Technical Note
R323783_TN_App1

Development	Planning permission for Cloonkett Wind Farm consisting of 14 no. wind turbines, a permanent 220kV substation and ancillary development
Location	located in the townlands of Carrowreagh East and West, Cloondrinagh, Cloonkett, Burrenfadda, Shessiv, Craghera, Glenconaun More and Ballyduneen, County Clare.
Planning Authority	Clare County Council
Applicant(s)	Cloonkett Green Energy
Type of Application	Private Development - REDIII Application
Topics	Efficacy of mitigation measures for water quality protection
Scientist	Finbarr Quigley
Inspector	Alaine Clarke

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1.0 Introduction

1.1. Proposed Development

Cloonkett Green Energy have applied for permission, a RED III application, for a wind farm development comprising 14 no. turbines, a permanent 220kV substation and ancillary development in the townlands of Carrowreagh East and West, Cloondrinagh, Cloonkett, Burrenfadda, Shessiv, Craghera, Glenconaun More and Ballyduneen, County Clare.

1.2. Scope of Report

1.2.1. Regarding the application and its potential for impacts on water quality and consequently the Freshwater Pearl Mussel (*Margaritifera*) (FPM), the Inspector requested a Technical Note from the Environmental Scientist as follows:

- Provide an independent professional appraisal of the information provided by the applicant in view of current best practice taking account of observations made by the Department of Housing, Heritage and Local Government, any other statutory submissions and any public submissions.
- Provide a professional opinion, proportional to the development proposed, on the overall impact assessment highlighting any inadequacies.

In my capacity as Senior Environmental Scientist with over twenty years of professional experience, I have the relevant expertise to provide a professional opinion in relation to the items above.

1.2.2. This report to the Inspector and available to the Commission is a written record of my review and examination of the submitted information and will support the Inspectors report in relation to this application.

1.3. Site Location and Description of Proposed Development

1.3.1. The site location and proposed development is described in detail in the Inspectors report and not repeated here.

2.0 Documentation

2.1. Overview

2.1.1. I have read the documentation attached to this file ABP 323783-25 relating to impacts on Soils and Geology, Hydrogeology, Hydrology and Biodiversity including the relevant sections of the EIAR and appendices. I have also reviewed the relevant drawings, plans and particulars etc.

2.1.2. Other sources of information which were consulted in preparation of this report include:

- The EPA's online Water Framework Directive App on EDEN
- The GSI Online Groundwater Data Viewer

3.0 Relevant Submissions

3.1. Development Applications Unit, Department of Housing, Local Government and Heritage (DAU) submission

3.1.1. A submission from the DAU included a suggestion that the efficacy of the proposed mitigation measures during construction and operation to prevent alteration of the hydrological functioning and pollution of the River Cloon, in particular, with fine sediment and nutrients was not demonstrated.

3.2. Applicants' response to DAU submission

3.2.1. In response to the DAU suggestion that the efficacy of the mitigation measures to protect the hydrological regime and prevent pollution was not demonstrated, the applicant provided a detailed response which referenced the contents of various sections of the following application documents:

- AA Screening and Natura Impact Statement Report
- EIAR (various chapters)
- Construction Environmental Management Plan (Appendix 2.1)
- Surface Water Management Plan (Appendix 11.1)
- Aquatic Habitat Management and Enhancement Plan (Appendix 9.6)
- Peat & Spoil Management Plan (Appendix 10.3)

In summary, the applicant's response suggested that the efficacy of mitigation measures to protect the hydrological regime and prevent pollution from sediments

and nutrients in particular had already been already demonstrated clearly in the aforementioned reports. The applicant did not introduce any new information in response to this element of the submission.

4.0 Assessment

4.1. Freshwater Pearl Mussel sensitivities

4.1.1. Moorkens et al (2024)[1] outlines that the freshwater pearl mussel (FPM) is acknowledged to be one of the most demanding species of high-water quality and high riverbed quality in the world. Due to the extreme sensitivity of *Margaritifera*, all land use activities in a catchment supporting the species must be in keeping with the needs of a thriving mussel population, as just one damaging activity can destroy conservation efforts in the rest of the catchment.

4.1.2. The guidance document includes the following (among other) requirements as favourable conditions for FPM:

- Maintenance of natural flow regime variability (including high flows)
- Low nutrient concentrations and resulting absence of filamentous algae
- Stable cobble and gravel substrate with an absence of inorganic silt, organic peat and detritus

4.1.3. The guidance states that when considering a project such as this within a FPM catchment, a full assessment with no gaps is the required approach by which a project can be considered with regard to Article 6.3 of the Habitat's Directive. In order to assess site locations, works areas, construction methods and mitigation measures, the exact location, design, hydrology, hydrogeology, soil type, and nutrient levels need to be considered for in-combination effects. This includes the need for detailed method statements, full designs, clear detailed scale drawings that document the construction process from start to finish.

