May 28, 2025

DENR ADMINISTRATIVE ORDER
2025 - 20

SUBJECT : **GUIDELINES IN SECURING ENVIRONMENTAL COMPLIANCE CERTIFICATE (ECC) UNDER THE PHILIPPINE ENVIRONMENTAL IMPACT STATEMENT SYSTEM (PEISS) FOR FLOATING PHOTOVOLTAIC (FPV) PROJECTS ON INLAND FRESHWATER BODIES**

I. RATIONALE

The Philippine Energy Transition Program (PETP) serves as a major component of the blueprint for the country's commitment to achieve a just energy transition, comprising various sector-specific strategies to decarbonize the country's energy system. Under the PETP, the deployment of renewable energy (RE) projects will be accelerated, including marine-based energy resource development projects such as Floating Photovoltaic (FPV) or floating solar.

The development and diversification of renewable energy sources are essential to achieving a sustainable future and addressing the challenges of climate change, in alignment with the Paris Agreement and the Sustainable Development Goals (SDGs). As the FPV technology advances, it presents a significant opportunity for renewable energy growth without competing for limited land resources.

However, the installation, operation, and decommissioning of FPVs can have significant environmental impacts. This underscores the need for a robust Environmental Impact Assessment (EIA) regulatory framework that emphasizes careful planning and proactive management to ensure the sustainable development of FPVs and effectively mitigate potential environmental risks.

Effective site selection is critical for a successful development of FPV projects and should be addressed in the early concept phase to assess project viability. Freshwater bodies with low hardness and salinity are highly preferred. This include lakes, man-made reservoirs, hydropower dams, and industrial water bodies, such as cooling ponds and wastewater treatment facilities with water quality suitable for FPVs, as well as mine subsidence areas, and irrigation ponds.

II. DECLARATION OF POLICY

Given the scientific uncertainties and lack of baseline data on the potential impacts of FPV facilities, the State shall adopt a policy that ensures a balance between environmental benefits and protection of the country's freshwater bodies in their utilization for renewable energy generation.

In line with this, the Precautionary Principle shall be applied in evaluating the environmental impact assessment study for FPV projects and in identifying the appropriate mitigating measures to address any adverse environmental impacts. Further, a mitigation hierarchy approach —avoid, minimize, restore, compensate— shall be employed in implementing these measures.

III. OBJECTIVES OF THE ADMINISTRATIVE ORDER

This Administrative Order (AO) aims to ensure that FPV development on inland freshwater bodies within the country adheres to the highest environmental sustainability standards by:

A. Establishing environmental parameters to address potential environmental, social, and economic impacts;

B. Promoting the efficient use of freshwater bodies while maximizing clean energy generation from FPV projects;

C. Fostering collaboration among stakeholders, including government agencies, local communities, and the private sector, to ensure the successful implementation and operation of FPV projects;

D. Supporting continuous research and innovation to improve the environmental performance and resilience of FPV projects in the face of climate change and other challenges; and

E. Incorporating adaptive management strategies to respond effectively to evolving conditions and new information regarding the environmental impacts of FPV projects.

IV. SCOPE AND COVERAGE

This Administrative Order shall apply to all FPV projects on inland freshwater bodies within the country, including those previously issued an Environmental Compliance Certificate by the Environmental Management Bureau (EMB) or a Renewable Energy (RE) Service Contract by the Department of Energy (DOE).

“Freshwater” means water containing less than 500 parts per million dissolved common salt, sodium chloride, such as that in groundwater, rivers, ponds and lakes, in accordance with DAO 2016-08 or the Water Quality Guidelines and General Effluent Standards of 2016.

V. PHILIPPINE ENVIRONMENTAL IMPACT STATEMENT SYSTEM FOR FPV PROJECTS ON INLAND FRESHWATER BODIES

A. Categorization of FPV Projects

FPV Projects are categorized as Category B Project or projects which are not classified as Environmentally Critical Project (ECP) but which are deemed to significantly affect the quality of the environment by virtue of being located in an Environmentally Critical Area (ECA) under Environmental Management Bureau (EMB) Memorandum Circular 2014-005 or the "Guidelines for Coverage Screening and Standardized Requirements under the Philippine Environmental Impact Statement System (PEISS) amending relevant portions of MC 2007-002".

FPV Projects are required to secure an Environmental Compliance Certificate (ECC). The Project Threshold for Coverage Screening and Categorization for FPV Project Components is attached as **Annex A.**

