APPENDIX 4-7

AGL CONSULTING PEER REVIEW

TECHNICAL NOTE

To: **William O'Connor, Planree Ltd.**

From: Conor O'Donnell

Re: **Meenbog Wind Farm – Peer Review of Peat Stability Assessment Reports & Peat and Spoil Management Plans for the Existing Development & Prospective Development**

Date: 19/6/2026 **Ref: 25-129-TN001 (Rev.1)**

1.0 INTRODUCTION

I have been requested by Planree Ltd. to carry out a peer review of the Peat Stability Assessment Reports (PSAR) and Peat and Spoil Management Plans (PSMP) that have been prepared for the Existing Development and Prospective Development on the Meenbog Wind Farm in Co. Donegal.

The purpose of my review was to confirm that the reports have been prepared in accordance with industry best practice guidelines, and that the risk of peat instability on the site has been appropriately assessed and mitigated so that there will be an acceptably low risk of peat instability on the site for the wind farm infrastructure that has already been completed on the site (the Existing Development), and for the remaining works that are required to complete the wind farm (the Prospective Development).

The Existing Development includes all the wind farm infrastructure that had been completed for the 19 No. turbines prior to the large peat slide that occurred on the site in November 2020. The civil works on the project had been substantially completed by that time and included the majority (>90%) of the new and upgraded site access tracks, the reinforced concrete pad foundations that were completed for 14 No. turbines and partially completed for a further 4 No. turbines, the crane hardstandings that were substantially completed for 17 No. turbines and partially completed for 1 No. turbine, 3 No. borrow pits and 4 No. peat storage cells in various stages of development, peat sidecast areas, two temporary construction compounds; site drainage works, underground ducts and cabling for the wind farm, as well as the 110 kV substation, grid connection and associated site development and ancillary works. All this scope constitutes the Existing Development, which will be incorporated into the permanent works on completion of the wind farm. The Existing Development is described in detail in Chapter 4 of the rEIAR.

The Prospective Development is the scope of work that is required to complete the wind farm, which includes the completion and upgrading of the remaining site access tracks and junctions (≈10%), final surfacing of the substantially completed site access tracks and crane hardstanding areas, minor works at the hardstandings for auxillary crane pads, blade setdown areas and hardstand extensions, completion of the remaining 5 No. turbine foundations, erection of all 19 No. turbines and a new met mast, further development of existing borrow pits for crushed rock

aggregates and storage of excavated peat and mineral soil, as well as all remaining drainage, ducting, cabling and ancillary works, including recreation and amenity works on the wind farm site, and biodiversity enhancement measures on a nearby site. The Prospective Development is described in detail in Chapter 4 of the EIAR.

The PSAR and PSMP reports are included as appendices to the remedial Environmental Impact Assessment Report (rEIAR) for the Existing Development, and the EIAR for the Prospective Development.

2.0 STATEMENT OF EXPERTISE

My name is Conor O'Donnell. I am a Senior Geotechnical Consultant and Managing Director of AGL Consulting, based in Dublin, Ireland. I have an honours undergraduate degree in civil, structural and environmental engineering from Trinity College Dublin, and a master's degree in geotechnical engineering and structural mechanics from Cornell University in Ithaca, New York. I am a Chartered Engineer with Engineers Ireland, a Fellow of the Geological Society of London, and a Fellow Consulting Engineer with the Association of Consulting Engineers of Ireland.

I have extensive experience with civil and earthworks design for wind farms and infrastructure works in Ireland and the UK and have developed a particular area of expertise in assessing and managing the risk of peat instability for wind farms on upland blanket bogs at planning, detailed design and construction stage.

I was the lead project geotechnical engineer responsible for managing the risk of peat stability for the completion of the civil works on the Derrybrien Wind Farm site after the peat slide in October 2003, which included the design, evaluation and testing of over 17.5km of floating roads across the site as well as geotechnical investigations and stability analyses to design repository sites to store peat excavated from 70 turbines and crane hardstanding areas and the substation site.

Since then, I have carried out peat stability risk assessments and provided expert advice on geotechnical risk mitigation and management for several wind farms on upland blanket bogs including the Garvagh Glebe and Tullynahaw Wind Farms in Co. Leitrim and Co. Roscommon, the Grousemount Wind Farm in Co. Kerry, and the Crockagarran, Carrickatane and Crockdun Wind Farms in Co. Tyrone. I have also provided expert advice and forensic investigation services to the Health and Safety Authority and insurance companies in relation to peat slides that occurred on wind farm sites in Ireland.