4.1.4. Key information gaps that need to be addressed as part of any assessment of the impact of a plan or project on FPM within an SAC include:

[1] Atkinson, S., Magee, M., Moorkens, E.A. & Heavey, M. (2024). *Guidance on Assessment and Construction Management in Margaritifera Catchments in Ireland.*

- Identifying whether evidence-based avoidance or mitigation measures can be implemented to reduce or eliminate, any potential impacts of the project or plan on the conservation objectives of the FPM population within the SAC.
- Assessing the effectiveness of proposed mitigation and avoidance measures.
- The identification and incorporation of monitoring requirements into mitigation measures

4.1.5. The focus of my report is on the effectiveness of the mitigation measures identified by the applicant with specific relevance to potential flow, sedimentation and nutrient impacts on receiving waters from the proposed development. A key question to be answered is whether the applicant has demonstrated beyond a reasonable scientific doubt that no significant adverse effects on water quality or quantity will arise as a result of the proposed development.

4.2. Proposed Mitigation Measures

4.2.1. Moorkens et al (2024) suggests that mitigation should be considered in a hierarchy consisting of avoidance, reduction or minimisation, rehabilitation/restoration, and compensation. In the context of the FPM, minimisation through reduction of duration of an impact is not considered to be feasible. The sensitivity of the pearl mussel means that significant impact occurs even when duration of the impact is reduced. Rehabilitation/restoration of suitable ecosystems relate to legacy issues and do not apply in this instance. Compensation measures for FPM are considered to be extremely difficult given the complicated life cycle of the species and the need for pristine water quality and habitat. The above means that mitigation by avoidance or reduction/minimisation are the only feasible options available in a FPM catchment.

4.2.2. The applicant has provided a detailed list of embedded mitigation measures relevant to the protection of water quality and the hydrological condition of receiving waters. These are outlined in detail in Section 5.3 (p. 70) of the NIS and within the other documents aforementioned.

4.2.3. These measures adopt the principles of mitigation by avoidance where possible and include avoiding deep peat, using floating roads where necessary, implementing buffer distances around watercourses, minimising volumes of contaminated water, minimising the number of water-crossing points, replacing a ford crossing in a river

with a clear-span bridge and the adoption of good practice methods for construction. In addition, the applicant has advised that some works will only be undertaken within certain periods of the calendar year and certain weather conditions (e.g. heavy rainfall) will be avoided. I am satisfied that the inclusion of these embedded measures is best practice and their implementation would provide effective mitigation.

4.2.4. Having reviewed the information relating to the applicants proposed mitigation measures relating to the control of impacts from the use of concrete and hydrocarbons during construction I am satisfied they are well developed, robust and in line with industry best practice. The potential impacts from sanitary wastewater generated on site have also been considered and appropriate mitigation measures designed and outlined in sufficient detail within the application.

4.2.5. The applicant has outlined a series of measures which adopt the principles of mitigation by minimisation or reduction. These include measures taken to reduce the extent of impacts (including direct, indirect and cumulative impacts, as appropriate) that cannot be completely avoided, as far as is practically feasible. For FPM mitigation through minimisation means reduction of pressures to the extent that no significant impact on FPM conservation status materializes. These key measures include those relating to the minimisation of impacts on receiving waters which are detailed in the SWMP, the CEMP, the Peat & Spoil Management Plan and listed in the NIS. Sections 4.3 to 4.7 below include a more detailed assessment of these measures and their effectiveness as presented by the applicants Surface Water Management Plan.

4.3. Jar/Bench Tests

4.3.1. A Bench Test (also known as a Jar Test) is a small-scale laboratory procedure used to simulate and evaluate water treatment processes, particularly the settlement and sedimentation behaviour of soil or suspended solids in water.

4.3.2. On 5th March 2024 the project Hydrogeologist drafted an initial briefing note (Volume III, Appendix 11.5) on Drainage/Hydrology/Hydrogeology for the applicant which outlined ‘Key Emerging Issues’ relating to these topics. This report provided a ‘Suggested Hydrological Scope’ (section 4.1) which included recommendations for a

baseline hydrological characterisation of the site to include '*Bench tests (jar tests to prove settlement times)*'. The report says the following in relation to Bench Test/Jar Testing:

"*As discussed, we have completed Jar tests on previous sites to demonstrate settlement can be achieved. Results of the tests may determine if chemical treatment is required. Jar testing is relatively simple and should not be over-complicated.*"

4.3.3. In Volume III, Chapter 10 (10.4.11.3) the applicant described how 5 bench tests were conducted by BHP Laboratories on non-peat soil samples collected from the Phase 1 ground investigation (GI) trial pits. A summary of the results was presented in Table 10-18 and analysis results presented in Appendix 10.4. The results of this analysis indicated that all samples were predominantly composed of fine-grained materials, with varying percentages of clay and silt-sized constituents. The applicant concluded that the results suggested low permeability soils were present at the testing locations and the reported settlement values indicated slow-settling fine-graded materials dominated the samples tested.

4.3.4. The above results as reported by the applicant suggested that the achievement of sufficient settlement of particles within the proposed settlement ponds would prove challenging due to elevated levels of clay-sized particles which require extended periods to settle. It is noteworthy that despite the stated significance of Jar/Bench testing, there was no further discussion of the aforementioned results within the application documents, in particular within the Surface Water Management Plan (Appendix 11.1) which includes the applicants design considerations for the proposed settlement ponds.

4.3.5. Given the reported results of the Jar/Bench tests outlined above, the proposed development is likely to produce waters which will not be treated adequately in the settlement ponds as designed. The applicant has described (see 4.4.2 and 4.4.3 above) how additional treatment of waters to remove clay-sized particles may be necessary using flocculants and mobile treatment plants.

