

Environmental Impact Assessment Guidelines

Environmental Protection Agency, Guyana

Volume 6 – Offshore Hydrocarbon Exploration
and Production

Table of Contents

Overview..... 3

Background and Context 4

 Scope of the Guidelines4

 Guidelines Development Process4

Guiding Principles..... 6

 Guyana’s Green Economy6

 Sustainability Assurance7

 Precautionary Principle.....7

 Climate Change8

 Traditional Knowledge.....8

 Cultural Awareness.....8

 Cumulative Effects.....8

 Transboundary Effects9

 Public Participation and Engagement9

 Information Sharing.....10

 Timelines.....10

Environmental Permit Application 11

 Public Awareness11

 Occupations12

 Project Scope and Boundaries.....12

 Alternatives.....13

 Site Description13

 Issues Scoping13

 Mitigation and Monitoring.....14

 Project Related Documents.....14

Initiating the EIA Process 14

 Retaining Qualified Consultants14

 Preparation of Terms of Reference.....15

 Objectives 15

Issues Identification	15
The Project.....	16
The Environmental Assessment	17
<i>Environmental Impact Assessment</i>	19
Environmental Baseline Study	20
Environmental Assessment	21
The Developer.....	22
The Project.....	22
Issues Identification	24
Effects Predictions	24
Prediction Methods	24
Mitigation Measures.....	25
Assessment Types.....	26
Environmental Impact Statement (EIS)	28
Environmental and Social Monitoring and Management Plan	31
Unplanned Events.....	33
Environmental Effects Monitoring	33

Overview

The Environmental Impact Assessment Process serves as both a planning tool and an approval process for defined undertakings (Environmental Protection Act, Cap 20:05, Fourth Schedule – Projects).

Each proposed project will undergo a process of examination and, as required a set of Terms of Reference developed for specific EIAs. The Environmental Protection Act (Part IV-Environmental Impact Assessments) provides direction on the elements of an EIA. As well, the rules and procedures for conducting and reviewing EIAs are contained in the generic Environmental Impact Assessment Guidelines-Volume I. Additionally, Guidelines have been developed for preparation of an Environmental Management Plan (EPA, 2013) This document is intended to complement the Act and provide generic advice and direction within the offshore hydrocarbon sector.

This document is a result of an exercise carried out by the Environmental Protection Agency and following consultations with affected stakeholders. The intention is to provide to the EPA, EAB, sector agencies, private sector, NGOs, members of the public and practitioners, a set of approved guidelines for the conduct and review of Environmental Impact Assessments for Offshore Oil and Gas Projects in offshore waters under the jurisdiction of Guyana. These undertakings can include exploration (seismic surveys, exploration drilling) as well as development and production.

Background and Context

In June 2017, the Environmental Protection Agency of Guyana issued an Environmental Permit for the Liza Phase I Development Project- Offshore Operations. This is the first offshore petroleum production project approved for the country. As such, it introduces a new industry sector to the country. It also presents a challenge for regulators, resource managers and the many individuals and groups potentially affected by this new industry.

The development of sector guidelines is one initiative to improve the environmental assessment process as laid out in the Environmental Assessment Act. Guidelines have been developed and are in place for other sectors (mining, forestry, electric power generation). These guidelines follow a similar format, but additionally have some features that reflect the nature of the offshore industry and may provide needed guidance.

Scope of the Guidelines

These guidelines are somewhat broader in scope than those in place for other sectors. They address all stages of offshore hydrocarbon development – exploration (seismic surveys, exploration drilling) development (delineation drilling, site development, servicing) and operations. (closure, progressive rehabilitation).

Additionally these guidelines extend through all regulatory stages as laid out in the Environmental Protection Act, i.e. application for an Environmental Permit, development of EIA Terms of Reference, as well as completion of the EIA components and implementation of required follow-up (monitoring and reporting) programs.

Guidelines Development Process

The development of these guidelines followed a consultative process. The work was initiated by the Guyana Environmental Protection Agency following the experience of the Liza Phase I Environmental Impact Assessment.

With support from Canadian Executive Services Organization (CESO), a practitioner familiar with offshore oil and gas environmental assessments was identified and retained to work with EPA staff.

Consultations were initiated with the various interested parties – regulators, potential developers, practitioners, environmental organizations, and industry representatives. Following a series of meetings a draft document was prepared. The draft was distributed for comment.

A final draft was submitted to EPA for review and acceptance. The approved Guidelines were issued on (date to be determined). These guidelines are intended to be reviewed and updated as necessary to incorporate new information and reflect changing standards of performance. The EPA would welcome any suggestions for improvements in the document.

Guiding Principles

The EPA Environmental Assessment process is guided by a set of principles. Developers need to consider how their operations, including their proposed project, adhere to these principles. Developers will be expected to demonstrate their commitment to these principles by describing how they have been incorporated into their corporate environmental policy. As well, developers will be expected to apply these principles with respect to the proposed project, and document the results in the environmental assessment and related submission documents.

Guyana's Green Economy

The Government of Guyana has adopted a mission “to develop a robust, world-class environmental system that safeguards the integrity of the natural environment and protects public health through the development and adoption of appropriate, sustainable and coherent policies and programmes.” The Department of Environment is a lead agency, charged with working to nurture this system through the utilisation of best available science, up to date information and the engagement of all stakeholders to effectively advance the environmental initiatives of the government for the benefit of all Guyanese and the global community.

Currently, DOE is developing a framework to guide the development of Guyana's Green State Development Strategy (GSDS). The GSDS will lay the foundations for inclusive green economic growth for achieving the Sustainable Development targets. As well, in 2017 Guyana was accepted as a member of the Partnership for Actions on Green Economy (PAGE), an initiative, which was launched in 2013 as the United Nations Sustainable Development or Rio+20 response to the call to support those countries wishing to embark on greener and more inclusive growth trajectories.