In 2020 I prepared the chapter on soils, geology and land for the 2020 remedial Environmental Impact Assessment Report (rEIAR) for the Derrybrien Wind Farm, including the appendices on peat stability risk assessment and on the management of peat stability during construction.

Since then, I have also prepared the chapters on soils, geology and land for the 2025 application to decommission the wind farm, which included an EIAR and PSAR for the elements of the windfarm to be decommissioned and taken off site, as well as an rEIAR and PSAR for the elements to be left in place after decommissioning.

I was the geotechnical advisor to An Bord Pleanála on peat stability and ground movement for the Oral Hearing into the 2009 application for the Corrib Onshore Gas Pipeline. I was also the expert geotechnical consultant to Sligo County Council on spoil management for excess peat and mineral soil for the EIS and 2014 Oral Hearing for the N4 Collooney to Castlebaldwin Road Improvement Scheme, which included design proposals for storage of large volumes of excavated peat in borrow pits and bunded peat repository sites.

3.0 DOCUMENTS REVIEWED

I have been provided with a copy of the following relevant documents for my review:

- Meenbog Wind Farm (Existing Development) – Peat Stability Assessment Report, by Fehily Timoney, Document No. P24234-FT-EGT-XX-RP-GE-0001
- Meenbog Wind Farm (Existing Development) – Peat and Spoil Management Plan, by Fehily Timoney, Document No. P24234-FT-EGT-XX-RP-GE-0004
- Meenbog Wind Farm (Prospective Development) – Peat Stability Assessment Report, by Fehily Timoney, Document No. P24234-FT-EGT-XX-RP-GE-0002
- Meenbog Wind Farm (Prospective Development) – Peat and Spoil Management Plan, by Fehily Timoney, Document No. P24234-FT-EGT-XX-RP-GE-0003

I was also provided with the following report with background information on ground conditions, hydrology and peat stability on the site after the peat slide on 12th November, 2020:

- Meenbog Wind Farm – Peat Stability Assessment of Meenbog Wind Farm Site, by Fehily Timoney, Rev.04, dated August 2021 (Ref. P20-328).

Appendix D of that report includes the following report that was prepared by Ionic Consulting on behalf of the contractor Mid-Cork Electrical Ltd. on the assessment of peat stability for the detailed design and construction stage of the project in 2019-2020:

- Meenbog Wind Farm – Peat Stability Quantitative Assessment, Ionic Consulting, Document Ref. MNBG r057, Rev.C, August 2021.

4.0 OPINION

Having reviewed the relevant information on the project details, ground and groundwater conditions, hydrology, spoil management and peat stability I would make the following observations:

- An appropriate peat stability risk assessment methodology has been adopted for the project that is in accordance with the current best practice guidelines, including the 2017 Best Practice Guidelines for Peat and Landslide Hazard and Risk Assessments prepared by the Energy Consents Unit of the Scottish Government for electricity generation developments, i.e.:
    - **[Scoping]:** Extensive investigations have been carried out across the site at planning, detailed design and construction stage, and after the Nov.2020 slide to characterise the extent and depth of peat on the windfarm site as well as records of peat instability on site and in the surrounding area.
    - **[Desk Study]**: A comprehensive desk study of relevant information on baseline site conditions has been carried out, including:
        - Aerial photography, Ordnance Survey & LiDAR survey data on topography, geomorphology and historic landslides and peat slides.
        - Subsoils, bedrock geology and Geological Heritage Sites from the Geological Survey of Ireland (GSI);

- Landslide susceptibility mapping (GSI) – including records of historic landslides and peat slides in and around the study area.
- Local and regional hydrology (EPA/Planning Documents).
- A detailed review of ground investigation information and construction records including quantitative stability analyses carried out by Ionic Consulting for the Contractor.

- **[Site Reconnaissance Survey]** – extensive site reconnaissance and walkover surveys across the site, including an inspection and characterisation of the small and large-scale peat failures that occurred on the site during construction, and an inspection of the civil works that had been completed by the time of the slide in November 2020, including remedial works to stabilise the peat and mitigate the impact of the slide.

- **[Ground Conditions Assessment]** – a comprehensive ground investigation has been carried out across the site involving boreholes, rotary coreholes and extensive peat probing to characterise the peat, subsoil and bedrock conditions on the site, with in-situ hand vane shear testing to determine profiles of undrained shear strength with depth in the peat.