B. Documentary Requirements for ECC Applications

1. FPV Projects with a capacity of ≥100 MW or a project footprint of ≥100 hectares

    a. For new projects, EIS Report shall be submitted to the EMB Regional Office, along with the following documentary requirements:

        i. DOE RE Service Contract
        ii. Feasibility study submitted to the DOE
        iii. Project Description for Scoping (PDS)
        iv. IEC Documentation Report
            **Documentation of FGDs conducted, at the minimum, represented by stakeholder groups identified based on the guidelines in Section 5 of DAO 2017-15 and Annex E of this DAO*
            **Documentation of IEC including a proof of receipt of IEC materials by LGU and other stakeholders*
        v. Initial Perception survey results at the minimum indicating the baseline knowledge about the project, concerns/questions about the description of the project alternatives and concerns about the environmental impacts of the project using accepted methodology

    b. Existing, and to be expanded, modified, and/or rehabilitated projects shall be categorized according to the parameters set forth in Annex B of EMB MC 2014-05, accompanied by the following additional documentary requirements:

        i. DOE RE Service Contract
        ii. Copy of previously issued ECC

2. FPV projects with a capacity of <100 MW or a project footprint of <100 hectares

    a. For new projects, IEE Checklist Report shall be submitted to the EMB Regional Office, along with the following documentary requirements:

        i. DOE RE Service Contract

ii. Feasibility study submitted to the DOE
iii. Project Description

b. For existing and to be expanded, modified, and/or rehabilitated projects, an amended IEE checklist shall be submitted to the EMB Regional Office, accompanied by the following documentary requirements:

i. DOE RE Service Contract
ii. Updated Project Description
iii. Copy of previously issued ECC

IEE Checklist Report covers pre-determined environmental impact and corresponding measures as well as climate and disaster risk management and adaptation strategies. The report contains the project description, completed IEE Checklist Form, Environmental Management Plan, Project Environmental Monitoring and Audit Prioritization Scheme (PEMAPS), Sworn Statement of Accountability, and Certification from LGU in Land Compatibility. The IEE Checklist Report Form is attached as **Annex B**.

EIS Report documents the results of studies on environmental impacts of a project including discussions on direct and indirect impacts and their mitigation. The report contains EIS summary, project description, summary of scoping agreements, baseline environmental condition, impact assessments, environmental risk assessments, and environmental management plan.

EPRMP documents the actual cumulative environmental impacts and effectiveness of current measures for single projects that are already operating but without ECCs. It includes detailed description of the results of the FPV project's EIA process. Baseline environmental conditions for critical parameters are established, followed by comprehensive impact assessments, and proposed mitigation measures to minimize adverse effects. The EPRMP evaluates the project's environmental performance, benchmarked against the original ECC-covered Environmental Management Plan (EMP). It incorporates Environmental Risk Assessment and outlines an EMP tailored to current project requirements.

The EIS/EPRMP Outline Content Checklist and the Key Environmental Impacts to be included in the assessment and formulation of Management and Monitoring Plan to be reflected in the EIS/EPRMP are attached as **Annex C** and **D**, respectively**.**

C. Jurisdiction over FPV Projects

As a Category B Project, FPV projects are under the jurisdiction of the DENR-EMB Regional Office where the project is located. All Environmental Impact Assessment (EIA) Reports, whether an Initial Environmental Examination (IEE) Checklist or an Environmental Impact Statement (EIS), are evaluated by the respective DENR-EMB Regional Office.

In complex cases where jurisdiction is unclear, the EMB Director may assign the nearest office as the lead. If disputes arise over jurisdiction among DENR-EMB Regional Offices, the matter is escalated to the EMB Director for resolution.

For projects crossing local government units (LGUs), provinces, or regions, inter-regional committees are to be established as needed. The lead office will be from the region with the largest coverage of the project area, while regions with smaller portions of the projects will still participate in the review process.

D. Public Participation and Consultation Mechanism

Prior to public scoping, there shall be a proponent-led Initial Perception Survey and socio-economic surveys through conduct of stakeholder meetings to document feedback and disclose proposed scope of the EIA study, to gather initial public opinion and insights into the project's preliminary impacts. Issues, concerns and suggestions from stakeholders shall be integrated into the technical scope of the EIA, facilitated by the EMB-Regional Office and the proponent to establish a grievance redress mechanism.

The EIA requirement shall encompass all components of an FPV project, including their Associated Facilities (AF) which include offshore or aquatic components (e.g. FPV panels, lightning protection systems, inverters, and buried cables) and onshore or terrestrial components (e.g. onshore substations, buried export cables, and transmission lines beyond the substation).

The proponent shall conduct a stakeholder mapping to understand the socio-economic and cultural contexts, potential conflicts and synergies of interests. A stakeholder directory relevant to the entire development process of FPV projects is attached as **Annex E.**

Information and Education Campaigns using various communication channels such as community meetings, informational brochures, social media platforms, local radio and television stations, SMS alerts, local newspapers, public forums, educational workshops, Key Informant Interviews (KII), and Focus Group Discussions (FGD) tailored to FPV projects should be conducted to ensure that stakeholders are informed of the project, its benefits, potential impacts and mitigation measures.

All gathered information shall be summarized in the preparation of a Project Description for Scoping Report (PDS Report). The PDS Report shall also contain information about the project such as location, area, project components, alternatives, process and technology, project size and capacity, project phases, manpower requirements, potential impacts, and recommendations, among others.

All other provisions of DENR Administrative Order No. 2017-15 entitled "Guidelines on Public Participation under the Philippine Environmental Impact Statement (EIS) System" and EMB Memorandum Circular No. 2020-30 entitled "Interim Guidelines on Public Participation in the Implementation of the Philippine Environmental Impact Statement System (PD 1586) During the State of National Public Health Emergency" shall have suppletory application to FPV projects.