The mission of the Department of Environment includes, but is not limited to, the development of a robust, world-class environmental system that safeguards the integrity of Guyana's natural environment and protects public health through the development and adoption of appropriate, sustainable and coherent policies and programs.

One of the key elements of this green economy is environmental sustainability. So now, more than ever before, there is a need to place emphasis on improving the quality of the environment.

Developers will want to review Government initiatives in light of their proposed undertakings, and be prepared to indicate how their activities will support and sustain efforts to achieve a Green Economy for Guyana.

Sustainability Assurance

Sustainability is defined as *“to manage planetary resources in a manner that benefits present generations, while not compromising the reasonably foreseeable needs of future generations.”*

Define and describe how this principle has been addressed by the Developer, including a description of corporate policies related to sustainability assurance, including the protection of biodiversity (at the species and ecosystem level). Sustainability should also be approached from the perspective of the social and economic (socio-economic) features of the proposed project, and the identification of measures to reduce or avoid negative outcomes, while enhancing positive ones for both present and future generations.

Precautionary Principle

Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost effective measures to prevent environmental degradation.

The Precautionary Principle calls for a cautionary approach to environmental assessment, especially with respect to implementation of pollution control measures. In general it supports the approach that preventative action or avoidance is preferable to curative treatment.

For the purposes of environmental impact assessment, the principle calls for a cautionary approach at all stages. In adherence to the Precautionary Principle, developers will be expected to demonstrate how they have taken a cautionary approach in project conceptualization, alternatives selection, detailed design, effects predictions,

selection and implementation of mitigation measures, design and implementation of monitoring programs, and corrective actions.

Climate Change

The physical environment is showing evidence of increased variability on a global and regional scale. Developers will need to provide an inventory of anticipated greenhouse gas emissions from their operations, commit to appropriate control measures, and consider the effects of climate change on their proposed project.

Traditional Knowledge

Guyanese, especially indigenous people as well as resource harvesters and people whose culture and lifestyle are closely tied to the natural environment, can possess local knowledge about their environment. Much of this knowledge is passed on orally and not documented in scientific literature. Such knowledge can prove useful in project planning and implementation (e.g. emergency response planning). Developers should access relevant information in a respectful manner, and incorporate this knowledge into baseline descriptions of the environment. As well, and where appropriate, this information should be incorporated into effects analysis, including identification of suitable mitigation measures.

Cultural Awareness

Major projects can employ non-nationals, and comprise a labour force that includes both Guyanese as well as foreign nationals. In order to ensure a safe workplace environment, and avoid friction within the workforce, developers will need to consider initiatives that increase awareness of cultural diversity, appreciation for different “world views”, measures to assure a safe workplace environment. A training program as part of worker initiation can include cultural sensitivity training that addresses these issues.

Cumulative Effects

The Guyana offshore oil and gas industry is likely to grow over time as additional exploration uncovers new reservoirs. Consequently it will be important for project proposals to be considered in light of other offshore developments. A cumulative effect may be defined as the impact on the environment that results from the incremental effects of a development when added to other past, present, and reasonably

foreseeable future actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. A cumulative effects assessment (CEA) identifies the residual effects of the Project, and the potential to interact with the residual effects of other projects or activities that could result in a greater effect to either the biophysical or socio-economic environments.

Developers of offshore production projects will be expected to complete a cumulative effects assessment as part of the EIA.

Transboundary Effects

A transboundary environmental effect can occur when animals move across jurisdictional boundaries (e.g. sea turtles, marine mammals and migratory birds) or when project activities themselves, or their zone of influence, cross jurisdictional boundaries (e.g. transportation and air quality, unplanned events – an oilspill). The focus of an offshore oil and gas project is on the latter, as effects on migratory species can be expected to be addressed in the component-specific effects assessments.

Public Participation and Engagement

An essential ingredient of environmental assessment is the maintenance of an open and ongoing dialogue with stakeholders.

A developer is urged to commence community awareness and stakeholder consultation programs as early as possible in the EA process. It must be recognized that offshore oil and gas exploration and development are new activities for Guyana; hence awareness of the industry is low, and anxiety high. Programs should include the following elements:

- Be addressed to all potentially affected and interested audiences.
- Provide information on the industry in general
- Describe the proposed undertaking through presentations, brochures and graphics.
- Utilize a variety of communication methods - social media, broadcasting, community meetings, workshops/seminars.
- Provide a means for feedback – questionnaire, contact for submissions.

- A record should be kept of all public interaction. For meetings, including a description of the time, place, duration, attendance, means of notice, discussion held.
- Documentation of issues and concerns (for incorporation into Issues Scoping and effects assessment).

Information Sharing

The environmental assessment process is intended to be an open process. All information provided by the developer, as well as inputs received from others forms part of an open dialogue and is to be made available to the general public.

The developer should, therefore be prepared to make openly available such information as:

- General information about the industry, its safety and environment record;
- Applicable corporate and industry policies on environmental sustainability, environmental protection, equity initiatives, emergency response planning and other matters of general public interest;
- Contracting, employment and training opportunities associated with the project; and
- Background, baseline studies, associated data and data analysis generated to support the environmental assessment process.

Timelines

The Environmental Protection Act lays out timelines for specific stages of the environmental impact assessment process, and it can be expected that these deadlines will be respected by the regulator. The developer is encouraged to be pro-active, especially with respect to public engagement. For example, communications and consultation programs can be initiated early in the process, and even in advance of submission of an Application Form. Such actions can serve to better inform the developer about issues and concerns, and equip them with the ability to modify plans or take other measures to address anticipated negative effects. This can have the effect of reducing the overall approval schedule.