  The depth, strength and Von Post degree of humification of the peat was also assessed at the location of supplemental trial pits and Russian Peat Sample (RPS) probes. The trial pits were also used to obtain undisturbed samples of the peat for laboratory strength tests, and to validate the methodology for characterising the strength of the peat by assessing the stability of the side walls of the trial pits. The PSAR reports also include a coloured contour drawing of peat depth across the site.

- **[Geomorphology Hazard Assessment]** – A site-wide geomorphological risk assessment has been carried out to identify key features that could impact peat stability on the site with a qualitative assessment of the likelihood that each feature could contribute to peat instability, which relies on experience and expert judgement. The results are presented as a set of geomorphology plans showing zones of peat stability hazard across the windfarm site, which are used to inform the peat stability risk assessment.

- **[Stability Analyses]** – A deterministic approach has also been carried out to assess the stability of the peat slopes based on an infinite slope factor of safety against sliding in the short-term undrained and long-term drained condition. Reasonably conservative lower-bound shear strength parameters have been assumed for the peat. Sensitivity analyses have been carried out to assess the stability of the slopes under a 10kPa surcharge load in the short-term undrained condition (to represent the 1.0m of peat), and for a range of groundwater levels up to ground level in the long-term effective stress condition.

- **[Zonal Hazard Ranking Assessment]** – The results of the stability analyses and geomorphological hazard assessments have been incorporated into a semi-quantitative hazard ranking assessment to determine the likelihood of a peat slide in zones across the wind farm site based on natural and anthropogenic factors that are known to contribute to peat instability, i.e.

- Peat/subsoil conditions
- Topography/Geomorphology
- Factor of Safey Calculations
- Hydrology/hydrogeology
- Other significant contributory factors including history of peat instability on the site, evidence of peat instability, vegetation, drainage and mechanical peat harvesting, where applicable.

- [Assessment of Adverse Consequences] - The likely impact of a peat failure has been assessed based on factors including

  - the potential scale of a slide and possible run-out distances;
  - the sensitivity of the receiving environment and possible degree of contamination.
  - the potential impact of the slide on land use, infrastructure and sensitive receptors.

- [Peat Stability Risk Assessment (PSRA)] - The risk of peat instability in each zone across the site has been assessed on a 5-point scale as Low to High based on the product of the interpreted Likelihood of a peat failure and the likely Impact of that failure (R= Lx I)

- [PSRA & Risk Mitigation] – The reports appropriately assess the changing profile of peat stability risk for the wind farm between development stages of the project as mitigation measures are implemented, site conditions improve and the nature and intensity of construction activities and their potential impact on peat stability reduces, i.e.:

  - A baseline PSRA has been prepared to reflect the risk of peat instability for the wind farm site based on the original conditions prior to construction and prior to the implementation of appropriate design and construction mitigation measures.

  - The PSRA for the Existing Development reflects the lower likelihood of peat instability for the wind farm in its existing condition taking account of the mitigation measures that were implemented at detailed design and construction stage, and the improvement in site conditions where the site drainage has been improved, and the peat under the floating roads and sidecast areas has increased in strength as it compressed and increased in strength under the sustained surcharge loads over the last 6 years, significantly reducing the risk of peat instability. This is the baseline PSRA for the Prospective Development.

  - The PSRA for the Prospective Development has also been re-assessed to take account of the proposed design and construction mitigation measures that will be implemented for the remaining works that are required to complete the project, and the reduced likelihood of peat instability for the lower level of construction activity required to complete the works (i.e. 80-90% of civil works and peat excavations already completed, no more floating roads on the site, all excavated peat

to be placed in borrow pits and bunded storage areas with no sidecasting.)

- The PSRA for the Prospective Development after implementation of mitigation measures reflects the residual risk of peat instability for the wind farm for the operation and maintenance phase after construction has been completed.

This methodology of risk assessment before and after mitigation is consistent with industry best practice for geotechnical risk management in accordance with the ICE publication on Managing Geotechnical Risk [Clayton, 2001].

- [Mitigation]:
  - The PSAR report for the Existing Development summarises the design and construction mitigation measures that were implemented during the detailed design and construction stages of the project;
  - The PSAR report for the Prospective Development sets out the mitigation measures that are proposed to ensure that the risk of a peat failure is at an acceptable level for the completion of the construction works on site; and
  - The Peat and Spoil Management reports set out the methodology and control parameters for controlled storage and disposal of excavated peat and mineral soil on the site.

