DUNAREA EAST WIND FARM

Cumulative Impact Assessment

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Report no.: 10587683-R-04, Rev. C
Document no.: 10587683-R-04-C
Date: 2026-05-12

Project name:	Dunarea East Wind Farm	DNV Italy S.r.l. Energy Systems
Report title:	Cumulative Impact Assessment	Risk - Italy - 2530
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Date of issue:	2026-05-12	07013490961
Project no.:	10587683	
Organization unit:	Risk - Italy - 2530	
Report no.:	10587683-R-04, Rev. C	
Document no.:	10587683-R-04-C	

Applicable contract(s) governing the provision of this Report:

Objective:

Objective of the report is to examines how the expected impacts of the Dunărea East Wind Farm may combine with those generated by other existing, permitted, or planned developments in the wider area.

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Keywords ESIA, Wind Farm, Cumulative Impact, Romania

Rev. no.	Date	Reason for issue	Prepared by	Verified by	Approved by
A	2025/11/28	First issue	CG	LL	GG
B	2026/04/23	Final Issue	CG	LL	GG
C	2026/05/12	Comments implementation	CG	LL	GG

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ACRONYMS

Acronym	Definition
AoI	Area of Influence
APM	Environmental Protection Agency (Constanța)
ANRE	Romanian Energy Regulatory Authority
CIA	Cumulative Impact Assessment
CO_2e	Carbon Dioxide Equivalent
DC	Communal Road
DE	Agricultural Road
DJ	County Road
DN	National Road
EA	Environmental Agreement
EBRD	European Bank for Reconstruction and Development
EC	European Commission
EIA	Environmental Impact Assessment
EN	Endangered (IUCN)
ENR	Energy generation projects (renewable)
ESIA	Environmental and Social Impact Assessment
EU	European Union
GN	Guidance Note
IFC	International Finance Corporation
IUCN	International Union for Conservation of Nature
MW	Megawatt
O&M	Operation and Maintenance
PV	Photovoltaic

Acronym	Definition
ROSCI	Site of Community Importance (Romania Natura 2000)
SEN	National Energy System (Romania)
UNFCCC	United Nations Framework Convention on Climate Change
VEC	Valued Environmental and Social Component
VP	Vantage Point for ornithological monitoring
VU	Vulnerable (IUCN)

1 INTRODUCTION

1.1 Background and objective of the study

DNV was contracted by the Project Company, as independent environmental and social practitioners, to undertake an Environmental and Social Impact Assessment (ESIA) for the Project. As the Client is seeking to secure international financing, the ESIA has been prepared specifically to inform potential Lenders that may provide funds or financial support. This Cumulative Impact Assessment (CIA) forms an integral part of the ESIA Report.

The CIA examines how the expected impacts of the Dunărea East Wind Farm may combine with those generated by other existing, permitted, or planned developments in the wider area. The CIA has been developed using mostly a qualitative approach, consistent with international good practice and proportionate to the availability of regional data and the characteristics of the valued environmental and social components.

The Dunărea East Wind Farm has experienced a long planning history, beginning in 2010 and progressing through several phases of design optimisation and environmental permitting, culminating in the revised Environmental Agreement issued in 2025 for 45 turbines with a total capacity of up to 315 MW. Previous international assessment work undertaken by ERM in 2023 provided the initial framework for alignment with lenders' standards.

Building on that foundation, and following the resumption of the ESIA process under DNV's appointment in 2025, this CIA contributes a focused evaluation of combined impacts to ensure that cumulative effects are appropriately considered within the overall ESIA.

1.2 Project Description and Location

The Dunărea East Wind Farm is located in the extra-urban area of Deleni Commune, within Constanța County, southeastern Romania (Figure 1-1). The project area lies entirely outside built-up zones, encompassing predominantly agricultural land, pastures, and farm roads, as defined in Urban Planning Certificate No. 50/02.03.2022.

The wind farm will consist of 45 wind turbines, each, depending on the supplier that will be selected, with a nominal capacity of 6-7 MW, for a total installed capacity of up to 315 MW. Permanent infrastructure includes internal access roads, a 33 kV/400 kV substation, underground and overhead electrical lines, and connections to the National Energy System (SEN).

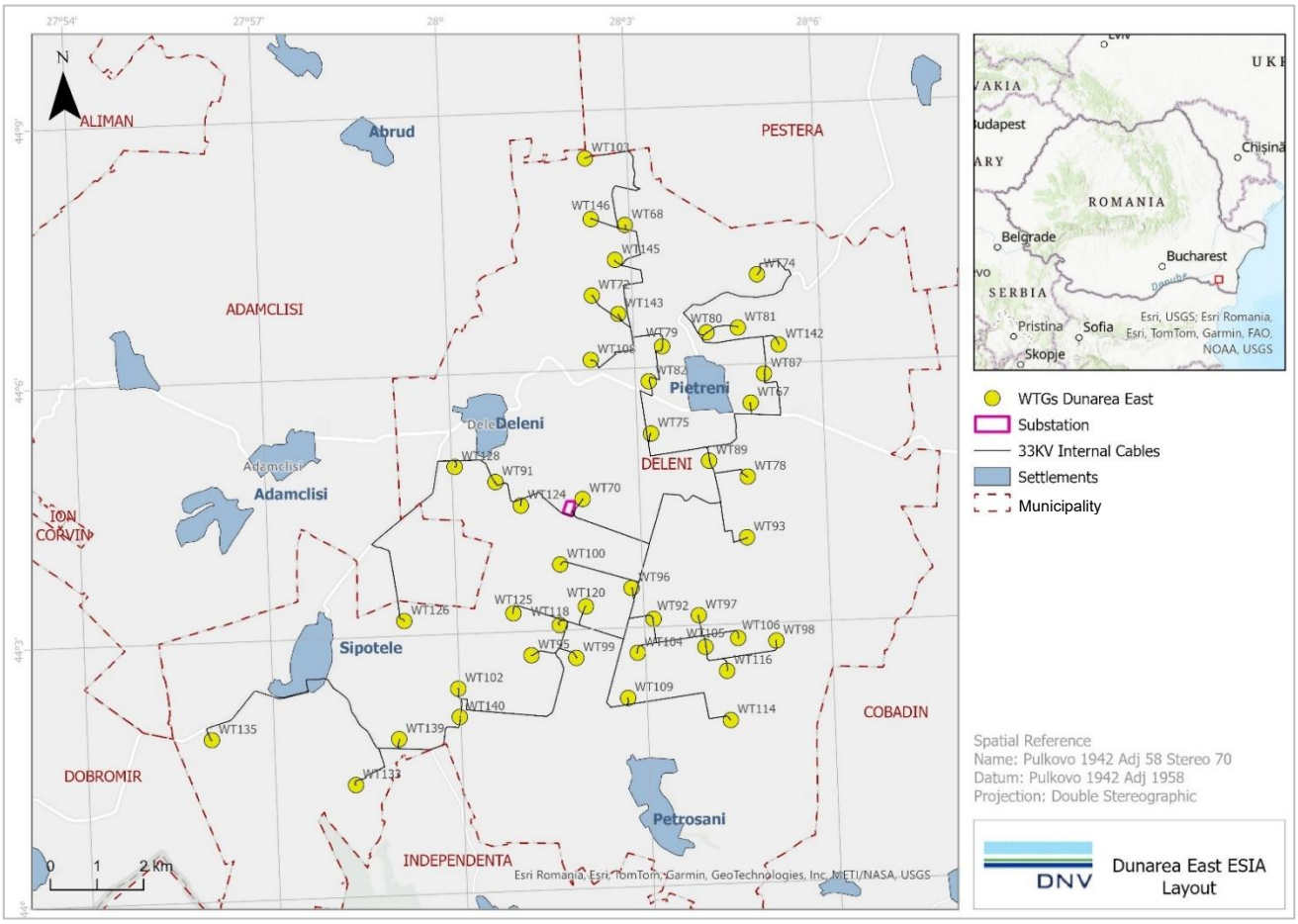

Figure 1-1 Project Layout

At the time of this assessment, the specific turbine model has not been finalized. However, four (4) potential turbine models are under consideration:

- Vestas V162 EnVentus with a hub height of 125 m and a rotor diameter of 162 m;
- Goldwind GW165-6.0MW with a 121 m hub height and a rotor diameter of 165 m;
- Nordex N163-7.0MW with a max hub height of 124.5 m and a rotor diameter of 163 m;
- GE Vernova GE164-6.0MW with a maximum hub height of 128 m in some locations and 112 m for other locations where 128m exceeds the aviation threshold and a rotor diameter of 164 m.

To produce a conservative scenario, and in agreement with the Project Sponsor, this VIA has been performed using the Goldwind GW165 turbine characteristics, as shown in the figure below. While the 128 m hub height GE Vernova turbines could represent a potential worst-case scenario, these turbines are not expected to be installed across the entire wind farm. Given the current uncertainty regarding both turbine location and final supplier selection, the Goldwind GW165 remains the representative worst-case model for this assessment.