Environmental Permit Application

In preparing an application, developers are guided by the Environmental Protection Act, which describes in general the required contents of a submission. Additionally, the Rules and Procedures for conducting and Reviewing EIAs (Environmental Impact Assessment Guidelines version 5 Nov. 2004) provide general guidance. The Agency has developed an Application Form for Environmental Authorization (EPA-EMPD2014EAAF1R0). The form lays out the type of information required from the applicant.

For offshore undertakings, some adaptation may be required to fill out some sections of the document. Applicants are encouraged to consult with the Technical Secretariat of EPA for guidance.

Developers may also want to consider providing additional information beyond the minimum as laid out in the Application Form. The provision of supplemental information can serve to facilitate the evaluation process, and result in a favourable outcome. In the case of some exploration activities (e.g. seismic surveys) this additional information may be adequate to result in a decision that a full EIA is not required, i.e. no further assessment, or an Environmental Management Plan (Environmental and Social Monitoring and Management Plan) only will be sufficient for approval purposes. For other undertakings, a thoroughly documented application can serve to expedite a decision on the requirement for an EIA, and also facilitate the development of Terms of Reference and ensuing stages of the EA process.

Suggested inclusions in an Application Form are described below.

Public Awareness

Implement a public awareness program as early as possible in project planning and advise the general public of the intent to apply for an environmental permit.

Contact potentially interested parties and offer to meet to explain the undertaking, identify issues of concern, and discuss information needs as well as potential mitigation and monitoring measures.

Provide summary descriptions of the undertaking using non-technical language and illustrations to assist in as broad a comprehension as possible.

Incorporate the results of this awareness program in the application.

Occupations

(See Application Form item 14 – “*Please state the workforce for each phase*”).

Estimate the number of employees required by project phase, as well as the expected duration of employment.

Provide an enumeration and breakdown of occupations anticipated for this undertaking according to an accepted classification code (e.g. ILO (1990), *International Standard Classification of Occupations: ISCO-88*, International Labour Office, Geneva; Canadian National Occupational Classification). Classifications should be to the highest level of detail practicable (e.g. 3 digit level for ISCO-88). This information is used to determine if any hazardous occupations are involved.

Identify what work will be carried out by direct hiring and/or contracting out.

Describe any existing hiring and contracting policies that address employment equity (e.g. relative to age, gender, and ethnic diversity).

Describe any programs or initiatives to encourage local hiring/participation in the project.

Describe plans to employ Marine Mammal Observers, including required qualifications and provisions for local trainees.

Project Scope and Boundaries

Describe the scope of the project in terms of physical (geographic), temporal, administrative and technical boundaries.

(See Application Form Item 14 - Stages in development of the Project)

Describe the project by phases, including planning/design, construction/mobilization, implementation/operation and closure/abandonment. Describe the activities associated with each phase. For seismic operations, describe the proposed area of operation, the survey boundaries, the survey pattern and line separation, number of vessels, type and area of seismic array, energy type and source, vessel speed during surveying, duration of program.

Alternatives

(See Application Form Item 10 - Alternative Sites, if any).

Identify alternatives to the Project, including the “no project” alternative and provide a discussion as to the rationale for the selected alternative.

Identify major alternatives within the project, i.e. alternative means to carry out the undertaking. Provide a discussion of the rationale for each selected alternative.

Site Description

For seismic operations, provide information on potential other activities in the survey area, including marine traffic patterns, fishing grounds and pattern of harvesting operations. Describe measures to reduce or avoid interactions with other anticipated marine users. Describe any other potential hazards to vessel navigation.

Describe any sensitive areas such as known travel routes or aggregation areas for marine mammals and sea turtles.

Issues Scoping

Identify issues of concern, using an approach such as VEC identification (valued environmental components)

Identify the anticipated zone of influence by affected ecosystem and socio-economic component (VEC).

This analysis will serve to assist in defining the scope of the environmental impact assessment (including the required baseline environment description and effects analysis), should such a decision be reasonably anticipated.

Mitigation and Monitoring

Provide a description of measures that can be referred to as “designed in” mitigation, i.e. standard operating procedures (industry best practices) intended to reduce or eliminate negative environmental (or enhance positive) effects.

Describe the associated monitoring measures that apply to the operation, including proposed means of reporting results to regulators, other interested parties and the general public.

Project Related Documents

Provide a bibliography of all project-related documents already generated by or for the developer.

Provide one copy of any reports on environmental work already performed by or for the developer.

Initiating the EIA Process

Should a developer be required to undertake a full Environmental Impact Assessment, the following guidance may be useful in achieving a timely decision on the project.

Note, in some cases an Environmental and Social Management and Monitoring Plan (or Environmental Monitoring Plan) could be determined as the only additional requirement prior to a decision on issuance of an Environmental Permit. In such cases, refer to the applicable section of the guidelines.

Retaining Qualified Consultants

A developer may benefit from retaining external expertise early in the process, i.e. at the application stage.

Once a decision has been made to require an EIA, the developer is expected to select qualified persons to undertake the preparation of the required documents. A registry of qualified consultants is maintained by the EPA and, subject to selection processes employed by the Developer, individuals and companies on this list can be selected to comprise the EIA Team.

While the priority should be on qualifications, where practical, Developers should consider using companies and individuals resident in Guyana and possessing local knowledge and relevant experience.

Preparation of Terms of Reference

The Terms of Reference will establish the nature and extent of issues to be considered in the EIA. It will also identify the information contents of the EIA, as well as applicable methods for effects prediction and related analyses.

Following the completion of a public and stakeholder consultation process, the EPA will set the terms and scope of the required EIA, through the preparation of Terms of Reference. This document may be distributed in draft form for comments, prior to issuance as Final. Once the Terms of Reference have been issued, the developer, with his consultant, is in position to prepare the EIA.