- The peat stability risk assessment reports and peat and spoil management plans have been prepared by engineering consultants with the appropriate level of professional qualifications and experience for wind farm developments on upland blanket bogs. i.e.:
  - The reports were prepared by Mr. Ian Higgins – a Technical Director at Fehily Timoney & Company (FTC) with an MSc in Geotechnical Engineering and over 25 years of experience in earthworks and the geotechnical assessment and design of windfarms on upland blanket bogs at various stages of development across Ireland and the UK.

- FTC have demonstrated a clear understanding of the pertinent ground and groundwater conditions on the site that relate to peat stability as well as contributory factors that could have an impact on peat stability for the wind farm development, including, for example:
  - The depth and extent of very soft peat across the site;
  - Geomorphological features related to site topography and hydrology that can impact peat stability;
  - Profiles of characteristic undrained shear strength with depth determined by in-situ hand vanes.
  - Zones of elevated or higher construction risk in areas of deep very soft peat with adverse drainage and hydrological conditions – e.g. the floating roads connecting Turbines T1 to T4, the area around the November 2020 slide near Turbine T7, and sections of the existing floating road to Turbine T18.

  - The characteristics, failure mechanisms and likely causes and contributary factors for the peat failures that occurred during the initial stage of construction.
  - The geotechnical analysis and design of floating roads including the increase in strength that occurs in the peat under the roads, which improves the stability and performance of the roads over time.

- Overall, although there were significant incidents of peat instability during the original phase of construction on the site in 2019/2020 that have been attributed to construction activities for the wind farm, I would consider that at this stage the risk of further peat instability for the Prospective Development is low and manageable with appropriate construction management and supervision. This is primarily because:

  - Approximately 80-90% of the heavy civil engineering earthworks and peat excavations for the site access tracks, turbines, crane hardstandings, borrow pits and bunded peat storage areas on the wind farm have already been completed as part of the Existing Development.

  - The turbines will be erected from the crane hardstanding areas which are constructed of rockfill on the glacial till or rock below the peat and are designed to support the design crane loads with a negligible risk of peat instability.

  - No more floating roads will be constructed on the wind farm site. All the remaining sections of site access tracks that need to be completed will be constructed of rockfill supported on competent mineral soil or rock below the peat by the excavate/replace method. Along the access roads to Turbines T4, T7 and T18, which are the main sections of access tracks that need to be completed, this will involve replacing rather than upgrading an existing floating road to reduce the risk of peat instability.

  - Where existing roads have been constructed as floating roads that will be left in place for the permanent works (e.g. between Turbines T1 and T4):
    - The highest risk of peat instability was at the time of construction. Since then the peat under the roads would have consolidated and increased in strength, which would reduce the risk of peat instability;
    - The roads were heavily trafficked by construction vehicles to transport stone, concrete and excavated soil to and from the turbines without any issues with peat instability during the initial phase of construction;
    - Completion of the floating roads for the Prospective Development is limited to placing an additional 150mm thick layer of granular rockfill surfacing;
    - A rockfill berm will be constructed in an area of shallower peat downslope from the floating road at the T1/T2-T4 junction as an additional mitigation measures to secure the peat where there are localised conditions that contribute to an elevated risk of peat instability without appropriate mitigation measures.
    - Stability analyses have been carried out to demonstrate that there is acceptable margin of safety against shear failure under the roads:

- in the existing condition under the typical construction surcharge loads; and
- for the completed final condition under the design surcharge load for the mobile cranes that will be used to erect the turbines accounts and accounting for the increase in shear strength that will have occurred in the peat under the roads;

- Additional in-situ vane-shear site testing will be carried out during construction to validate the characteristic parameters used in the stability analyses.
- Monitoring pegs will be installed downslope from the roads to monitor for peat movement during the Prospective Works;
- Full-scale proof load tests will be carried out on all of the completed floating roads prior to mobilising the cranes on site to erect the turbines.

- No more sidecasting of excavated peat will be permitted on the site. All of the remaining 15% of excavated peat and spoil will be securely stored in existing bunded borrow pits and peat storage areas on the site.

