Proposed Ballynalacken Windfarm Project

Environmental Impact Assessment Report

Chapter 2: EIAR Process and Presentation

March 2025

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List of Abbreviations

Abbreviation	Full Term
EIA Directive	EU Directive 2011/92/EU (as amended by Directive 2014/52/EU) on the assessment of the effects of certain public and private projects on the environment.
EIAR	Environmental Impact Assessment Report prepared by competent experts and submitted as part of the planning application
EIA	Environmental Impact Assessment by the planning authority of the effects of certain public and private projects on the environment, governed by the terms of the EIA Directive
Habitats Directive	EU Habitats Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora.

CHAPTER 2 EIAR PROCESS AND PRESENTATION

EIAR 2.1 The EIA Directive

The Environmental Impact Assessment (EIA) of projects is governed by the terms of European Union Directive 2011/92/EU (as amended by Directive 2014/52/EU) on the assessment of the effects of certain public and private projects on the environment, herein called the EIA Directive. The EIA Directive requires that projects that are likely to have significant effects on the environment be made subject to an assessment prior to development consent being given by the planning authority.

EIA Directive Article 1: Paragraph 2(a) defines 'project' as

- The execution of construction works or of other installations or schemes and
- Other interventions in the natural surroundings and landscape including those involving the extraction of mineral resources.

The EIA Directive divides potential Projects into two lists;

- Annex I – where EIA is required in all cases.
- Annex II – where Member States shall determine whether an EIA is required.

EIAR 2.2 Screening for EIA

As Ballynalacken Windfarm Project is a large infrastructure project, and a SID application, an EIAR accompanies the planning application.

EIAR 2.3 The EIA Report

Article 5 of the EIA Directive states that;

1. Where an environmental impact assessment is required, the developer shall prepare and submit an environmental impact assessment report. The information to be provided by the developer shall include at least:

(a) a description of the project comprising information on the site, design, size and other relevant features of the project;

(b) a description of the likely significant effects of the project on the environment;

(c) a description of the features of the project and/or measures envisaged in order to avoid, prevent or reduce and, if possible, offset likely significant adverse effects on the environment;

(d) a description of the reasonable alternatives studied by the developer, which are relevant to the project and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the project on the environment;

(e) a non-technical summary of the information referred to in points (a) to (d); and

(f) any additional information specified in Annex IV relevant to the specific characteristics of a particular project or type of project and to the environmental features likely to be affected.

The promoter Rowanmere Limited commissioned Ecopower Developments to prepare an EIA Report for the Ballynalacken Windfarm Project. This EIA Report fulfils all the requirements of an EIA Report under the EIA Directive and was compiled having regard to the generality of the EIA and specifically to the requirements of Article 5; Annex IIA and Annex IV and also having regard to Schedule 6 of the Planning and Development Regulations 2001 (as amended).

EIAR 2.3.1 Guidance Documents for the EIA Report

This EIA Report has been prepared in accordance with the following Guidance Documents:

- **EIA Directive**: Article 5, Annex IIA and Annex IV https://environment.ec.europa.eu/law-and-governance/environmental-assessments/environmental-impact-assessment_en
- **Planning and Development Regulations 2001** (as amended) – Part 10 Environmental Impact Assessment & Schedule 6 Information to be contained in EIAR.
- **Planning and Development Act 2000** (as amended) – Part X Environmental Impact Assessment

  Statutory Instrument S.I. No. 296 of 2018. European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018. http://www.irishstatutebook.ie/eli/2018/si/296/made/en/pdf
- **Guidelines on the information to be contained in Environmental Impact Assessment Reports** (EPA May 2022). https://www.epa.ie/publications/monitoring--assessment/assessment/EIAR_Guidelines_2022_Web.pdf
- **Guidance on the preparation of the EIA Report** (European Commission, 2017) https://data.europa.eu/doi/10.2779/41362
- **Guidance on Screening** (European Commission, 2017) https://data.europa.eu/doi/10.2779/092377
- **Guidance on Scoping** (European Commission, 2017) https://data.europa.eu/doi/10.2779/286012
- **Guidelines for the Assessment of Indirect and Cumulative Impacts** as well as Impact Interactions, (European Commission, 1999). https://ec.europa.eu/environment/archives/eia/eia-studies-and-reports/pdf/guidel.pdf

EIAR 2.3.2 The Project Design Team

An EIA Report Coordinator was appointed, who arranged for all the initial consultations, site investigations, development designs and technical investigation to be carried out; appointed engineering and scientific experts as the Project Design Team to prepare the final project design; assembled the EIA Report Team of experts (which includes the project design team members) to prepare the specialist environmental factors or topic chapters for the EIA Report on the chosen design; co-ordinated the assembly and presentation of the EIA Report and carried out continuous reviews of the Report.

Specialist engineering and environmental consultants were engaged for planning, design and evaluation of the Ballynalacken Windfarm Project. These specialists are competent experts[1] in their field of expertise and, are identified in the table below.

Table 2-1: The Project Design Team

Team Member	Competence	Design Area
Ecopower Developments	Windfarm planning and development specialists Project Supervisor Design Process (PSDP) EIA practitioners	Supervision and co-ordination of design iterations Consideration of alternatives EIAR Coordinators
INIS Environmental Consultants Ltd	Environmental Consultants specialising in ecology & environmental management	Mitigation of effects on Biodiversity
Hydro Environmental Services	Geologist and Hydrogeologist Environmental engineering consultancy	Mitigation of effects on Soils, Water
Fehily Timoney (Engineering, environmental science and planning consultancy)	Geotechnical Engineering Consultants	Site layout in relation to Geotechnical Stability
AMS (Archaeological Management Solutions)	Cultural Heritage Consultants	Mitigation of effects on Cultural Heritage
Ai Bridges	Telecommunications Consultancy	Site Layout in relation to Telecommunications and Aviation
TLI Group	TLI (Transmission Links Ireland) Utility Infrastructure Development Consultancy	Electrical and Cable Design Construction Methodologies
Malone O' Reagan	Consultant Engineers	Design of Site Entrances, Bridge Crossing and Local Road widening
Mable Engineering	Consultant Engineers	Turbine components haulage route Swept Path Analysis
MacroWorks	Landscape Consultancy	Turbine design in relation to Landscape and Visual Impact
AWN Consultancy	Consultant Engineers	Turbine Noise Modelling
Jennings O'Donovan	Consultant Engineers	Shadow Flicker Modelling

[1] Competent Experts: Article 5(3) Directive 2014/52/EU

EIAR 2.3.3 The EIA Report Team

Including the Project Design Team, Ecopower engaged the services of additional suitably qualified and experienced Competent Experts to appraise the likely effects on all the prescribed Environmental Factors of the Ballynalacken Windfarm Project development as described in Chapter 5 of this EIAR. The competency of all the experts engaged is summarised in the table below.

