



Technological University of the Shannon: Midlands Midwest

Ollscoil Teicneolaíochta na Sionainne:
Lár Tíre Iarthar Láir

OBSERVATION ON A STRATEGIC INFRASTRUCTURE DEVELOPMENT APPLICATION

Submitted to An Coimisiún Pleanála pursuant to the Planning and Development Act 2000 (as amended) and the Planning and Development Regulations 2001 (as amended)

To: An Coimisiún Pleanála, 64 Marlborough Street, Dublin 1, D01 V902

Application: Ballincor Wind Farm — Strategic Infrastructure Development

Applicant: RWE Renewables Ireland Ltd.

Location: Townlands of Cloonaheen, Ballincor Demesne and Curralanty, Co. Offaly, and Clonfree, Castletown and Cronekill, Co. Tipperary

Case reference: PAX92.324279

ACP reference: ACP-324279-26

Observer: Technological University of the Shannon (TUS)

Table of Contents

Section	Description	Page
	Glossary	iii
1	Introduction and basis of this observation	1
2	ILOFAR: the affected research infrastructure	1
3	Strategic Importance of ILOFAR to TUS	2
4	The statutory framework the Commission is required to apply	4
5	The deficiency in the environmental impact assessment	5
5.1	The applicant acknowledgments	6
5.2	Yet the EIAR does not assess the effect on ILOFAR	6
5.3	Preliminary technical basis for concern	6
5.4	Engagement to date	6
5.5	Relocation or post-construction study is not adequate mitigation	7
6	Conditions sought	7
7	Relief sought	8

Glossary

Acronym	Meaning
TUS	Technological University of the Shannon: Midlands Midwest.
TCD	Trinity College Dublin
DIAS	Dublin Institute for Advanced Studies
LOFAR	LOw Frequency ARray
ILOFAR	Irish LOFAR station
ERIC	European Research Infrastructure Consortium
HEI	Higher Education Institute
AIT	Athlone Institute of Technology (defunct)
HEAnet	Higher Education Authority network
CERN	Conseil Européen pour la Recherche Nucléaire (European Organisation for Nuclear Research)
EPE	Education and Public Engagement
PWM	Pulse Width Modulation

1. Introduction and basis of this observation

This observation is made by the Technological University of the Shannon (TUS). TUS is one of the higher-education and research institutions comprising the Irish Low Frequency Array (ILOFAR) consortium, which owns and operates the ILOFAR radio telescope at Birr Castle Demesne, Co. Offaly. TUS therefore makes this observation as a directly affected stakeholder with a substantial institutional and research interest in the matters set out below.