4.3.6. In this instance, the applicant has identified that due to the nature of the soil types present on site and the limitations of the standard mitigation measures proposed, additional water treatment options may be required. The applicant has not provided

sufficient information on the nature of this additional water treatment. This in my opinion, creates significant uncertainty over the ability of the proposed development to effectively mitigate against impacts on water quality and consequently the population of FPM.

4.4. Surface Water Management Plan

4.4.1. The Surface Water Management Plan (SWMP) as prepared by the applicant (Appendix 11.1) is based on industry standard principles which aim to minimise the volume of contaminated water to be treated and use a multi-stage treatment train of the discharges from the development.

4.4.2. The treatment train is designed to capture surface water run-off from the access tracks and other hardstanding areas in swales and discharge into settlement ponds specifically constructed for managing surface water runoff generated from the Proposed Development infrastructure. After passing through the settlement pond, surface run-off will be permitted to spread across the adjacent lands. The applicant stated that this treated water will percolate to groundwater or travel over ground and be assimilated into the existing drainage network. The applicant stated that there will be no direct discharges from the Proposed Development to any existing natural watercourse.

4.4.3. The SWMP (Table 2-1) provided details of the dimensions and locations of 79 settlement ponds which will be installed across the site adjacent to excavations for access roads, turbine bases and hardstand areas. The applicant has outlined that all elements of the SWMP including ponds would be constructed in parallel with the access track construction and thus be in-situ for all the subsequent stages of construction, operation and decommissioning.

4.4.4. In addition to the 79 ponds identified, the SWMP also refers to ‘semi-permanent settlement ponds’ to be located adjacent to significant earthworks which are to be decommissioned and reinstated on completion of the construction works. The number and location of these semi-permanent settlement ponds is not provided as it is expected they would be installed on an ‘as needed’ basis during construction. The applicant does state that these additional ponds would be located a minimum of 50m

from ‘existing watercourses’ but does not provide details of any discharges from the ponds.

4.4.5. The SWMP describes how the surface water treatment train including the settlement ponds will receive contaminated waters from all elements of the construction phase, with the exception of the initial site clearance phase. Water encountered during the excavations for turbine bases has the potential to contain an increased concentration of suspended solids and the applicant has stated that this water will also be pumped into the site drainage system for treatment.

4.4.6. The SWMP also described a scenario where dewatering may be required in areas away from the site drainage system. In this scenario, the applicant suggested that dewatering would be via filter bags to adjacent lands within the red-line boundary. These types of discharges would be onto natural vegetation and would be set back a minimum of 20m from any drain or watercourse. The SWMP did not provide any further details on the type of excavation which would require these measures, what the threshold for ‘away from the site drainage system’ is or any further details on the filter bags and what particle sizes they were capable of removing.

4.4.7. The SWMP described how the settlement ponds were designed to allow suspended solids of a ‘*very small particle size*’ to fall out of suspension. The report states that Stoke’s Law was used to inform the design of the ponds. Stoke’s Law is a mathematical formula that calculates the settling velocity of a small, spherical particle falling through a fluid under the influence of gravity. A key variable in Stoke’s law is the particle size radius and in water treatment, it explains why heavy particles like sand sink quickly, while tiny particles like clay remain suspended in water for long periods of time. The Jar/Bench test results of the 5 samples taken on site were not discussed in this section of the SWMP which in my opinion is a significant omission as these results would inform the effectiveness of ponds to remove all particles likely to be encountered.

4.4.8. The SWMP contains industry-standard measures for treating water generated from construction projects. It lacks rigorous, site-specific hydrogeological modelling of fine sediment transport during construction, overlooks the impact of silt clogging critical gravel interstitial spaces on juvenile recruitment, and relies on generalised mitigation

rather than the strict, zero-tolerance sediment controls required in protected catchments.

4.5. Construction and Environmental Management Plan

4.5.1. Appendix A of the CEMP contains the schedule of mitigation measures for the proposed development. Section 5.1.3.4 of this document provides details on the measures proposed to protect watercourses and downstream aquatic ecology. Within the section, the applicant states that the proposed settlement ponds will be designed to provide sufficient retention time and a low velocity environment to allow suspended solids down to silt-sized particles to settle out of suspension prior to discharge to the existing site drainage network (drains and watercourses). This means that suspended solids below silt size (such as clay particles) will not be removed within the settlement ponds, as designed.

4.5.2. Within Section 5.1.3.4, the applicant also states that the settlement of clay-sized particles may require additional treatment using flocculants if sufficient settlement of these proves to be impractical. Flocculants are specialised chemicals or polymers often used in water and wastewater treatment to clump suspended fine particles into larger, heavier clusters called "flocs" thus making them easier to remove via settlement. The applicant provided no further details on this proposed treatment process within this document.

4.5.3. It was also noted that within the Water Framework Directive Assessment (WFD)(Appendix 11.2) the applicant stated in Section 11.5.4 that the settlement of clay-sized particles may require additional treatment using flocculants in a mobile treatment plant employing lamellar clarifiers if natural settlement of these fine-grained particles is impractical. A mobile lamellar clarifier is a transportable wastewater treatment unit using inclined plates to separate suspended solids from runoff. The use of this technology alone will not remove clay or peat particles from water and would require the use of coagulants and flocculants to successfully remove these particles.

