Greensource

Moanmore Lower Wind Farm

Freshwater Pearl Mussel Stage 1 Surveys

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April 2025

Client:	Greensource
Address:	Station Road Adare Co. Limerick Ireland
Project reference:	P00013688
Date of issue:	April 2025

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1. Introduction

1.1. Background

APEM Ireland (now part of APEM Group Woodrow) were commissioned by Greensource Ltd. to conduct a Stage 1 Freshwater Pearl Mussel (FPM) assessment of watercourses along the proposed turbine delivery route (TDR) for the Moanmore Lower wind farm project. FPM surveys were undertaken to establish baseline FPM data to be used in the preparation of the EIAR for the proposed Project, which is described in detail in Chapter 2 (Project Description) of the EIAR.

A section of the proposed TDR along the L6132 will require widening and verge strengthening. A detailed description of the proposed temporary accommodation requirements can be found within Section 2.5.5 of Chapter 2. There are three watercourse crossings along the L6132. At these three locations, steel plates will be placed on the verge for 10 m each side of watercourse crossings to avoid excavation and disturbance of the existing ground.

Two of the three watercourse crossings, namely the Tullagower River and Brisla East Stream, are hydrologically connected to locations downstream where previous surveys of the Doonbeg River, by EirEco in 2012 & 2016, and MKO in 2014 , identified the presence of FPM (Chapter 7, Figure 7 4).

The Tullagower River and Brisla East Stream drain into the upper reaches of the Doonbeg River catchment (Doonbeg_030). The Doonbeg_030 waterbody is classified under the EU WFD as being of Poor status. The Doonbeg_030 flows into the Doonbeg_040 at Cooraclare where the WFD status is classed as Good (Chapter 7, Figure 7 5).

Given the hydrological link of the location of the temporary accommodation requirements on the TDR to previous surveys where FPM were previously confirmed as being present, surveys were undertaken in October 2023 to investigate the presence of FPM in the Tullagower River and Brisla East Streams, as the catchment is considered a sensitive area for the species.

This document provides a summary of the methods used and results obtained.

1.2. Site Description

The proposed crossing pointsare located at approximately Irish Transverse Mercator (ITM) 505161 659761 and 506874 659796 on the L6132.

1.3. Aquatic Ecology Survey Site Selection

Survey locations were chosen based on the proposed turbine delivery route (TDR), which is described in detail in Chapter 2 Section 2.5.5, and the points at which the TDR crosses the upper reaches of the Doonbeg catchment.

Six locations were chosen for FPM Stage 1 surveys (Table 1, Figure 1). Sites 1-3, each c. 300 m long, are adjacent to the L6132 road, including where it crosses the rivers. Sites 4-6, each 50-150 m long, are between the L6132 and the confluence of the Tullagower River and Doonbeg.

Table 1. FPM Stage 1 survey sites and EPA classification

Site	EPA Name	EPA Code	Segment code	Comments
1	Tullagower River	28T01	28_360 - 28_171	Around and downstream of L6132 road crossing
2	Tullagower River	28T01	28_171	Reach parallel to L6132
3	Tullagower River Brisla East	28T01 28B08	28_171 – 28_236 28_381	Around L6132 road crossing of Brisla East, and confluence of Brisla East and Tullagower River
4	Tullagower River	28T01	28_236	Between Brisla East confluence and Doonbeg confluence
5	Tullagower River	28T01	28_236	Between Brisla East confluence and Doonbeg confluence
6	Tullagower River	28T01	28_236	Immediately upstream of Doonbeg confluence

Sites 1-6 were identified in advance of the field survey. However, once on site, several other locations were visited for a visual assessment (Figure 1).

- Site A, on the opposite bank of the Doonbeg to the Tullagower River confluence, was visited better to observe the downstream part of Site 6, which was otherwise inaccessible.
- The site visit confirmed that the majority of the flow of the lower Tullagower River, downstream of the Brisla East confluence, was diverted into an unmapped channel (Figure 2). Sites B-D are along this water course, which is uncoded. Site E is situated on an unnamed river (EPA Segment code 28_373). No surveys had been planned for this channel and river, but the sites were visited to determine the potential for it to be suitable habitat.