Objectives

The Terms of Reference set out the questions and matters that are required to be answered or considered in the EIA.

Issues Identification

The scope of the assessment will be based in large measure on the results of an active public consultation program that is focused on identification of issues and concerns – possible effects from the project and from alternatives under consideration.

The planning and execution of public scoping exercises is the responsibility of the developer, supported and facilitated by EPA whose advice will be offered as to timing, location, and target audiences. The EAB will attend these sessions.

Developers will need to review the feedback received from its consultation efforts, and combined with its own knowledge of the proposed undertaking, will identify the issues to be addressed, as well as the key environmental and socio-economic components associated with these issues.

Offshore oil developments are typically large in scale and involve a number of issues in common. These are likely to include the following major concerns:

- Unplanned Events – Spills prevention, monitoring, emergency preparedness. Subsidiary issues include:
 - Adequacy of baseline knowledge (e.g. weather, wind, currents and seastate) as it relates to project design and emergency response planning.
 - Proximity to sensitive ecosystems (special areas, species of concern).
- The potential for the project to introduce invasive species – aquatic as well as terrestrial. Major mechanisms for transport of invasive species include ballast water transfer, hull biofouling, and ships' cargo.
- Disturbances to marine mammals, sea turtles, some fish species.
- The social and economic changes associated with project implementation especially with respect to employment (hiring practices), training, contracting, and local benefits initiatives.

Other issues of concern might include

- Planned discharges to air (Greenhouse gas emissions, exhaust emissions, flaring),
- Planned discharges to water (produced water, drill cuttings, greywater, ballast water)
- Solid waste management
- Social issues associated with the in-migration of itinerant workers from different cultures, as well as mixed cultures in the site workforce.
- Interaction/interference with fishing/resource harvesting
- Traffic congestion associated with supply base operation.
- Incorporation of traditional knowledge into baseline environment description and response planning
- Benthic community disturbance (depending on water depth).

The Project

The TOR will list the features of the project that are to be described in the EIA. It will also define the scope of the project that is to be assessed, and for which approval is sought, keeping in mind that excluded items will likely require their own environmental

assessment, and will need to be taken into account in the Cumulative Effects Assessment.

The scope of the project is defined by establishing the physical (geographic), temporal, administrative and technical boundaries of the undertaking. Aspects of the proposed project that lie outside the jurisdiction of the Environmental Protection Act will not form part of the scope of the project that is to be assessed, however these will need to be identified and, as appropriate, considered in the Transboundary Assessment.

Relevant phases of the project, and their timing is to be provided, including planning/design, construction/mobilization, implementation/operation and closure/abandonment. The TOR will likely ask for a description of the activities associated with each phase.

The TOR should indicate the alternatives to the project that will be discussed in the EIA, including the “No Project” option. Additionally, the TOR will note alternatives within the project (alternative ways to complete the project) that will be addressed in the EIA.

Alternatives within the Project could include:

- Alternative layout of seabed structures and flow lines;
- alternative means for extraction, storage, transfer/transport;
- Alternative strategies for dealing with produced natural gas (in addition to re-injecting or flaring).

Georeferenced mapping/graphics at a suitable scale should be provided for project sites and to illustrate project features.

The Environmental Assessment

The TOR will summarize the required contents of the EIA documents – the Environmental Baseline, The Environmental Impact Assessment, the Environmental Impact Statement and the Environmental Management Plan.

The TOR will also provide guidance as to whether and how the submission will address important guiding principles, including: Guyana Green Economy Initiatives, Climate Change, Sustainability Assurance, Precautionary Principle, Traditional Knowledge

incorporation, cultural awareness, public participation and engagement, and information sharing.

Scope of the Assessment

The issues scoping exercise will be a major determinant of the scope of the assessment, and the developer will need to document the connections between issues identification and where in the EIA each has been addressed.

In order to conduct a thorough assessment, the identified issues need to be connected to a potential interaction between the project and the affected (biophysical or human) environment. One approach to assessment is to identify Valued Environmental Components (VECs) and utilize these in the effects assessment.

As per the EP Act, the scope of the assessment includes direct and indirect effects. As well, the developer is expected to carry out the EIA in a manner that addresses the need to protect and improve human health and living conditions and the need to preserve the stability of ecosystems as well as the diversity of species.

The assessment will need to include a cumulative effects assessment. For production proposals, it will also likely require an assessment of Transboundary effects.

Assessment Methods

The TOR will describe the need for use of proven effects prediction assessment methods, employing mathematical models or statistical analysis where possible. The TOR will also require the establishment of criteria to be employed in assessing effects and determining the significance of predicted impacts.

The TOR may specify analytical tools to be employed for specific issues, e.g for air quality modeling, spill modelling, risk assessments.

The assessment methods should also provide for a conservative means to address uncertainty (low level of confidence) in predictions.

Types of Assessment

The TOR will identify any specific types of assessments required beyond the project-specific assessment. Such other assessments could include Cumulative Effects Assessment and Transboundary Effects Assessment

Environmental Impact Assessment

The EIA will comprise three components: Environmental Baseline Study; Environmental Assessment; and Environmental Impact Statement. The Environmental Impact Assessment may be submitted in the three components stated above or could be submitted as one document depending on the size and nature of the proposed project.

The Environmental Baseline Study will record the present quality of the environment within the area of influence before project implementation. This data will then be analysed in the environmental assessment and will be used to predict and quantify impacts.

The Environmental Assessment is basically the identification and assessment of impacts of the proposed project and of its alternatives. The EA will also consider mitigation measures to offset negative impacts and will assess the impact of implementing these measures on the environment.

The Environmental Impact Statement is a summary of the findings of the Environmental Baseline Study and the Environmental Assessment, and includes an Environmental Management Plan.

