OBSERVATIONS ON SHANCLOON WINDFARM SID: P. Johnston

An Coimisiún Pleanála - Case reference: PAX07.323699

Shancloon Windfarm in the townlands of Beagh, Beagh More, Cloonbar, Cloonweelaun, Cloonnaglasha, Cloonteen, Corillaun, Derrymore, Ironpool, Shancloon, Toberroe and Tonacooleen, Co. Galway

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INTRODUCTION

I make the following observation both as a resident of the hydrological catchment area downgradient of the location of the proposed windfarm development, and as an engineering hydrologist with 40 years practical and academic experience in karst and wetland/bog hydrology. I am currently adjunct professor in Civil and Environmental Engineering at Trinity College Dublin. I have formerly acted as a Technical Advisor to An Bord Pleanála and have undertaken field and policy-related research projects for the EPA, Teagasc and Coillte.

LANDSCAPE

The nature of the landscape and hydrology of North Galway and South Mayo makes the siting of any windfarm difficult and problematic. It is basically unsuitable even if the County Development plan indicates windfarm development is 'open to consideration'. The landscape is essentially flat, some 30-40m OD, dominated to the south by Knockma, a hill of national archaeological significance. The hill's summit is at 170mOD, making its elevation some 130m above the surrounding landscape. The proposed 11 turbines of Shancloon windfarm have a tip height of 185m, making them an intrusive 55m above the summit of Knockma. Although the windfarm is some 6-7 km from Knockma, the turbines represent an unacceptable visual intrusion on the surrounding landscape itself littered with archaeological remains subservient to the important dominance of Knockma. This landscape is clearly visible from the R334 and N84 routes northwest of the development site which lies between these routes and Knockma. This observation is irrespective of the impact of the turbines on the noise, shadow flicker and visual intrusion on nearby dwellings, observations which are treated in separate submissions to An Coimisiún Pleanála.

HYDROLOGY

The nature of the hydrological regime in the vicinity of the windfarm means it is vulnerable to impact from the construction and operation of the proposed 11 turbines and their infrastructure. However, the assessment of this impact as exhibited in the EIAR is totally inadequate in enabling a sustainable planning decision to be made.