1.4. Evidence of Technical Competence and Experience

Summaries of the qualifications and experience of the personnel involved in the work, and their role in delivering it, are outlined below. Gráinne Keogh and Amy Adwan carried out the field survey. This report was prepared by Gráinne Keogh and technically reviewed by Michael Dobson.

Gráinne Keogh is a Senior Ecologist at APEM. Gráinne holds a BSc (Hons) in Ecology and Environmental Biology and an MSc in Marine Biology. Gráinne has carried out field and lab work across marine, terrestrial, and freshwater environments; these include habitat surveys and mapping, species identification, freshwater pearl mussel surveys, electrofishing surveys

and chemical and biological water quality analysis including SSRS and Q-value assessments. She has previously worked on the Climate Change Mitigation Research Project in Inland Fisheries Ireland and she has also spent time at sea on research vessels conducting fisheries surveys with the Marine Institute. Grainne also has a robust understanding of the impact assessment processes, and Irish and EU wildlife legislation and has written a number of Appropriate Assessments, Natura Impact Statements and Ecological Impact Assessments.

Amy Adwan is a Senior Terrestrial Ecologist with APEM with nine years' experience in the ecological sector in Ireland. Amy is a qualified ecologist experienced in a wide range of ecological survey techniques and methodology including bats, mammals, freshwater and habitats. Amy has worked on various projects relating to bats including extensive survey work, mitigation plans including the design of bat houses, derogation licences as well as Ecological Clerk of Works and compliance reporting. Amy holds a licence to disturb bats for survey work, a bat handling licence and a photography licence covering all species of bat in Ireland. Amy has also extensive experience in surveying mammal species for a wide range of developments, including road schemes, wind farms and housing projects.

Dr Michael Dobson FLS (Associate Director) is a freshwater biologist with over 35 years' experience. He has a BSc (Hons) in Biology from the University of Southampton and a PhD in river ecology from the University of London (QMUL). He spent 20 years as a research scientist, specialising in ecology and management of rivers and freshwater wetlands throughout Europe and East Africa, along with developing biotic indices for river quality assessment in Central America. He was Director of the Freshwater Biological Association for six years before joining APEM in 2013, working initially in the limnology and water quality team before setting up its dedicated invasive species team in 2019 and moving to APEM's Ireland sector in 2022. Mike has written many peer- reviewed papers in ecology and biogeography, along with two undergraduate textbooks for Oxford University Press (both in their second editions) and seven identification guides to freshwater invertebrates of Britain and Ireland. He has extensive experience of survey design, data analysis and reporting, including publication and verbal reporting for non-technical audiences. He has written and reviewed Habitats Directive assessments in both Ireland and the UK, and contributed aquatic ecology baseline survey reports and EIAR chapters to five other wind farm proposals since 2022.

2. Freshwater Pearl Mussel Survey

2.1. Methods

2.1.1. Stage 1 Survey

The survey work was carried out under licence (No. C214/2023) granted by NPWS for qualified ecologists to survey the FPM in the specified locations.

Surveys took place following the standard methodology used by the NPWS (National Parks and Wildlife Service, 2004) on 09 and 10 October 2023. Weather conditions during the surveys were clear (c. 15% cloud cover), sunny, 20°C with a light wind.

The following were considered in the habitat assessment prior to survey. FPM require clean, fast-flowing water, optimum water depths of 0.3–0.4 m, optimum current velocities of 0.25–0.75 ms^{-1} with boulder-stabilised refugia, and which contain enough sand for burrowing. Adults can tolerate silty or muddy conditions for unknown lengths of time, but juveniles are never found in this type of habitat. Boulders are important as they usually prevent significant bed scour during major floods (Hastie *et al*. 2000, Gittings *et al*. 1998). Most suitable areas to search

during stage 1 survey is in the immediate vicinity of boulders and under overhanging trees in suitable marginal areas, channel shading is extremely important, but dense low shading over small channels will generally make them unsuitable for the species.