E. Compliance and Environmental Impact Monitoring

The EMB Regional Office concerned shall undertake monitoring of the proponent's compliance with the conditions stipulated in their ECC and its commitment to the Environmental Management and Monitoring Plans for FPVs projects to ensure actual impacts of the projects are adequately prevented or mitigated. The EMB RO concerned shall submit a compliance evaluation report (CER) quarterly to DENR, copy furnished EMB CO.

F. Environmental Impact Assessment Process

Key aspects of EIA enhancement for FPV projects include the following:

1. Prior to the initiation of the Information and Education Campaign (IEC), high-level environmental and social impact assessment for the host waterbody focusing on the carrying capacity, cumulative impacts of multiple projects, climate risk assessment, and site suitability study shall be conducted.

2. Submission of project description to request public scoping from the EMB shall include a feasibility study with focus on site suitability.

3. During public and technical scoping, letter request for public scoping submitted by the developer to the EMB shall include details about the proposed project, its location, and its potential impacts. Considerations for site suitability, potential project impacts to water quality, aquatic and terrestrial biodiversity, and affected communities must be covered. Proof of conduct of public IEC, FGD, and Initial Perception Surveys with relevant stakeholder shall likewise be submitted.

4. The EIA Report based on project threshold shall be prepared and submitted to the EMB Regional Office. The EIA must be data-driven and must use all available secondary information and primary data collection involving modelling and on-site surveys.

5. Experts from the DOE-Renewable Energy Management Bureau shall be included in the EIA Review Committee as Resource Person during the EIA review and evaluation stage.

6. Specific recommended environmental monitoring parameters shall be included to ensure water quality and health of the host waterbody. Focus should be provided on water quality and biodiversity, and monitoring system to track performance, ECC compliances, and operations and maintenance standards should be set up.

The EIA Process shall comply with the procedure under the Revised Procedural Manual of DENR Administrative Order No. 2003-30. The flowchart of the ECC application procedure is attached as **Annex F.**

VI. GENERAL ENVIRONMENTAL AND SOCIAL CONSIDERATIONS ACROSS FPV PROJECT PHASES

A. Pre-Construction Phase

The pre-construction phase is pivotal for the success of an FPV project as it involves several critical activities, including identification of a suitable location to ensure minimal environmental disruption and optimal solar energy capture, conduct of comprehensive assessment of the entire "area of influence", and feasibility study to evaluate the technical, economic, and environmental viability of the proposed site.

1. Factors to consider in assessing site suitability

a. **Location**. To minimize transportation costs and the need for additional access or transmission infrastructure, sites near accessible roads and ports, and electricity loading centers/power grids are preferred.

b. **Weather and climate**. Areas with high solar irradiation are preferred. Regions with minimal wind and low susceptibility to annual storms are preferred over areas prone to typhoons and seasonal flooding.

c. **Size of waterbody.** The classification and current uses of the waterbody influence project feasibility, with the size being proportional to the project scale. Sufficient surface area and depth for the FPV system, with larger volumes to aid heat dissipation, feasible for secure anchoring and with minimal shading, must be ensured.

d. **Ecology.** To minimize environmental impact and support biodiversity conservation efforts, overlap with critical habitats, protected areas, Key Biodiversity Areas (KBAs), RAMSAR sites, and ecologically significant areas must be avoided.

e. **Social.** Sites that are used to support livelihood activities (e.g. fishing, foraging, aquaculture, transportation or tourism) and those with recreational or cultural significance, should be avoided.

2. PEISS Activities

The key EIA activities undertaken during pre-construction phase involves stakeholder identification and engagement, baseline data collection, assessment of the FPV project's potential impact, and the development of a management and monitoring framework, culminating in preparing and submitting the necessary EIA report to the DENR-EMB Regional Office to obtain an ECC. Specifically, the following PEISS activities shall be conducted during pre-construction phase:

a. Information and Education Campaign (IEC) shall be conducted as stated in Part V (D) of this Order covering the conduct of Initial Perception

Surveys and socio-economic surveys. All information gathered shall be summarized in the Project Description for Scoping Report (PDS Report).

b. Public scoping shall be facilitated together with EMB to inform the stakeholders of the project activities, including the baseline surveys needed, and gather stakeholders' concerns on the FPV project for inclusion in the EIA study. All collected information during public scoping shall be concluded in the Public Scoping Report (PSR) for submission to the EMB and review of the EIA Review Committee (EIARC).

c. Technical Scoping shall be scheduled by EMB and EIARC to determine relevant contents, to establish key environmental and social issues to be addressed in the EIA study, and to delimit the extent of baseline information to evaluate impacts and propose mitigation measures. The Technical Scoping Checklist signed by both the project proponent and its consultants will sign as an agreement to establish the final scope of the EIA Study. This includes submission of the conduct of feasibility study (site suitability) and stakeholder identification. The Technical Scoping Checklist is attached as **Annex G**.

d. EIA reports based on the project based on the project threshold in Part V(B) of this Order, providing detailed description of the FPV project including planning, design, materials, implementation and mitigation hierarchy for adverse environmental and social impacts, shall be prepared and submitted by the project proponent.