Table 2-2: The EIAR Team

EIAR Chapter	Competent Expert
EIA Report Co-ordinator **Chapters 1-5, Chapters 18-20**	Julie Brett (Dip. EIA), Philomena Kenealy (Dip. EIA), Conor Brett BSc (Hons), Cert.EIA; James Carroll BSc (Hons), Cert.EIA; Aoife Butler (AutoCAD technician, Cert.EIA). Project Managers in EIA, multi-disciplinary team which has completed site investigations, assessments and planning applications on 23 windfarm projects on-shore in Ireland. Since incorporation in 1996, the Ecopower group has developed extensive knowledge of the full spectrum of windfarm development and operation from; initial site investigations; site optimisation; landowner negotiations; grid connection procurement; contract negotiation; financing; construction; and asset management through to Operation & Maintenance of working windfarms and green electricity sales to the end customer.
Research of Cumulative Projects **Non-technical Summary**	James Carroll (Ecopower) BSc(Hons), Environmental Science, Cert.EIA Juliette Harvey BA in Anthropology (Hons), Cert.EIA
Biodiversity	Dr Alex Copland (BSc PhD MIEnvSc, MCIEEM), Howard Williams (BSc CEnv MCIEEM CBiol MRSB MIFM), Andrew Whitfiled (MA BA CEnv CEcol), Megan Doyle (MSc, BSc), for Inis Environmental Consultants, were the main ecologists involved in the Biodiversity chapter *(see chapter for full list).* Inis Environmental are an established ecological consultancy with a full-time inhouse ecological team of bird surveyors, habitat specialist, general ecologists, and GIS specialists. Inis Environmental consultants have over 17 years of experience in the onshore wind energy industry, and team members are either full or associate members of the Chartered Institute of Ecology and Environmental Management (CIEEM). Ross Macklin (BSc (Hons), MIFM, HDip GIS, PDip IPM) and Bill Brazier (BSc (Hons), MIFM) of Triturus Environmental Ltd, involved in all aquatic surveys undertaken for the proposed development used to inform the Biodiversity chapter of the EIA Report.
Population	Ciara Morley (Ph.D. and M.A. in Economics and Finance), Director at Morley Economic Consulting Ltd. Juliette Harvey BA in Anthropology (Hons) - tourism and community amenities research
Human Health	Tara Barratt (MSc (DIC) in Environmental Technology, BSc (Hons) in Geography, Associate Director in Savills' Health and Social Impact Assessment team), Millie Potter (MSc in Environmental Science, BSc (Hons) in Geology and Physical Geography). Dr Andrew Buroni (PhD in international Health and Impact Assessment methods and best practice, Savills' Health and Social Impact Assessment Practice Leader)
Land	Andy Dunne (B.Agr.Sc M.Sc (Agr) PhD) director of Environmental Agricultural Engineering Consultancy (EAEC) Appendix 6.1: Composition of Forestry at the Proposed Ballynalacken Windfarm Project was prepared by Veon Limited. Veon is a forestry and ecology management company and

EIAR Chapter	Competent Expert
	has been in business for over 30 years. Veon manage approximately 15,000 ha of forests throughout Ireland.
Soils	David Broderick P.Geo (BSc, H. Dip Env Eng, MSc): Hydrogeologist, and Michael Gill P.Geo (BA, BAI, Dip Geol., MSc, MIEI), Environmental Engineer and Hydrogeologist of Hydro-Environmental Services (HES). David has over 17 years' experience in groundwater resource assessment and hydrogeological/hydrological investigations in relation to developments such as quarries and wind farms, while Michael has over 22 years' environmental consultancy experience in Ireland. Ian Higgins, Principal Geotechnical Engineer of Fehily Timoney, an Irish engineering, environmental science and planning consultancy, who have established themselves as one of the leading engineering consultancies in peat stability assessment, geohazard mapping in peat land areas, investigation of peat failures and site assessment of peat.
Water	David Broderick P.Geo (BSc, H. Dip Env Eng, MSc): Hydrogeologist, and Michael Gill P.Geo (BA, BAI, Dip Geol., MSc, MIEI), Environmental Engineer and Hydrogeologist, both of Hydro-Environmental Services (HES). Biog. as per Soils above
Air Quality & EMF	**Air Quality** Ciara Nolan MSc in Applied Environmental Science and BSc (Hons) in Energy Systems Engineering, of AWN Consulting, a multidisciplinary environmental consultancy. Member of the Institute of Air Quality Management (MIAQM) and Institute of Environmental Sciences (MIEnvSc). **Electromagnetic Fields** - Lewis Brien (BEng (Hons) in Electronics) of Compliance Engineering Ireland (CEI)
Noise & Vibration	Mike Simms (Principal Acoustic Consultant) holds a BE and MEngSc in Mechanical Engineering and is a member of the Institute of Acoustics (MIOA) and of the Institution of Engineering and Technology (MIET). Dermot Blunnie (Principal Acoustic Consultant) holds a BEng (Hons) in Sound Engineering, MSc in Applied Acoustics and has completed the Institute of Acoustics (IOA) Diploma in Acoustics and Noise Control. Consultants with AWN Consulting, a multidisciplinary environmental consultancy.
Shadow Flicker	Aileen Byrne (BA, H.Dip) environmental scientist. Aileen has experience across a variety of environmental topics including Shadow Flicker and WindPRO software. Consultant with Jennings O'Donovan (JOD) consulting engineers.
Climate	AWN as per Air Quality above
Material Assets – Traffic and Transportation	Angeliki Kalatha – Senior Transportation Engineer, MSc in Civil Engineering; MSc in Engineering Project Management. Skilled in using TRL Junctions 10 and TRANSYT software for modelling and analysing roundabouts, priority junctions and signalised junctions Adam Price holds a BEng (Hons) in Civil Engineering from DIT, 2012 and BEng Construction and Civils Works (2009) and is a qualified TII Road Safety Auditor (2015) (Auditor No AP275695). Associate at ORS multidisciplinary building consultancy.
Material Assets – Public Roads and Local Built Services	Ruairí Geary and David Tarrant, Chartered Engineers with TLI Group, which is a utility infrastructure consultancy and construction company, operating extensively within the utilities sector both in Ireland and internationally.

EIAR Chapter	Competent Expert
Material Assets – Telecommunications	Kevin Hayes, Engineering Director at Ai Bridges, B.Eng in Electronic & Communications Engineer, M. Eng Hons in Communications & Software Engineering. David McGrath (Electronic Engineering and Software Design Engineer) Ai Bridges, telecommunications consultancy
Cultural Heritage	Dr Kim Rice Senior EIA Consultant BA (hons.) in Heritage Studies, MA in Landscape Archaeology, PhD in Archaeology and Advanced Diploma in Planning and Environmental Law. Breana McCulloch EIA Archaeologist with AMS (BA in Anthropology MES in Archaeology). Breana is also a member, and current Secretary, of the Institute of Archaeologists of Ireland. Consultants with Archaeological Management Solutions (AMS) Cultural Heritage Consultants
Landscape	Richard Barker Master Landscape Architecture (MLA MILI) of Macro Works consultancy, a specialist LVIA company with over 20 years of experience in the appraisal of effects from a variety of energy, infrastructure and commercial developments.

A more detailed statement of competency of the environmental experts is provided in each environmental topic chapter.