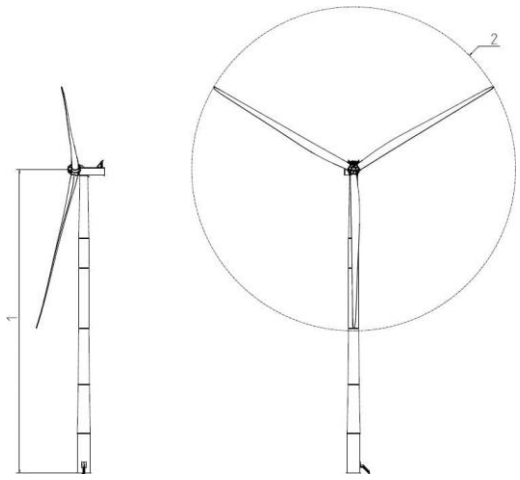

Figure 1-2 Dimensions of the proposed wind turbine

1. *Hub height – 121 m*
2. *Diameter – 165 m*

1.3 Other projects

As reported in the AON National EIA, the cumulative analysis considers all projects identified by APM Constanța the regional Environmental Protection Agency responsible for environmental permitting and oversight in Constanța County, (as specified in Letter No. 681/04.04.2024, in which APM Constanța requested an assessment of cumulative impacts with the listed developments) as potentially relevant for interactions with the proposed wind farm. However, only projects located within a reasonable spatial proximity and exhibiting overlapping construction or operational phases were regarded as significant for the purposes of the cumulative assessment.

Projects located at distances greater than 20 km from the first turbine of the proposed wind farm were excluded due to the negligible potential for cumulative effects. Likewise, projects that do not comply with the minimum safety distances between wind turbines established by ANRE Order No. 239/20.12.2019 were also excluded.

Projects excluded from the cumulative impact analysis for these reasons include:

- ECOVARIANT PROIECT SRL – Ciocârlia and Medgidia wind farms (distance >10–15 km);
- SABLOAL ENERGIE EOLIANA SRL – Ciocârlia, Peștera and Medgidia wind farms, either located too far or not compliant with technical safety distances;
- RIG SERVICE SRL – Zonal Urban Plans for 92.4 MW and 112.8 MW wind farms, located approximately 12–14 km away;
- EMERGY STREBOG SRL – Independenta wind farm, approximately 14 km away.

Projects included in the cumulative impact assessment are those located within closer range and of comparable technical nature, namely:

- CONSENSWIND SA – Adamclisi wind farm;
- EDPR ROMANIA SRL – Cobadin–Ciocârlia wind farm;
- ECOVARIANT PROIECT SRL – Peștera;

- EXTRAPOWER SRL – Cobadin;
- UNITED POWER EOLIAN SRL (formerly MIRE ENERGIA SRL) – Băneasa–Dobromir wind farm;
- NEW EOLIC INVESTMENTS SRL / RIG SERVICE SA – Independenta wind farm (44 turbines, 110 MW);
- RADRAMO POWER SRL – Peștera 2 wind farm (396 MW);
- GREEN ENERGY DYNAMIC SRL – Cobadin and Pietreni;
- DELENI PV POWER SRL, SOLAR PV POWER SRL, and SUNTRUCK SRL – photovoltaic developments in Deleni commune.
- EDP RENOVÁVEIS – Peştera wind farm

These represent the projects most likely to contribute to spatial or temporal cumulative effects with the proposed development.

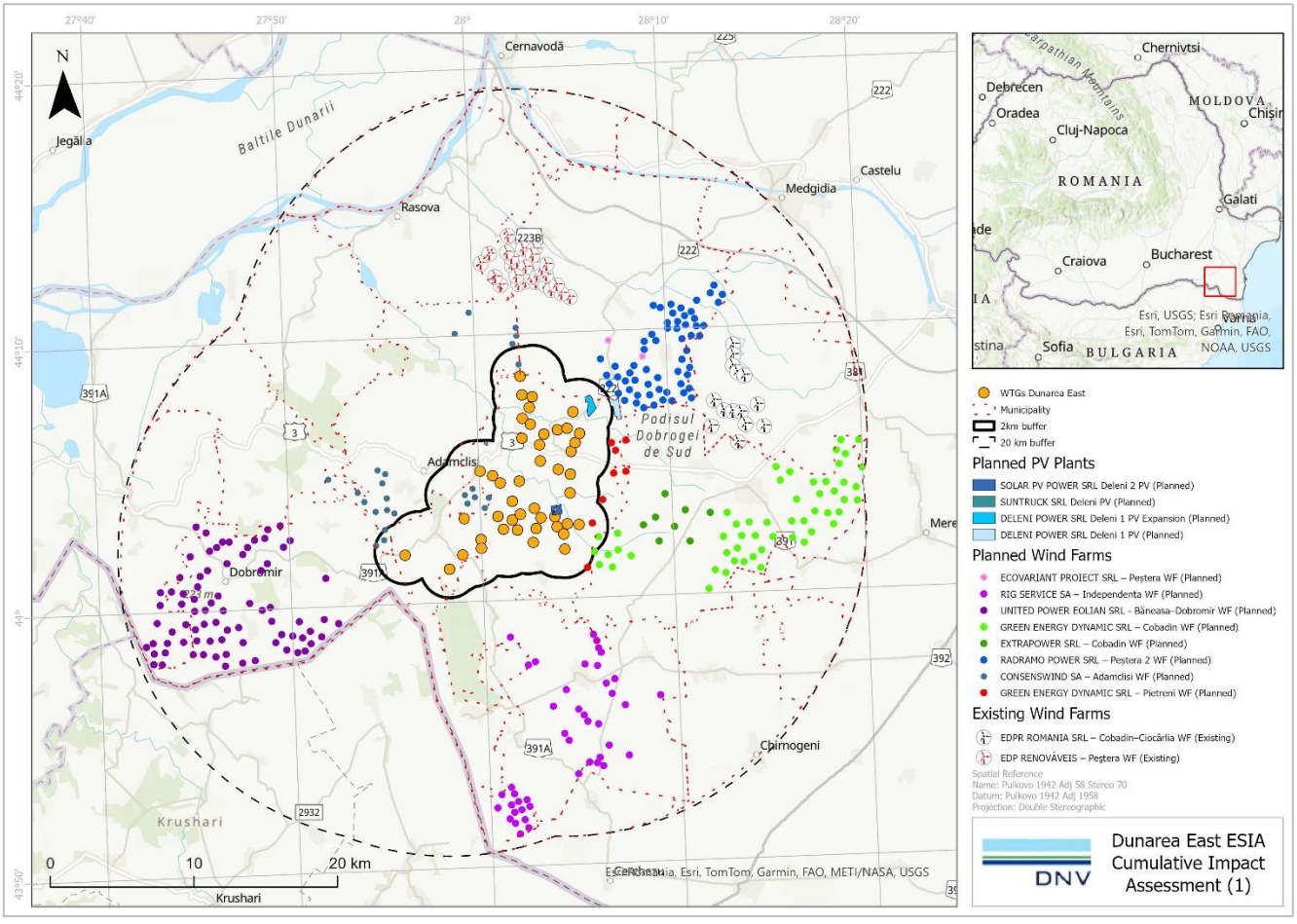

Figure 1-3 Other projects contributing to cumulative impacts

1.4 Purpose of this Document

This CIA Report presents the Cumulative Impact Assessment for the Dunărea East Wind Farm and has been prepared to align with the requirements of international lenders, including the International Finance Corporation (IFC) Performance Standards. The assessment examines how the impacts of the Project may interact with those generated by other existing, approved, or reasonably foreseeable developments within the broader area, considering the potential for combined pressures on environmental and social receptors. Cumulative effects are often not immediately visible at the level of individual projects, yet they may become significant when viewed collectively, particularly for sensitive species, habitats, ecosystem services, and community-related conditions.

It should be noted that this CIA represents a structured re-elaboration and update of the information previously compiled in the AON National EIA, integrating additional data and aligning the methodology with international best practice, specifically the six-step guidance provided by the IFC Good Practice Handbook (2013). This ensures that the assessment is fully compliant with international lender requirements while building on the baseline work already undertaken.

The identification and assessment of cumulative effects is a core expectation throughout the ESIA process. It typically involves analysing clusters of projects, regional development trends, and foreseeable land-use changes that may influence the Project Area of Influence (AoI).

The objectives of this CIA are to:

- identify other existing, permitted, or planned projects that may contribute to cumulative effects within the AoI;
- determine the Valued Environmental and Social Components (VECs) potentially affected by cumulative interactions;
- assess the significance of cumulative impacts on these VECs; and
- propose a management framework aimed at avoiding or minimising adverse cumulative effects.

1.5 Relevant Standards and Guidelines

The IFC Performance Standards (2012) are the primary reference for this CIA. Although IFC Performance Standard 1 does not explicitly mandate the preparation of a CIA, it requires that the ESIA process consider the findings and conclusions of regional and sectoral assessments, development plans, and other studies relevant to the Project's Area of Influence. Guidance Note 1 further clarifies that conducting a CIA may be appropriate where multiple developments occur, or are planned, within the same geographic area, and it emphasises the need for an assessment proportional to the Project's incremental contribution to cumulative pressures.

1.6 Key Terminology

For the purposes of this report, the following definitions apply (adapted from IFC, 2013):

- **Cumulative Impact**: Impacts resulting from the combined, successive, or incremental effects of the Project together with other past, present, or reasonably foreseeable future actions or developments.
- **Cumulative Impact Assessment (CIA)**: A process that evaluates the Project's impacts in combination with those from other relevant developments, including unplanned but predictable activities that may arise as a consequence of the Project.
- **Other Projects**: Existing, planned, or reasonably expected developments or activities that may influence the same VECs assessed in this CIA.