3. Environmental Considerations

Specific environmental considerations and crucial baseline survey and assessment during pre-construction phase shall include seasonal surveys (wet and dry seasons):

a. Water quality

The main environmental considerations for waterbody components of FPV projects focus on assessing water quality and the overall health of aquatic ecosystems. A comprehensive environmental baseline study should account for impacts distributed across the three distinct zones of a freshwater body: littoral zone (i.e. nearshore zone connecting riparian and terrestrial habitats with the aquatic environment), limnetic zone (i.e. open, well-lit area where light penetrates from the surface down to a depth where the rate of photosynthesis equals the rate of respiration), and benthic zone (i.e. bottom layer including the sediment surface).

FPV projects significantly impact various aquatic zones of a waterbody, such as changes in water temperature and temperature stratification in the water column due to shading, fluctuations in dissolved oxygen (DO) levels and biological oxygen demand (BOD) due to reduced photosynthetic activity, and potential increases in sedimentation and turbidity from the

installation of electrical cables, mooring systems, reduced water flow, surface heating, or decreased plant growth.

Water quality assessment should adhere to DENR Administrative Order No. 2016-08 or the Water Quality Guidelines and General Effluent Standards of 2016.

Monitoring should include Chemical Oxygen Demand, Algal Concentration, and Chlorophyll - A to ensure impact analyses establish appropriate thresholds for assessing changes in water quality caused by the FPV project.

b. Ambient air quality and noise

As FPV projects have the potential to have impact on air quality and noise during construction, operations and maintenance, and decommissioning phases, it is imperative to conduct pre-construction baseline studies to serve as benchmark on future changes.

Air Quality Impact Assessment shall determine the air pollutant concentrations, such as particulate matter (PM), nitrogen dioxide (NO_2) and sulfur dioxide (SO_2) due to activities involved in the FPV project. The assessment shall also include the scope of the project, worst-case impacts, characteristics and quantity of emissions, air concentration models, incorporating meteorological data, air quality levels estimates in the surrounding community, conservative estimates for unavailable data to ensure that the assessment does not underestimate potential impacts, and development of community engagement strategies.

Greenhouse Gas Assessment involves the calculation of GHG emissions estimates that are directly and indirectly generated by the development of the FPV project. The assessment shall include scope of assessment, inventory of GHG emissions and factors covering ‘scope 1’ and ‘scope 2’ emissions as minimum but also preferably ‘scope 3’ emissions, and calculation of GHG emissions for each development phase.

Noise Impact Assessment includes measurement of the existing noise environment, modelling of expected noise levels for each phase, impact evaluation of expected noise on different receptors, and design of noise mitigation measures.

c. Meteorology, climatology and climate and disaster risks

The assessment of meteorological and climatological factors, such as solar radiation, wind speed and direction, humidity, cloud cover, and atmospheric temperature, is essential for determining the suitability of the project site. Data collection should span a full annual cycle to provide a comprehensive profile, including historical trends and future projections under climate change scenarios. This profile supports informed decision-making regarding site selection and project design.

In addition to understanding the site's meteorological and climatological characteristics, a climate and disaster risk assessment must be conducted to evaluate the FPV project's vulnerability to natural hazards. This includes identifying potential risks from heatwaves, droughts, floods, typhoons, increases in wind speed, landslides, and changes in solar radiation and atmospheric temperature. Integrating these findings into the Environmental Impact Assessment (EIA) identifies climate and disaster-related risks that could affect project outcomes and guides the development of mitigation strategies to enhance resilience.

d. Aquatic biodiversity

To prevent biodiversity and habitat loss, environmental degradation, and ecological imbalances that could induce species loss or disrupt ecosystem services, baseline studies should include detailed profiling of the general biotic communities across various zones of aquatic ecosystems. This can be accomplished through desk-based reviews complemented by robust primary data collection as necessary. To mitigate potential biodiversity impacts, FPV projects should not be sited in ecologically significant areas.

A comprehensive description of habitats within the littoral, limnetic, and benthic zones should be conducted, alongside an inventory of all aquatic species, including threatened, endemic, and invasive species. This will identify areas with high biodiversity value, fish sanctuaries, and overall habitat quality.

The ecological baseline should include the collection of data on environmental parameters, biological composition, and ecosystem services to identify significant ecological features and thoroughly document findings. Seasonal surveys may also be required during this phase to account for temporal variations in biodiversity.

To further inform the biodiversity impact assessment, a Critical Habitats Assessment may be needed to determine if any features in the area qualify as a Critical Habitat or Priority Biodiversity Features (PBFs).

e. Terrestrial biodiversity

Baseline studies for terrestrial biodiversity should provide a comprehensive assessment of existing biological conditions at both species and ecosystem levels. In the context of freshwater ecosystems, these assessments typically involve evaluating riparian floral assemblages, insects, herpetofauna, birds, and mammals.

Terrestrial biodiversity assessments through desk-based reviews and site surveys, strategically timed to align with seasonal activities such as migratory and non-migratory periods, and breeding and non-breeding seasons, to ensure a thorough understanding of biodiversity dynamics throughout the year.