EIAR 2.4 Scoping for Content and Extent of the EIA Report

According to 'EC 2017 Guidance on Scoping', scoping is the process of determining the content and extent of the information to be submitted to the planning authority to ensure that the environmental assessment is focused on any likely significant effects of the project on the environmental factors. Scoping was carried out throughout the whole EIA Report preparation process.

EIAR 2.4.1 Key Activities in the preparation of the EIA Report

The key activities involved in the preparation of this EIA Report included:

- A preliminary description of the proposed Ballynalacken Windfarm Project was prepared by Ecopower Developments. This was examined by the Project Design Team for consideration of alternatives from an environmental effects consideration.
- Consultations with local landowners, An Bord Pleanála, local and regional authorities, prescribed and statutory consultees and parties that may have a particular interest in the receiving environment were carried out and their views were reflected in alternative designs for the project and the final particulars.
- Once the final particulars were established, a description of the final proposed whole Ballynalacken Windfarm Project development was prepared by Ecopower Developments which included the characteristics of the whole Project; the life-cycle stages including construction and operation phases and the decommissioning of the windfarm; the use of natural resources including land, biodiversity, water and soils; expected residues, emissions, and waste from the Project; and the vulnerability of the development to major accidents, natural disasters and climate change. All other (unrelated) projects and activities which warrant examination for cumulative effects were also identified. Scoping for the content and extent of the EIA Report was then carried out.
- Preparation of the topic specific chapters covering Land; Soils; Water; Air (Air Quality & EMF); Noise & Vibration; Shadow Flicker; Climate; Biodiversity; Landscape; Cultural Heritage; Material Assets;

Population and Human Health. These chapters were carried out by topic specific experts and describe the topic in a local context; the sources of information and guidance for the topic evaluation; the study methodology; establish the study area and identify possible development impacts on the environment and identify the sensitive aspects that could be impacted; followed by a description of the baseline environment and the evolution thereof; and the evaluation of the likely effects during construction, operation and decommissioning, on those aspects of the receiving environment. The direct, indirect and cross-factor effects of the proposal and the cumulative effects with other projects and activities were assessed. Mitigation measures, monitoring arrangements, and alternatives to be considered if required, were brought forward. The residual effect(s) are established and quantified. Each topic chapter has a summary at the end.

- The Interaction of the Foregoing chapter follows, summarising any interaction of the predicted effects between the environmental factors which were examined in the topic specific chapters.
- The Mitigation Measures and Monitoring Arrangements are compiled from the topic specific chapters in a separate chapter, by the EIA Coordinator.
- A summary of scoped-in impacts assessed by the component experts in the Environmental Factor topic chapters, is provided in a concluding chapter.
- A non-technical summary of the information contained in the EIA Report, is prepared and accompanies the main EIA Report.

EIAR 2.4.2 Scoping for Sensitive Aspects

Scoping to identify the sensitive aspects of the environment which have potential to be affected by the development was conducted through all iterations of the project from initial design; through to alternatives; and during examination of the final design. The scoping process considered topic specific publications; the available results from other assessments which were previously carried out pursuant to European Union legislation (e.g Strategic Environmental Assessment, Habitats and Birds Directive; Water Framework Directive;); legislation or regulatory controls relevant to the project; feedback from statuary bodies and NGOs and other parties who have either or both, thematically specific or area specific concerns; landowner and neighbour feedback; competent expert fieldwork and desktop studies. The Scoping process followed the same pattern irrespective of the topic;

- **Scoping to identify Sensitive Aspects of the Environment:** Any Sensitive Aspects with potential to be affected by the project were identified using a combination of field surveys; desktop surveys of mapping including designated sites mapping; information from other assessments, industry guidance on protection standards for the environmental topics and the competent expert's knowledge and expertise.
- **Identification of a Study Area**: The Ballynalacken Windfarm Project study areas are not governed by the development area (red line boundary) or by the land property area (blue line boundary) - rather to delineate a study area boundary, the receiving environment relevant for each topic and each Sensitive Aspect was scoped for the likely zone of impact based on the nature and scale of the proposed development and the competent expert's knowledge and expertise using a combination of information from previous assessments and industry guidance.
- **Scoping to identify Impact Pathways:** The Conceptual Site Model technique was used by the Competent Experts to identify likely source-pathway-receptor links to the Sensitive Aspects. The 'receptor' in the model is the Sensitive Aspect or an element of the Sensitive Aspect. An impact source by itself does not constitute an impact. It is only when there is a source of an impact and a receptor for that impact and a pathway of exposure, that there is any potential for impact. Where a source-pathway-receptor linkage exists, it is then the nature and magnitude of impact and the sensitivity of the receptor that will determine what level of impact is predicted.

  Appendix 1 of the EPA "Guidelines on the information to be contained in Environmental Impact Assessment Reports" (May 2022) contains the standard definitions of terms to inform the preparation of EIA Reports. These terms are used throughout this report.

Table 2-3: Extract from Appendix 1 Glossary of Terms

Term	Description
Source	The activity or place from which an effect originates
Pathway	The route by which an effect is conveyed between a source and a receptor
Receptor	Any element in the environment which is subject to impacts
Effect/Impact	A change resulting from the implementation of a project

- The Source-Pathway-Receptor is identified in the Evaluation Tables relating to each Sensitive Aspect in the topic specific chapters.
- Cross Factor effects between topics were also examined. Topic chapters were shared between the competent experts so that potential cross factor effects could be examined.

EIAR 2.4.2.1 Scoping out of Sensitive Aspects of the Environment

During all stages of EIAR preparation, the competent experts also scoped out (excluded) Sensitive Aspects or receptors relating to their environmental topic. This was because either:

- there will be either no potential or no likelihood for the Sensitive Aspect or receptor to be affected, or
- any effects to the Sensitive Aspect will be Neutral, or
- to avoid duplicating evaluations due to the Sensitive Aspect being examined in another topic chapter.

Note: The EPA Guidelines, in Table 3.4 Description of Effects, defines 'Neutral' as 'No effects or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error'.

EIAR 2.4.3 Scoping Projects and Activities for inclusion in the Cumulative Evaluations

EIAR 2.4.3.1 What are Cumulative Impacts?

The EPA Guidelines, in Table 3.4 Description of Effects, defines Cumulative impacts as 'The addition of many minor or insignificant effects, including effects of other projects, to create larger, more significant effects'.

EIAR 2.4.3.2 Cumulative Evaluation Requirements

Under the EIA Directive, the cumulative effects of a project must be considered which includes all elements of the project itself and the cumulative effects of related and unrelated projects and activities. The examination of cumulative effects in this EIA Report includes all elements of the project itself (the Whole Project) , and other related projects (Off-site Projects and Secondary Developments), as well as Other Unrelated Projects and Activities.

EIAR 2.4.3.3 Whole Ballynalacken Windfarm Project

The proposed Ballynalacken Windfarm Project comprises separate elements as outlined in the table below. The whole project is taken into consideration in each of the topic chapters in the EIAR.