For large EIAs, the EIS will be the document which decision makers and the public will use. The Environmental Baseline Study and the Environmental Assessment will then serve as reference documents to the EIS.

Environmental Baseline Study

The baseline description of the environment is intended to provide information relevant to potential project-environment interactions, and the outcome of issues scoping, i.e. the description should be tailored to the scope of the undertaking, relevant to the identified zones of influence, and focused on potential pathways for effects.

The environmental baseline should be established in suitable detail to record the environmental conditions and natural (spatial and temporal) variability prior to development, to permit the assessment of potential effects and, potentially to provide a baseline against which to monitor future changes (based on Environmental Effects Monitoring Design). The needs will vary by project and potential environmental effects but for offshore oil and gas projects, would normally encompass the following physical, biological and socioeconomic conditions.

- **Physical Environment:** geology, bathymetry, sediments, geotechnical character of the seabed, climate and meteorology; oceanography; ambient air quality; seasonal changes; seismology; and coastal zone sensitivity. The focus should be on physical environment features that are important to design and operations of the proposed project, as well as aspects that function as transport mechanisms for project discharges.
- **Biological Environment:** flora; fauna; species at risk; sensitive ecological habitats and ecological balance. Specific data may be required on marine animals, benthic species and diversity; plankton; fish and fisheries, spawning sites, mangroves and salt marshes.
- **Socioeconomic Environment:** Demographics - employment, income, skills and education; marine resource use – shipping lanes, fishing areas, seabed installations and use; zoning proximate to project features (parks, reserves, protected areas, residential, commercial, agricultural and industrial);

development plans; cultural/historic resources (archaeology); indigenous peoples; infrastructure; population distribution and public health.

A literature review of the environmental effects of similar undertakings elsewhere may be helpful in informing the EIA, especially where baseline data are lacking for the proposed project. Such a review should address both environmental effects as well as the efficacy of mitigation measures.

The developer will be expected to identify knowledge gaps, discuss their implications for the effects assessment and impact predictions. Where appropriate, developers may need to initiate baseline data collection in cases where such gaps are likely to impair the ability to make reliable predictions, i.e. a low level of certainty or confidence in predictions. In some cases, the gap in knowledge might require long term information collection. Such programs should be initiated at as early a stage as possible, and the subsequent effects assessment completed with full recognition and acknowledgement of this deficiency (i.e. effects predictions will be tagged with a “low” rating for degree of confidence).

In the collection of data it is imperative to include a Quality Assurance/Quality Control program, submit detailed protocols for all field testing procedures and use procedures generally accepted within the discipline. Consultations should be initiated with relevant agencies (resource managers, researchers) to identify data collection protocols and means to render the collected data compatible with other collection efforts.

Environmental Assessment

The environmental assessment (EA) will provide technical detail on the environmental effects of the project. The EA will focus on the proposed project but must also address alternatives as well as cumulative effects and transboundary effects. The data and project-specific studies used to support the EA may be included as appendices.

The main sections of an EA document are described below.

The Developer

More detail can be expected to be supplied in the EMP (ESMMP), so summary text only is required to describe the developer in terms of :

Health, Safety and Environmental Policy

Corporate Social Policy

Quality Management Systems

Industry Organization memberships

Industry Best Practices

Corporate Organization structure;

Project Organization, including contracted arrangements.

The Project

This section lays out the Project in terms of the applicable scope of the undertaking under consideration. Suggested ingredients of the Project Description are described below.

An offshore oil and gas project can include international linkages such as transport routes, equipment supplies, major component fabrication, and retention of specialists. In defining the scope of the undertaking to be assessed, the following boundaries should be considered and described:

Temporal – time scale of the undertaking, by project phase.

Spatial/geographic – location of project features – supply bases, transportation routes, product delivery.

Administrative – legislated boundaries, e.g.

Zones of Influence can be defined for project features to provide a context for effects assessment; note the ZOI can be expected to vary in accordance with the subject of assessment.

In keeping with the Project Terms of Reference, Identify and describe major alternatives within the project (alternative ways of undertaking the proposed project) that have been considered during planning, or are still under consideration. Compare the identified alternatives and provide a rationale for the selected alternative, with a focus on comparison of environmental factors. Note, where selection of alternatives has not been finalized, the environmental assessment is to include a consideration of each candidate alternative.

Describe the compatibility of the proposal with the existing environmental legislation that applies to the project itself or to its area of influence. In the event that national or local environmental standards do not exist, refer to applicable international or industry-wide standards.

Provide a description of physical changes (nature and area of disruption) that will occur as a consequence of the project for all phases including construction, operation and closure.

Provide an estimate by type and quantity of expected contaminants, residues, and emissions (water, air and soil pollution, noise, radiation, heat) resulting from the operation of the proposed project. Greenhouse should be quantified

Identify the anticipated quantity of hydrocarbon resources that will be extracted and either exported or consumed locally. Describe the pattern of exploitation, and the residual resource anticipated at the time of project closure.

Describe how the project will be closed down or suspended. Any progressive rehabilitation measures should be described. Describe the state of the seabed upon

final closure. Describe any continuing monitoring programs to be implemented during and following closure.

Issues Identification

This identification should be consistent with the EIA Terms of Reference, but can be supplemented with updates resulting from the regulatory and public participation program. These programs would normally include meetings, workshops, information brochures and should include consultation with NGOs, regulators, members of the public including indigenous peoples, as well as community organizations. The intent is that the proponent identify and assess all relevant issues and potential mitigation strategies.