During the pre-construction phase, it is essential to establish baseline environmental conditions through various surveys. These include topographical, geological, hydrogeological, groundwater, surface water, water sampling, and hydraulic structure surveys. Collecting this information will create a robust ecological profile of the area of influence.

In addition, a comprehensive Contaminated Land Assessment may be required. This assessment involves site walkover, historical investigation, sampling and analysis of soil and groundwater, risk assessment, and remediation strategy. These efforts are crucial to identify and address potential contamination issues to ensure that the site is suitable for development while minimizing the risks to the environment and public health.

4. Social Considerations

The pre-construction phase of FPV projects introduces several potential social impacts, positive and negative alike. Beyond economic benefits and infrastructure improvements, there are challenges posed by FPV projects which include:

a. Disruption of Livelihoods

FPV projects can significantly disrupt traditional livelihoods of those reliant on freshwater bodies like fisherfolks and local communities engaged in fishing activities. These disruptions often stems from changes in water use patters, alterations to fish habitats, and restricted access to fishing grounds due to project infrastructure installation.

By integrating community feedback, avoiding impact wherever possible, or developing feasible alternative livelihood options, developers can minimize the adverse impact, promote social resilience and enhance project acceptance within local communities.

The project proponent/developer should engage with affected communities and conduct a comprehensive Socioeconomic Impact Assessment which includes activities such as scoping and issues identification, determination of social and economic baseline, prediction and analysis of impacts of the proposed development on various scales, and evaluation of the significance of predicted impacts against relevant legislative, legal and social criteria.

b. Community Dynamics

Community dynamics refer to the complex social relationships, cultural traditions, and economic structures within local communities that may be influenced by the implementation of an FPV project. Understanding these dynamics is crucial for anticipating potential social impacts and ensuring that the project aligns with the values and needs of the community.

To achieve a comprehensive understanding, a desk-based review should be conducted to gather historical and technical information on protected and significant sites, such as scheduled monuments, listed buildings, historic gardens, designated landscapes, world heritage sites, and conservation areas.

In addition, site visits are recommended to confirm the presence and condition of historical, cultural, and conservation sites, to ensure that no significant features are overlooked. Conducting social surveys—including questionnaires, key informant interviews, and focus group discussions—further enriches the assessment by identifying any locations of local cultural or spiritual importance. This participatory approach helps capture community perspectives, which are essential for incorporating social considerations into project planning and mitigating potential impacts effectively.

c. Public Access, Water Navigation and Safety

Since FPV projects may pose risks to navigational safety, potential collisions, and disruptions to existing vessel traffic from construction to decommissioning phases, it is necessary to consider nearby ports, harbors, shipping lanes, or recreational areas, and other water uses during the pre-construction phase. Proper planning for anchorage, pipe laying, and cable routes is critical to ensure safety and minimize interference with maritime activities.

A comprehensive Transport Impact Assessment should be conducted to evaluate the FPV project's effects on transportation systems. This assessment should result in the development of a Construction Traffic Management Plan that outlines the scope of the assessment, existing traffic conditions, and transport implications of the proposed development. It should also address accessibility requirements to manage and mitigate any potential disruptions.

d. Conflicts over Land and Water Use

Given the competing demands for limited resources, particularly where freshwater bodies support multiple uses such as aquaculture, fishing, recreation, and domestic water supply, conflicts over land and water are likely to arise. Addressing these conflicts proactively is vital to maintain harmony among stakeholders and ensure project feasibility.

To mitigate these conflicts, harmonization with local zoning plans, along with a transparent consultation process in accordance with DAO 2017-15 on public participation, are essential to identify concerns and negotiate agreements early on. Further, adherence to DAO 2016-08 or the Water Quality Guidelines and General Effluent Standards is critical for determining suitable locations based on intended beneficial use. FPV projects should not be sited in watersheds and protected areas designated as

Environmentally Critical Areas (ECAs) (Class AA-Public Water Supply Class I).

Project proponents/developers must thoroughly assess potential social impacts of FPV projects, including visual clutter, landscape alterations, and impacts on productive fishing grounds. A comprehensive review of landscape and visual environment should consider specific features valued by communities, government agencies, and economic actors. These values are articulated through policy frameworks such as planning legislation.

B. Construction Phase

The construction phase of an FPV project is critical and involves key activities such as site preparation for staging areas, setting up temporary facilities (e.g., worker accommodations and site offices), actual construction, and installation of solar arrays and support structures. During this phase, strict adherence to the Environmental Compliance Certificate (ECC) conditions is essential.

1. PEISS Activities

During construction phase, strict adherence to the conditions outlined in the ECC must be maintained. Project proponents/developers shall conduct required monitoring activities and timely submit Self-Monitoring Reports (SMRs) and Compliance Monitoring Reports (CMRs) to the Environmental Management Bureau (EMB).

2. Environmental Considerations

a. Water quality

Construction activities such as drilling, dredging, and anchoring can disturb sediment in the littoral, limnetic, and benthic zones of the waterbody, causing increased turbidity in the water column and potential contamination if sediments contain harmful substances. Poor maintenance of construction vessels, their sanitation facilities and construction equipment, and accidents can also result in contaminants being released into the aquatic environment.