- **External Stressors or Drivers**: Natural or anthropogenic pressures—such as climate change, demographic shifts, natural hazards, or land-use change—that may affect VECs independently of project-related activities.
- **Valued Environmental and Social Components (VECs)**: Environmental, social, economic, cultural, or aesthetic elements considered important by the scientific community, regulatory authorities, or potentially affected communities. Examples include habitats, species, ecosystem services, natural processes, community health, socio-economic conditions, and cultural heritage resources.

VECs represent the endpoints of ecological and social pathways and are therefore the ultimate receptors of potential cumulative effects.

2 METHODOLOGY

2.1 Approach

The Cumulative Impact Assessment (CIA) adopts a perspective that differs from a traditional ESIA. While an ESIA examines how a single project affects environmental and social receptors, a CIA evaluates how multiple past, present, and foreseeable activities interact to influence key Valued Environmental and Social Components (VECs). The emphasis is therefore placed on the overall condition, trends, and resilience of the VECs, rather than on isolated project-level effects.

International practices for CIA continue to evolve, and methodologies are not universally standardised. Nevertheless, the IFC's *Good Practice Handbook: Cumulative Impact Assessment and Management* (2013) provides internationally recognised guidance for private-sector projects.

This handbook outlines a six-step, iterative process that has been adopted for the CIA of the Dunărea East Wind Farm. Following this guidance, the CIA for Dunărea East has been developed by building upon the existing data and analysis from the AON National EIA, but applying a structured six-step methodology to ensure consistency with IFC standards and lender expectations:

1. **Establish spatial and temporal boundaries**, taking into account where and when cumulative pressures on VECs may arise due to the combination of the Project and other developments.
2. **Select VECs**, based on their environmental and social relevance, data availability, and sensitivity.
3. **Describe the existing condition of each VEC**, using accessible datasets, expert judgement, and supporting studies.
4. **Identify other projects, activities, and external drivers** that may influence the VECs within the defined boundaries.
5. **Analyse cumulative impacts**, considering the combined influence of all relevant developments and the Project's incremental contribution.
6. **Determine the significance of cumulative effects and propose management measures**, complementing the mitigation actions already defined for the Project.

This approach ensures that cumulative effects are examined in a structured, transparent manner consistent with lender expectations and good international practice.

2.2 Information Sources

The CIA draws on multiple information streams, including:

- the AON National EIA, used to identify relevant developments at national and regional levels;
- the updated list of projects provided by the Project Sponsor, ensuring inclusion of the most recent planned or ongoing activities;
- project documents and environmental studies supplied by the Client;
- publicly accessible datasets and online information on infrastructure and environmental conditions in the wider area;

These inputs provided the basis for defining the cumulative context and identifying interactions relevant to the Dunărea East Wind Farm.

2.3 Assumptions and Limitations

The CIA has been developed using the best information available at the time of reporting; however, the following limitations should be noted:

- Limited information for some neighbouring or proposed projects;
- Data gaps for certain VECs at the regional scale;
- The assessment builds on the AON National EIA; therefore, assumptions regarding VEC conditions, spatial coverage, and project information reflect both the original data and subsequent updates for IFC compliance;
- Assumptions regarding VEC conditions across nearby project areas, considered generally comparable due to similar landscape characteristics;
- Uncertainty in future project implementation, including possible changes in timing, design, or permitting outcomes.

Despite these constraints, the adopted six-step method provides a robust framework for evaluating cumulative interactions and identifying relevant management actions.

It has to be noted that this CIA adopted mostly a qualitative approach. Given the current data availability and the characteristics of the Valued Environmental and Social Components considered in this CIA, a qualitative assessment represents the most reliable and proportionate method since regional datasets on ecological receptors, baseline information on neighbouring projects, and consistent monitoring results across the area are insufficient to support the development of robust quantitative models. In the absence of ecologically meaningful thresholds, population-level parameters, or validated cumulative impact algorithms applicable to this context, the use of complex quantitative tools would not improve the accuracy or decision-relevance of the assessment.

3 CUMULATIVE IMPACT ASSESSMENT

3.1 Step 1: Definition of spatial and temporal boundaries

The spatial boundaries for the cumulative impact assessment were defined to capture both direct and indirect effects of the Dunarea Wind Farm, informed by the ESIA baseline data.

- Direct Area of Influence (AoI): 2 km around turbines, access roads, and associated infrastructure. This captures areas where project-related ecological, visual, noise, and social impacts are most likely.
- Indirect AoI: extends beyond 2 km to account for potential secondary or cumulative effects, particularly for visual, landscape, and biodiversity receptors.
- Specific receptor distances (from ESIA):
    - Air quality: 500 m for construction phase.
    - Noise: 2 km.
    - Biodiversity: 2 km.
    - Visual and landscape: 20 km.
    - Archaeology and Cultural Heritage: 2km

The boundaries were established based on expected project influence, receptor-specific sensitivities, and potential overlaps with other regional developments. This approach ensures the assessment captures the full geographic context for cumulative effects.

The temporal scope corresponds to the entire life cycle of the project, including:

- Construction phase: temporary impacts such as dust, noise, and habitat disturbance.
- Operation phase: ongoing impacts from turbine operation (noise, collision risk, visual changes).
- Decommissioning phase: restoration and land-use changes.

Additionally, the CIA considers reasonably foreseeable future developments in the region (see Chapter 1), including other planned wind and renewable energy projects, whose operational periods could overlap with Dunarea and contribute to cumulative effects on VECs.

3.2 Step 2: Identification of VECs

Valued Social and Environmental Components (VECs) were identified through the ESIA process based on the outcomes of the baseline biodiversity and social assessment findings. A risk-based approach was applied to identify those VECs for which Project-level impacts could become significant when considered cumulatively with other wind farm developments.

The following VECs have been included in the CIA:

- **VEC 1: Avifauna (birds and bats) -** Highly mobile, sensitive to turbine collision, and regionally important due to proximity to migration corridors and Natura 2000 sites. Cumulative risk arises when multiple wind farms overlap flight routes.
- **VEC 2: Landscape and Visual -** The South Dobrogea Plateau is an open and visually exposed environment. Multiple wind farms can create cumulative visual saturation and alter perception of rural identity.
- **VEC 3: Employment -** Wind farms contribute cumulatively to temporary employment demand, workforce pressure, and supply chain interactions at municipal and county levels.

- **VEC 4: Traffic -** Multiple wind farms constructed in overlapping timeframes use the same transport corridors. Cumulative impacts include increased road wear, temporary congestion/bottleneck, safety risks, and community disturbance.
- **VEC 5: Archaeology and Cultural Heritage** – Multiple projects increase the direct physical disturbance from construction activities on tangible and intangible cultural heritage resources within the project area.
- **VEC 6: Climate** - Wind energy projects, and other renewable energy projects such as solar plants, collectively contribute to regional and national decarbonisation goals. Cumulative assessment captures the broader climate benefit from renewable energy expansion.
- **VEC 7: Noise and Air Quality** - Cumulative effects related to noise and air quality (primarily construction dust) may occur at a limited number of rural receptors where multiple renewable energy projects overlap spatially.

In addition, a broader set of potential VECs was considered during the screening process. These were assessed based on the likelihood of cumulative effects, receptor sensitivity, and the degree of spatial and temporal overlap between projects. VECs for which cumulative effects are considered negligible or are addressed within other VECs have been scoped out. The rationale for their exclusion is summarised in Table 3-1 below.

Table 3-1 Scope out VECs

Potential VEC	Inclusion in CIA	Justification
Community Health and Wellbeing	Scoped out	Considered to capture combined exposure to multiple stressors (e.g. combined exposure to noise, shadow flicker, traffic and dust, as well as stress or annoyance associated with multiple wind farms). However, the assessment identified that cumulative effects are highly localised and limited to a very small number of rural receptors (approximately three locations), where limited overlap of noise and dust effects may occur during construction phases. These effects are addressed under a dedicated Noise and Air Quality VEC, which captures potential cumulative impacts from these specific stressors. Shadow flicker effects are not considered relevant to this VEC, as only one rural receptor potentially experiences shadow flicker from nearby wind turbines not associated with the Project. This receptor does not experience shadow flicker from Project turbines but may be subject to other environmental stressors such as noise and dust; however, no combined or overlapping exposure across multiple stressor types has been identified at this location. Traffic-related effects are assessed separately under a dedicated Traffic VEC, and therefore are not included within the scope of Community Health and Wellbeing. On this basis, and given the absence of multiple concurrent high-magnitude stressors affecting the same receptors, cumulative effects on community health and wellbeing are considered negligible and this VEC has been scoped out of further assessment.

Potential VEC	Inclusion in CIA	Justification
Land Use and Livelihoods	Scoped out	While multiple renewable energy projects are present within the wider area, land take associated with wind energy infrastructure remains limited and is largely compatible with continued agricultural use. Potential overlap of land take is limited to a small number of agricultural parcels, including areas where a few turbines from the Project and adjacent developments (notably Dunarea West and the Deleni 1 PV plant expansion) are located in proximity. However, these overlaps are spatially constrained and do not result in significant fragmentation of agricultural land or long-term restriction of access. Agricultural activities are expected to continue alongside project infrastructure, with only minor and localised reduction in usable land area. No evidence of cumulative pressure leading to a material change in agricultural productivity or land use patterns has been identified. On this basis, cumulative impacts on land use and livelihoods are considered negligible and this VEC has been scoped out of further assessment.
Operational noise	Scoped out	Operational noise was not considered in the cumulative impact assessment because the project-specific assessment for the Dunarea Wind Farm demonstrates compliance with applicable operational noise limits at all sensitive receptors; therefore, significant cumulative operational noise effects are not expected. Furthermore, operational noise modelling data for the other identified projects are not publicly available, preventing a robust and meaningful cumulative operational noise assessment.