Effects Predictions

As laid out in the Environmental Protection Act, the effects prediction is required to include the *“identification, characterization, description and determination of magnitude and importance of the social distribution of the potential impacts in the short, medium and long term. Analysis of impacts must include as a minimum, direct, primary and secondary, temporary and permanent, reversible and irreversible impacts on the physical, biological, social, economic and cultural components of the environment, when applicable.”*

Prediction Methods

Detailed information is to be presented regarding the methods used to analyse impacts (EIA methods) and the techniques used to estimate the magnitude of the impacts (prediction techniques).

A central ingredient of environmental assessment is the ability to make accurate predictions of the effect of the Project on the various elements of the natural and human environment. The factors that reduce certainty (level of confidence) in predictions include:

- where the existing baseline information is limited (e.g. temporal or geographic extent) or otherwise suspect,
- where the interaction phenomena are not well understood, or
- where there is uncertainty as to the effectiveness of mitigation measures.

In many cases, effects predictions are based on “professional judgement”. The developer and their consultant will be challenged to employ quantitative methods wherever these are available.

Use of non-quantifiable techniques will lead to a lack of certainty in predictions, e.g. where the prediction is based on “professional judgement” rather than modelling or use of statistical analyses. In such cases the predicted effect characterization has to be made conservatively and a commitment made to implementation of monitoring programs to reflect the low level of confidence in the prediction.

In some cases, there are established approaches and methods for effects prediction, such as spill dispersion modeling and air emissions modelling. In other cases, risk assessments (quantifiable and semi-quantifiable) can be employed. These may be appropriate in cases where technology alternatives are available for treatment, such as for ballast water

When making effects predictions, the cumulated effect of various project inputs is to be considered, for example water borne effluents from several sources at the production site may combine their effect. The assessment should consider the potential interactions and confounding features of each mixing zone, within the identified zone of influence. The combined effects of these individual discharges could be greater than the individual predictions. This needs to be taken into account, both as part of effects prediction, as well as in design of monitoring programs.

Mitigation Measures

The various mitigation measures identified in the effects prediction section will be brought forward and summarized with a commentary on level of effectiveness based on

experience of the developer or others. Where the measures reflect best practices, this should be indicated.

The developer should indicate how a cautionary approach applies to the identification and implementation of mitigation measures.

Assessment Types

The assessment of environmental effects will need to be organized such that the following assessments are completed:

Cumulative Effects

The Cumulative Effects Assessment (CEA) consists of three main steps:

- determine whether the Project will have a residual effect on identified valued environmental components (VECs);
- if a residual effect is likely, assess the potential for the Project's residual effect to interact with residual effects resulting from other projects or activities (past, current, or future); and
- determine if the interaction of the residual Project effect, in combination with other project effects, is likely to meaningfully influence a VEC.

The assessment of a single project determines if *that* project is incrementally responsible for adversely affecting a VEC beyond an acceptable level. The CEA must make clear to what degree the project under review is *alone* contributing to that total effect. Interactions are only considered if their assessment would influence the decision regarding approval by the regulatory reviewers.

In the context of offshore oil and gas developments, there is the potential for positive benefits associated with the presence of more than one production site in an area. Emergency response capability can be enhanced through cooperation agreements, including such aspects as relief well drilling), as can the collection and consolidation of environmental monitoring data (e.g. met-ocean). These features can be discussed in the context of cumulative effects.

Transboundary Effects

Transboundary effects assessment should consider Project effects that occur across territorial and international boundaries. In some cases, ingredients of the undertaking will occur outside the jurisdiction of Guyana. Nevertheless, these project elements should be identified and considered as part of a Transboundary assessment. In particular, because of the potential for environmental harm, the transboundary assessment should consider oilspills, including assessment of potential effects, required response measures, and the provision of resources to respond adequately to such an eventuality.

Climate Change

Developers will be expected to provide documentation of anticipated greenhouse gas emissions from the various phases of their proposed undertaking. An inventory should be provided by project phase and as emitting sources change over time. A commitment should be made to employ control measures for reducing and minimizing discharges.

A projection of forecast changes in the physical environment specific to the zone of operations should be presented through modelling. Based on the results of model forecasts, the developer should illustrate how these changes have been incorporated into project design and planning.

Environmental Impact Statement (EIS)

The EIS is intended to provide, in summary form, and using non-technical language, an overview of the results of the environmental assessment. It should present

- Key aspects of the project
- Baseline environment overview as it relates to the project and its interactions with the environment.
- Effects assessment – e.g. summary tables to illustrate residual effects and characteristics (level of confidence) and mitigation measures.
- Summarize mitigation measures – designed-in (standard practice) versus project-specific undertakings.
- Summarize monitoring and management programs.

The EIS will present a summary level of detail adequate to allow the average reader to make an informed decision on the project. This document will present overview information on the developer, the proposed schedule, the description of the project, regulatory framework, a review of alternatives, environmental management plans, socioeconomic factors, environmental impacts, cumulative effects, transboundary effects, mitigation, monitoring and reclamation.

Where detailed information is helpful or required, it should be presented in the other project EIA documents (Baseline Environment, EA) or as appendices.

A typical EIS report could be organized as follows:

- Executive summary
- Introduction-overview of the project; the developer, ownership, the resource, description of the key components with site/land use maps; and regulatory framework and requirements.
- The Proposed Project - including the area of influence (spatial and temporal boundaries), location, layout, description of present use of the project area and the area contiguous to it, project size and production, land requirements, activities associated with all development stages from construction to closure, alternatives

considered, staffing and employment, emission characteristics, water supply and waste disposal, environmental/waste management plans.