The use of bubble plumes and mechanical aerators can mitigate these impacts by promoting water mixing across water zones and maintaining dissolved oxygen (DO) levels by minimizing temperature and DO level stratification. Water quality monitoring should focus on maintaining ambient water parameters and monitoring critical indicators like Chlorophyll-a, algal concentration, and chemical oxygen demand. Oil and hazardous material spill prevention and response plans should also be in place.

Other typical mitigation and monitoring requirements include implementation of the Construction Plan as outlined in the EIA Report as well as good practice construction measures and pollution prevention, use of vessels, equipment and methods optimized to minimize potential

environmental impacts of dredging, drilling, piling, and cable burial, and maintaining construction equipment.

b. Ambient Air Quality and GHG Emissions

During material delivery and transportation, air emissions from construction vessels, earth-moving equipment, and transportation can affect air quality. Project proponents/developers should adopt best practices to minimize emissions, such as using low-emission equipment and implementing dust suppression measures.

Community engagement regarding air quality management and an effective grievance redress mechanism (GRM) should be maintained. Regular air quality monitoring is required to ensure compliance with GHG assessments, including scope 1 and 2 emissions, and ideally, scope 3 emissions, to track the project's environmental footprint.

c. Ambient Noise

Underwater and onshore noise generated during construction activities, such as drilling, dredging, and piling, can impact both biodiversity and community health.

Noise reduction measures should include using sound-dampening equipment, scheduling noisy construction activities during less sensitive periods, and limiting construction hours to daytime. Continuous noise monitoring should be conducted to ensure compliance with environmental and health standards, and project proponents/developers must communicate noise management plans to local communities to maintain transparency and trust.

Specific methods to minimize underwater noise impacts include optimizing the choice of equipment, adjusting operational hours, and performing construction activities during periods when noise levels are naturally low. Avoiding highly biodiverse microsites, informed by baseline site studies, and limiting non-essential personnel movement can also reduce noise disturbance.

Direct noise reduction methods may involve using acoustic barriers, material damping isolation, and acoustic glazing. Additionally, incorporating alternative ventilation schemes, natural corridors, appropriate spacing, and internal structural layouts can further mitigate noise impacts on both wildlife and communities.

d. Aquatic Biodiversity

Construction activities can disrupt aquatic habitats and lead to sedimentation, which negatively impacts biotic communities and overall ecosystem health. To mitigate these effects, construction schedules should be planned to avoid critical breeding and spawning periods, ensuring

minimal disturbance to aquatic life. Additionally, careful project planning should be employed to limit habitat disruption, with particular attention to the control of vegetation removal to reduce runoff and sediment loading, which can degrade water quality.

An ecological watching brief should be conducted, informed by pre-construction survey results and studies, to monitor construction activities that may potentially impact legally protected areas or locations where sensitive species are present. This brief ensures that any unforeseen issues are addressed promptly and that work practices are adapted as necessary to minimize harm to these ecosystems.

e. Terrestrial biodiversity

Permanent loss or temporary disturbance to terrestrial habitats through clearance of vegetation for construction of access routes, substations, transmission lines and cable routes (for land-based elements), disturbance due to noise and increased human presence, or the creation of barriers to movement (e.g. from fencing) thus disturbing or displacing species breeding and foraging are anticipated impacts during the construction phase.

Mitigation measures and management plans developed as part of the EIA process in the pre-construction phase should be comprehensively implemented during the construction phase. The effectiveness of this mitigation should also be monitored with changes made to mitigation strategies if necessary. Various construction optimization and practices must be implemented to prevent and reduce habitat damage and associated ecological impact during construction.

f. Invasive and Non-Invasive Species (INNS)

Introduction of INNS occurs when new species are (often inadvertently) introduced or spread via transportation of materials to new sites or where construction disturbances create opportunities for invasive species to establish in the area. Anthropogenic activities in the area can also displace and affect natural predators of INNS, allowing them to proliferate in new and favorable environmental conditions. INNS must be assessed and monitored while compliance with the quality standards is strictly observed.

3. Social Considerations

a. Community health and safety

The movement of materials and personnel during FPV construction can have various impacts, including increased traffic, dust generation, and potential pollution.

During both construction and subsequent phases of FPV projects, ensuring public protection at construction sites involves comprehensive assessments and action plans. These encompass traffic flow management to minimize

congestion and maintain safe passage for both construction vehicles and the general public, adherence to local regulations to prevent accidents and ensure orderly project execution, and thorough training of workers in safety and construction hazards, such as handling heavy equipment, cranes, hazardous materials, and exposure to dust and noise, falling objects, live power lines, and work conducted over and under water. Tailored safety measures are essential to mitigate risks effectively.

Addressing site safety concerns, particularly those involving water navigation hazards, is vital. Construction areas must be marked, and appropriate barriers and warning systems should be employed to alert nearby water users. Additionally, risks related to solar glare and aviation safety should be assessed, with clear protocols established to mitigate potential issues. Public access restrictions to construction areas should be well-communicated to prevent unauthorized entry and enhance overall safety.

b. Disruption of recreational activities and livelihoods

FPV construction can disrupt recreational activities and livelihoods, potentially displacing community practices. To mitigate these impacts, project proponents/developers should establish support programs, such as training, temporary jobs, or financial assistance. Proactive engagement with stakeholders is essential, including scheduling construction during off-peak times, providing alternative access routes, and compensating affected businesses.

