this part of Ireland, also impacted the aquatic ecology during the 2025 surveys. A total of 10 no. sites, inclusive of five GCR watercourse crossings, were dry at the time of survey and did not support aquatic habitats.

Nevertheless, the majority of the riverine survey sites were evaluated as at least **local importance (higher value)** in terms of their aquatic ecology due to the presence of or suitability for high conservation value fish species, Annex II white-clawed crayfish, Annex II otter, the Red-listed beetle *Gyrinus urinator* or Annex I habitats (**Table 4.3**). Site G11 on the River Nore (proposed GCR crossing) was evaluated as **international importance** given its location with both the River Barrow and River Nore SAC (002162) and River Nore SPA (004233). Site B3/G1 on the Drish River (proposed GCR crossing) was evaluated as **county importance** given the presence of Annex I hydrophilous tall herb habitat. Site B6 on the River Suir was of **county importance** given the river's regional importance as an ecological corridor.

The 4 no. lakes and wetlands located near the turbine array originate from historical cutover bog activities and as such were shallow, peat stained, poorly vegetated and of lower productivity, providing relatively poor habitat for many higher conservation value species or habitats. Nevertheless these sites supported a range of macro-invertebrate species and were of high suitability for amphibians[1]. None of the lake/wetland sites corresponded to Annex I lake habitats (e.g. natural dystrophic lakes and ponds, 3160) and were of **local importance (lower value)**.

In support of previous surveys, no rare or protected macrophytes/aquatic bryophytes, otter breeding/resting areas or aquatic invasive species were recorded during the current survey. Biological water quality had broadly declined relative to the previous 2023 surveys, driven primarily through lower water volumes and reduced flows in the 2025 survey period.

5.1 Fisheries

Electro-fishing was beyond the scope of the current survey. However, a fisheries appraisal at all survey sites generally supported available data and previous findings. In 2023 a typical diversity of fish species for Irish midland rivers, namely Atlantic salmon, brown trout, lamprey (*Lampetra* sp.), European eel, stone loach, minnow, pike, perch and three-spined stickleback, were recorded via electro-fishing (Triturus, 2024). Whilst some good instream recovery had occurred locally (e.g. Drish River, Black River, Breegagh River, Lisdowney Stream), significant siltation and hydromorphological pressures

[1] Many sites had high suitability for amphibians although a dedicated survey for smooth newt and common frog was beyond the scope of this survey. An environmental DNA approach would help to clarify the status of amphibians at these sites

were evident throughout the survey area. Historical straightening and deepening of watercourses damages habitat and flow heterogeneity, removes instream structure and refugia, encourages sediment deposition and invariably results in an irreparable reduction in fisheries potential, particularly for salmonids (O'Briain et al., 2019; O'Grady et al., 2017; Blann et al., 2009; O'Grady, 2006) but also European eel and lamprey species.

Despite often considerable water quality and hydromorphological pressures, salmonid populations are widespread in the survey area, with Atlantic salmon known to occur on the Clover River, Drish River, Black River, Breegagh River, Ardreagh River, Gorteenahilla River and the Lisdowney Stream, as well as the River Nore and River Suir. In context of the survey area, lamprey (*Lampetra* sp.) are known from the Clover River, Drish River, Black River, Breegagh River, River Goul, River Suir and River Nore, although densities are typically low given sub-optimal spawning and nursery habitats, often a result of siltation and historical instream modifications. These characteristics were again observed in the current survey, including at proposed GCR crossings not surveyed previously (i.e. G2-G8 inclusive). Red-listed (King et al., 2011) and critically endangered (Pike et al., 2020) European eel are also known to occupy a restricted distribution in the survey area but are known from the majority of the survey watercourses (Triturus, 2024). Current and previous findings suggest this is due to a combination of sub-optimal habitat and widespread migration barriers in the survey catchments.

The 4 no. lakes and wetlands located adjacent to the proposed turbine array originate from historical cutover bog activities and as such are shallow, highly turbid (peat stained), poorly vegetated, isolated from other aquatic habitats and of lower productivity. None were considered of significant fisheries value (stickleback only).