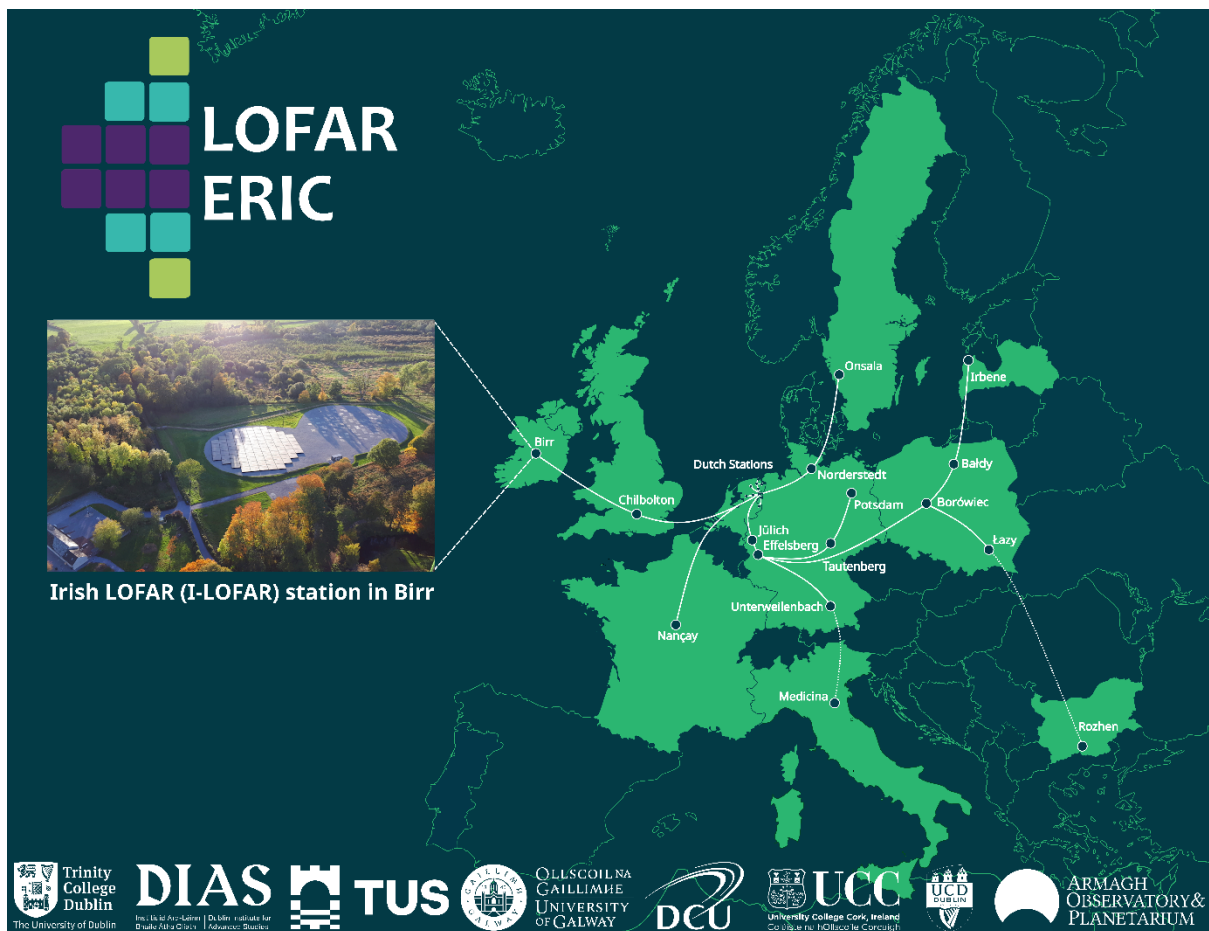
TUS wishes to be unambiguous at the outset as to the nature and the limits of this observation. TUS strongly supports the transition to renewable energy and the achievement of Ireland's climate objectives. The Faculty of Engineering and Technology and the wider University work actively and collaboratively with the renewable-energy sector, and TUS recognises that wind-energy development of this kind may properly be regarded as strategic infrastructure of national importance. Nothing in this observation should be read as opposition to wind energy in general, to this category of development, or to the principle of renewable generation in this region.

This observation is concerned with two distinct and narrow questions: first, the *siting* of this particular development relative to an incumbent, nationally and internationally significant item of State-funded research infrastructure; and second, the *adequacy of the environmental impact assessment* of the effects of the development on that infrastructure. TUS's position is that the development can and should be capable of proceeding compatibly with the continued operation of ILOFAR, provided that the effects on ILOFAR are properly assessed and that appropriate, enforceable conditions are attached to any permission. The relief sought below is framed accordingly.

2. ILOFAR: the affected research infrastructure

ILOFAR is Ireland's only research-level radio telescope station. It was constructed by a consortium of higher-education and research institutions on the island of Ireland, including Trinity College Dublin, the Dublin Institute for Advanced Studies, University of Galway, TUS, University College Cork, University College Dublin, Armagh Observatory and Dublin City University.