- Where material was sidecast on peat adjacent to the access tracks, turbines and crane hardstanding areas for the Existing Development, the highest risk of peat instability – either as a flow slide in the excavated peat, or as a peat slide in the underlying peat – was at the time that the peat was placed on the slope. Over time the peat dries out and vegetates and the underlying peat compresses and increases in strength so that the stability of the peat improves. Stability analyses in the PSAR report for the Existing Development also show that there is an acceptable margin of safety against shear failure in these sidecast areas.

- Storing the balance of excavated peat and spoil in the bunded borrow pit cells and storage areas, as proposed, is the most reliable method of spoil management to mitigate the risk of peat instability when compared to sidecasting or "floating" repository sites that are not contained by perimeter bunds. i.e.

    - It is a proven method of effective containment of weak remoulded peat that has been successfully implemented on windfarm sites on upland blanket bogs in Ireland, including sites where there was a history of peat instability, with the following examples provided, with supporting photos appended to this technical note:

        - Photos 1 and 2 show the deep borrow pit cells in cohesive glacial till and mudstone/shale bedrock that were backfilled with excavated peat on the Garvagh Glebe Wind Farm site in Co. Leitrim. Photo 3 shows an aerial view of the cells in their current condition where they have been stable for over 15 years.

        - Photo 4 shows an example of a stable bunded peat repository on the Crockagarren Wind Farm in Co. Tyrone.

        - Photos 5 and 6 show recent aerial photographs of other examples of bunded peat storage areas that have been in place for over 15 years on the Garvagh Glebe and Tullynahaw Wind Farm sites.

Similar bunded repository sites and borrow pit cells have routinely been used to safely store large volumes of excavated peat and soft clay on many other wind farm sites on upland blanket bogs across Ireland. Rockfill barrages have also been used to effectively contain large volumes of remoulded displaced peat within the slide area on the Derrybrien Windfarm.

- The rockfill bunds for the borrow pits and peat storage areas have been designed with standard earthworks and drainage details to ensure that they will be stable and can effectively contain the excavated peat and soft clay in the short and long-term, i.e.:
    - They are constructed on competent glacial till or weathered rock below the peat to ensure that they have adequate bearing capacity and resistance to sliding.
    - The size and geometry of the berms have been designed to resist the fluid and earth pressures from the peat and soft clay in sliding, uplift and overturning by self-weight and frictional resistance.
    - They are constructed of coarse well-graded angular rockfill which will be sufficiently permeable to allow water from the peat to drain through the berm and allow the peat to dry out over time.
    - The gradient of the outer slopes and the friction angle of the rockfill are sufficient to ensure that the slopes are stable for the steady state seepage condition that will develop initially after the pits are filled, which has been demonstrated by stability analyses.
    - Interceptor drains will be constructed upslope from the borrow pit and peat storage areas to intercept surface runoff, and toe drains will be constructed at the base of the berms to collect seepage through the rockfill. Drains will also be installed through the berms at the top of the backfilled peat to prevent ponding and overtopping of surface water.
- The proposed methodology for backfilling the borrow pits and bunded peat repository sites is consistent with the methodology that was used for the sites shown in Photos 1-6. The surface of the peat and soft clay will be levelled out and shaped to promote surface runoff, and the berms will be designed with min. 0.5m freeboard to prevent overtopping.

- Finally, construction of the works for the Prospective Development will be supervised by a suitably qualified geotechnical engineer to ensure that peat stability is effectively managed on site over the course of the works.

5.0 CONCLUSIONS

Based on my peer review I would conclude that:

- The Peat Stability Risk Assessments carried out by Fehily Timoney & Co. represent robust and representative assessments of the risk of peat instability for the Existing Development and Prospective Development that comply with industry best practice guidelines and have been carried out by a senior geotechnical engineer with the requisite qualifications and experience.

- The interpreted low or low to medium risk of peat instability for the Existing Development is representative of the current risk of peat instability on the wind farm site and appropriately takes account of the improvement in site conditions since the first phase of construction as well as the design and construction mitigation measures that were implemented at that time.

- The low residual risk of peat instability that has been interpreted for the Prospective Development is also representative of the lower impact of the remaining construction activities that are required to complete the wind farm combined with the specific design and construction mitigation measures that are proposed for the works as well as the improvement in site conditions since the first phase of construction.

- Although there were significant incidents of peat instability on the site during the first phase of construction in 2019/2020 that have been attributed to construction activities for the wind farm, I would consider that at this stage the risk of further peat instability for the Prospective Development is low and manageable with appropriate construction management and supervision.