5.2 White-clawed crayfish

Despite suitability at numerous sites, only a single live white-clawed crayfish was recorded during targeted surveys in September 2025, with an adult captured via hand searching on the Ardreagh River, a tributary of the River Goul, at site G3 (proposed GCR crossing) (**Plate 4.37**). Indeed, crayfish remains (but no live crayfish) were recorded in otter spraint at this same location in September 2023 (Triturus, 2024). White-clawed crayfish are also known from the Drish River, Clover River, Black River, River Goul and the River Nore (**Figure 3.1**) although crayfish plague (*Aphanomyces astaci*) has likely impacted crayfish populations throughout the Suir and Nore catchments.

The 4 no. survey lakes/wetlands were inherently unsuitable for white-clawed crayfish given their unsuitable peat geologies, water chemistry (humic/acidic) and physical habitat attributes (Demers et al., 2005; Lucey & McGarrigle, 1987).

5.3 Otter

Despite widespread suitability, only a low number of otter signs (3 no.) were recorded across 34 no. individual survey sites. All were recorded from riverine sites with the lakes/wetlands surveyed providing poor otter habitat, primarily due to insufficient prey resources. Spraint sites (all regular) were recorded at sites on the Black River (C6), Breegagh River (D1) and the Lisdowney Stream (G10). Otter signs were recorded at 6 no. sites during the previous 2023 survey (Triturus, 2024).

In keeping with previous observations, the paucity of signs in the wider survey area was considered to mainly reflect the influence of historical instream modifications (straightening, deepening) and low summer flows on the health and distribution of fish populations, the key prey resource of otter (Krawczyk et al., 2016; Ruiz-Olmo & Jiménez, 2009). Otters are food-limited and prey availability is a crucial factor in determining mortality, breeding success and the status of local populations (Sittenthaler et al., 2019; Ruiz-Olmo et al., 2002). Furthermore, otter sign marking is routinely associated with prominent features such as large instream boulders and tree root systems (Almeida et al., 2012). Historical drainage, such as that carried out historically in the vicinity of the proposed project, significantly reduces instream habitat heterogeneity (O'Grady, 2017) and the availability or marking features which therefore results in the deposition and detection of fewer otter signs such as spraints, irrespective of watercourse utilisation (e.g. for foraging).

No breeding (holts) or resting (couch) areas were identified in the vicinity of the survey sites in September 2025 or during the previous 2023 surveys (Triturus, 2024).

5.4 Macrophytes and Annex I habitats

In keeping with previous data, no rare or protected macrophytes or aquatic bryophytes were recorded at the riverine or lacustrine survey sites in September 2025.

Based on the presence of several indicator species (EC, 2013; Devaney, 2013), including *Lythrum salicaria, Epilobium hirsutum, Solanum dulcamara*, *Calystegia sepium, Myosotis scorpioides, Mentha aquatica* and *Galium palustre,* the heavily modified Drish River at site B3/G1 supported the Annex I habitat 'Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels (6430)'. This habitat often forms along unmanaged margins of lowland rivers (Devaney et al., 2013) and was recorded at the same location in 2023 (Triturus, 2024).

Although Annex I floating river vegetation (3260) was recorded at sites on the Black River (C6) and Breegagh River (D3) in 2023 (Triturus, 2024), the aquatic vegetation communities at these locations, though still supporting indicator species (EC, 2013), were not considered representative of the habitat in the current survey. This was mainly due to lower summer flows and water levels compared with 2023 which resulted in fragmentation and reduced coverage of the habitats.

5.5 Macro-invertebrates & biological water quality

Site C6 on the Black River was found to support the IUCN-threatened whirligig beetle *Gyrinus urinator*. This species is listed as IUCN near-threatened and has a limited distribution in Ireland, being largely restricted to lowland, base-rich rivers and streams (Foster et al., 2009).