4.5.4. The applicant made no reference to this treatment method in the SWMP or the CEMP which raises concerns over the consistency of approach adopted when drafting the various management plans that assist the application. The applicant

provided no further details within the application documents of the procedures to be employed if this treatment process were deemed necessary to achieve the required suspended solids removal.

4.5.5. Within the CEMP and WFD assessment, the applicant has acknowledged that the removal of clay-sized particles in the settlement ponds may not be possible. This is due to the longer settlement times required to remove these smaller particles. They have suggested that flocculants may be required to provide effective treatment of waters arising. They have also suggested that a mobile treatment plant may be required to carry out this treatment but have provided no information on how this technology would be employed. Consequently, no risk assessment of the impact of this treatment process on receiving waters has been undertaken. This is a significant omission and, in this instance, creates a high degree of uncertainty when assessing the effectiveness of the proposed mitigation measures against the known sensitivities of the FPM.

4.6. Discharges from Settlement Ponds

4.6.1. Following treatment in the settlement ponds, the applicants SWMP states that the concentration of suspended solids in the surface water run-off will be '*reduced*' but this reduction is not quantified. The discharge from the settlement ponds is to be released at greenfield runoff rates across the surface of the ground with no discharges directly into watercourses. These discharges are described as '*diffuse*' and the SWMP states they will '*percolate to groundwater or travel over ground and be assimilated into the existing drainage network*.' This additional level of treatment post-settlement pond is dependent on a number of factors including the presence of vegetation, the soil type and percolation values, the topography of the area, the proximity to drains and watercourses etc.

4.6.2. To illustrate this issue, I would draw your attention to Drawing No. P22-125-0500-0002 which shows part of the site layout (Sheet 2 of 23) including a proposed Borrow Pit, 2 Peat & Spoil Storage Areas, a water crossing and access road among other elements. I have included an excerpt from this drawing in Figures 4-1 and 4-2 below.

4.6.3. The drawing shows a settlement pond (blue) with a north-south orientation adjacent to a peat & spoil storage area (green). The outlet from this proposed settlement pond

is located on the southern side of the pond, approximately 2m from a drainage channel which flows from east to west. The soil type in this area is poorly draining (GSI maps suggest Gley soils and subsoils) as characterised by rushes observed growing in the field at this location (Site visit 19th June 2026).

4.6.4. Water leaving the settlement pond would be discharged through a stone diffuser (see Drawing P22-125-0501-0007 for details) approximately 2m from the open drainage channel. Given the in-situ soil type, it is highly unlikely that any significant infiltration to ground would occur in this scenario and therefore surface run-off and a subsequent discharge into surface waters is more likely to occur. If the suspended solids content of the discharge were to be elevated due to insufficient treatment in the settlement pond, these suspended solids would be discharged into surface waters.