Projects should minimize disruptions to local economies by promoting local hiring, skill development, and local procurement. Coordinating construction schedules to avoid peak periods for fishing and tourism helps reduce impact, while offering compensation for losses ensures community stability.

Maintaining open communication and keeping stakeholders informed about project developments is vital. Project proponents/developers should implement a grievance redress mechanism for addressing concerns promptly. In areas near cultural or heritage sites, tailored monitoring may be necessary to protect visual and landscape values. Ongoing engagement and transparent practices foster trust and accountability throughout the project.

C. Operation and Maintenance Phase

During the operation and maintenance phase, the focus shifts to the ongoing functionality and efficiency of the FPV facilities. Site presence is significantly reduced, limited primarily to scheduled inspections and maintenance tasks. These activities can range from minimal, routine work, such as cleaning panels, to more substantial efforts, like replacing anchor lines or repairing infrastructure.

1. PEISS Activities

Continued adherence to conditions specified in the ECC is essential. Project proponents/developers must implement environmental management protocols,

conduct regular monitoring, and submit reports such as Self-Monitoring Reports (SMRs) and Compliance Monitoring Reports (CMRs).

Any enhancements or modifications to the project that might necessitate an amendment to the ECC must be applied for and approved accordingly to ensure that the project continues to operate within regulatory frameworks and environmental standards throughout its operational lifecycle.

2. Environmental Considerations

a. Water quality and aquatic biodiversity

The long-term impacts of FPV projects on aquatic environments, including potential material leaching, temperature stratification, and fluctuating water quality parameters essential for supporting life, are not yet fully understood. To mitigate these uncertainties, precautionary measures must be adopted to minimize potential adverse effects on water quality and the biodiversity it sustains.

Changes in temperature stratification, caused by reduced water mixing and shading, can lead to decreased dissolved oxygen (DO) levels over time, which are critical for the survival of aquatic organisms. Shading from FPV panels is a notable impact, affecting sunlight penetration essential for prey visibility, primary productivity (photosynthesis in aquatic plants), and respiration processes.

FPV developers should adopt innovative, site-specific strategies to minimize the shading effect. This includes practices such as optimized panel placement and spacing, appropriate panel tilt and orientation, and the use of advanced floating platform and panel designs that allow better light transmission.

To safeguard environmental integrity, stringent measures should be taken to prevent material leaching and accidental releases of oils or lubricants during maintenance. Regular water chemistry monitoring is mandated to track the health of the water body, focusing on key parameters.

Ecological monitoring may be necessary, especially when sensitive habitats and species are present, to compare current conditions with baseline data and predicted impacts from environmental assessments. Seasonal water quality and meteorological monitoring should be conducted to detect any deviations from baseline conditions and to adjust operational practices to minimize impacts and comply with water quality regulations. Collaborative efforts with local stakeholders to safeguard water quality should also be part of the operational framework.

To further enhance sustainability, operations and maintenance procedures should specify the use of non-toxic, environment-friendly materials for all project components. Monitoring mooring and electrical systems is also

essential to prevent bottom surface dragging and minimize ecological disturbance.

b. Terrestrial biodiversity

FPV projects may introduce new conditions that will create opportunities for new habitats, promoting biodiversity, or allowing invasive species to proliferate. Where critical habitats have or could be impacted, longer term direct mitigation, compensation and/or monitoring measures must be implemented to achieve no net loss or net gain of biodiversity value.

Community-based biodiversity and ecosystem services monitoring designed based on coordination and consultation with local regulating committee and stakeholders, shall be implemented to monitor impacts of the project. Continuous engagement with local conservation organizations and stakeholders is crucial to identify emerging biodiversity issues and develop appropriate, responsive measures.

c. Solar glare

Solar glare from FPV installations can pose significant risks to wildlife, particularly birds, as well as to communities, view sheds, and navigational safety for aircraft and watercraft. Mitigation measures include the application of anti-reflective coatings on solar panels, strategic panel orientation, and thoughtful site design to reduce reflective surfaces. Proper siting and design preparations can greatly enhance safety and minimize the visual impact on surrounding areas.

d. Waste management

Effective waste management during the Operation & Maintenance (O&M) phase is crucial to minimize the environmental footprint of FPV projects. Improper disposal of debris and maintenance waste can lead to pollution, affecting both aquatic and terrestrial ecosystems. Project proponents/developers should establish and enforce comprehensive waste management plans to ensure that the project remains compliant with waste regulations.

e. Structural integrity and safety

Ensuring structural integrity and safety is essential to prevent accidents and system failures. Regular inspections and maintenance help identify and address potential issues before they escalate, protecting both the environment and the investment.

Project proponents/developers should prioritize the use of durable materials and robust engineering practices to enhance the FPV system’s safety and longevity, reducing the risk of environmental damage and ensuring continuous energy production.

Regular maintenance of equipment not only optimizes operational efficiency but also minimizes environmental risks for the overall sustainability and reliability of the FPV project.