Table 2-4: EIAR Nomenclature for the Whole Project

EIAR Nomenclature	Overview Description
Ballynalacken Windfarm	12 No. Wind Turbines and associated works including foundations and hardstanding areas, windfarm roads, electrical control building and internal underground cabling connecting the wind turbines to the control building, to be located in the townlands of Byrnesgrove; Commons; Ballymartin; Ballynalacken; Ballyouskill and Loughill.
Internal Cable Link	Underground cabling through the townlands of Ballymartin and Tinnalintan which will connect the Windfarm Control Building to the Tinnalintan Substation.
Tinnalintan Substation	110kV Electrical Substation in Tinnalintan townland and associated site entrance and access road.
Ballynalacken Grid Connection	Underground Grid Connection from the Tinnalintan Substation to the existing EirGrid Ballyragget Substation through Tinnalintan, Coole and Moatpark townlands, and facilitating works in the EirGrid Substation.
Ancillary Works	At the windfarm site – windfarm site entrances; 1 no. met mast; 1 no. telecoms relay pole; site drainage network and sediment control systems; three temporary construction compounds; two temporary borrow pits; temporary works in private lands and along the public road corridor and road widening works to facilitate turbine component deliveries; long-term and temporary deposition areas for overburden; landscaping and reinstatement works; commercial forestry felling on-site and; a viewing/picnic area to the east of Cromwell's Road. Also temporary works in private lands and along the public road corridor remote from the windfarm site along the turbine component haulage route to facilitate the transport of the large components particularly the turbine blades, including a blade transfer area in Damerstown townland.

EIAR 2.4.3.4 Scoping for Off-site Projects

Forestry felling will be required for the construction and operation of the Ballynalacken Windfarm. This felling will be carried out under licence issued by the Forest Service division of the Department of Agriculture, Food and the Marine (DAFM) and not returned to forestry use. It will be a requirement of the felling licence to replant (afforest) the equivalent hectares of forestry on an alternative site in Ireland.

Separate to the felling license application, an afforestation license application will be made to the DAFM for the replant lands, who will consider the potential impacts across a range of issues and sensitivities and who will apply the necessary procedures regarding Environmental Impact Assessment. The afforestation licence application will comply with the *Environmental Requirements for Afforestation* (DAFM, June 2024) which will ensure that the establishment of the new forest is carried out in a way that is compatible with the protection and enhancement of our environment, including water quality, biodiversity, archaeology and landscape.

While the replanting of forestry (afforestation) is directly related to the Ballynalacken Windfarm Project, it will take place at a location remote from the Project site, and therefore it is considered to be an Off-Site Project in this EIAR. The potential for cumulative impacts of the forestry replanting (afforestation) with the proposed Ballynalacken Windfarm Project is taken into account in the cumulative evaluations in the EIA Report.

EIAR 2.4.3.5 Scoping of Secondary Developments

Secondary Projects are projects that may arise largely because of the existence of the principal project, though they are usually not carried out by the developer of the principal project.

The potential for cumulative impacts as a result of another energy project potentially connecting into the new Tinnalintan Substation, is taken into account in the cumulative evaluations.

EIAR 2.4.3.6 Scoping of Other Unrelated Projects and Activities

The identification of Other Projects and Activities relevant to the scoping and evaluation of cumulative impacts was carried out through research of planning records and databases covering an area 25km from the Ballynalacken Windfarm. In relation to water and aquatic impacts, the research area was extended (beyond the 25km) to include the full extent of any hydrologically connected sub-catchments, this effectively included all of the upper catchment of the River Nore, and this area extended downstream as far as, and including, the Nore_SC_100 sub-catchment which includes Kilkenny City and Bennettsbridge village.

This research was carried out to identify any existing, consented or currently proposed (*in the planning system*) projects which, due to their size and characteristics, were considered to have potential to cause cumulative impacts with the proposed Ballynalacken Windfarm Project. The records and databases which were examined included; the Construction Information Services (CIS) database, EPA, Kilkenny County Council, Laois County Council, Carlow County Council, Tipperary County Council and An Bord Pleanála. The research covered the period 2016 to March 2025. In addition to this, the EIAR Team's knowledge of the area added existing projects such as existing windfarms, to the list.

EIAR 2.4.3.7 Scoping of Cumulative Study Areas

Cumulative study area boundaries were set out by the various EIAR topic experts, then, Other Projects or Activities which occurred within the cumulative study area boundary and whose nature and scale were considered to be relevant to the cumulative impact evaluation, were included in the cumulative impact scoping exercise in the EIAR topic chapters.

EIAR 2.5 Evaluation Methodology used in this EIA Report

The methodology used to describe the baseline environment and to quantify the significance of the impacts of the Project, is appended to each chapter.

For environmental factor topics, where there are no specific industry/topic specific guidelines on evaluating the baseline environment and assessing the effects of a development on that factor, a systematic approach called ARVI has been used to assess the significance of the expected impacts of the Project, together with the guidance provided in the *Guidelines on the Information to be contained in Environmental Impact Assessment Reports* (EPA, 2022).

The ARVI approach was developed under the EU LIFE11 programme[2] - IMPERIA, and the evaluation of impact significance uses a replicable, multi-criteria decision analysis, where the sensitivity of the receptor (i.e., the sensitivity of a Sensitive Aspect of the environment) and the magnitude of the change caused by a project are rated using sub-criteria or scales, and then the overall significance is evaluated using a matrix. The IMPERIA ARVI tool is included as Appendix 2.1: IMPERIA ARVi Approach.

EIAR 2.6 Descriptive Terminology Used in this EIA Report

Terms that have a widely accepted meaning are used consistently throughout this EIA Report. Specialised or technical terms are listed in the Glossary of Terms at the beginning of each chapter. The terms 'effect' and 'impact' and 'receptor' and 'Sensitive Aspect' are used interchangeably in this EIA Report.

The terms used to describe effects are generally EPA definitions taken from the latest relevant guidance - *Guidelines on the information to be contained in Environmental Impact Assessment Reports* (EPA, May 2022).

The standard descriptive terminology for Effects in the EPA Guidance and which is used in this EIA Report is set out below, for;

- Probability
- Quality
- Extent and Context
- Type of Effects
- Other types of Effects
- Duration and Frequency
- Significance

Table 2-5: Definition of Probability of Effects

Probability of Effect	Description
Likely Effect	The effects that can reasonably be expected to occur because of the planned project if all mitigation measures are properly implemented.
Unlikely Effect	The effects that can reasonably be expected not to occur because of the planned project if all mitigation measures are properly implemented.

Source: *EPA (May 2022) Guidelines on the information to be contained in EIA Reports*

[2] Improving environmental assessment by adopting good practices and tools of multi-criteria decision analysis

Reference: LIFE11 ENV/FI/000905 | Acronym: IMPERIA

Table 2-6: Definition of Quality of Effects

Quality of Effect	Description
Positive Effect	A change which improves the quality of the environment (for example, by increasing species diversity; or the improving reproductive capacity of an ecosystem, or by removing nuisances or improving amenities)
Neutral Effect	No effect or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error.
Negative/Adverse Effect	A change which reduces the quality of the environment (for example, lessening species diversity or diminishing the reproductive capacity of an ecosystem; or damaging health or property or by causing nuisance).