3.3 Step 3: Evaluation of the status of VECs

This step establishes the existing condition of each VEC and provides the contextual foundation required for the cumulative impact analysis. Understanding the current state, sensitivity, and trends affecting each VEC is essential to determine how it may respond to additional pressures generated by the Project and by other developments within the region. According to international CIA good practice, baseline information should focus on the most relevant VECs and be built from available, reliable data, primarily the ESIA studies and other authoritative sources. Where existing data are sufficient to describe the condition and recent evolution of a VEC, no new extensive surveys are required; however, any significant gaps that limit the capacity to assess cumulative impacts are noted.

For each VEC, this step identifies:

- its existing condition within the regional context;
- the indicators used to characterise and track its status;
- the trends and dynamics that influence its vulnerability;
- its sensitivity and resilience to additional stressors;

- the data gaps and uncertainties affecting cumulative assessment.

Table 3-2 Evaluation of the status of VECs

VEC 1 – Birds and Bats

Existing Conditions
 	
Bird and bat populations in the Deleni–Dunarea project area represent a diverse and ecologically significant faunal assemblage, shaped by the open agricultural landscape of the South Dobrogea Plateau and the proximity to multiple Natura 2000 sites.
 	
Birds
Long-term ornithological surveys (2010–2021, and 2022–2023) demonstrate high species richness, with 118 species recorded historically and 126 species recorded during the 2022–2023 Vantage Point (VP) monitoring campaign. Several groups of conservation interest occur:
 	
• 40 species listed under Annex I of the Birds Directive
• 15 species classified as NT or higher on the IUCN Red List, including:
  ○ *Falco cherrug* (EN) – 1 record
  ○ *Clanga clanga* (VU) – 1 record
  ○ *Falco vespertinus* (VU) – 15 records
  ○ *Streptopelia turtur* (VU) – 42 records
• 31 species listed as Vulnerable or higher in the Romanian Red Book
• No endemic bird species recorded
 	
Flight activity data collected for collision risk modelling (Band Model) show uneven spatial distribution of use across the wind farm. VP1, VP11, and VP2 recorded the highest abundance (3163, 2558, and 1867 individuals respectively).
 	
Bird communities using the site include migrants, foragers and locally breeding species. The Project area itself is primarily used as a foraging and transit zone rather than a key breeding or nesting area for species of highest conservation concern. The area does not host nesting populations of the most sensitive raptors (e.g., Saker Falcon, Greater Spotted Eagle), but is part of a wider migratory corridor where cumulative effects from multiple wind farms may be relevant.
 	
In line with the Critical Habitat Assessment, a large proportion of avian species recorded (including migratory species regularly using the airspace) qualify as Priority Biodiversity Features (PBFs), although none trigger Critical Habitat thresholds within the Project's EAAA.

Bats

Bat monitoring (2009–2010, 2021, 2022–2024) recorded 22 bat species or species groups, representing 68.75% of all bat species in Romania. Activity is dominated by:

- *Pipistrellus nathusii/kuhlii* – 454 contacts
- *Pipistrellus pipistrellus* – 52 contacts
- *Nyctalus noctule* – 26 contacts

All bat species detected are strictly protected under Annex IV, and ***Miniopterus schreibersii*** is additionally listed under Annex II of the Habitats Directive and globally assessed as Vulnerable (VU). ***Miniopterus schreibersii*** is also a qualifying feature of the nearby Natura 2000 site ROSCI0071, although no roosting sites are located within the Project footprint.

Activity levels vary across the project, and static detector surveys demonstrate the presence of both high-flying migratory species and low-flying foraging guilds using the area primarily for commuting and feeding rather than roosting that may be sensitive to cumulative mortality across multiple wind farms.

Indicators Used

- Species richness and conservation status
- Flight height, duration, and direction (for collision risk assessment)
- Abundance and frequency of records
- Activity index from static detectors (bats)
- Presence of protected / qualifying species of nearby Natura 2000 sites
- Presence and distribution of Priority Biodiversity Features (PBFs)

Trends

- Avifaunal and bat studies across more than a decade indicate a relatively stable but seasonally dynamic assemblage, typical of open plateau ecosystems strongly influenced by migratory flows.
- No evidence of decline in species richness, though migration peaks remain highly variable year-to-year.
- Regional expansion of wind energy developments may contribute to increasing cumulative pressure, particularly for migratory raptors and high-flying bats.
- Presence of *Miniopterus schreibersii* aligns with regional patterns of sensitivity for cave-associated bat species.

Sensitivity and Resilience

- Birds:
  - Migratory raptors and long-distance flyers show high sensitivity to collision risk.
  - Annex I species have low resilience to additional mortality at population scale.
  - Farmland passerines exhibit moderate sensitivity and high resilience, given broad distributions.

- Bats:
  - High-flying species (*Nyctalus*, *Pipistrellus*) demonstrate high collision susceptibility.
  - Cave roosting species, especially *Miniopterus schreibersii*, show low resilience to population decline due to slow reproductive rates.

Overall, despite the predominance of modified agricultural habitats, the regular use of the area by migratory species and the presence of multiple PBFs indicate a receptor of a certain **ecological sensitivity, particularly in relation to collision risk during operation.**

Data Gaps and Uncertainties

- Limited information on regional movement patterns between neighbouring wind farms.

VEC 2 – Landscape and Visual

Existing Conditions

The project area is located within the South Dobrogea Plateau, a predominantly rural-agricultural landscape characterised by large-scale farming, simple landforms, and extensive open horizons. Landscape character reflects a long-term interaction between natural processes and intensive agricultural use.

The physical–visual environment includes:

- vast cultivated fields with minimal vertical elements;
- scattered rural settlements located along valley floors;
- existing overhead transmission lines, irrigation channels, and agricultural infrastructure;
- rolling topography that provides long viewing distances and wide exposure.

Level landscape sensitivity is moderate due to the already transformed rural environment, though the high visibility and open horizons increase the perceptual influence of tall structures such as wind turbines.

The area partially overlaps two Natura 2000 sites (ROSCI0353, ROSCI0071) but the intersected areas are limited to arable land with no conservation value, representing 0.012% and 0.94 ha respectively.

Indicators Used

- Landscape character type and description
- Topographic openness and visual exposure
- Presence of protected areas and natural features
- Existing anthropogenic vertical structures
- Visibility patterns from settlements and transport corridors
- Land use composition (agricultural dominance)

Trends

- The landscape has undergone decades of agricultural intensification, reducing natural vegetation and increasing visual uniformity.
- Linear infrastructure and existing developments contribute to a semi-industrial rural character, with low complexity and high openness.
- Expansion of wind energy developments in the wider region is progressively altering perceptual baselines, with increasing turbine visibility at the regional scale.

Sensitivity and Resilience

- Visual sensitivity is moderate due to:
    - the dominance of human-modified land cover;
    - low-density settlement patterns;
    - existing large-scale elements (power lines, access roads).
- Resilience is moderate–high, as landscape character is already shaped by industrial-agricultural structures.
- However, the open views and uniform horizons mean that turbines remain strongly perceptible across long distances, increasing cumulative visibility effects.

Data Gaps and Uncertainties

- Limited data on viewer perception from key viewpoints other than those assessed in the ESIA.

VEC 3 – Employment

Existing Conditions

The socioeconomic environment of the Deleni Commune and the wider Social Area of Influence is characterised by a predominantly agricultural economy, low registered unemployment, and seasonal fluctuations linked to farming cycles.

Key attributes include:

- National employment rate 61.9%, unemployment 5.6% (2021).
- Rural youth unemployment significantly higher (23.8%).
- In Deleni, 112 registered unemployed persons (2021), indicating a small unemployed labour pool.
- Employment structure includes:
    - agriculture (dominant livelihood activity);
    - construction (temporary, project-based opportunities);
    - public services (administration, education, health);
    - commerce and transport;
    - commuting-based employment in Constanța city.

Local labour is mostly semi-skilled or unskilled, oriented toward manual agricultural tasks. Temporary construction-related employment is common and often relies on local small contractors.

Indicators Used

- Employment rates and unemployment rates at local and county level
- Labour market composition by sector
- Availability of skilled labour for construction and O&M
- Seasonal labour fluctuations
- Share of commuting workforce

Trends

- Unemployment in the commune shows a declining trend after 2022.
- Agricultural dependence remains high but diversification is slowly increasing through construction and services.
- Regional demand for labour in renewable energy and infrastructure projects is rising, suggesting increasing cumulative competition for workers.

Sensitivity and Resilience

- The local labour market is moderately sensitive to large construction projects due to limited local skilled workforce.
- The economy shows moderate resilience, supported by the ability of residents to commute to nearby cities.
- Temporary employment opportunities from multiple simultaneous projects may cause cumulative strain on small local businesses and service providers.

Data Gaps and Uncertainties

- No official records on cumulative workforce pressure from other wind farms in the region.