With the exception of *Gyrinus urinator* (site C6), no other rare or protected macro-invertebrate species (according to national red lists) were recorded in the biological water quality samples taken from 20 no. wetted riverine sites or 4 no. sweep samples from lake sites in September 2025 (**Appendix A**). Whilst not protected, the nationally uncommon dytiscid beetle *Hyphydrus ovatus* and the pigmy backswimmer (*Plea minutissima*) were recorded at sites L18 and L20 respectively.

None of the riverine sites achieved greater than **Q3-4 (moderate status)** water quality in the current survey and thus all sites failed to meet the target good status (≥Q4) requirements of the European Union Environmental Objectives (Surface Waters) (Amendment) Regulations 2019 and the Water Framework Directive (2000/60/EC) (**Figure 4.1**). Two sites (B5 & G10) achieved Q4 status in 2023 but not in 2025, with a greater number of moderate status sites also in 2023 (**Table 4.1**). The reduction in water quality from the previous survey can be attributed to the low summer flows experienced during the September 2025 survey which evidently impacted macro-invertebrate populations and distribution. Site C5 on the Black River showed a slight improvement in water quality in September 2025, achieving **Q3–4 (moderate status)**, compared with **Q3 (poor status**) in 2023 (**Table 4.1**). Peat extraction (leading to siltation) and forestry are the significant threats to water quality in the survey area (EPA data). Furthermore, hydromorphological modifications also influenced biological water quality in September 2025.



Plate 5.1 Stock image of the IUCN near-threatened whirligig beetle *Gyrinus urinator*, recorded on the Black River at site C6 in September 2025

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7. Appendix A – Q-sample results (biological water quality) & lacustrine macroinvertebrates

Table 7.1 Macro-invertebrate Q-sampling results for riverine sites in the vicinity of Littleton wind farm, September 2025

Taxon	Family	Binomial name	A1	A3	A5	B1	B4	B5	B6	C2	C4	C5	C6	EPA Class
Ephemeroptera	Heptageniidae	*Ecdyonurus dispar*										2		**A**
Ephemeroptera	Baetidae	*Alainites muticus*	1		1			15		1		2		**B**
Ephemeroptera	Leptophlebiidae	*Paraleptophlebia cincta*					4							**B**
Odonata	Coenagrionidae	sp. indet.	1				1							**B**
Plecoptera	Leuctridae	*Leuctra fusca*			1			6	1	1			1	**B**
Trichoptera	Beraeidae	*Beraeodes minutus*									1			**B**
Trichoptera	Cased caddis pupa	sp. indet.		1									2	**B**
Trichoptera	Goeridae	*Silo pallipes*										2		**B**
Trichoptera	Hydroptilidae	*Hydroptila* sp.						1						**B**
Trichoptera	Leptoceridae	*Athripsodes aterrimus*							1					**B**
Trichoptera	Sericostomatidae	*Sericostoma personatum*		2	1	1		1		1				**B**
Trichoptera	Hydropsychidae	*Hydropsyche instabilis*		2	2			9	1	2		34		**C**
Trichoptera	Hydropsychidae	*Hydropsyche siltalai*						3						**C**
Trichoptera	Polycentropodidae	*Polycentropus kingi*	2		17		12	1	7				3	**C**
Trichoptera	Rhyacophilidae	*Rhyacophila dorsalis*						1				2		**C**
Ephemeroptera	Baetidae	*Baetis rhodani*			1			23		2		7		**C**
Ephemeroptera	Caenidae	*Caenis horaria*								1				**C**
Ephemeroptera	Caenidae	*Caenis luctuosa*				3			3					**C**
Ephemeroptera	Caenidae	sp. indet.						1						**C**
Ephemeroptera	Ephemerellidae	*Serratella ignita*							2			2		**C**
Coleoptera	Dytiscidae	Dytiscidae larva						2		2				**C**
Coleoptera	Dytiscidae	*Dytiscus semisulcatus*										1		**C**
Coleoptera	Dytiscidae	*Nebrioporus depressus*								4	2			**C**
Coleoptera	Elmidae	*Elmis aenea*		5	7	1	1	2	4			25	13	**C**
Coleoptera	Elmidae	*Limnius volckmari*			3			1		1		3		**C**