As shown in the network map overleaf, ILOFAR is the westernmost element of a pan-European network of radio telescopes (the International LOFAR Telescope), and forms part of Ireland's participation in the LOFAR European Research Infrastructure Consortium (ERIC) — one of only two ERICs in which Ireland participates. Being 630 km northwest from Chilbolton in the UK (the next most westerly station of LOFAR ERIC), the ILOFAR station in Birr adds significantly to the width, and hence the resolving power, of the entire network. The facility has been developed and is sustained through significant and ongoing public investment, including from Research Ireland, the Department of Further and Higher Education, Research, Innovation and Science, the Department of Enterprise, Tourism and Employment, Offaly County Council, and the consortium institutions themselves.

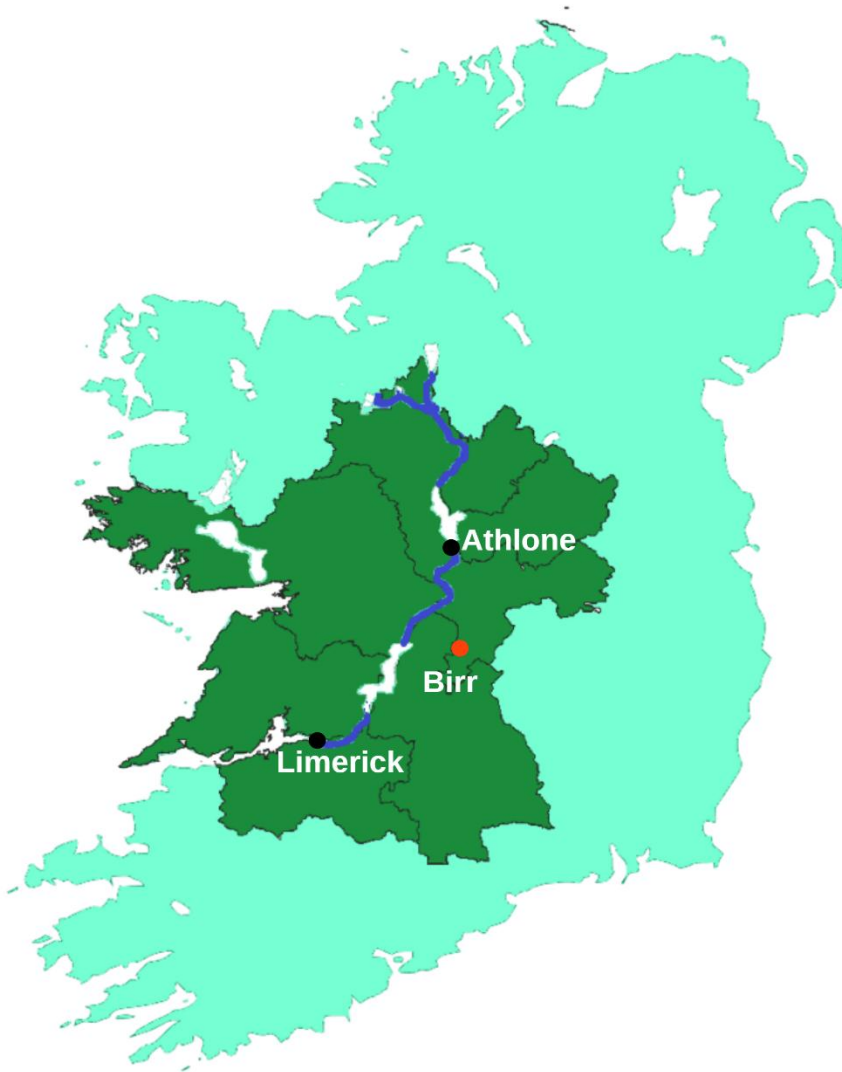


ILOFAR operates in two modes. In international mode it functions as part of the European network, contributing an effective baseline that will exceed 2,700 km once the Bulgarian station comes online in late 2026. In local mode it is used independently by Irish researchers for space-weather monitoring, pulsar studies and planetary science, and as a national training facility for radio astronomers and data scientists. Harmful interference at the ILOFAR site degrades both modes of operation.