VEC 4 – Traffic

Existing Conditions

The project area is served exclusively by a road-based transport network, comprising national, county, communal and agricultural roads. These routes provide the only access for residents, farm activities, and construction logistics.

Key corridors include:

- DN3 – major national road connecting Bucharest and Constanța.
- DJ307, DJ391A, DJ222 – county roads linking villages and accessing turbine clusters.
- DC roads – communal routes providing intra-communal connectivity.
- DE roads – agricultural tracks heavily used for farming activities.

Within the above-mentioned corridors the following sensitive receptors are identified:

- Pestera Municipality (which includes a primary and secondary school as the most sensitive receptor)
- Pietreni Municipality
- Deleni Municipality (which includes a high school and a local health center)
- Adamclisi Municipality (which includes a primary school)
- Sipotele Municipality

Existing agricultural and communal roads are already in variable condition, with some requiring upgrading to accommodate heavy loads.

Within the project area, there are:

- 55.75 km of new permanent access roads planned, and
- 38.18 km of existing roads to be upgraded.

Construction-related transport will rely heavily on DN3 and county roads for long-distance turbine component delivery, with internal distribution via communal and agricultural roads.

Indicators Used

- Road hierarchy and classification
- Existing road condition and load-bearing capacity
- Traffic volumes and vehicle typology (light, agricultural, heavy transport)
- Planned upgrades and new access roads
- Connectivity between turbine locations and public roads

Trends

- Existing traffic is low to moderate, dominated by agricultural vehicles.
- Infrastructure upgrades are occurring through municipal projects, improving local roads incrementally.
- Regional development of multiple wind farms indicates increasing cumulative heavy-vehicle traffic during construction periods, particularly on DN3 (westward up to Adamclisi) and county roads.
- **Construction-phase traffic will not be uniformly distributed, but rather concentrated along shared access corridors and during specific time windows.**

Sensitivity and Resilience

- Road infrastructure shows moderate sensitivity due to limited width, variable surfacing and limited structural capacity.
- Community sensitivity is moderate, given dependence on the same corridors for daily mobility to reach the above-mentioned community points of interests (e.g. schools or health centers).

- Resilience is influenced by planned upgrades, which will enhance load capacity and long-term connectivity.

Data Gaps and Uncertainties

- Regional cumulative traffic data from simultaneous wind farm construction projects is not available.
- Transportation route surveys of the planned wind farms are not available.

VEC 5 – Climate

Existing Conditions

- The project area lies in the South Dobrogea Plateau, characterized by a continental climate: hot, dry summers and cold winters.
- Emissions in the broader region stem from a mix of sources — transport, agriculture, and electricity production from conventional (non-renewable) sources at national/regional level.
- The regional electricity supply currently includes a portion generated from fossil fuels; renewable energy penetration remains limited, but is gradually increasing.

Indicators Used

- Annual regional CO_2 (or GHG) emissions.
- Installed and planned capacity of renewable energy facilities in the region (wind, solar, etc.).

Trends

- Growth of wind and solar energy projects in the region, gradually reducing reliance on fossil-fuel generation.
- Progressive decrease in carbon intensity of the regional electricity mix, especially as more renewables come online.
- The project is expected to significantly increase renewable capacity, thus contributing to emission reductions and to lowering overall CO_2 output compared to a “business-as-usual” fossil-heavy scenario.

Sensitivity and Resilience

- The emission-reduction benefit is relatively robust: even under moderate variations in wind conditions, any electricity generated by the wind farm offsets fossil generation and contributes to decarbonization.
- The climate-benefit outcome is resilient to changes in regional energy demand or future developments: as long as the national/regional grid includes fossil-based plants, every MWh from renewables offsets emissions.
- The project supports long-term resilience by aligning with climate and energy transition goals, reducing dependency on fossil fuels, and contributing to sustainable local development.

Data Gaps and Uncertainties

- Timing and realization of other renewable projects in the region may affect the net marginal benefit of this project.

VEC 6 – Archaeology and Cultural Heritage
Existing Conditions The Project Area within Deleni Commune exhibits high archaeological sensitivity, as documented in baseline surveys conducted between 2023 and 2025. The area includes numerous registered archaeological sites, including burial mounds (tumuli), necropolises, Roman rural settlements, prehistoric occupation layers, and ancient quarries. Although preventive archaeological excavations have been undertaken, there remains a possibility of undiscovered subsurface archaeological deposits. Public accessibility is generally low, with the Adamclisi Museum being the only significant heritage facility in the vicinity, which will remain fully operational and unaffected by Project construction.
Indicators Used • Number, type, and spatial distribution of registered archaeological sites and known buried remains • Archaeological sensitivity mapping and previous excavation coverage • Public accessibility and usage of cultural heritage assets Proximity to other planned or existing renewable energy projects
Trends • Recent surveys indicate that most archaeological sites are already partially investigated; however, urban and agricultural development in the region continues to pose incremental pressures. • The expansion of renewable energy infrastructure, including wind farms and PV projects, represents a growing source of cumulative effects on buried and surface-visible heritage features. Regional interest in heritage preservation remains high, with institutional frameworks supporting protection, monitoring, and documentation of sites.
Sensitivity and Resilience • Sensitivity is high due to the irreplaceable nature of archaeological deposits, with any physical disturbance causing permanent and irreversible loss of cultural, scientific, and contextual value. Resilience is low: once destroyed, archaeological deposits cannot be restored, although documentation and salvage archaeology may partially mitigate scientific loss.
Data Gaps and Uncertainties • Complete coverage of subsurface archaeological deposits remains uncertain despite extensive surveys. Exact future layouts and construction corridors of neighboring projects are not fully defined, introducing uncertainty in cumulative impact scenarios.
VEC 7 – Noise and Air Quality
Existing Conditions

The Project area is located in a predominantly rural environment characterised by low population density and limited industrial development. The ambient environment is influenced primarily by agricultural activities, local road traffic, and intermittent construction activities from existing and planned renewable energy projects.

For air quality, regional conditions are characterised by generally low to moderate pollutant concentrations, as derived from national monitoring stations and EEA modelled datasets. While exceedances of some pollutants (notably PM10 annual averages and localized NO2 and O3 variations) are observed in small urban centres such as Deleni and Adamclisi, the wider rural areas generally remain within or close to applicable guideline values. The nearest air quality monitoring stations (e.g. Medgidia CT-7 and Calarasi CL-3) are located at significant distances from the Project area and are therefore not fully representative of site-specific conditions.

Within the Project area, baseline air quality is mainly influenced by:

- **agricultural activities (machinery operation, soil disturbance, seasonal field works)**;
- **local traffic along national, county, and communal roads; an**d
- **localised emissions from nearby industrial and quarry activities (e.g. Sipotele Quarry located approximately 1.4 km from the Project footprint).**

For ambient noise, baseline conditions reflect a mixed rural acoustic environment with generally moderate continuous noise levels (LEQ-A) and frequent short-term noise peaks (SPL-A), particularly during daytime and nighttime periods. These peaks are associated with road traffic, agricultural operations, and occasional industrial or construction activities. Baseline monitoring confirms a relatively quiet environment in terms of average exposure, but with episodic noise events exceeding typical rural background conditions.

Indicators Used

- **Concentrations of key air pollutants (NO2, NOx, PM10, PM2.5, O3) based on national monitoring data and EEA modelled datasets**
- **Compliance with national (Law 104/2011) and EU air quality limit values**
- **Spatial distribution of pollutant concentrations across rural and nearby urban areas**
- **Distance to nearest industrial sources and monitoring stations**
- **LEQ-A (equivalent continuous noise levels) for daytime and nighttime periods**
- **SPL-A max (instantaneous noise peaks)**
- **Road traffic intensity and agricultural activity patterns**
- **Temporal variability of noise and emissions (seasonal and operational fluctuations)**

Trends

- **Air quality in the wider region is generally stable, with no evidence of significant deterioration trends at rural locations.**
- **Localised exceedances of particulate matter (PM10 and PM2.5) are associated with small urban centres and areas of higher anthropogenic activity.**

- **Wind farms and similar renewable energy developments do not contribute significantly to operational air emissions; construction-phase impacts are temporary and spatially limited.**
- **Noise levels show a consistent pattern of low-to-moderate average exposure with intermittent high SPL-A peaks linked to traffic, agricultural activities, and episodic construction works.**
- **The development of multiple renewable energy projects in the wider area suggests a potential increase in short-term, localised construction-related dust and noise events during overlapping construction phases, particularly along shared access routes and near** three (3) **sensitive rural receptors.**

Sensitivity and Resilience

- **The rural environment exhibits moderate sensitivity to temporary increases in noise and dust due to the presence of dispersed residential receptors and reliance on outdoor living spaces and agricultural activities.**
- **Sensitivity to air quality changes is considered low to moderate, given the generally good baseline conditions and absence of significant industrial emissions within the immediate Project area.**
- **Sensitivity is higher at a small number of rural receptors (approximately three), where proximity to multiple renewable energy projects may result in combined exposure to construction-related noise and dust.**
- **Environmental resilience is generally high due to the temporary nature of construction activities, low baseline pollution levels, and the capacity of the local environment to recover following cessation of works.**
- **The presence of existing agricultural and transport-related emissions reduces the relative contribution of Project-related emissions to overall cumulative air quality conditions.**

Data Gaps and Uncertainties

- **Limitations already included in the ESIA.**
- **Lack of coordinated, real-time cumulative construction data from neighbouring renewable energy projects, including timing, duration, and intensity of dust-generating activities.**
- **Absence of continuous noise monitoring data for all potential sensitive receptors across the wider cumulative study area.**

3.4 Step 4: Assessment of cumulative impacts

According to IFC's "Good Practice Handbook: Cumulative Impact Assessment and Management" (2013) this step estimates the likely cumulative change in each VEC that will result from the combined influence of:

- the Dunarea East Wind Farm and
- other renewable projects reasonably foreseeable within the spatial and temporal boundaries.