Taxon	Family	Binomial name	A1	A3	A5	B1	B4	B5	B6	C2	C4	C5	C6	EPA Class
Coleoptera	Gyrinidae	Gyrinidae larva					2							C
Coleoptera	Gyrinidae	*Gyrinus urinator* †											1	C
Coleoptera	Haliplidae	*Brychius elevatus*			1			3				1		C
Coleoptera	Hydrophilidae	*Laccobius minutus*							1					C
Gastropoda	Bithnyiidae	*Bithynia tentaculata*				2	39							C
Gastropoda	Lymnaeidae	*Lymnaea stagnalis*					2		1					C
Gastropoda	Planorbidae	*Bathyomphalus contortus*	1											C
Gastropoda	Planorbidae	*Gyraulus albus*							1					C
Gastropoda	Planorbidae	*Planorbis planorbis*		6		1	7		1					C
Arachnida	Hydrachnidiae	sp. indet.						3		1				C
Hemiptera	Gerridae	*Gerris* sp.		3			2			13	4	8		C
Hemiptera	Hydrometridae	*Hydrometra stagnorum*					1							C
Hirudinidae	Piscicolidae	Piscicola sp.										1	1	C
Crustacea	Gammaridae	*Gammarus duebeni*	10	45	8	5	11	47	19	27		65	8	C
Diptera	Chironomidae	Non-*Chironomus* spp.			1			1	10	4		1		C
Diptera	Culicidae	sp. indet.			1								1	C
Diptera	Pediciidae	*Dicranota* sp.		1								2	1	C
Diptera	Simuliidae	sp. indet.						1	1			9		C
Diptera	Tipuliidae	*Tipula* sp.							9					C
Gastropoda	Tateidae	*Potamopyrgus antipodarum*							4				2	C
Crustacea	Asellidae	*Asellus aquaticus*	3			2	29	3	4	1	3			D
Crustacea	Crangonyctidae	*Crangonyx* sp.						1	1					D
Gastropoda	Lymnaeidae	*Ampullacaena balthica*					2		8					D
Gastropoda	Physidae	*Physa fontinalis*				2	7	1	2					D
Hirudinidae	Glossiphoniidae	sp. indet.	1	1	2		1				2			D
Megaloptera	Sialidae	*Sialis lutaria*				2								D

Taxon	Family	Binomial name	A1	A3	A5	B1	B4	B5	B6	C2	C4	C5	C6	EPA Class
Mollusca	Sphaeriidae	sp. indet.					5	1					2	**D**
Diptera	Chironomidae	*Chironomus* spp.			14				9		4	2	1	**E**
Annelidae	Oligochaeta	sp. indet.						1				2		**n/a**
Abundance			**19**	**66**	**60**	**19**	**126**	**128**	**90**	**61**	**16**	**171**	**36**	
Q-rating			***Q3**	**Q3**	**Q3**	***Q3**	***Q3**	**Q3**	**Q3**	**Q3**	**Q3**	**Q3-4**	**Q3**	
WFD status			**Poor**	**Poor**	**Poor**	**Poor**	**Poor**	**Poor**	**Poor**	**Poor**	**Poor**	**Mod.**	**Poor**	

* tentative rating due to poor flows and or lack of suitable riffle areas for sampling (as per Toner et al., 2005)

† Listed as 'Near threatened' in Ireland (Foster et al., 2009)

Table 7.2 Macro-invertebrate Q-sampling results for riverine sites in the vicinity of Littleton wind farm, September 2025 (* tentative rating)