TUS submits that ILOFAR is properly regarded as a material asset for the purposes of environmental assessment. It is an existing, lawfully operating, publicly funded installation whose function is uniquely sensitive to electromagnetic interference. A radio telescope is designed to detect signals many orders of magnitude weaker than commonplace man-made emissions; the distance and design measures required to achieve electromagnetic compatibility with such a system are correspondingly greater than for ordinary receivers. ILOFAR is, accordingly, the incumbent strategic installation in this location, and its protection is a material consideration that the Commission is required to weigh.

3. Strategic Importance of ILOFAR to TUS

As mentioned previously in Section 1, TUS has significant institutional and research interest in the ongoing operation of ILOFAR in Birr. TUS (previously AIT), as the nearest HEI to Birr, has operated as the gateway to HEAnet for data from ILOFAR since its commissioning in 2017.



The map above shows the location of Birr relative to the two largest campuses of TUS (Athlone and Moylish in Limerick) with the counties from which most of the CAO students attend TUS shaded in dark green. It is evident from this map that Birr is placed close to the centre of this region and approximately halfway between the major campuses in Athlone and Limerick. The siting of a major research facility in Birr naturally has an impact on the region where TUS is located.

Since 2019, TUS in collaboration with DIAS has funded, and continues to fund, a number of PhD students whose research is fundamentally linked to ILOFAR. The success of these research projects has led to the signing, in June 2025, of a Memorandum of Understanding (MoU) between DIAS and TUS; the first of its kind between DIAS and a Technological University. This MoU commits both parties to funding PhD students and to engage regionally with schools, industrial stakeholders, and county councils to raise awareness of how the placement of ILOFAR in Birr can benefit the region. These EPE (Education and Public Engagement) activities use both the observatory at Dunsink and the ILOFAR Education Centre located next to ILOFAR in Birr. Postgraduates involved in the aforementioned PhD projects with ILOFAR are expected to participate in these EPE initiatives with EPE playing a significant role in their development as researchers and scientific communicators.

Ireland's accession to Associate Membership of CERN, which took effect on 22 October 2025, represents a further dimension of the strategic importance of ILOFAR to TUS. Minister for Further and Higher Education, Research, Innovation and Science James Lawless has described CERN membership as opening world-class opportunities for Irish researchers, students and enterprises, and has identified it as a vehicle for enhancing teaching, learning and skills development in STEM across the country. As mentioned previously, ILOFAR is one of only two ERIC projects in which Ireland participates, and TUS's active role in the ILOFAR Consortium positions the University to contribute meaningfully to Ireland's developing engagement with CERN. The research capabilities cultivated through ILOFAR, particularly in large-scale distributed data acquisition, signal processing, and the engineering challenges of operating within an international collaborative framework, are directly relevant to the technical environment at CERN and to the kinds of participation that Associate Membership is intended to enable. TUS's capacity to widen and deepen its engagement with CERN is therefore materially dependent on the continued operation of ILOFAR; any degradation of the telescope's receiving environment diminishes not only the immediate scientific output of the facility but also the institutional research base on which TUS's participation in Ireland's broader portfolio of international research collaborations, including CERN, depends. In this context, protecting ILOFAR is not solely a question of preserving one instrument; it is a question of sustaining the national research infrastructure through which the Government's own stated ambitions for international scientific collaboration are to be realised.

4. The statutory framework the Commission is required to apply

This application in question is a direct application to An Coimisiún Pleanála for Strategic Infrastructure Development under the Planning and Development Act 2000, as amended. The application has been submitted under section 37E of the 2000 Act and is identified in the public notice as a renewable-energy development to which the RED III completeness-check procedure under section 37JA applies. The development is therefore being determined by the Commission as the first-instance consent authority.

Because there is no prior planning-authority decision and no merits appeal, this written observation is the principal mechanism by which TUS can place its concerns before the Commission. The observation is made in accordance with Article 217 of the Planning and Development Regulations 2001, as amended, and sets out the subject matter of the observation and the reasons, considerations and arguments on which TUS relies.