At each station, accessible sections of the proposed 300 m section of riverbed were systematically searched for living mussels or mussel shells, where suitable habitat was available, giving particular attention to the immediate vicinity of suitable habitat (suitable habitat is described in detail in Appendix A) and a detailed recording Stage 1 data survey form was completed, including information on mussel numbers (including absence of mussels), describing the habitat in detail, and including any relevant observations on the state of the watercourse.

The survey covered approximately 40 m at site 1, 118 m at site 2 and 130 m at site 3. Survey was not possible at sites 4, 5 and 6, due to absence of the expected river channel.

Surveys were carried out using bathyscope techniques. Surveys were conducted by one surveyor and a bankside manager.

The extra sites A-E were not surveyed, but observations were made of potential habitat suitability for FPM.

2.2. Results

2.2.1. Stage 1 Survey

There were access issues limiting the survey coverage relative to that planned (Figure 1), but the habitat in many cases was unsuitable for pearl mussel. The species avoids silt- or clay-dominated beds and is unlikely to be present where there is extensive overhanging vegetation and aggregations of organic matter. It is sensitive to fine sediments and will not be present where there has been recent channel straightening or clearance. Runoff via land drains will also make the habitat unsuitable. All of these features were extensive in the areas surveyed.

No live mussels were encountered and there was no evidence recorded of mussels (e.g. empty shells) during the surveys.

Site 1 was largely an overgrown channel which had signs of previous modification throughout. High banks and field drains were present throughout this stretch along with overhanging brambles and vegetation (Plates 1-3). This area was well shaded but the substrate, where accessible, was not suitable FPM substrate, with up to 50% of the substrate being clay in areas. Immediately downstream of the existing road crossing was the most suitable habitat, with 35% of the substrate being cobble. The surveyed stretch (ca. 40 m) had an average depth of ca. 8 cm, mainly comprised of run habitat and had an average width of ca. 1 m. Upstream of the road crossing the river was almost entirely inaccessible due to vegetation cover (Plate 3).

Site 2 was a channel between 1-2 m width with an average depth of ca. 70 cm where surveyed (ca. 118 m) (Plate 4). Signs of previous channel modification were present throughout with high steep banks and field drains present. There was extensive instream vegetation narrowing the surveyable area within the channel; this instream vegetation includes *Nasturtium officinale, Callitriche stagnalis, Sparganium sp.,* and *Lolium sp* (Plate 5). The substrate in this area was mainly soft and comprised of silt and clay, no cobble or boulder substrate was present in this stretch. This stretch was mainly comprised of glide habitat. At the upstream end of the stretch the channel was >1 m depth and very soft, this was unsuitable to survey and the river bed could not be seen even with the use of a torch.

Site 3 spanned across the Tullagower River and Brisla East Stream. The Tullagower River downstream of the confluence the channel was up to 2 m wide with an average depth of 30

cm (Plate 6). It was largely overgrown with brambles and ferns, plus conifers from the bordering forestry, and was inaccessible in many areas due to this vegetation. Again, there was evidence of previous channel modification and field drains at this site. The substrate consisted of up to 50% cobble, with instream vegetation consisting of *Lolium sp* and *Stachys palustris* also present in the section surveyed upstream of the confluence on the Tullagower River (Plate 7). The survey was conducted on ca. 130 m of the Tullagower River at this site. Survey was not possible on the Brisla East Stream, as it was heavily vegetated instream and bankside (Plate 8). Upstream of the road crossing on this stream was heavily overgrown with brambles and inaccessible. Japanese knotweed (*Fallopia japonica*) was also noted upstream of the road crossing at this Site.

Site 4 was located within an area of cutover bog. There was no water body present at this location (Plate 9), and thus no FPM survey was possible. Bog drains, field drains and forestry drains were present in the surrounding areas (Plate 10).

Site 5 and 6 (Plate 11, Plate 12) were assessed from the banks, but no FPM surveys were conducted due to channel access at these sites. The channel at these sites was narrow and shallow with high overgrown banks; the channel was heavily vegetated, making it unsuitable FPM habitat. At site 6, the confluence with the Doonbeg, the Tullagower River was stagnant with instream vegetation.