Taxon	Family	Binomial name	D1	D2	D3	B3/G1	G2	G3	G4	G10	G11	EPA Class
Ephemeroptera	Baetidae	*Alainites muticus*		1	2			3				**B**
Plecoptera	Leuctridae	*Leuctra fusca*	1		3						3	**B**
Trichoptera	Cased caddis pupa	sp. indet.		3								**B**
Trichoptera	Glossosomatidae	*Agapetus fuscipes*							10			**B**
Trichoptera	Glossosomatidae	sp. indet.		4	2						2	**B**
Trichoptera	Limnephilidae	*Drusus annulatus*								1		**B**
Trichoptera	Limnephilidae	*Potamophylax cingulatus*			5					7		**B**
Trichoptera	Odontoceridae	*Odontocerum albicorne*	1								7	**B**
Trichoptera	Sericostomatidae	*Sericostoma personatum*		1	1	1	2			8	2	**B**
Trichoptera	Hydropsychidae	*Hydropsyche instabilis*		18	6						2	**C**
Trichoptera	Polycentropodidae	*Plectrocnemia conspersa*	1									**C**
Trichoptera	Polycentropodidae	*Polycentropus kingi*	3		1			12				**C**
Trichoptera	Rhyacophilidae	*Rhyacophila dorsalis*			1							**C**
Ephemeroptera	Baetidae	*Baetis rhodani*	3		1			3	3		13	**C**
Ephemeroptera	Ephemerellidae	*Serratella ignita*			6			1			2	**C**
Coleoptera	Dytiscidae	Dytiscidae larva	1				2					**C**
Coleoptera	Dytiscidae	*Ilybius fuliginosus*					1					**C**
Coleoptera	Dytiscidae	*Nebrioporus depressus*		1						9		**C**
Coleoptera	Dytiscidae	*Oreodytes sanmarkii*		1								**C**
Coleoptera	Dytiscidae	*Oreodytes septentrionalis*		2								**C**
Coleoptera	Dytiscidae	*Stictotarsus duodecimpustulatus*					2			2		**C**
Coleoptera	Elmidae	*Elmis aenea*		18	1		2	6	26			**C**
Coleoptera	Elmidae	*Esolus parallelepipedus*					1					**C**
Coleoptera	Elmidae	*Limnius volckmari*		1				1				**C**
Coleoptera	Halipliidae	*Brychius elevatus*		3	4			3		1		**C**

Taxon	Family	Binomial name	D1	D2	D3	B3/G1	G2	G3	G4	G10	G11	EPA Class
Coleoptera	Halipliidae	*Haliplus ruficollis*					1					**C**
Coleoptera	Halipliidae	sp. indet.								1		**C**
Coleoptera	Hydraenidae	*Hydraena gracilis*							1			**C**
Coleoptera	Hydrophilidae	*Laccobius bipunctatus*					2					**C**
Gastropoda	Bithnyiidae	*Bithynia tentaculata*				28						**C**
Gastropoda	Planorbidae	*Bathyomphalus contortus*				7						**C**
Gastropoda	Planorbidae	*Planorbis planorbis*				3		2		1	2	**C**
Gastropoda	Valvatidae	*Valvata piscinalis*						7				**C**
Arachnida	Hydrachnidiae	sp. indet.		2	3							**C**
Hemiptera	Gerridae	*Gerris* sp.	14				2			2	4	**C**
Hemiptera	Veliidae	*Velia caprai*					3				1	**C**
Hirudinidae	Piscicolidae	*Piscicola* sp.			3			1				**C**
Diptera	Chironomidae	Non-*Chironomus* spp.	3	3	2			1	1	10		**C**
Diptera	Pediciidae	*Dicranota* sp.		2				3	14			**C**
Diptera	Ptychopteridae	sp. indet.							1			**C**
Diptera	Simuliidae	sp. indet.			1							**C**
Gastropoda	Tateidae	*Potamopyrgus antipodarum*	2	4							15	**C**
Crustacea	Gammaridae	*Gammarus duebeni*	27	109	32	15	4	42	27	1	10	**C**
Crustacea	Asellidae	*Asellus aquaticus*	1	19	8	26	2	1		31		**D**
Gastropoda	Lymnaeidae	*Ampullacaena balthica*		6			11			19	2	**D**
Gastropoda	Physidae	*Physa fontinalis*				8				10		**D**
Hirudinidae	Glossiphoniidae	sp. indet.				1	1			1	1	**D**
Diptera	Chironomidae	*Chironomus* spp.	9	5	2		3	2			1	**E**
Abundance			**66**	**203**	**84**	**89**	**39**	**88**	**83**	**104**	**67**	
Q-rating			***Q3**	***Q3**	**Q3**	***Q3**	***Q3**	**Q3**	**Q3**	***Q3**	**Q3**	
WFD status			**Poor**	**Poor**	**Poor**	**Poor**	**Poor**	**Poor**	**Poor**	**Poor**	**Poor**	