The Commission is required to carry out an environmental impact assessment under sections 171A and 172 of the 2000 Act, giving effect to Directive 2011/92/EU, as amended by Directive 2014/52/EU. That assessment must identify, describe and assess the direct and indirect significant effects of the proposed development, including effects on material assets and the interaction between relevant environmental factors. TUS submits that ILOFAR is plainly capable of being treated as a material asset for this purpose. It is an existing, lawfully operating, publicly funded research installation whose function is uniquely sensitive to electromagnetic interference.

The EIAR must contain the information required by Article 94 and Schedule 6 of the Planning and Development Regulations 2001, as amended. That includes a description of the likely significant effects of the development on relevant environmental factors, including material assets, and an assessment of cumulative effects with other existing and approved

developments. TUS submits that the radio-frequency environment on which ILOFAR depends is a finite and shared resource. Permission has recently been granted for the Cush Wind Farm in the same general area (An Coimisiún Pleanála ref. 318816, granted 4 November 2024), and the cumulative effect of Ballincor together with that and any other permitted or proposed wind-energy development in the wider area must therefore be assessed in combination, and not on a project-by-project basis that overlooks the aggregate burden on the radio-quiet environment.

Where the Commission considers that the EIAR is not adequate, or that further information is required to allow it to carry out a lawful environmental impact assessment, the Commission has power under section 37F of the 2000 Act to require further information, including a revised EIAR where appropriate. Section 172 requires the Commission to obtain such further information where necessary to ensure that the EIAR is complete and of sufficient quality to allow it to reach a reasoned conclusion on the effects of the development. TUS's submission, developed at Section 4 below, is that the EIAR is presently incomplete in respect of effects on ILOFAR, with the consequence that the Commission cannot, on the material before it, reach a reasoned conclusion on the significance of those effects in either direction. The appropriate course in that circumstance is to require the necessary assessment before any decision is made.

In determining the application, the Commission must apply section 37G of the 2000 Act. It must consider the EIAR, any submissions or observations made in accordance with the statutory procedure, any further information submitted, the report(s) of the planning authority or authorities concerned (the site spanning both Offaly and Tipperary), relevant development-plan and policy considerations, and the likely effects of the proposed development on the environment. The Commission may grant permission, grant permission with modifications, grant permission in part, or refuse permission.

If permission is granted, the Commission may attach conditions under section 37G, including conditions of the kind referred to in section 34(4). Where the environmental impact assessment identifies effects that require mitigation, the measures relied upon to render those effects acceptable must be secured through clear and enforceable conditions rather than left to be resolved after consent. Such conditions may properly include pre-commencement requirements, technical specifications, monitoring, liaison and remediation mechanisms, provided that they are sufficiently precise and enforceable.

The Commission is also required to state the main reasons and considerations on which its decision is based, including its conclusions on the environmental impact assessment and its reasons for attaching any conditions. The matters raised in this observation are therefore matters on which TUS respectfully requests express engagement in the Commission's assessment and decision.

5. The deficiency in the environmental impact assessment

TUS's central submission is that the EIAR does not adequately assess the effects of the proposed development on ILOFAR, and that the assessment is therefore incomplete in a respect that the Commission is legally required to address before any decision is made.

5.1 The applicant acknowledgments

The applicant's own EIAR concedes that the development has the potential to affect the radio-frequency environment. The EIAR acknowledges that the proposed project has the potential to contribute to cumulative radio-frequency interference levels in the region, depending on the final design and technologies used. That is an acknowledgement, in the applicant's own statutory document, that an effect on the radio environment is foreseeable.