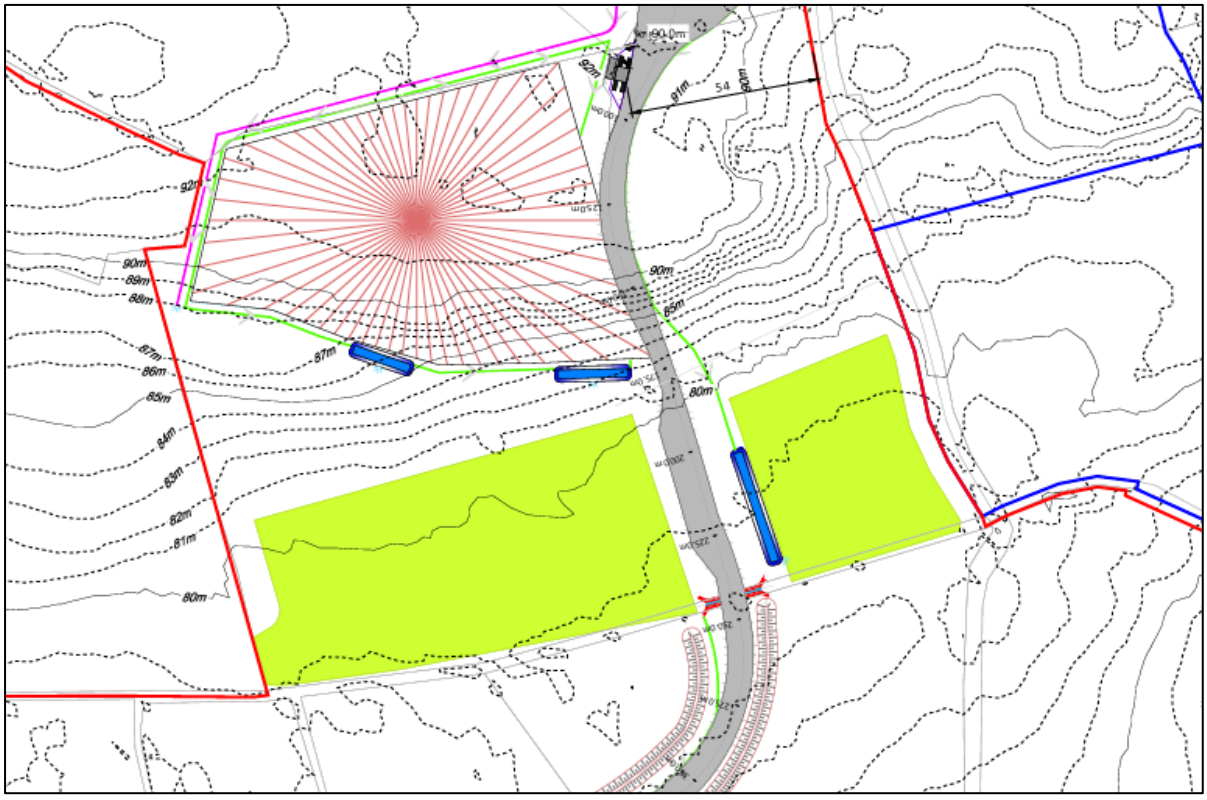


Figure 4-1 Detail from Drawing No. P22-125-0500-0002 showing site layout

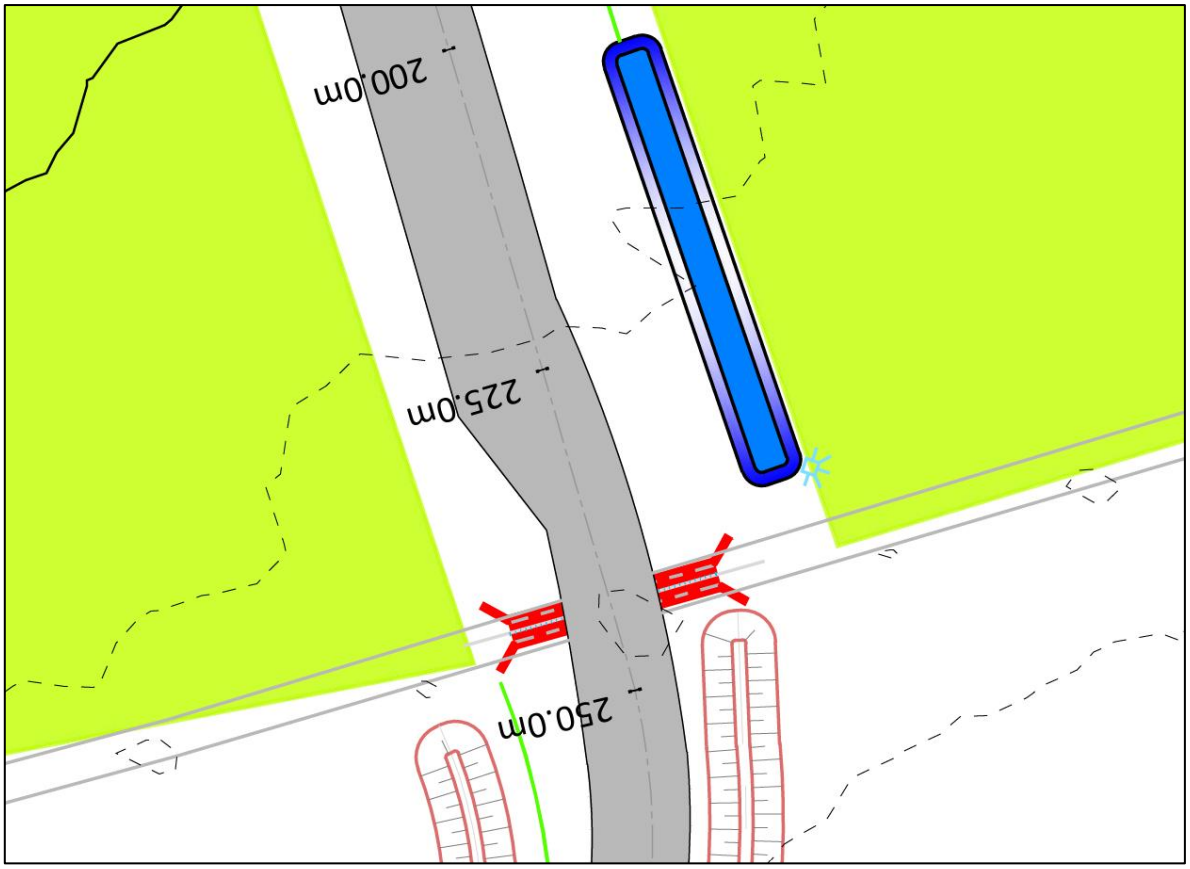


Figure 4-1 Detail from Drawing No. P22-125-0500-0002 showing site layout

4.6.5. There are 79 settlement ponds proposed across the site and the outfalls from many of these ponds are located within 10m of existing watercourses. Given the aforementioned uncertainty relating to how effective the treatment process will be, there is a risk that water containing elevated levels of suspended solids may discharge via surface runoff into watercourses and drainage ditches at various locations within the site, particularly during the construction phase of the proposed development.

4.6.6. The applicant's assessment fails to adequately evaluate the severe risks of silt loss on the critically sensitive freshwater pearl mussel (*Margaritifera margaritifera*) population. It lacks rigorous, site-specific hydrogeological modelling of fine sediment transport during construction, overlooks the impact of silt clogging critical gravel interstitial spaces on juvenile recruitment, and relies on generalized mitigation rather than the strict, zero-tolerance sediment controls required in protected catchments.