- Economic information regarding the project, including major expenditure items.
- Rationale for the project and its sustainability, including consideration of alternatives to and within the project including a discussion of the “no project” alternative. An environmental rationale and justification for the selected/proposed alternatives should be presented.
- Existing Environment – summary of information that is provided in the baseline study report
 - o Summary of the public consultation programme
 - o A statement of the alternatives selected and the justification behind each choice.
- Environmental Effects Prediction- A description of the likely significant effects of the proposed project on the environment resulting from: the existence of the project; the use of natural resources; the emission of contaminants, the creation of nuisances and the elimination of wastes. This section should present the results of the main effects assessment, as well as the cumulative effects assessment, the transboundary effects assessment, and the climate change assessment. It should identify and discuss the methods employed to make predictions, and discuss the factors affecting the level of confidence that can be placed in predictions, and in the proposed mitigation measures.
 - o A statement of the degree of irreversible damage and an explanation of how it was assessed.
 - o A description of the best available technology.
- The Environmental Management Plan (EMP), (refer to pg. 10 for guidelines for preparing EMPs)

- An Emergency Response Plan for containing and cleaning up any pollution or spill of any contaminant.
- Closure and Rehabilitation An Initial plan for closure and reclamation of the project.
- Limitations An indication of any difficulties (technical deficiencies or lack of knowledge or expertise) encountered in the EIA, including factors limiting the ability to make predictions, or compromising the confidence or certainty of these predictions.
- Annexes which include the Terms of Reference, Curriculum Vitae of the members of the EIA team, document references, field observations.

Environmental and Social Monitoring and Management Plan

The term “Environmental Management Plan” has been amended as shown above in order to reflect the full scope of the required document, noting specifically that the EIA process encompasses not only the biophysical environment, but also the human (socio-economic and cultural) environment.

Environmental Management Plans (EMP) are necessary to ensure that the proposed procedures, actions and measures identified as part of alleviating environmental impacts of a project are not just a statement of goodwill by the company/developer but that they will be effectively implemented.

The EMP should identify feasible and cost effective measures that may reduce potentially significant adverse environmental impacts to acceptable levels. It should also involve operational procedures needed to avoid environmental risks during everyday and maintenance operations, as well as emergency and contingency plans in case of accidents, where applicable.

Each EMP must clearly state the company’s commitment and policy on the environment. There must also be a clear statement committing the company to integrate environmental management and specifically the EMP into its operation.

The preparation of an Environmental Management Plan (EMP) involves the following:

- A listing of required permits and authorizations for the project.
- The Environmental Policy of the company.
- Specific objectives of the plan.

Identification and description of the potential adverse impacts and environmental risks associated with implementation of the proposed/existing project.

Detailed description of the appropriate mitigation and compensatory measures together with designs, equipment descriptions and operational procedures (as appropriate) to respond to these impacts or to avoid or reduce risks.

Determination of requirements for ensuring that responses to predicted impacts are made effectively and an implementation schedule (timing) for mitigation measures that must be carried out as part of the project.

Development of a program to monitor the impacts arising out of the project operational activities and the effectiveness of the proposed mitigation measures. The monitoring plan should detail as a minimum, impact indicators, location and frequency of sampling, analytical methods to be used and criteria for evaluation. Such information enables the developer and the EPA to evaluate the success of mitigation and allows corrective actions to be taken when needed. This program should also include regular audits of the implementation of the EMP.

Identification of persons within the company responsible for executing the EMP

Identification of necessary funds (including budget) to implement mitigation measures.

Emergency Response Plan in cases where the project uses or produces substances known to have a deleterious effect on the environment.

The decision to proceed with a project is based in part on the expectation that the EMP will be executed effectively. Consequently, the EPA expects the plan to be specific in its description of the individual mitigation and monitoring measures which must be integrated into the project's overall planning, design, budget and implementation. Such integration is achieved by establishing the EMP within the project so that the plan will receive funding and supervision along with the other project components.

The Environmental Protection Agency encourages companies to move towards ISO 14000 Certification. ISO 14000 is an internationally accredited set of environmental standards that allow companies to achieve an Environmental Management System.

Unplanned Events

Oil Spill Contingency response planning will include features such as:

- Modelling – both for planning purposes (spill scenario development) and response implementation in the event of an actual spill. A “worst case” scenario should be included, based on a credible maximum release of oil, e.g. loss of well control – blowout requiring relief well drilling.
- Cooperative arrangements to share data (e.g. coastal sensitivity mapping, met-ocean data, marine mammal movements) as well as resources, up to and including e.g. relief well drilling, cooperate in training exercises
- Provisions for public reporting on spill response status and vulnerable areas.
- Measures to address transboundary effects
- Provision of a Compensation policy and procedures for claimants affected by spilled oil (direct effects – oiled gear, vessels, shore-based facilities; lost opportunity (fishing interrupted; market plummet), how to submit, substantiate a claim, settlement procedure, rights to sue.
- Measures to monitor effectiveness of spill response, and recovery rates for affected environments.
- Training programs, including provision for training and recruiting local resources in the event of a major spill.
- Equipment inventories by location

Environmental Effects Monitoring

Developers will be required to implement an environmental effects monitoring (EEM) program, in part to confirm the predictions of environmental effects. These programs are focused on the interaction between Project activities and the receiving environment, and in the establishment of cause-effect relationships that flow from these interactions.

The results of the monitoring outlined in the specific EEM programs provide information that will serve to modify, add, or eliminate mitigation measures. Additional monitoring programs may be developed, if required, and could lead to the implementation of adaptive management measures.

The purposes for conducting an EEM program are to:

1. provide data so that project activities can be scheduled and/or planned to avoid or reduce conflict;
2. evaluate the accuracy of effects predictions;
3. evaluate the effectiveness of mitigations;
4. identify unforeseen environmental effects;
5. provide an early warning of undesirable change in the environment;
6. improve the understanding of cause-effect relationships with respect to Project-induced change; and
7. assist in the identification of target species and linkages for monitoring;

There are three categories of study which follow from these purposes:

Research—background studies intended to establish need for, or parameters of, an EEM program. Research studies may address issues such as natural variability of a measured parameter or monitoring target, or examine the nature, extent or duration of a potential Project/VEC interaction. Research studies address Purpose no. 7 (above).