5.2 Yet the EIAR does not assess the effect on ILOFAR

Notwithstanding that acknowledgement, and notwithstanding that ILOFAR is an identified, mapped and well-known sensitive receptor in the vicinity, the telecommunications impact assessment within the EIAR appendices does not assess the effect of the development on ILOFAR. The known sensitive receptor most likely to experience a significant effect is, in substance, absent from the assessment of that effect. An assessment that concedes a potential contribution to interference while omitting any analysis of the one installation in the area uniquely vulnerable to it is, in TUS's submission, incomplete on its face.

5.3 Preliminary technical basis for concern

Preliminary calculations carried out by ILOFAR in collaboration with its international partners indicate that a wind farm at the Ballincor site, with the proposed number of turbines and nacelle heights, has the potential to cause harmful interference to ILOFAR. The principal mechanisms by which a wind farm may cause harmful interference to a radio telescope are well understood and include:

- emissions from turbine inverters, a particular concern given fast current-switching speeds and long cable runs from the nacelle;
- emissions from nacelle electronics, yaw motors, contactor switching transients and turbine-to-turbine communications links;
- emissions from aviation warning lighting and from any LED or fluorescent lighting using inverter (PWM) drivers;
- radio-frequency emission from cabling between the nacelle and the base of the tower, and emissions escaping through gaps in shielding or non-RF-sealed doors;
- inadequate grounding or poor electrical bonding between tower sections; and
- scattering of terrestrial transmissions (for example DAB broadcasts) from turbine structures into the telescope, and modulation of natural radio sources rising or setting behind the turbines by the motion of the blades.

These mechanisms are capable of mitigation through appropriate design. Electromagnetic compatibility between a wind farm and a radio telescope has been achieved at the LOFAR core at Dwingeloo in the Netherlands, through careful design of the turbines and their associated systems and through binding, ongoing coordination between the parties. The existence of that precedent demonstrates that the concern raised here is not an objection to wind energy, but a question of design and siting that is capable of resolution.

5.4 Engagement to date

TUS understands, from other members of the ILOFAR consortium, that the position recorded in the EIAR — to the effect that ILOFAR did not engage with the scoping exercise — does not reflect the engagement that has in fact taken place. The consortium has advised that its

representatives held several meetings with representatives of the applicant at which the sensitivity of ILOFAR, the mechanisms of harmful interference, and the solutions applied at the LOFAR core in the Netherlands (including the make and model of the turbines used there) were discussed, and that the Ballincor development was among the developments raised. The consortium has further advised that the necessary mitigation measures were communicated to the applicant.

TUS notes that the applicant's EIAR indicates a willingness to engage with ILOFAR following construction. In the context of research infrastructure of this sensitivity, post-construction engagement is an inadequate substitute for pre-construction engineering controls. An offer of future engagement of that kind is vague, non-binding, sets no enforceable mitigation threshold, and defers critical electromagnetic-compatibility design decisions until after irreversible construction has occurred. Reliance on future engagement, absent enforceable conditions, does not satisfy the requirements of a precautionary and lawful assessment of effects on a unique item of scientific infrastructure.

5.5 Relocation or post-construction study is not adequate mitigation

TUS further understands from the ILOFAR consortium that proposals such as relocating ILOFAR, or funding post-construction research into interference effects, would not constitute adequate mitigation for the purposes of this application. Relocation would involve the loss or displacement of an existing, State-funded research installation, the identification and servicing of a suitable new radio-quiet site, extensive civil and technical works, and the procurement and commissioning of replacement infrastructure over a prolonged period. It would also provide no assurance that a future site would remain free from comparable development pressures. Similarly, funding research or student activity after construction would not address the core planning issue if the telescope had already been compromised. The relevant mitigation must therefore be embedded in the design, specification, construction and operation of the proposed wind farm before development commences and secured by enforceable condition.

6. Conditions sought

TUS submits that, rather than refusal, the appropriate course is for the Commission either to require the applicant to furnish a proper assessment of effects on ILOFAR (see Section 7), or to grant permission subject to binding, enforceable conditions of the following kind. These conditions are directed at securing electromagnetic compatibility in advance of construction and would allow the development to proceed compatibly with the continued operation of ILOFAR.