Document Approval Form			
Document No:	25-129-TN001	**Description:**	Peer review of PSAR and PSMP for Existing Development & Prospective Development
Revision No:		**Date:**	**Notes**
Rev.0		18/6/2026	**Final**
Rev.1		19/6/2026	**Final – minor amendments**
Made/Checked by		**Signature**	
Made by:	Conor O'Donnell		

Photo 1 – Fully developed borrow pit cell prior to backfilling on the Garvagh Glebe Wind Farm

Photo 2 – Backfilled borrow pit cells on the Garvagh Glebe Wind Farm, Co. Leitrim

Photo 3 – Recent aerial photo of the backfilled borrow pit cells on the Garvagh Glebe Wind Farm

Photo 4 – Bunded peat repository site on the Crockagarran Wind Farm, Co. Tyrone

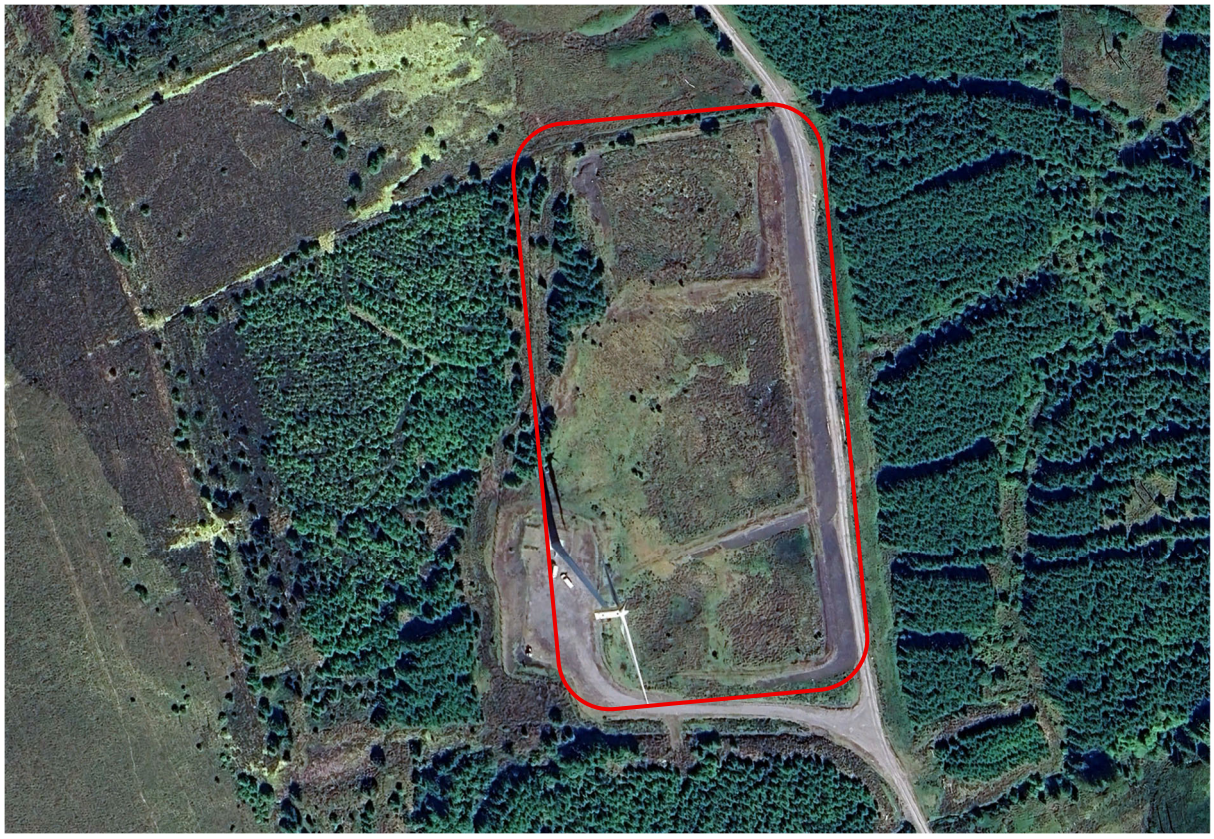

Photo 5 – Recent aerial photo of bunded peat repository cells on the Garvagh Glebe Wind Farm.

Photo 6 – Recent aerial photo of bunded peat repository cells on the Tullynahaw Wind Farm in Co. Roscommon.