4.7. Nutrients

4.7.1. Sections 4.4 to 4.6 of this report have dealt with the issue of the effectiveness of the proposed mitigation measures to remove suspended solids from contaminated waters generated as part of the proposed development. The applicant suggested that various construction elements have the potential to result in increases in nutrients, particularly ammoniacal nitrogen and phosphate in runoff to surface waters. The proposed development will not introduce a new source of nutrients however the disturbance of vegetation, peat and soils has the potential to release nutrients into the water environment.

4.7.2. With regard to nutrient impacts, the applicant states that '*potential impacts on ecological receptors are anticipated to be unlikely as the majority of construction activities (with the exception of watercourse crossings for cables and access tracks) will be at least 50m away from each watercourse in the waterbody, as far as possible'*. However, the site layout plan does show access roads, turbines, hard stands, and settlement ponds much closer to drainage ditches, small streams etc. which are all hydrologically connected to the two main watercourses which flow through the site and have the potential to transport nutrients quickly to the FPM sites.

4.7.3. Within the WFD Assessment (Appendix 11.2) the applicant relied on the silt mitigation measures to minimise nutrients (along with silt) in the final discharges from the settlement ponds. While I agree that removing a considerable proportion of the suspended solids content of the water will remove nutrients, in particular phosphates which bind to soil particles, I note that no attempt to quantify the retention/removal of nutrients has been undertaken by the applicant. Given the proposal to install 79 settlement ponds as part of the proposed development and the sensitivities of the receiving aquatic environment to additional nutrient inputs, the absence of any detailed discussion on the likely concentrations of nutrients leaving the settlement ponds is a flaw.

4.7.4. Within the AHMEP the applicant outlined measures intended to reduce agricultural sources of nutrients such as the fencing of riparian buffers along watercourses and the removal of direct cattle access points such as the ford on the Carrowreagh East stream. It is true that if implemented, these measures could lead to reduced nutrient concentrations in the aquatic environment.

4.7.5. Taken in totality, the applicant's nutrient impact assessment is inadequate because it fails to evaluate the long-term mobilization and downstream delivery of phosphorus and nitrogen from peat disturbance and construction runoff. This oversight ignores the strict oligotrophic requirements of the freshwater pearl mussel (*Margaritifera margaritifera*), where minor nutrient enrichment triggers filamentous algae and macrophyte growth that chokes the gravel bed, cuts off vital oxygen exchange, and causes juvenile mortality.

4.8. Peat excavation and impacts on Surface Waters

4.8.1. In Chapter 10 of the EIAR (10.4.3) the applicant reported that much of the central and eastern portions of the site is underlain by Blanket Peat deposits. These deposits become more sporadic along the sites' southern margin and within the western portion of the site. Table 10-8 reports that deposits of blanket peat were noted to be present either exclusively or in combination with deposits of Till and/or bedrock below the following infrastructure elements:

- Turbines/Hardstands for T01-T02, T05-T09, and T11-T14 (79%)
- Met Mast
- Construction Compound 2 (East)

In Table 10-15 the applicant provided a summary of the ground and groundwater conditions within the 49 trial pits conducted across the site. These results show that of the 49 trial holes completed, 27 were found to contain blanket peat deposits ranging in depth from very shallow (0.15m bgl) to deeper layers (4.5m bgl). Therefore, it is assumed that peat will form a significant constituent of the material to be excavated during construction. Table 10-23 confirms this assumption by reporting that the applicant anticipates that 140,211 m^3 of peat will need to be excavated along with 178,365 m^3 of spoil (non-peat).

4.8.2. The applicant has outlined in Section 10.6.2.2 that the groundwater levels within the peat piezometers (Table 10-20) were shallow, ranging from ground level to 1.15m bgl with a mean groundwater depth of 0.36m bgl. This means that excavations within peat are highly likely to encounter significant volumes of water which may need to be pumped into the surface water management system proposed for the site. This water

will contain peat particles which will need to be removed via the treatment train proposed by the applicant within the SWMP.

4.8.3. As discussed in Section 4.3.3 above, the 5 samples taken by the applicant and sent for analysis via Jar/Bench Testing were all non-peat samples. Peat soils are based on decayed plant material and not inert sand, silt and clays and the Jar test is not an appropriate test for these particle types. Within the SWMP the applicant proposed to remove all suspended solids using a range of features including silt fences, traps, swales, and settlement ponds. There is insufficient discussion and inconsistencies within the SWMP, the CEMP and the Peat & Spoil Management Plan on the management of all 'silty' waters to be generated on site including those with a high peat content. The use of additional treatment methods such as the application of flocculants and the employment of lamella clarifiers are referenced in some documents and absent from others.

4.8.4. In my opinion and having regard to the sensitivities of the receiving waters within the site, the applicant has not demonstrated to a sufficient degree of confidence that the proposed surface water management systems will be effective at removing peat particles from the water prior to discharge to the receiving environment.

4.9. Aquatic Habitat Management and Enhancement Plan

4.9.1. The applicant produced an Aquatic Habitat Management and Enhancement Plan (AHMEP) (Appendix 9.6) to document enhancement measures for the study area, based on best practice, to increase its value as habitat, and its potential to support FPM and its host fish in the future. Appropriate associated monitoring and evaluation of these enhancement measures was also outlined within the document.