Condition 1: *Pre-construction electromagnetic compatibility agreement.* Prior to the commencement of development, the developer shall procure the preparation of a written electromagnetic-compatibility specification for the proposed development by a suitably qualified electromagnetic-compatibility specialist with experience of radio-frequency interference assessment. The specification shall be prepared in consultation with the ILOFAR consortium and shall address, at a minimum, turbine type, inverter design and switching characteristics, nacelle electronics, shielded cabling, RF sealing, turbine-to-turbine communications, grounding, bonding,

lighting systems and any other component or system capable of giving rise to radio-frequency interference affecting ILOFAR. The specification shall include measurable performance criteria, proposed mitigation measures, verification arrangements and an implementation programme. No development shall commence until the specification has been submitted to and agreed in writing by the Commission, or by such planning authority as the Commission may specify for compliance purposes.

Condition 2: *Turbine and component specification.* The turbine type and associated components shall be demonstrated to achieve electromagnetic compatibility with a radio observatory, having regard to the design solutions applied at the LOFAR core at Dwingeloo. This shall include inverter design and switching characteristics, RF-sealed nacelle doors, shielded cabling between nacelle and tower base, multiple low-inductance ground paths, electrical bonding between tower sections, and shielded turbine-to-turbine communications links.

Condition 3: *Lighting.* Any LED or other lighting shall be powered by linear regulators rather than inverter (PWM) drivers, and aviation warning lighting shall be specified so as to minimise radio-frequency emissions.

Condition 4: *Baseline survey and operational monitoring.* Prior to the commencement of development, the developer shall procure a baseline radio-frequency-interference survey of the ILOFAR receiving environment, to be carried out by a suitably qualified electromagnetic-compatibility specialist in consultation with the ILOFAR consortium. The developer shall thereafter implement an operational monitoring programme for the lifetime of the development, including defined emission thresholds, periodic reporting, procedures for investigating exceedances, and a binding remediation mechanism where exceedances or harmful interference attributable to the development are identified. The monitoring programme shall include provision for reasonable technical verification costs incurred by the ILOFAR consortium in assessing compliance with agreed emission thresholds. No turbine shall become operational until the baseline survey, monitoring programme and remediation mechanism have been submitted to and agreed in writing by the Commission, or by such planning authority as the Commission may specify for compliance purposes.

Condition 5: *Scattering assessment.* The potential for scattering of terrestrial transmissions from turbine structures into ILOFAR shall be assessed and mitigated as required.

Condition 6: *Liaison and enforcement.* A named liaison point and a binding process for ongoing coordination between the developer and the ILOFAR consortium shall be established and maintained for the life of the development, so that the mitigation obligations persist and remain enforceable.

7. Relief sought

TUS respectfully requests that the Commission, in the discharge of the statutory duties identified at Section 4:

- (a) as a first step, require the applicant under the environmental-impact-assessment procedure to furnish further information in the form of a proper assessment of the

effects of the development on ILOFAR — sufficient to allow the Commission to reach a reasoned conclusion on the significance of those effects — together with an agreed pre-construction electromagnetic-compatibility design, before any decision is made; and

- (b) in the event that permission is granted, attach binding and enforceable conditions of the kind set out at Section 6, so as to secure electromagnetic compatibility between the development and ILOFAR in advance of construction; and
- (c) refuse permission only in the event that the effects on ILOFAR cannot be adequately assessed or cannot be mitigated by condition.

TUS's objective is the coexistence of two pieces of strategic infrastructure — the proposed renewable-energy development and the existing national radio-astronomy facility — and not the frustration of either. TUS submits that, properly assessed and properly conditioned, that coexistence is achievable.



Professor Raphaella Kane
Chief Academic Officer

Signed on behalf of the
Technological University of the Shannon: Midlands Midwest
University Road
Athlone
Co Westmeath
N37 HD68
Ireland