The objective here is to identify the principal cumulative impact pathway driven by other renewable developments, classify the single type of effect generated (additive, synergistic, masking or countervailing), provide a concise justification for that classification, and indicate the expected future trend of the VEC (stable / slight deterioration / significant risk).

Table 3-3 Identification of potential cumulative impacts

VEC 1 – Birds and Bats
Other renewable projects All identified wind farms in Chapter 1.
Type of effect Cumulative effects are primarily associated with the additive increase in collision risk and disturbance across multiple wind farms within the wider migratory corridor and Ecologically Appropriate Area of Analysis (EAAA). For birds, this includes: • Increased probability of collision for migratory and high-flying species, including several Annex I and PBF species (e.g., raptors and steppe-associated birds); • Barrier and displacement effects, with some species altering flight paths or avoiding areas with higher turbine density, potentially affecting energy expenditure and habitat use. For bats, cumulative effects include: • Increased risk of collision and barotrauma, particularly for high-flying and migratory species (e.g., *Nyctalus* spp., *Pipistrellus* spp.); • Potential reduction in activity levels in areas with multiple wind farms due to disturbance or avoidance behaviour.
Expected Trend The cumulative pressure is expected to increase collision risk moderately, particularly during peak migration, when large numbers of birds and bats move through the area. However, several factors limit the overall severity of cumulative effects: • The Project is located in a predominantly agricultural landscape of moderate ecological value, without key breeding or roosting sites for the most sensitive species within the footprint; • Highly sensitive species (e.g., large raptors) are present at low frequency and not regularly using the site for nesting or critical life stages; • Many species within the assemblage, particularly migratory birds, exhibit behavioural avoidance and route flexibility, reducing prolonged exposure to turbine arrays; • Bat activity is spatially variable and generally moderate, with no evidence of major roost concentrations within the Project area. Overall, cumulative impacts are expected to remain moderate in magnitude, with: • Localized and temporary displacement effects for some sensitive species;

- A limited contribution to overall mortality rates at the population level;
- No anticipated significant decline in PBF populations or conservation status, provided standard mitigation measures are implemented.

VEC 2 – Landscape and Visual

Other renewable projects

All identified wind farms in Chapter 1.

Type of effect

Visual saturation and alteration of rural landscape perception.

Expected Trend

The landscape is likely to experience cumulative visual impacts as multiple wind farms alter horizon continuity and the perception of openness, but overall character remains rural-agricultural.

VEC 3 – Employment

Other renewable projects

All identified wind farms in Chapter 1.

Type of effect

Increased competition for workforce especially during construction.

Expected Trend

Employment opportunities will temporarily increase, creating mild cumulative pressure on labor availability, with positive effects for local economy during overlapping construction periods.

VEC 4 – Traffic

Other renewable projects

Wind farms sharing major transport routes (DN3, DJ307, DC roads).

Type of effect

Increased vehicle movements, road wear, and temporary congestion at key intersections and settlement crossings.

Expected Trend

Wind farm developments are geographically dispersed and cumulative traffic impacts during simultaneous construction activities are expected to be localized along shared transport corridors with potential bottlenecks that may occur:

- Along DJ222 in proximity to Pestera municipality considering that this portion of road might serve access to three (3) wind farms, of which one only for maintenance since it is already built.

- In the intersection of DN3 and DJ222 (northward toward Pestera) considering that this intersection might serve access to three (3) wind farms, of which one just for maintenance since it is already built.
- In the intersection of DN3 and DJ307 (southward toward Sipotele municipality) considering that this intersection might serve access to two (2) wind farms.

Traffic might increase particularly along DN3 (westward up to Adamclisi) in case of simultaneous construction activities, with temporary inconvenience for communities.

Impacts are expected to be temporary and peak during overlapping construction periods, particularly during delivery of turbine components and civil works phases. Outside these peak periods, traffic levels are expected to return to baseline conditions. Cumulative traffic impacts are therefore intermittent and spatially concentrated rather than continuous across the region, with the highest pressure occurring at specific nodes within the road network.

VEC 5 – Archaeology and Cultural Heritage

Other renewable projects

Adamclisi Wind Farm (about 7 turbines located near the boundary with Deleni municipality on the west side of the wind farm), SOLAR PV POWER SRL Deleni 2 PV (Planned), DELENI POWER SRL Deleni 1 PV Expansion (Planned), SUNTRUCK SRL Deleni PV (Planned), GREEN ENERGY DYNAMIC SRL – Pietreni WF (one turbine located close to WT98 on the east), GREEN ENERGY DYNAMIC SRL – Cobadin WF (one turbine located close to WT98 on the east).

Type of effect

- Direct permanent loss of subsurface archaeological deposits due to excavation and civil works
- Partial disturbance of known tombs, burial mounds, and ancient settlement structures
- Gradual change in the landscape character, which could influence the visual setting and perception of archaeological and cultural heritage assets

Expected Trend

The cumulative effect is expected to be predominantly negative due to irreversible physical loss of archaeological material within overlapping construction footprints. Indirect impacts (dust, visual intrusion, temporary access restrictions) are expected to remain minor, given the limited public use of affected sites.

In addition to physical effects, cumulative considerations also extend to the wider landscape and cultural context. Cultural heritage assets derive part of their value from their visual and spatial relationship with the surrounding rural landscape. The increasing presence of wind farms in the region may therefore contribute to a gradual change in landscape character, which could influence the visual setting and contextual perception of heritage features, even in the absence of direct physical impacts.

Without coordinated planning or mitigation across multiple developers, cumulative pressures could reduce both the physical integrity and the contextual value of archaeological resources in areas such as Deleni Commune.

VEC 6 – Climate

Other renewable projects

All identified projects in Chapter 1
Type of effect Incremental reduction of carbon emissions.
Expected Trend The cumulative effect is positive; each additional project contributes to decarbonisation, reinforcing climate benefits regionally.
VEC 7 – Noise and Air Quality
Other renewable projects • CONSENSWIND SA – Adamclisi wind farm • **Deleni 1 PV plant (Expansion)**
Type of effect **Temporary increases in construction-related noise and dust emissions due to simultaneous activities from multiple renewable energy projects.** **Effects are primarily associated with:** • **earthworks and soil disturbance generating dust emissions;** • **construction vehicle movements** and construction equipment **generating noise and fugitive dust**. **Effects are expected to be most relevant at a limited number of rural receptors located in proximity to the other project developments (3 receptors in total).**
Expected Trend Cumulative noise and air quality effects are expected to be spatially limited and temporally intermittent, occurring mainly during overlapping construction phases of nearby renewable energy projects. • The most relevant cumulative interactions are expected at a small number of rural receptors (approximately three locations), where: construction activities from the Project and Adamclisi wind farm may overlap spatially; and a nearby photovoltaic development may contribute additional short-term construction dust and traffic-related emissions. However, these effects are not expected to be uniform across the Project area, but rather concentrated in specific localised zones where construction schedules overlap. Outside these periods and locations, noise and air quality conditions are expected to remain consistent with baseline rural conditions. Cumulative effects are therefore expected to be temporary, localised, and reversible following completion of construction activities, with no long-term deterioration of ambient conditions anticipated.

3.5 Step 5: Evaluation of significance of cumulative impacts

3.5.1 Purpose and approach

Step 5 focuses on determining the significance of the cumulative impacts identified in the previous step. According to the IFC Good Practice Handbook, significance in a CIA context differs fundamentally from the approach used in project-level ESIAs. Rather than relying on fixed numerical criteria or matrix-based scoring systems, significance is evaluated in relation to the vulnerability, resilience, and long-term sustainability of the VECs.

In the context of cumulative effects, significance is not defined simply as the magnitude of change caused by the project and other developments, but by the risk that incremental contributions could contribute to crossing ecological or social thresholds. These thresholds may relate to carrying capacity, limits of acceptable change, or conditions beyond which a VEC could undergo degradation, loss of function, or irreversible change. Where such thresholds exist, they provide a useful benchmark. However, in most real-world situations, especially for biological systems and landscape-scale processes, such thresholds are not well established, partially known, or entirely absent.

Therefore, the determination of significance in CIA is inherently qualitative and depends on professional judgement, informed by the best available science, stakeholder values, and the mitigation hierarchy. In line with the Handbook, any cumulative impact that requires mitigation or monitoring beyond what is already foreseen in the ESIA should be considered significant, and the evaluation should adopt a precautionary approach when uncertainty is present.

3.5.2 Limitations

The assessment of cumulative impact significance is subject to several key limitations:

- Absence of defined ecological or social thresholds: Most VECs do not have established limits of acceptable change, making it difficult to determine when cumulative impacts become unacceptable.
- Iterative and judgement-based nature of CIA: Significance relies on professional judgement rather than fixed numerical criteria, and must be revisited as new information becomes available.
- Variability in stakeholder values: For VECs such as landscape and visual character, thresholds of acceptable change depend on community perceptions, which are not easily quantified.