3. Social Considerations

During the operations and maintenance phase, balancing local socio-economic values with regulatory policies and continuous engagement with affected communities are essential. Developers must address concerns related to community health, safety, livelihoods, resource usage, and compensation to ensure project sustainability.

a. Ongoing community engagement

Developers should maintain transparent and continuous communication with local communities about project updates, potential issues, and upcoming maintenance activities. Establishing feedback mechanisms and effective grievance redress mechanisms allows community members to report concerns and provide feedback. Integrating stakeholder engagement ensures that communities remain active participants in planning and decision-making, reinforcing transparency and accountability.

b. Employment and local economy

Ensuring sustained employment for the local workforce during regular operations and maintenance is vital. Project proponents/developers should provide training programs to enhance skills and job stability while prioritizing the procurement of materials and services from local businesses to boost the local economy and create long-term community benefits.

c. Public safety

To protect public safety, project proponents/developers should manage access to FPV facilities through clear signage, barriers, and controlled entry points. Regular safety drills and training for both employees and local residents should be conducted to prepare for emergencies. Maintaining an updated Traffic and Transport Management Plan ensures safe and efficient movement around the project site.

d. Health and well-being

Mitigating noise and visual impacts through thoughtful design and operational practices is essential to preserving community well-being. Project proponents/developers should support local health initiatives to address any potential impacts from FPV operations and prioritize occupational health and safety measures to safeguard workers and nearby residents.

D. Decommissioning Phase

The decommissioning phase encompasses the systematic removal of the FPV project equipment and structures, including its floaters, PV panels, electrical equipment, and associated infrastructure. Restoration of the site to its original condition to the extent feasible, along with the effective management of any waste and debris generated during decommissioning, forms an integral part of this phase.

Emphasis must be placed on is placed on environmentally sustainable practices prioritizing the recycling, reusing, or recovery of materials. Additionally, the removal of all sub-surface infrastructure is crucial to prevent hazards for future use.

1. PEISS Activities

As part of regulatory compliance, a comprehensive Abandonment and Termination Plan (ATP) must be submitted to the EMB at least one (1) year prior to the FPV project's decommissioning. This plan should detail systematic dismantling, removal, and repurposing or environmentally responsible disposal of all FPV components**.** It should also outline site rehabilitation measures and strategies for remediation of affected areas, with proposed alternative projects for the area post-decommissioning to support continued environmental stewardship.

The ATP shall delineate rehabilitation measures, cleanup and restoration strategies, including remediation of areas affected by the FPV project. Moreover, it should propose alternative projects or programs for the area post-decommissioning to ensure a smooth transition and continued environmental stewardship.

The ATP must be adhered to rigorously, alongside any EMB-imposed conditions. The Stakeholder Engagement Plan (SEP) should be updated and implemented to ensure transparent communication with communities, government agencies, and other stakeholders. Regular consultations should inform stakeholders of decommissioning activities, timelines, and potential impacts, with a robust grievance redress mechanism (GRM) in place to resolve any issues transparently.

2. Environmental and Social Considerations

a. Site restoration and habitat rehabilitation

Restoration efforts should focus on rehabilitating the natural ecosystem and supporting biodiversity by re-establishing native vegetation, restoring soil structure, and improving water quality in affected areas. Mitigation measures for any residual environmental impacts, such as sediment disturbance or habitat fragmentation caused by anchoring, should be implemented. Continuous monitoring of restored habitats is essential to ensure their long-term ecological health and resilience.

Pre-decommissioning assessments, including re-baselining surveys and studies, should be conducted to account for environmental changes or newly designated protected areas. This precautionary measure ensures that restoration efforts align with current ecological conditions and regulatory requirements.

b. Waste management and pollution prevention

Effective waste management is essential for reducing pollution during decommissioning. Developers should implement robust handling, storage, and disposal strategies for construction debris, hazardous materials, and wastewater. Ensuring compliance with pollution control regulations. Pollution prevention measures should include sediment and erosion control to prevent runoff into nearby water bodies, as well as containment measures for any spills or leaks that may occur during dismantling activities.

Monitoring and reporting on environmental parameters like water quality and air emissions are critical for maintaining regulatory compliance and addressing any incidents promptly.

c. Adaptive management and contingency planning

Adaptive management strategies allow for flexible responses to unforeseen challenges during decommissioning. Developers should have contingency plans in place to address potential environmental risks. Regular environmental assessments and audits help identify emerging issues and ensure that mitigation measures are effective and responsive to evolving environmental conditions.

VII. REPEALING CLAUSE

All orders and other similar issuances inconsistent herewith are hereby revoked, amended, or modified accordingly.

VIII. SEPARABILITY CLAUSE

If any provision of this Order shall be held invalid or unconstitutional, the other portions or provisions hereof which are not affected shall continue in full force and effect.

IX. EFFECTIVITY

This Order shall take effect fifteen (15) days after its publication in a newspaper of general circulation and upon acknowledgment of three (3) certified copies hereof with the Office of the National Administrative Registrar (ONAR).

Originally Signed

MARIA ANTONIA YULO LOYZAGA
Secretary

Annexes A-G:
https://tinyurl.com/33wnsn54