***Source**: EPA (May 2022) Guidelines on the information to be contained in EIA Reports*

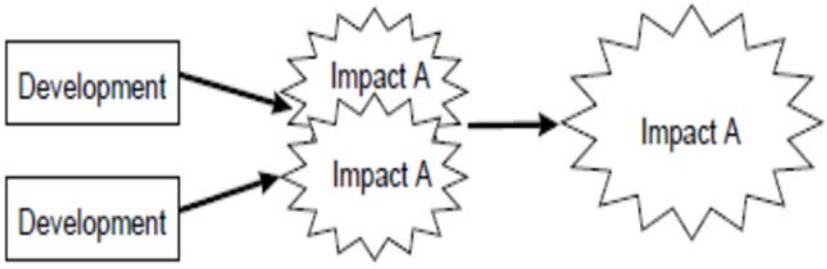
Extent and Context refers to the 'size' or 'amount' of an effect, determined on a quantitative basis and the 'context' which refers to whether the effect is unique or, perhaps, commonly or increasingly experienced.

Table 2-7: Definition of the Extent and Context of Effects

Extent and Context	Description
Extent	The size of the area, the number of sites and the proportion of a population affected by an effect
Context	Describe whether the extent, duration, or frequency will conform or contrast with established (baseline) conditions (is it the biggest, longest effect ever?)

***Source**: EPA (May 2022) Guidelines on the information to be contained in EIA Reports*

Table 2-8: Types of Effects

Type of Effect	Description
Direct effects	An effect that results from direct cause-effect consequences of interactions between the environmental factor and the development.
Indirect Effects (also referred to as Secondary or Off-Site effects)	Effects on the environment, which are not a direct result of the project, often produced away from the project site or because of a complex pathway. 
Cumulative Effects	The addition of many minor or insignificant effects, including effects of other projects, to create larger, more significant effects. 

***Sources**: EC (May 1999) Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions: Section 2.1*

Table 2-9: Definition of Other Types of Effects

Type of Effect	Description
'Do Nothing' Effects	The environment as it would be in the future should the subject project not be carried out.
'Worst Case' Effects	The effects arising from a project in the case where mitigation measures substantially fail.
Indeterminable Effects	When the full consequences of a change in the environment cannot be described.
Irreversible Effects	When the character, distinctiveness, diversity or reproductive capacity of an environment is permanently lost.
Residual Effects	The degree of environmental change that will occur after the proposed mitigation measures have taken effect.
Synergistic Effects	Where the resultant effect is of greater significance than the sum of its constituents, (e.g. combination of SO_X and NO_X to produce smog).

***Source**: EPA (May 2022) Guidelines on the information to be contained in EIA Reports*

Table 2-10: Definition of the Duration and Frequency of an Impact

Duration of Effect	Description
Momentary	Effects lasting from seconds to minutes
Brief	Effects lasting less than a day
Temporary	Effects lasting less than a year
Short-term	Effects lasting one to seven years
Medium-term	Effects lasting seven to fifteen years
Long-term	Effects lasting fifteen to sixty years
Permanent	Effects lasting over sixty years
Frequency of Impacts	How often the effects will occur. (once, rarely, occasionally, frequently, constantly – or hourly, daily, weekly, monthly, annually)

***Source**: EPA (May 2022) Guidelines on the information to be contained in EIA Reports*

Table 2-11: Definition of Significance of Impacts

Significance of Effect	Description
Imperceptible	An effect capable of measurement but without significant consequences.
Not Significant	An effect which causes noticeable changes in the character of the environment but without significant consequences.
Slight Impacts	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities
Moderate Impacts	An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends
Significant Impacts	An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment
Very Significant Impacts	An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment
Profound Impacts	An effect which obliterates sensitive characteristics

***Source:** EPA (May 2022) Guidelines on the information to be contained in EIA Reports*

The EIAR Guidelines also highlight that 'Significance' is a concept that can have different meanings for different topics. For the purposes of this EIAR, effects rated as being 'Significant', 'Very Significant' and 'Profound' are considered to be significant in EIA terms. Effects rated as being 'Moderate' are effectively significant or not significant, subject to professional judgement, and effects rated as 'Imperceptible', 'Not Significant' and 'Slight' are considered to be not significant in EIA terms.

EIAR 2.7 Presentation of the EIA Report

In this EIA Report the Coordinators' aim was to set out the herein environmental information in a rational and systematic format so that the EIA Directive requirements are shown to be addressed. This was achieved through briefing and reviewing by the EIA Coordinators during the whole EIAR process in order to keep the focus on evaluating the likely effects on important or sensitive environmental receptors. Ease of reading, clarity and structure were key considerations during chapter preparation and review, in order to produce an EIA Report that is concise and well-integrated across the environmental topic chapters.

To achieve this concise and focused style, the key presentation techniques deployed were;

- The **Non-Technical Summary** is presented in a handy, short, separate volume with figures included.
- In the **EIAR Report**, the information in the Environmental Factor topic Chapters 6 – 17 is prepared by various experts but presented in the chapters generally using a standardised structure with a pre-defined layout, and using standardised terms and definitions, evaluation processes, descriptive methods and impact descriptions in order to ensure that the key characteristics of sensitive aspects of the environment, and the likely effects to these receptors or sensitive aspects are clearly communicated, placed in context and easily cross-referenced.
- The evaluation of the baseline or receiving environment and likely impacts are presented by individual Sensitive Aspect.
- The impacts that are examined in topic chapters 6 to 17, are for the whole development as it is described in Chapter 5: Description of the Development.
- The cumulative impacts with other projects and activities that are examined in Chapters 6 to 17 are for those projects as listed in Chapter 5: Description of the Development.
- **Appendices** have been used for including detailed, supplementary or technical information which underpins the information and evaluations in the topic chapters. Appendices can be found at the end of the relevant chapter.
- **Mapping and Illustrations,** including maps, plans, sections and diagrams are presented at the end of each chapter so that they can be prepared at a scale that is legible and so that they do not distract from the flow of the text.
- Red Font is used to cross reference to appendices, figures and references to interacting environmental factors in other chapters of the EIA Report.
- A **list of chapter figures**, **list of chapter appendices**, **glossary of terms** and **list of abbreviations** is located before the introduction to each chapter.
- **EPA evaluation criteria and definitions** are used across all the topic Chapters as set out in this chapter, any topic-specific guidance used for the evaluation is identified in the Methodology section of each chapter.

EIAR 2.8 Reference List

Environmental Protection Agency (2022) *Guidelines on the information to be contained in Environmental Impact Assessment Reports*.