In the absence of measurable ecological or social thresholds, this assessment uses narrative qualitative thresholds, describing the conditions under which a VEC would be considered at risk of degradation or reduced sustainability. The significance of each cumulative impact is then evaluated in relation to whether the predicted cumulative changes may approach or exceed those narrative limits, and whether additional mitigation or monitoring is warranted beyond ESIA requirements.

Table 3-4 Significance of predicted cumulative impacts

VEC	Impact	Qualitative Threshold / Limit of Acceptable Change	Significance Description
VEC 1 – Birds and Bats	Permanent removal of agricultural land used as feeding/resting areas by multiple wind and PV projects.	A threshold would be approached if cumulative land conversion reduced habitat availability or landscape connectivity to the extent that seasonal movements, foraging	Current cumulative land conversion is largely confined to low ecological value agricultural habitats, with no evidence of loss of key breeding or roosting sites. As such, no functional habitat loss

VEC	Impact	Qualitative Threshold / Limit of Acceptable Change	Significance Description
		efficiency, or functional use of the area by key species (including PBFs and migratory species) are impaired at a population-relevant scale.	is expected at regional scale. However, given uncertainties in future land-use change and the role of the area as part of a wider migratory landscape, a precautionary approach is warranted, particularly for areas supporting seasonal concentrations.
VEC 1 – Birds and Bats	Cumulative collision risk from multiple wind farms.	A threshold would be exceeded if cumulative mortality exceeds sustainable levels, leading to measurable declines in population viability of sensitive species, particularly Annex I species, PBFs, or species with low reproductive rates and low population density (e.g., large raptors and some bat species).	Available assessments indicate low predicted collision mortality at project level, and cumulative effects are expected to remain below population-level significance thresholds. While a moderate increase in collision risk may occur, particularly during migration periods, this is not expected to compromise overall population viability. Nonetheless, uncertainties remain for certain species groups (e.g., migratory raptors and high-flying bats), and continued monitoring and adaptive management are recommended.
VEC 2 – Landscape and Visual	Visual saturation and cumulative alteration of rural character.	A threshold would be exceeded if the cumulative presence of wind farms fundamentally altered dominant landscape character, reducing key visual qualities valued by local communities (e.g., openness, horizon continuity).	Projects contribute to increased visual presence but do not fundamentally change the rural-agricultural identity of the landscape. Nonetheless, coordinated design (layout harmonisation, turbine colour consistency) is recommended to maintain visual coherence and avoid exceeding acceptable landscape change.
VEC 3 – Employment	Temporary competition for workforce and supply chains.	A threshold would be reached if cumulative labour demand exceeded local capacity,	Cumulative labour demand is expected to remain manageable and positive for the local

VEC	Impact	Qualitative Threshold / Limit of Acceptable Change	Significance Description
		creating workforce displacement, inflationary pressures, or social conflict.	economy. No additional mitigation is required beyond standard contractor management and local hiring practices.
VEC 4 – Traffic	Increased vehicle movements and temporary congestion/bottlenecks.	A threshold would be exceeded if cumulative construction-phase traffic created sustained disruptions to local mobility, road safety, or emergency access.	While traffic increases are temporary and predictable, with short-term peaks during overlapping construction periods, a risk of localized exceedance of road capacity at specific bottlenecks and sensitive receptors might occur. However, with the implementation of basic traffic management plans, cumulative impacts are expected to remain limited in duration, spatially confined, and not significant at regional scale.
VEC 5 – Archaeology and Cultural Heritage	Direct physical disturbance of archaeological resources and potential cumulative effects from nearby projects. Additional cumulative considerations include changes to the landscape and cultural context in which heritage assets are experienced.	A threshold would be exceeded if cumulative development results in the destruction of heritage deposits to the point that key archaeological contexts, features, or research potential are permanently lost. It would be exceeded also if the widespread alteration of the surrounding landscape materially affects the contextual setting of cultural heritage assets at a regional scale.	Direct impacts are permanent at the site level and may result in the loss of archaeological material within specific construction footprints. However, these effects are expected to remain highly localised, limited to discrete areas of ground disturbance (e.g. turbine locations and associated infrastructure, including approximately 8 turbines in potential overlap zones). In addition to physical effects, cumulative impacts may also occur through gradual changes in landscape character associated with the increasing presence of wind farms in the wider region. These changes may influence the visual setting and contextual perception of cultural heritage assets within an open rural

VEC	Impact	Qualitative Threshold / Limit of Acceptable Change	Significance Description
			landscape, although no direct impacts on heritage integrity at regional scale are anticipated. Overall, cumulative effects are considered to be localised and incremental, and are not expected to result in widespread degradation of the archaeological resource or the broader cultural landscape.
VEC 6 – Climate	Contribution to renewable energy and decarbonisation goals.	A positive threshold would be reached where cumulative renewable capacity contributes materially to regional or national emissions reduction targets.	The cumulative impact is beneficial and strengthens regional low-carbon development pathways. No mitigation is required; impacts contribute positively to long-term climate commitments.
VEC 7 – Noise and Air Quality	Temporary increase in construction-related noise levels and dust emissions due to overlapping activities from multiple renewable energy projects within a limited number of rural receptors.	A threshold would be exceeded if cumulative construction activities from multiple projects resulted in sustained increases in noise or dust levels leading to prolonged disturbance at sensitive rural receptors, or if combined exposure significantly altered baseline rural ambient conditions over an extended period.	While cumulative increases in noise and dust may occur during short-term overlapping construction phases, these effects are expected to be highly localised and limited to a small number of rural receptors. Exposure is intermittent, with no evidence of sustained or widespread exceedance of acceptable environmental conditions. Effects are driven by temporary construction activities and are expected to cease upon completion of works. Given the spatial limitation of affected receptors, the lack of continuous exposure, and the reversibility of impacts, cumulative effects are considered not significant at the local or regional scale.

VEC	Impact	Qualitative Threshold / Limit of Acceptable Change	Significance Description
			With standard construction management measures in place, cumulative impacts are expected to remain within acceptable limits.

3.6 Step 6: Identification of measures to mitigate cumulative impacts

This step focuses on designing and implementing management measures that address the cumulative effects identified through the assessment. The objective is not only to minimize the project's incremental contribution but also to collaborate with other actors where necessary to maintain acceptable VEC conditions over time.

Based on the results of the cumulative assessment and the project ESIA, the Project is not expected to be a major contributor to cumulative effects on the identified VECs. For most VECs, the project's incremental impacts are limited compared with those generated by the wider set of existing and planned developments in the area. As a result, the mitigation measures already proposed at ESIA level are considered sufficient to ensure that the Project's contribution to cumulative impacts remains within acceptable limits. These measures are therefore adequate to reduce the Project's residual cumulative impacts to minor or insignificant levels.

In addition, cumulative assessment highlights several broader mitigation and management actions that require coordination among multiple developers and institutions. These actions, although outside the direct responsibility of the Project, can support regional cumulative impact management and provide guidance for future developments that may interact with similar VECs.

Table 3-5 Mitigation strategy for cumulative impacts

VEC	Cumulative Impact	Management and Mitigation Measures	Monitoring & Adaptive Management	Coordination Needs
VEC 1 – Birds and Bats	Permanent removal of agricultural land used as feeding/resting areas by multiple wind and PV projects.	**Current Project Mitigations** Implementation of mitigation measures defined in the ESIA, including minimization of habitat disturbance and restoration of temporarily affected areas, is considered adequate to address project-level habitat impacts. **Possible mitigation for other projects** For cumulative context, similar good practice measures should be encouraged across other projects to limit progressive habitat degradation and maintain landscape permeability. Mechanisms to encourage the sharing of long-term vegetation, habitat and species monitoring data (from baseline surveys through to operational monitoring) can be useful in furthering the understanding of regional trends in habitat degradation and the relative impact on bird species.	**Monitoring** Periodic monitoring of species presence and habitat use in remaining agricultural areas. **Adaptive Management** Adaptive measures to be considered only if monitoring indicates unexpected reduction in habitat functionality, such as sustained avoidance, reduced usage by key species, or evidence of increasing fragmentation. Measures may include targeted habitat enhancement or refinement of land management practices.	**Coordination** Coordination with regional landowners, agricultural associations, and other energy developers is encouraged to align habitat enhancement and maintain landscape permeability.
VEC 1 – Birds and Bats	Cumulative collision risk from multiple wind farms.	**Current Project Mitigations** Implementation of ESIA mitigation measures is considered sufficient to manage project-level risks. **Possible mitigation for other projects** Coordinating and harmonizing monitoring and mitigation measures across WF projects so that cumulative effects on bird and bat populations can be accurately measured, assessed and adaptively managed.	**Monitoring** Post-construction monitoring of bird and bat collisions, using standardized survey methods (see ESIA). **Adaptive Management** Adaptive management to be triggered only in case of observed mortality exceeding predicted levels or new evidence of sensitivity for specific species (particularly PBFs or Annex I species). Potential actions may include adjustment of curtailment regimes (timing, thresholds), temporary shutdowns during peak migration events, or targeted mitigation trials.	**Coordination** Coordination with other projects is encouraged to coordinate proper management of existing Natura 2000 habitats.