Surveillance — programs to produce information about the pattern of occurrence of target species/ monitoring targets. Surveillance studies (e.g., to establish travel patterns of migratory animals through the Project area) address Purpose no. 1 and 5 (above) for EEM.

EEM— programs to address and quantify cause and effect linkages between Project activities and components of the receiving environment. The full rigor of design criteria would apply to this type of monitoring program, which would address one or more of Purposes no. 1 through no. 6 (above).

Research studies are conducted primarily to determine the need for further monitoring and if a program is deemed necessary, to identify target species and linkages.

Research is usually only done once near the beginning of the Project. Upon the determination that an EEM program is necessary, either a surveillance program or an EEM program is initiated. **Surveillance** monitoring is usually short term and is typically designed to identify potential mitigation measures to avoid Project interactions. A surveillance program can also commonly serve to identify a change in conditions which could trigger an EEM. A full scale **EEM** program is typically long term and is usually multifaceted.

Some studies maybe one-off research topics that address a fundamental question usually related to determining whether an interaction is possible or is occurring between the Project and the receiving environment. Other selected studies may be grouped into a surveillance category, including programs that can detect a change in the environment, but are not capable of establishing a clear cause and effect link to the Project. These surveillance programs can act as early warning indicators (EWI) and have the potential of triggering a full EEM Study.

Compliance monitoring is also carried out to demonstrate that the conditions of applicable permits and approvals (e.g. with respect to limits on concentrations of discharges) have been met by the undertaking.

In design and execution of its Environmental Monitoring Program developers will be expected to apply rigorous standards for study design, analysis and reporting. All study designs will be provided to EPA for review and comment. All data will be analyzed rigorously by experienced analysts, and all draft reports will be circulated to the EPA for review prior to issuance as final documents. Additionally, affected stakeholders and interested parties will continue to be consulted on study design and to participate in implementation. Study results will be presented to the public for discussion.

In all monitoring programs, developers should engage direct participation in study planning, execution and interpretation of results.

In developing the EEM program, developers should seek to ensure that all relevant issues have been addressed, while avoiding the tendency to carry out a broad spectrum of poorly focused efforts. To accomplish this, emphasis is placed on monitoring and studying Project-induced change and addressing the challenge of establishing cause and effect relationships between the Project and the identified monitoring targets.

Monitoring which simply records change is not Effects Monitoring. EEM must be relevant to the Project and to the possible effects which the Project will have on the environment. EEM must be capable of establishing a relationship between any observed change in the environment and some feature of the Project.

In EEM, it is necessary to establish protocols for evaluating data to determine if there is a need to modify monitoring plans or develop and implement corrective action as per the procedure illustrated in Figure 2.1. Thus, thresholds will need to be established for each monitoring program in a number of possible ways:

- Exceedance of background or baseline data by a prescribed proportion (e.g., percentage);
- Exceedance of an established “no observable effects concentration”;
- Exceedance of “meaningful change” threshold criteria;
- Exceedance of background or baseline data by an amount which is “statistically significant”;or
- Observance of levels which are known to cause an environmental effect.

For each monitoring program, appropriate thresholds should be established for the parameters and environmental effects being monitored. When thresholds are exceeded, the appropriate staff and management within the developer organization should be notified. As well, the appropriate regulatory agencies and monitoring partners should be advised and consulted. The cause of the exceedance and its nature would then be investigated. An action plan would be developed and appropriate mitigation measures will be implemented. As per the developer’s management system

requirements, the EEM program would be reviewed both internally as well as with EPA and, if necessary, modified to ensure that it continues to be relevant and appropriate.

The organization structure and process for response to an identified effect should be presented. They should include a feedback loop to evaluate each program and achieve continuous improvement in EEM design and implementation. By proper selection of monitoring parameters, these can serve as early warning indicators (EWIs) of change. Such indicators occur at the start of the pathway between a Project related influence (e.g., discharge) and a receptor or VEC. Generally, EWIs consist of the direct measurement of an environmental variable (e.g., metal levels in water) in the zone of influence (ZOI) (e.g. compliance monitoring for discharges containing metals).

Surveillance level EEM studies can also serve as EWIs where an observed change in conditions could trigger a more complete EEM study, or increase the temporal and/or spatial scope of monitoring. Results from EEM studies could also serve to initiate other monitoring. An EEM program focused at one ecosystem level (e.g., benthic invertebrates) could produce evidence of change, which triggers further monitoring at other ecosystem levels (e.g., fish populations). In some cases, relatively short-term research programs are conducted as a means to identify or select an EWI. Based on the results of such preliminary studies, a full scale, properly designed EEM program maybe initiated.

Program review can be triggered by an exceedance of an EWI. As well, an annual review will be conducted to assess the relevance of each program in light of Project activities, emerging developments in EEM methods, and changes in issues or concerns as identified by the developer or other stakeholders.

The set of criteria to be applied in considering candidate monitoring studies include:

- A credible 'cause and effect' relationship can be established;
- The identified effect has the potential to be negative:
 - The effect is considered significant;
 - The likelihood is high or moderate; and

- The timing of interaction between the Project and the VEC will be sustained;
- A credible, unplanned event which could result in a significant negative effect; and
- The level of confidence in the predicted effect is low.

The result is a pattern of interconnected monitoring programs, each of which meets selection criteria and design requirements for marine EEM, and together, provide a comprehensive monitoring plan. Through examination of the measured changes in the selected indicators, conclusions can be drawn with respect to project interactions and impacts on the marine ecosystem.