The confluence at Site 6 was also viewed from the right hand bank of the Doonbeg river at site A. The main Doonbeg channel at this location was ca. 8 m wide and comprised mainly of glide habitat (Plate 13). The substrate and depth of the river at this location were not clear from the bank however there were willows in stream which often provide suitable cover for FPM.

As there was a significant difference in the flow within the Tullagower River between sites 1-3 and sites 4-6, further sites were visited for investigation of the river system. At site B there was an unmapped forestry drain flowing east towards site C (Plate 14, Plate 15); the majority of the flow from the Tullagower River upstream was following this drain rather than along the mapped channel. This channel was still present at site C and was flowing north east towards site D (Plate 16). The link between the drain running from site D to site E (Plate 17) was not located but it is suspected these sites were connected. The routes of this channel is shown in Figure 2. None of the sites assessed were considered suitable habitat for FPM, being shallow, channelised and heavily vegetated.

2.3. Conclusions

Most of the river reaches earmarked for survey comprised unsuitable habitat for FPM; where the channel was inaccessible for survey, this was mainly due to thick, overhanging vegetation, which would almost certainly make the instream channel equally unsuitable for FPM. Where the channels were suitable for FPM survey, none were found. The complete absence of records paired with, for the most part, unsuitable habitat suggests a genuine absence of FPM at the locations surveyed.

Notwithstanding the probable absence of FPM in the tributaries, the Doonbeg River lies within an FPM sensitive area, which means that consideration of this species is required, particularly with respect to mitigation during and following construction. There are previous records of FPM in the Doonbeg River, both upstream and downstream of its confluence with the Tullagower River (Figure 1, Site 6). Therefore, although no FPM were recorded at the surveyed sites it is important to consider their presence in the wider Doonbeg system, particularly the Doonbeg River downstream of the Tullagower River confluence, when carrying out any works

surrounding the watercourses.

Presence of Japanese knotweed was noted on the Brisla East Stream where it crosses the road at Site 3. The European Communities (Birds & Natural Habitats) Regulations 2011 – 2023 restrict the importation, distribution, sale or release of approximately 70 species of plants and animals considered to be the most harmful Invasive Alien Species. Japanese knotweed is one of the plant species listed in Part 1 of the Third Schedule of the 2011 - 2023 regulations. Japanese knotweed is also listed as a vector material in Part 3 of the Third Schedule. It is an offence to plant, disperse, allow or cause to disperse, spread or otherwise cause to grow in any place any plant included in the Third Schedule. It is an offence under the Wildlife Acts 1976 – 2022 to plant or otherwise cause to grow in a wild state in any place in the State any species of (exotic) flora, or the flowers, roots, seeds or spores of (exotic) flora. Therefore care must be taken and appropriate mitigation must be put in place not to further disperse this or any other invasive species encountered.

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Plates

Plate 1. Site 1 surveyed section

Plate 2. Site 1 inaccessible section, downstream of road crossing

Plate 3. Site 1 inaccessible section, upstream of road crossing

Plate 4. Site 2 surveyed channel with instream vegetation visible

Plate 5. Site 2 instream vegetation

Plate 6. Site 3, surveyed channel downstream of confluence

Plate 7. Site 3, surveyed section Tullagower river upstream of confluence

Plate 8. Site 3, Brisla East Stream, inaccessible upstream of confluence

Plate 9. Site 4, no river present

Plate 10. Site 4, nearby large bog drain

Plate 11. Site 5, overgrown channel inaccessible for survey

Plate 12. Site 6, overgrown channel, inaccessible for survey

Plate 13. Main Doonbeg River downstream of confluence from right hand bank at Site A.

Plate 14. Channel continuing east at Site B

Plate 15. Mapped Tullagower channel running south towards unmapped forestry channel at Site B

Plate 16. Channel flowing east at Site C

Plate 17. Channel at Site E flowing towards Doonbeg channel

Figures

Figure 1. Stage 1 surveys, proposed survey reaches and actual locations surveyed

Figure 2. River network in the survey area, showing the original course of the Tullamore River (red) and the apparent main channel at the time of survey (orange)