VEC	Cumulative Impact	Management and Mitigation Measures	Monitoring & Adaptive Management	Coordination Needs
VEC 2 – Landscape and Visual	Visual saturation and cumulative alteration of rural character.	**Current Project Mitigations** The Project currently proposes limited landscape mitigation measures focused on local enhancement and community benefits, including small-scale improvements such as green areas, scenic paths, and upgrades to public spaces, alongside stakeholder engagement to support minor infrastructure and services in nearby communities. **Possible mitigation for other projects** Engage with other project developer during the ESIA disclosure phase in order to coordinate the adoption of a coordinated landscape design approach, minimizing visual contrast through color consistency, micro-siting, and landscaping around ancillary infrastructure.	**Monitoring** Periodic visual inspections will be carried out from key viewpoints to confirm general consistency with predicted landscape and visual effects. Monitoring will be complemented by feedback from local stakeholders, collected through the Project's grievance mechanism and community engagement activities. **Adaptive Management** Where stakeholder feedback indicates unexpected or significant visual disturbance, appropriate site-level measures (e.g. additional screening or minor adjustments to ancillary infrastructure) will be considered as part of adaptive management.	**Coordination** It is recommended to engage with relevant local and county-level planning and environmental authorities, including the Constanța County Council, APM Constanța, and the local municipality of Deleni, in order to better understand whether cumulative visual effects require additional coordinated action between developers, or whether existing planning assessments indicate that impacts remain acceptable at the local and regional scale. Where appropriate, such engagement may also help identify opportunities for consistency in design approaches among different projects. However, the need for formal developer-level coordination will be determined based on the outcomes of consultations with the competent authorities.
VEC 3 – Employment	Temporary competition for workforce and supply chains.	**Current Project Mitigations** The ESIA includes measures to ensure transparent recruitment processes, clear communication of employment opportunities, and fair labour conditions, supported by a Construction Labour Management Plan, worker information on rights, and accessible grievance mechanisms for both workers and local communities. A Stakeholder Engagement Plan will also be implemented to ensure regular, open, and transparent communication with all relevant stakeholders. **Possible mitigation for other projects** It is recommended to plan construction schedules to avoid unnecessary overlap of peak labour demand across nearby renewable energy projects.	**Monitoring** Monitoring will focus on local employment outcomes and labour market pressure indicators during construction, including the proportion of local workers employed and any reported shortages of skilled labour or upward pressure on wages. **Adaptive Management** If monitoring indicates significant labour shortages, recruitment constraints, or adverse effects on local workforce availability, adaptive measures will be considered, such as adjusting construction schedules, increasing engagement with training providers, or expanding recruitment outreach in surrounding areas.	**Coordination** Where considered relevant and subject to availability, other renewable energy developers in the area may be invited to participate in consultation or information-sharing meetings during post-disclosure or pre-construction stages. The purpose of such engagement would be to exchange information on project schedules, construction timelines, and workforce demand, in order to improve transparency and reduce potential cumulative pressure on the local labour market. It is also recommended to coordinate with relevant local employment services to better align labour demand with local workforce availability.

VEC	Cumulative Impact	Management and Mitigation Measures	Monitoring & Adaptive Management	Coordination Needs
		The Project will also promote the use of local labour and subcontractors where available, and support the development of workforce capacity through engagement with local training institutions. Where feasible, coordination with other renewable energy developers may include sharing information on workforce needs and subcontracting opportunities to support efficient use of local labour resources and reduce competition-driven cost increases.		
VEC 4 – Traffic	Increased vehicle movements and temporary congestion.	**Current Project Mitigations** The ESIA provides the implementation of a Traffic Management Plan (TMP) covering routing, scheduling, speed limits, and safety procedures for all construction-related traffic. **Possible mitigation for other projects** Engage with other project developer during the disclosure or before construction to get information regarding construction schedules in order to develop a coordinated traffic management plan, including shared delivery windows, optimized routing, and cumulative impact awareness for contractors. Establish frequent (i.e., monthly or other appropriate interval), regularly scheduled meetings between other developers and local traffic management authorities to address any problems that arise during the construction period and ensure measures to minimize disruption for road users and provide for road safety are consistently implemented.	**Monitoring** Continuous monitoring of traffic levels and incident reports with predefined trigger thresholds for implementing adaptive mitigation measures (e.g. rerouting, delivery rescheduling, or traffic holding strategies). **Adaptive Management** If monitoring indicates increased congestion, safety risks, or community disturbance beyond acceptable levels, the Traffic Management Plan will be adjusted accordingly. Adaptive measures may include rescheduling deliveries, modifying transport routes, increasing traffic control presence, or further staggering construction-related vehicle movements.	**Coordination** As anticipated, it is recommended to engage and collaborate with municipalities and other project developers to align transport schedules especially for heavy vehicle movements. In addition, engaging with local emergency services will be beneficial to ensure maintenance of access routes and uninterrupted emergency response capacity during construction phases.
VEC 5 – Archaeology and Cultural Heritage	Direct physical disturbance of archaeological resources and potential cumulative	**Current Project Mitigations** The ESIA includes a Chance Find Procedure, mandatory archaeological supervision during all ground-disturbing	**Monitoring** Archaeologists will supervise all excavation, grading, and trenching.	**Coordination** It is encouraged to establish an open communication channel with other developers to share information on

VEC	Cumulative Impact	Management and Mitigation Measures	Monitoring & Adaptive Management	Coordination Needs
	effects from nearby projects.	works, contractor training on cultural heritage procedures, coordination with cultural authorities, and implementation of preventive archaeological investigations where required. In addition, works are subject to stop-work provisions and design adaptation in case of significant finds, together with reporting obligations and access and dust control measures to protect nearby heritage assets. **Possible mitigation for other projects** Each developer shall maintain archaeological supervision during all ground-disturbing works, with workers trained on cultural heritage sensitivity and the Chance Find Procedure (CFP). A communication protocol is recommended in order to allow sharing discoveries among neighboring projects to support awareness and prevent uncoordinated impacts. In relation to potential effects on the wider landscape context, coordination between projects is recommended to minimise overlapping construction activities and reduce cumulative visual disturbance where feasible.	**Adaptive Management** Adaptive management will be triggered if discoveries indicate higher-than-expected archaeological sensitivity, allowing for adjustments in excavation methods or construction sequencing.	discoveries, discuss potential cumulative impacts, and align mitigation efforts where overlapping zones exist. Ongoing stakeholder engagement will be maintained with local communities and authorities, including the use of a grievance mechanism to capture and address concerns related to cultural heritage and landscape perception.
VEC 6 – Climate	Contribution to renewable energy and decarbonisation goals.	**Current Project Mitigations** N/A **Possible mitigation for other projects** Maximize generation efficiency and maintain high operational performance. Share performance data to support regional climate strategies. Explore opportunities for local benefit-sharing through low-carbon initiatives.	**Monitoring** Monitor annual energy generation and CO_2e avoided.	**Coordination** It is encouraged to engage in regional renewable energy planning platforms to contribute to coordinated decarbonization pathways.

VEC	Cumulative Impact	Management and Mitigation Measures	Monitoring & Adaptive Management	Coordination Needs
VEC 7 – Noise and Air Quality	Temporary increase in construction-related noise levels and dust emissions due to overlapping activities from multiple renewable energy projects within a limited number of rural receptors.	**Current Project Mitigations** The ESIA includes a range of mitigation measures to reduce dust and air emissions, including minimising exposed soil areas, sequencing earthworks, maintaining vegetation cover, wetting roads, covering transported materials, managing stockpiles, enforcing speed limits, maintaining vehicles, using low-emission equipment, and implementing traffic and routing management. It also includes measures to reduce construction noise, such as equipment maintenance, minimising engine idling, optimising vehicle movements, scheduling noisy activities during daytime hours, avoiding night-time or holiday works where possible, using efficient work practices, and applying additional noise controls (e.g. barriers or rescheduling) near sensitive receptors, supported by a grievance mechanism for community complaints. **Possible mitigation for other projects** Scheduling and intensity of construction activities will be considered in order to reduce the likelihood of overlapping peak dust- and noise-generating works and this is possible if an engagement with other developers will occur to share information on construction schedules and development status of projects. Noise and dust impacts are assumed to be managed through standard good construction practices implemented across all projects. These include: • limiting construction activities to daytime hours where feasible; • regular maintenance of construction equipment to reduce emissions and noise; • application of dust suppression measures (e.g. water spraying of unpaved surfaces during dry conditions); • speed management on unpaved access	**Monitoring** Monitoring will be carried out through routine construction-phase environmental supervision, including visual inspections and site checks to identify excessive dust generation or noise disturbance. **Adaptive Management** Where monitoring identifies excessive dust emissions, increased noise disturbance, or validated community complaints, adaptive management measures will be implemented, such as: • adjustment of construction timing or sequencing; • additional dust suppression measures; • review of vehicle routing or site access arrangements.	**Coordination** Coordination between developers is encouraged to reduce the likelihood of overlapping peak construction activities near sensitive receptors. This may include informal exchange of construction schedules and alignment of high-intensity works where practicable, particularly during earthworks and material transport phases. In addition, A community grievance mechanism will also be maintained to allow reporting of noise or dust disturbances. All complaints will be recorded, assessed, and addressed through the Project's environmental management system, with corrective actions implemented where necessary.

VEC	Cumulative Impact	Management and Mitigation Measures	Monitoring & Adaptive Management	Coordination Needs
		roads to reduce dust generation; • appropriate siting of temporary construction activities away from sensitive receptors where practicable.		

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