Table 7.3 Macro-invertebrate sweep sample results for lake/ wetland sites L8, L10, L12 & L14 in the vicinity of Littleton wind farm, September 2025

Taxon	Family	Binomial name	L8	L10	L14	L15
Ephemeroptera	Baetidae	*Cloeon simile*	2	9	11	
Ephemeroptera	Caenidae	*Caenis horaria*			7	
Trichoptera	Limnephilidae	*Limnephilus marmoratus*			3	
Trichoptera	Phryganeidae	*Agrypnia obsoleta*				1
Trichoptera	Polycentropodidae	*Plectrocnemia conspersa*	1			
Coleoptera	Dytiscidae	Dytiscidae larva	1			
Coleoptera	Dytiscidae	*Hyphydrus ovatus*	1		1	
Coleoptera	Dytiscidae	*Porhydrus lineatus*		1	3	
Coleoptera	Dytiscidae	*Stictonectes lepidus*			1	
Coleoptera	Gyrinidae	*Gyrinus marinus*	2			
Coleoptera	Haliplidae	*Haliplus ruficollis*	1			
Coleoptera	Haliplidae	*Haliplus* sp.			18	
Coleoptera	Hydrophilidae	*Laccobius bipunctatus*		1		
Coleoptera	Hydrophilidae	*Laccobius minutus*			1	
Coleoptera	Noteridae	*Noterus clavicornis*			1	
Gastropoda	Lymnaeidae	*Ampullacaena balthica*		7		2
Gastropoda	Physidae	*Physa fontinalis*			3	
Gastropoda	Planorbidae	*Gyraulus albus*				1
Gastropoda	Planorbidae	*Planorbis planorbis*		8	1	1
Gastropoda	Succineidae	sp. indet.		1	1	
Gastropoda	Tateidae	*Potamopyrgus antipodarum*			24	1
Hemiptera	Corixidae	*Callicorixa praeusta*				3
Hemiptera	Corixidae	*Corixa panzeri*	4	2		13
Hemiptera	Corixidae	Corixidae nymph				11
Hemiptera	Corixidae	*Hesperocorixa linnaei*	7	6		5

Taxon	Family	Binomial name	L8	L10	L14	L15
Hemiptera	Corixidae	*Hesperocorixa sahlbergi*		4		
Hemiptera	Corixidae	sp. indet.			3	
Hemiptera	Gerridae	*Gerris* sp.	1			
Hemiptera	Notonectidae	*Notonecta viridis*		2		1
Hemiptera	Pleidae	*Plea minutissima*			1	
Hirudinidae	Erpobdellidae	sp. indet.	2			
Hirudinidae	Glossiphoniidae	sp. indet.			1	
Mollusca	Sphaeriidae	sp. indet.				4
Odonata	Coenagrionidae	sp. indet.	18	16	7	
Crustacea	Asellidae	*Asellus aquaticus*	13	7	29	6
Crustacea	Gammaridae	*Gammarus duebeni*				2
Arachnida	Hydrachnidiae	sp. indet.	1			
Diptera	Chaoboridae	sp. indet.	8			
Diptera	Chironomidae	*Chironomus* spp.		1		
Diptera	Chironomidae	Non-*Chironomus* spp.	1			1
Diptera	Culicidae	sp. indet.		1		
Diptera	Limoniidae	sp. indet.			1	
Species richness (*n*)			**15**	**14**	**19**	**14**
Abundance			**63**	**66**	**117**	**52**



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