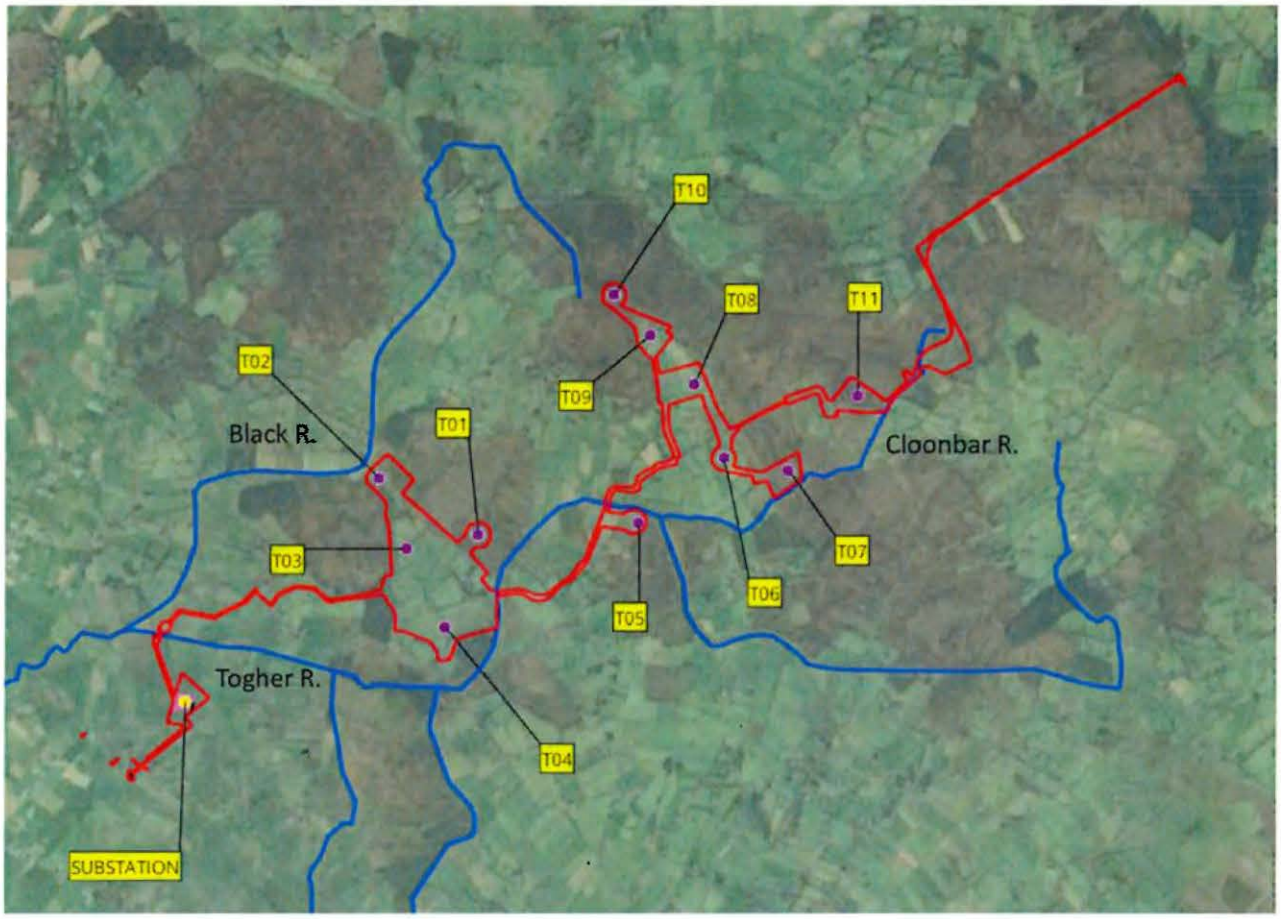

Fig. 1 : The development site with principal drainage – brown areas are peat bogs (from EIAR Appendix 12.3:Flood risk assessment)

There are many contradictory statements in the reporting of the geology and hydrogeology particularly in respect of the permeabiity of the various geological strata on site, suggesting the hydrological regime has not been well understood.

As shown in the EIAR (Fig.1), the development site is in the catchment of the Black River, mostly crossing the tributary catchments of the Togher and Cloonbar rivers. The flat landscape is essentially a mosaic of peatland and agriculturally reclaimed grassland, prone to flooding in spite of being part of a longstanding arterial drainage scheme. The site is within the Clare Groundwater Body which is the principal hydrological catchment area serving Lough Corrib, an SAC. The requirements of the Water Framework Directive (EU 2000/60) include the need to conserve the sources of water supply to the SAC. In this case the sources of supply are both groundwater and surface water and the development site is in the headwaters of both. The implications of the impact of the windfarm development on these sources of supply was not investigated in the EIAR, a serious deficiency in planning terms.

BEDROCK

In essence, the bedrock under most of the site is reported in the EIAR as an argillaceous limestone (also described differently, as calcarenite, in the same EIAR) known as the Ardnasillagh formation. It is of unknown hydraulic conductivity although the hydrogeology is mapped by the Geological Survey Ireland as a regionally important karstic aquifer. There are anecdotal reports of moderate yields including one artesian flow on the development site. The weathered bedrock on the site is overlain by a relatively thin (<20m) cover of mineral soil (glacial till) of relatively low permeability which serves as a confining layer to the karstified bedrock below. Broad depressions in this cover of glacial till have been infilled by raised peat bogs, much of which are now cutatway. However, there are still relatively intact fragments of high bog (Cloonbar) which are the subject of a restoration plan by a community wetland group Friends of Kilconly Wetlands.

The confused reporting in the EIAR of the apparent karst nature of the bedrock has led to significant uncertainty as to the likely impact of the construction and operation of the proposed 11 turbines. The setback of the turbines and their hardstands to the edge of the bogs seems to have been a guiding principle in their location, at least 5 of the turbines are still located *on* peat up to 8m in thickness. Critically, no account of the impact of the turbine foundations (piles with concrete foundations up to 5m thick and 25 m in diameter requiring 2400 cubic metre holes) on the underlying aquifer has been reported. In effect, all these foundations will necessarily puncture over 140 holes through the overlying mineral soil into the founding karstified bedrock, opening a route for potential drainage and contamination. None of this interpretation and analysis is mentioned in the EIAR which ultimately declares the impact as 'imperceptible'.

The EIAR declares an expected low permeability in the underlying karstc bedrock, yet the consultants' own reconnaissance survey of surface features showed over 30 likely karst features including dolines which are indications of conduit karst at depth. Moreover, the Ardnasillagh formation underlying the site is known to host turloughs elsewhere, as also reported in the EIAR. Moreover, the geophysics survey conducted by Apex Geophysics indicated a number of anomalies (albeit using an inappropriate Electrical Resistivity survey method for karst). None of these were investigated by drilling. They were just avoided by adjusting turbine locations, representing an approach which is not a solution for construction in karst.