European Commission (1999) *Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions*, https://ec.europa.eu/environment/archives/eia/eia-studies-and-reports/pdf/guidel.pdf

European Commission (2017) *Guidance on the preparation of the EIA Report* https://data.europa.eu/doi/10.2779/41362

European Commission (2017) *Guidance on Screening* https://data.europa.eu/doi/10.2779/092377

European Commission (2017) *Guidance on Scoping* https://data.europa.eu/doi/10.2779/286012

IMPERIA LIFE11 (2015) *Guidelines for the systematic Impact Significance Assessment – The ARVI approach*

https://jyx.jyu.fi/bitstream/handle/123456789/49498/Guidelines_for_impact_significance_assessment.pdf

IMPERIA LIFE11 (2015) *Manual for the ARVI approach*

EIA Directive: Article 5, Annex IIA and Annex IV https://environment.ec.europa.eu/law-and-governance/environmental-assessments/environmental-impact-assessment_en

Planning and Development Regulations 2001 (as amended) – Part 10 Environmental Impact Assessment & Schedule 6 Information to be contained in EIAR.

Planning and Development Act 2000 (as amended) – Part X Environmental Impact Assessment

Statutory Instrument S.I. No. 296 of 2018. European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018. http://www.irishstatutebook.ie/eli/2018/si/296/made/en/pdf

EIAR 2.9 List of Figures for EIAR Process and Presentation

No Figures

EIAR 2.10 List of Appendices for EIAR Process and Presentation

APPENDICES (overleaf)

Appendix 2.1	IMPERIA ARVi Approach

Appendix 2.1: IMPERIA ARVi Approach

Appendix to Chapter 2: EIAR Process and Presentation

Appendix 2.1: IMPERIA ARVi Approach

Guidelines for the systematic impact significance assessment – The ARVI approach

IMPERIA Project Report, December 31, 2015

Improving environmental assessment by adopting good practices and tools of multi-criteria decision analysis

1. Principles of impact significance assessment with the ARVI approach

1.1. Assessment framework

One deliverable of the IMPERIA project is a systematic approach called ARVI for assessing the significance of the expected impacts of a proposed development project. The fundamental principle of the ARVi approach is that for each impact (for instance noise, landscape or water quality) one first assesses the sensitivity of the target receptor in its baseline state, and then the magnitude of the change, which would probably affect the target receptor as a result of the proposed project. An overall estimate of the significance of an impact is derived from these judgments. Both the sensitivity of the target receptor and the magnitude of the change are evaluated systematically based on more detailed sub-criteria (Figure 1). These criteria are described in more detail on the following pages.

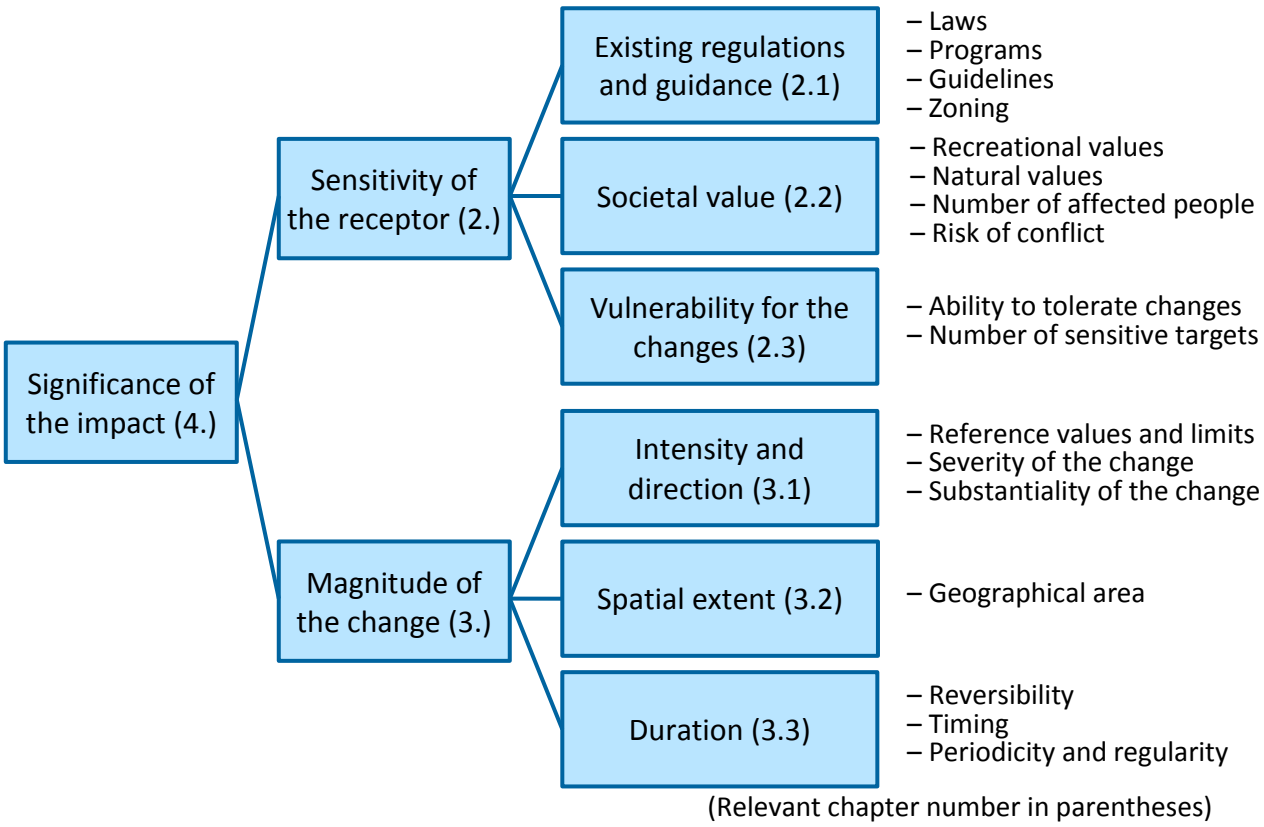


Figure 1. The structure of the ARVI approach.

The objective of this approach is to improve the transparency and consistency of impact assessment. In addition, the approach aims to promote dialog among EIA experts, between experts and stakeholders, and to improve the stakeholders' and citizens' understanding of impact characteristics.

1.2. Assessment process

The assessment process is described in Figure 2. For each alternative and impact combination under evaluation, an assessment form is filled including all the factors in the figure. Typically, each impact is assessed by an expert of the particular field, who evaluates all the alternatives with respect to this impact. Besides evaluation, it is important to also document the basis and rationale for reaching the conclusion in the evaluation form.

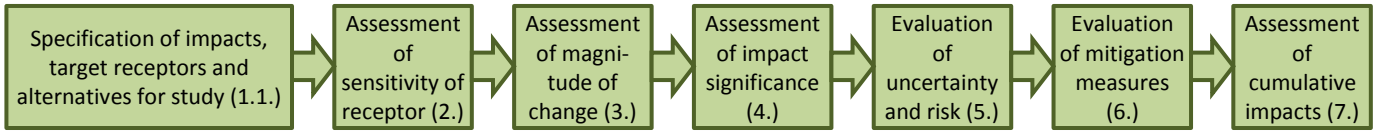


Figure 2. The assessment process with the ARVI approach.

First, one has to consider whether assessment of the following aspects can be integrated or should be addressed separately:

- Phases of the project, including construction, operation and decommissioning phase
- Separate actions comprising the alternatives
- Near and far impact zones
- Time periods of the impacts

If the impacts do not essentially differ from each other in terms of these dimensions, it is sufficient to fill in a single ARVI form. In other cases, one has to consider filling separate evaluation form for each dimension.