4.9.2. The AHMEP included details of a comprehensive Schedule of Works Operation Record (SOWOR) system, to be run by the Ecological Clerk of Works (ECoW). The purpose of the SOWOR is to manage project construction and include all the mitigation measures and maintain a spreadsheet of all work items, for compliance reporting purposes. The SOWOR is to be populated and maintained throughout the construction and operation phase, with all construction management methods and mitigations documented in it, and the success of each measure monitored and evaluated throughout. This SOWOR will include hold and proceed points, linked to

triggers such as rainfall and turbidity levels, weather forecasts and river flow levels. Any problems, delays, damage, and remediation encountered will be included in comments section to inform an assessment of effectiveness.

4.9.3. The AHEMP included details of the monitoring programme to be implemented during the project. This programme included daily visual checks of silt traps, settlement ponds, high construction activity sites or during high rainfall periods to identify any evidence of siltation, oil, or pollutants. The applicant intends to take monthly river water samples from fixed locations along with daily field measurements to be taken by the ECoW as they deem necessary. The applicant also identified that continuous turbidity monitors would be installed upstream and downstream of the site during vegetation clearance and construction works. Turbidity monitors are used as a 'proxy' for suspended solids measurements which require samples to be analysed in a suitable laboratory. In response to the DAU submission, the applicant clarified that these turbidity meters would be automated and alarmed to trigger a response if threshold turbidity values were exceeded. While the use of in-situ monitors with alarms are a useful tool in identifying spikes in turbidity, their usefulness in situations where chronic, low-level fine sediment is occurring may be limited. In addition, reaction times to spikes of turbidity can mean considerable damage may have already taken place before action is taken.

4.9.4. Despite the concerns identified above, I am satisfied that the applicant has produced a robust monitoring system in line with industry best practice which is designed to ensure routine checks are in place to identify any discharges with the potential to have a significant impact on water quality.

4.9.5. The AHMEP also included additional enhancement measures that will help to further improve aquatic habitats relative to its current status. The applicant outlined that the proposals were based on the experience and recommendations from FPM conservation projects in Ireland over the previous 15 years while also acknowledging that none of these projects considered pressures from construction development. The planned enhancement actions were as follows:

- Land use survey and walkover
- Consultation with relevant statutory agencies
- Fencing off all watercourses within the site to exclude livestock

- Implementing the Biodiversity Management Enhancement Plan (BMEP) regarding the management of habitats and drains (secondary benefits accruing)

Of these measures, the fencing of watercourses and the removal of livestock access would have the most immediate tangible benefit to the aquatic environment. When livestock have unlimited access to a watercourse their presence can contribute significant nutrients and generate high suspended solids content in the receiving waters. The removal of this pressure could be a significant benefit to the receiving waters, depending on the current stocking rates within the catchment and the number of unrestricted access points available.

4.9.6. The AHMEP also identified a series of longer-term measures to be considered during the lifespan of the proposed development to include:

- Developing a plan for invasive alien plant species
- Establishing protective riparian buffers along watercourses
- Developing a Nutrient Management Plan for the site identifying Critical Source Areas
- Identifying Septic Tanks

According to the applicants themselves, there are no septic tanks within the site, so the inclusion of this measure was unnecessary. The applicants also acknowledge that the current livestock stocking rates within the site indicate no intensive farming is taking place therefore the development of nutrient management plans may have limited success in changing the nutrient status of the receiving waters. However, the development of protective riparian buffers has proven to have benefits for the aquatic environment by stabilizing riverbanks and intercepting sediment and nutrients transported by overland flow.

4.9.7. The AHMEP for the site contains a list of all the identified risks associated with the proposed development and relevant mitigation measures relating to the aquatic environment. It contains a robust monitoring plan which does provide confidence that adequate data on water quality can be collected and maintained during the various phases of the development allowing appropriate protective actions to be taken. There are also several enhancement measures identified which have the potential to

have an unquantified benefit for the aquatic environment both inside and outside the site itself. I conducted a site visit on 19th June 2026 and noted several agriculture-related land improvements works within the proposed development site which were contributing suspended solids to the aquatic environment at the time of the visit. In my opinion, these receiving waterbodies would benefit from the introduction of supplementary enhancement measures as outlined in the AHMEP. The fencing of water courses and the long-term plan to introduce riparian buffers both have proven benefits when implemented in catchments where agriculture is a significant pressure on water quality.

4.9.8. I am satisfied that the monitoring and enhancement measures identified by the applicant in the AHMEP would be effective for the purposes for which they were designed.

4.10. Water Framework Directive

4.10.1. In Appendix 11.2 the applicant presented a Water Framework Directive (WFD) Assessment for the proposed development. The applicant reported that the WFD Assessment was completed with reference to the following:

- UK Environment Agency guidance for WFD Risk Assessments for England *'Water Framework Directive Risk Assessments: How to Assess the Risk of your Activity'* (April 2016)
- Northern Ireland Environment Agency (March 2012) *Carrying Out A Water Framework Directive (WFD) Assessment On EIA Developments*

4.10.2. The applicant has correctly identified all surface waterbodies relevant to the proposed development. The current overall status of each waterbody along with all the various element statuses (where available) has been correctly identified. The applicants have also correctly identified that with regard to the river waterbodies of most concern (Cloon_020 and Crompaun_010), the hydro morphological, physico-chemical, nutrient, chemical etc. elements have not been assigned a status due to the absence of the associated monitoring by the EPA.