At the very least, it is normal good practice to develop a water balance for the site, in order to understand the flows and pathways involved so as to define the impact of the development on them. This normally involves a map of the groundwater table as determined from measured water levels on the site. While limited water level monitoring in site investigation boreholes was undertaken, there was no analysis of the results. Consequently, there is no understanding in the EIAR of the role of groundwater and the impact of turbine foundations on it.

The karst in this area of north Galway is a reservoir for flows to Lough Corrib SAC. The whole of this region, both as karstifed bedrock and surface streams constitutes the Clare water body catchment for serving Lough Corrib. Any additional risk of opening new pathways for contamination or alteration of these pathways is not warranted. Later decommissioning of turbines will not remove that risk.

PEATLANDS

The extensive peat cover (albeit much of it cutaway) across the development site is also likely dependent on the underlying regional aquifer as an 'environmental supporting condition'. Most of the monitored reported groundwater levels in the boreholes near the turbines are within a few metres of the ground level. One reported artesian flow occurred near the proposed substation. These water levels are evidence of likely supporting pressures from the underlying aquifer that help to keep the remaining peatland bogs wet. Extensive peat cutting in the area has incorporated surface drainage but any attempts at rewetting/restoration would be jeopardized by any undermining of the underlying karstified aquifer. Piled foundations for turbines would very likely affect the role of the the regional karst groundwater in supporting any attempts at restoring the bog wetlands. Such restoration/re-wetting is a key objective of the national Climate Action plan in company with the recently enacted EU Nature Restoration law.

Siting new holes into a known karstified aquifer (RKc aquifer designation) does not make for a good planning decision, especially given their proximity and hydraulic connection to an established SAC. The EU Habitats Directive, article 6, requires protection of the "*integrity*" of a designated site – that includes the integrity of the water supply to that SAC, which, in this case includes the development site as a source.

CARBON CALCULATION

It is common practice to undertake a carbon balance for the proposed windfarm development, in part to justify its location and operation. This is particularly valid for siting turbines where they will affect the sustainability of underlying and adjacent peatlands which are a significant store of carbon. Use is made of a Scottish 'Carbon Calculator' which takes account of the manufacture of the turbines as well as impact on surrounding peatlands. This 'calculator' was developed for "high ground on peatlands which contain forestry in a similar climate" (EIAR sect. 7.2.3), clearly different to the landscape at Shancloon. Nevertheless, any use of the calculator has to take account of local conditions, investigated in the field. Such investigation should include assessment of the range of influence of subsidence in the peatbog of digging/drilling deep turbine foundations. It seems default values were used in this case and such parameters as the estimated loss of Dissolved Organic Carbon (DOC) was taken as zero. Such analysis does not provide any justification for the windfarm project.

SURFACE HYDROLOGY

The development site is largely situated on the catchment of the Togher and Cloonbar rivers which are tributaries of the Black River. The Black River, in company with the other streams flowing into Lough Corrib, is a salmonid stream. Discharges (particularly of colloidal sediments which are not prone to gravitational settlement) into the stream from any construction work or later operational conditions are not acceptable.

The surface drainage design, shown in many parts of the EIAR for the turbine hardstands and access roads, has been used on many windfarms but is unlikely to work effectively here, given the flat landscape, low permeability soil/peat cover and the ubiquitous existing dense drainage network (arising from arterial drainage). The design presented in the EIAR is effectively generic and has not been tailored to the local conditions – and is unlikely to work.

In short, in order to analyze the impact of the development on the hydrological regime, an evaluation of the prevailing water balance is a fundamental requirement. How much drainage water is capable of infiltrating the ground (as the drainage design requires)? What is the recharge to groundwater? The EIAR stated the data was not available.

The flood analysis in the EIAR is predicated on a modeling supported by measurements only of channel cross-sections. Such predictions (an 'Indicative Flood Assessment') are unsubstantiated if they are not validated by hydrometric measurements in the field. No measurements of stream discharges or levels were reported in the EIAR which would be required to validate the modelling. At least 6 of the turbines are adjacent or very close to the margins of predicted flooding – given the uncertainties involved, that puts them at risk.

Moreover, no account was taken of the likely runoff from access roads contributing to flood risk, especially given the more intensive storms being experienced under climate change.

It seems, from the EIAR, that flood predictions were meaningless anyway since mitigation was stated to simply require flood-proofing the base of the turbine towers.

CONCLUSION

To summarize, the hydrological/hydrogeological investigation was totally inadequate to support an environmental impact assessment of the Shancloon windfarm. Regardless, locating a windfarm of 11 turbines in a sensitive karstified landscape such as north Galway, upstream of the sensitive Lough Corrib SAC, is not justified on environmental grounds alone.

Paul Johnston 14 November 2025