For instance, typically one makes one overall assessment for the entire target area. However, this approach may be inappropriate in cases where the target area contains targets with distinctively different sensitivity or where the experienced effects are clearly of different magnitude. An example of this is an area which hosts one target sensitive to noise further away (experiencing a low magnitude), and another target insensitive to noise nearby (experiencing a large magnitude). In a case like this, it may be necessary to treat the near and far impact zones separately. On the evaluation form, fields are provided for specifying impact zones. Another instance which may require separate evaluation forms is the assessment of short and long-term impacts.

2. Assessment of the sensitivity of the receptor

Sensitivity of the receptor is a description of the **characteristics of the target of an impact**. It is a measure of 1) existing regulations and guidance, 2) societal value and 3) vulnerability for the change. The sensitivity of a receptor is estimated in its current state prior to any change implied by the project.

2.1. Existing regulations and guidance

Existing regulations and guidance describes whether there are any such objects in the impact area, which have some level of protection by law or other regulations (e.g. prohibition against polluting groundwater and Natura areas), or whose conservation value is increased by programs or recommendations (e.g. landscapes designated as nationally valuable).

The following issues could be considered in the evaluation of this factor:

- Are there any regulations in the legislation for the receptor?
- Are there any targets in the area with preservation orders or classified as valuable?
- Are there any species in the area classifies as endangered or threatened?
- Does the receptor belong to any national or international protection program?

Very high * * * *	The impact area includes an object that is protected by national law or an EU directive (e.g. Natura 2000 areas) or international contracts which may prevent the proposed development.
High * * *	The impact area includes an object that is protected by national law or an EU directive (e.g. Natura 2000 areas) or international contracts which may have direct impact on the feasibility of the proposed development.
Moderate * *	Regulation sets recommendations or reference values for an object in the impact area, or the project may impact an area conserved by a national or an international program.
Low *	Few or no recommendations which add to the conservation value of the impact area, and no regulations restricting use of the area (e.g. zoning plans).

2.2. Societal value

Societal value describes the value of the receptor to the society and depending on the type of impact may be related to economic values (e.g. water supply), social values (e.g. landscape or recreation) or environmental values (e.g. natural habitat). Societal value measures general appreciation from the point of view of the society, but should not consider that much the point of view of individuals exposed to negative impacts. When relevant, the number of people impacted is taken into account. Generally the anxiety of interest groups is not included in societal value because anxiety is taken into account in social impact assessment.

The following issues could be considered in the evaluation of this factor:

- How valuable or important is the receptor in general?
- Does the receptor have any cultural or historical values?
- How extensive is the recreational or other use of the area?
- Are there any valuable natural targets?
- What is the number of affected people?
- How original or unique is the state of the receptor?
- Does the project raise any concerns or conflicts (only on social impacts)?

Very high * * * *	The receptor is highly unique, very valuable to society and possibly irreplaceable. It may be deemed internationally significant and valuable. The number of people affected is very large.
High * * *	The receptor is unique and valuable to society. It may be deemed nationally significant and valuable. The number of people impacted is large.
Moderate * *	The receptor is valuable and locally significant but not very unique. The number of people impacted is moderate.

Low *	The receptor is of small value or uniqueness. The number of people impacted is small.

2.3. Vulnerability for the change

Vulnerability for the change describes how liable the receptor is to be influenced or harmed by pollution or other changes to its environment. For instance, an area which is quiet is more vulnerable to increasing noise than an area with industrial background noise.

The following issues could be considered in the evaluation of this factor:

- How vulnerable or susceptible is the state of the receptor for the external changes in the environment?
- What is the ability of the receptor to tolerate changes?
- Are there any sensitive targets in the area (hospitals, schools, kindergartens, etc.)?

Very high * * * *	Even a very small external change could substantially change the status of the receptor. There are very many sensitive targets in the area.
High * * *	Even a small external change could substantially change the status of the receptor. There are many sensitive targets in the area.
Moderate * *	At least moderate changes are needed to substantially change the status of the receptor. There are some sensitive targets in the area.
Low *	Even a large external change would not have substantial impact on the status of the receptor. There are only few or none sensitive targets in the area.

2.4. Deriving the overall sensitivity of a receptor from components of sensitivity

The overall sensitivity of a receptor is assessed by an expert on the basis on his/her assessment of the components of sensitivity. A general rule for deriving the overall sensitivity is to pick the maximum of existing regulations and guidance and societal value and then adjust that value depending on the level of vulnerability. However, the expert evaluating the impact should also use his/her judgment when necessary. The following are a few examples:

- If the receptor is strictly conserved by regulation, its sensitivity is high even though if societal value is low. However, if the receptor is not vulnerable for changes, its sensitivity could be adjusted to moderate because it's not liable to be harmed by external changes.
- If there's no regulation concerning the receptor, but it has moderate societal value (e.g. recreational value), sensitivity is assessed as moderate. For a receptor which is highly vulnerable that estimate could be adjusted even to high.

In the table below, there are example descriptions of different categories for the sensitivity of the receptor.

Very high * * * *	Legislation strictly conserves the receptor, or it is irreplaceable to society, or extremely liable to be harmed by the development. Even minor influence by the proposed development is likely to make the development unfeasible.
High * * *	Legislation strictly conserves the receptor, or it is very valuable to society, or very liable to be harmed by the development.
Moderate * *	The receptor has moderate value to society, its vulnerability for the change is moderate, regulation may set reference values or recommendations, and it may be in a conservation program. Even a receptor which has major social value may have moderate sensitivity if it has low vulnerability, and vice versa.
Low *	The receptor has minor social value, low vulnerability for the change and no existing regulations and guidance. Even a receptor which has major or moderate social value may have low sensitivity if it's not liable to be influenced by the development.

3. Assessing the magnitude of the change

Magnitude of the change describes the **characteristics of changes the planned project is likely to cause**. The direction of change is either **positive** (green) or **negative** (red). Magnitude is a combination of 1) intensity and direction, 2) spatial extent, and 3) duration. On duration, the timing of the impact should also be considered for impacts which aren't observable all the time such as periodic impacts. Assessment of magnitude should evaluate the probable changes affecting the receptor without taking into account the receptors sensitivity to those changes.

3.1. Intensity and direction

Intensity describes the physical dimension of a development and direction specifies whether the impact is negative ("–"/red) or positive ("+"/green). Depending on the type of impact, intensity can often be measured with various physical units and compared to reference values, such as the decibel (dB) for sound. Some impacts, such as landscape, have no natural unit of measurement, so then an expert evaluates the impact relative to available frameworks.

The objective is to make an assessment which describes the overall intensity across the impact area. However, it is common that intensity decreases over distance. Then a possible course of action is to assess intensity at the closest sensitive or at the most sensitive target at the impact area. In any case, the objective is to make an assessment which captures the overall characteristics of the impact.

The following issues could be considered in the evaluation of this factor:

- Is the change positive or negative?
- Are there any reference values for the change?
- Does the change cause exceeding regulatory limits?
- How much is the increase in the load or emissions?
- How severe are the changes caused by the project?
- How essential is the change?
- How much the project affects the characteristics of the area?
- How much the project affects the living conditions of people and nature?