4.10.3. The applicant has not identified the Groundwater Waterbodies relevant to the proposed development and the WFD Assessment makes no reference to Groundwater Waterbodies and the potential for impact from the proposed

development thereon. While I acknowledge that the interactions between the project elements and groundwater were discussed in detail in Chapter 10 of the EIAR, the absence of any discussion on the status of the Kilrush Waterbody (IE_SH_G_123) is a significant omission which weakens the overall WFD assessment of the project. For the record, the Kilrush Waterbody is currently at Good Status and is not considered to be at risk of failing its environmental objective.

4.10.4. The applicant conducted a scoping exercise of activities and potential risks of deterioration, the results of which were presented in Table 3 (Appendix 11.2). This scoping exercise has been conducted in a precautionary manner and all of the elements which were scoped in were discussed with respect to their possible impacts on the ecological status, hydro morphological status, physico-chemical status (including nutrients), specific pollutants, and priority substances of all receiving surface water waterbodies. The applicant relied on and referenced the same reports already discussed above to demonstrate that all of the quality elements of surface waters would remain unchanged as a result of the proposed development.

4.10.5. The WFD Assessment concluded that the proposed development is unlikely to include any activities that are likely to cause deterioration in WFD status for the waterbodies within the site boundary or prevent the waterbodies from achieving their WFD objectives. In relation to ecological elements, the report states that '*deterioration of the water quality of the water body is unlikely due to several control measures being in place to prevent surface water runoff from being contaminated by site activities*.'

4.10.6. The Water Framework Directive requires that, where more than one water status objective relates to a water body, the most stringent must apply. Many of the habitats and species listed for protection in both the Birds and Habitats Directives are water dependent. Some species such as the Freshwater Pearl Mussel (FPM) have a complicated life-cycle and are influenced by a variety of biological and environmental processes that cannot be explained by water quality alone. Accordingly, the freshwater pearl mussel has additional requirements for supporting conditions, which are set out in the Freshwater Pearl Mussel Regulations (S.I. No 296 of 2009) and described in the relevant site-specific conservation objectives for the Special Area of Conservation (SAC) in question. The applicant has acknowledged that the proposed development is located within the Cloon Freshwater Pearl Mussel (FPM) catchment.

4.10.7. While the environmental objective established for the Cloon_020 waterbody for the 3rd Cycle of the WFD was to achieve Good Status, the conservation objectives for the FPM within the Cloon River under the Habitats Directive were to 'Restore' the system to favourable conditions. This objective requires a more stringent target to be set which is the equivalent of a High-Status waterbody. In assessing the WFD Compliance of the proposed development, the applicant has not sufficiently considered the relationship/overlap between the WFD and Habitat's Directives with respect to these more stringent targets and has limited the discussion to the achievement of the Good Status objective only.

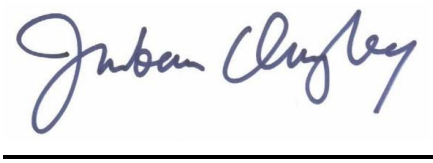
4.10.8. I am satisfied that the applicants WFD Assessment was conducted with reference to established guidance from the UK and was structured in accordance with currently available best practice. However, the absence of any assessment of impacts on the Kilrush Groundwater waterbody underlying the site is a significant oversight which weakens their overall conclusions. The reliance within the WFD Assessment on assumptions that the mitigation measures identified in the SWMP, the CEMP and the Peat & Spoil Management Plan prove that no significant impacts will occur on water quality or the ecological status (including conservation objectives of the FPM) is also flawed for the reasons already outlined earlier in this report. I also consider the applicants discussion of the water quality and ecological targets as set out under the WFD and Habitats Directive for the receiving waters to be underdeveloped.

5.0 Conclusions

5.1. I am not satisfied that the Surface Water Management Plan has been properly designed to intercept and remove the full volume of silt generated by this development. The site's specific soil profile contains highly mobile fine particles and peat, which will remain suspended and cannot be effectively captured by the applicant's proposed standard sediment settlement ponds. Furthermore, while the applicant suggests that chemical flocculants may be required to treat these fine fractions, they have failed to provide any design details, operational protocols, or environmental impact assessments regarding the toxicological risks or secondary ecological impacts these chemical additives could pose to the downstream freshwater pearl mussel (*Margaritifera margaritifera*) population.

5.2. I am not satisfied that the proposed Surface Water Management Plan has been properly designed to retain nutrients generated during this development. The applicant has failed to provide site-specific evidence or modelling demonstrating that dissolved or particulate nutrients will be effectively captured within the drainage system. This lack of rigorous retention data creates an unassessed risk of nutrient enrichment in the downstream catchment, which could cause eutrophication and jeopardize the critical habitat requirements of the freshwater pearl mussel population.

5.3. The applicant has failed to demonstrate beyond reasonable scientific doubt that the development will not adversely impact water quality and, consequently, the freshwater pearl mussel population. By omitting critical evidence regarding fine sediment retention, flocculant safety, and nutrient capture, the assessment leaves significant gaps in its environmental analysis. In the absence of this objective scientific certainty, the evaluation falls short of the stringent legal and ecological standards required to guarantee the protection of this highly sensitive species.



Finbarr Quigley

Senior Environmental Scientist

27th July 2026