Very high + + + +	The proposal has an extremely beneficial effect on nature or environmental load. A social change benefits substantially people's daily lives.
High + + +	The proposal has a large beneficial effect on nature or environmental load. A social change clearly benefits people's daily lives.
Moderate + +	The proposal has a clearly observable positive effect on nature or environmental load. A social change has an observable effect on people's daily lives.
Low +	An effect is positive and observable, but the change to environmental conditions or on people is small.
No impact	An effect so small that it has no practical implication. Any benefit or harm is negligible.
Low –	An effect is negative and observable, but the change to environmental conditions or on people is small.
Moderate – –	The proposal has a clearly observable negative effect on nature or environmental load. A social change has an observable effect on people's daily lives and may impact daily routines.
High – – –	The proposal has a large detrimental effect on nature or environmental load. A social change clearly hinders people's daily lives.
Very high – – – –	The proposal has an extremely harmful effect on nature or environmental load. A social change substantially hinders people's daily lives.

3.2. Spatial extent

Spatial extent describes the geographical reach of an impact area, or the range within which an effect is observable. In principle, spatial extent can be expressed as distance from the source, but the extent of an impact area may vary by direction due to topography, vegetation or other factors.

The following issues could be considered in the evaluation of this factor:

- In how large area can the change be observed?
- What share of the overall living territory of the target is covered by the project?

Very high * * * *	Impact extends over several regions and may cross national borders. Typical range is > 100 km.
High * * *	Impact extends over one region. Typical range is 10-100 km.
Moderate * *	Impact extends over one municipality. Typical range is 1-10 km.
Low *	Impact extends only to the immediate vicinity of a source. Typical range is < 1 km.

3.3. Duration

Duration describes the length of time during which an impact is observable and it also takes other related issues such as timing and periodicity into account. These are relevant for impacts which aren't observable all the time such as periodic impacts. A long-term impact, for example, can be comparable to a periodic moderate-term impact which occurs at such periods that it causes the least possible disturbance.

The following issues could be considered in the evaluation of this factor:

- How long can the change be observed?
- Is the change irreversible?
- How periodic and regular is the change?
- What is the timing of the change?

Very high * * * *	An impact is permanent. The impact area won't recover even after the project is decommissioned.
High * * *	An impact lasts several years. The impact area will recover after the project is decommissioned.
Moderate * *	An impact lasts from one to a number of years. A long-term impact may fall into this category if it's not constant and occurs only at periods causing the least possible disturbance
Low *	An impact whose duration is at most one year, for instance during construction and not operation. A moderate-term impact may fall into this category if it's not constant and occurs only at periods causing the least possible disturbance.

3.4. Deriving the overall magnitude of the change from components of magnitude

Magnitude of the change is a comprehensive synthesis of its component factors. In a case, where intensity, spatial case and duration all get the same value, the magnitude would also be given this value. In other cases, intensity should be taken as a starting point, and the assessment should be adjusted based on spatial extent and duration to obtain an overall estimate. Also here, the expert evaluating the impact should also use his/her judgment when necessary. The aim is that the overall assessment should capture the characteristics of an effect.

The table below describes some example descriptions of different categories for the magnitude of the change.

Very high + + + +	The proposal has beneficial effects of very high intensity and the extent and the duration of the effects are at least high.
High + + +	The proposal has beneficial effects of high intensity and the extent and the duration of the effects are high.
Moderate + +	The proposal has clearly observable positive effects on nature or people's daily lives, and the extent and the duration of the effects are moderate.
Low +	An effect is positive and observable, but the change to environmental conditions or on people is small.
No impact	No change is noticeable in practice. Any benefit or harm is negligible.
Low	An effect is negative and observable, but the change to environmental conditions

–	or on people is small.
Moderate – –	The proposal has clearly observable negative effects on nature or people's daily lives, and the extent and the duration of the effects are moderate.
High – – –	The proposal has harmful effects of high intensity and the extent and the duration of the effects are high.
Very high – – – –	The proposal has harmful effects of very high intensity and the extent and the duration of the effects are at least high.

4. Assessing the significance of an impact

The **assessment of significance** is based on the **magnitude of the change** affecting a receptor and on the **sensitivity of the receptor** to those changes. In the assessment of the overall significance, one can utilize a table show below, where positive impacts are in green and negative in red. The values obtained from the table are indicative because the most relevant dimensions for characterizing an impact are dependent on the type of impact. Thus, some discretion from the expert is required, in particular in cases, where the one component is low and the other one high or very high. **In any case, it is essential that experts retain informed judgment and record their reasoning on the assessment form.**

Impact significance		Magnitude of change								
		Very high	**High**	**Moderate**	**Low**	**No change**	**Low**	**Moderate**	**High**	**Very high**
Sensitivity of the receptor	**Low**	High*	Moderate*	Low	Low	No impact	Low	Low	Moderate*	High*
	Moderate	High	High	Moderate	Low	No impact	Low	Moderate	High	High
	High	Very high	High	High	Moderate*	No impact	Moderate*	High	High	Very high
	Very high	Very high	Very high	High	High*	No impact	High*	High	Very high	Very high

* Especially in these cases, significance might get a lower estimate, if sensitivity or magnitude is near the lower bound of the classification

5. Evaluation of uncertainty and risks

The assessment of the future impacts of the project might involve various uncertainties inherited from different kinds of sources. In the ARVI form one can address three drivers of uncertainty:

1. **Uncertainty about the realization of the impact.** Assessment of how probable it is that the impact will be realized at the level anticipated. Typically, this issue is related to the uncertainty about the future conditions and external influences.
2. **Imprecision in the assessment.** Assessment of imprecision related to the evaluation, for example, due to lack of baseline information and imprecise models.
3. **Risks arising from the possible disruptions of the process.** Assessment of the risks related to fault situations or disruptions of the process, which may be improbable but may result potentially major consequences if not properly managed. Assessment of risk involves estimation of probability and the level of consequence for a number of fault scenarios.

The evaluator assesses each type of uncertainty on a scale (not at all / low / moderate / high).

6. Evaluation of mitigation measures

Mitigation measures are evaluated on the basis of how effective they are in reducing potentially significant environmental impacts. For each impact, the evaluator assesses to what extent it can be mitigated on a scale (not at all / low / moderate / high), and specifies what measures are included in the assessment. The evaluator is also asked to estimate residual significance, namely the significance after the specified measures are implemented. Typically, mitigation measures influence the intensity of an effect, so residual significance can be estimated by plugging in new values to the familiar framework. It is a good practice to document what components of magnitude are reduced by a given measure.

7. Assessment of cumulative impacts

Cumulative impacts can arise from an interaction between the various impacts of a single development, or from the interaction between distinct developments in the same region. The coexistence of impacts may, for example, increase or decrease their combined impact. Similarly, other developments in the region may, for example, contribute to a build-up of environmental load on shared resources. The expert is asked to

identify and assess cumulative impacts. Reasoning should include a documentation of the origin of cumulative effects.