5 ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT PROCESS AND METHOD

5.1 Introduction

This section describes and defines the pipeline:

- environmental and social impact assessment (ESIA) process
- valued environmental and social components
- scoping process
- impact assessment method.

5.2 Environmental and Social Impact Assessment Process

The key steps of the Tilenga feeder pipeline ESIA process are illustrated in Figure 5.2-1, including steps through to pipeline implementation and the subsequent phase of reporting, audit and corrective actions.

Screening of potential pipeline impacts was undertaken early in the development of the pipeline, primarily by routing studies that were undertaken and described in Section 3, Alternatives.

A preliminary pipeline description was prepared during the scoping phase and was further developed based on front end engineering design and subsequent optimisation.

The ESIA has progressed interactively with pipeline planning and design. Pipeline impacts have been identified and mitigation measures developed iteratively during the interaction and the process will continue through the construction phase.

The impact assessment has been undertaken based on the requirements and guidelines provided in Ugandan legislation and described in Section 4, Legislative, Policy and Administrative Framework.

This impact assessment also concords with international guidance, also described in Section 4, including:

- International Finance Corporation's (IFC) environmental and social performance standards
- other relevant international standards and guidelines.

Baseline studies that were conducted during the scoping phase have informed the project environmental and social baseline conditions. These studies, along with the survey methods, are summarised in Section 6 and documented in Appendix A.

Stakeholder engagement was conducted during the scoping phase, then throughout the baseline studies and impact assessment, and during the pre-submission of the ESIA. A summary of stakeholder concerns and stakeholder engagement methods are described in Section 7 Stakeholder Engagement and Appendix C provides additional information on stakeholder concerns.

The assessment of pipeline impacts and determination of the significance of the impacts is included in Section 8 and a description of the methods is included in Section 5.5. The cumulative impact assessment (CIA) has been fully integrated in to the ESIA process.

Environmental and social management plans have been described in Section 10 and included in Appendix E4 with associated mitigation measures.

The intent is that this ESIA will be submitted to the National Environmental Management Authority (NEMA) which will initiate a review process during which it will decide whether an EIA certificate can be issued.

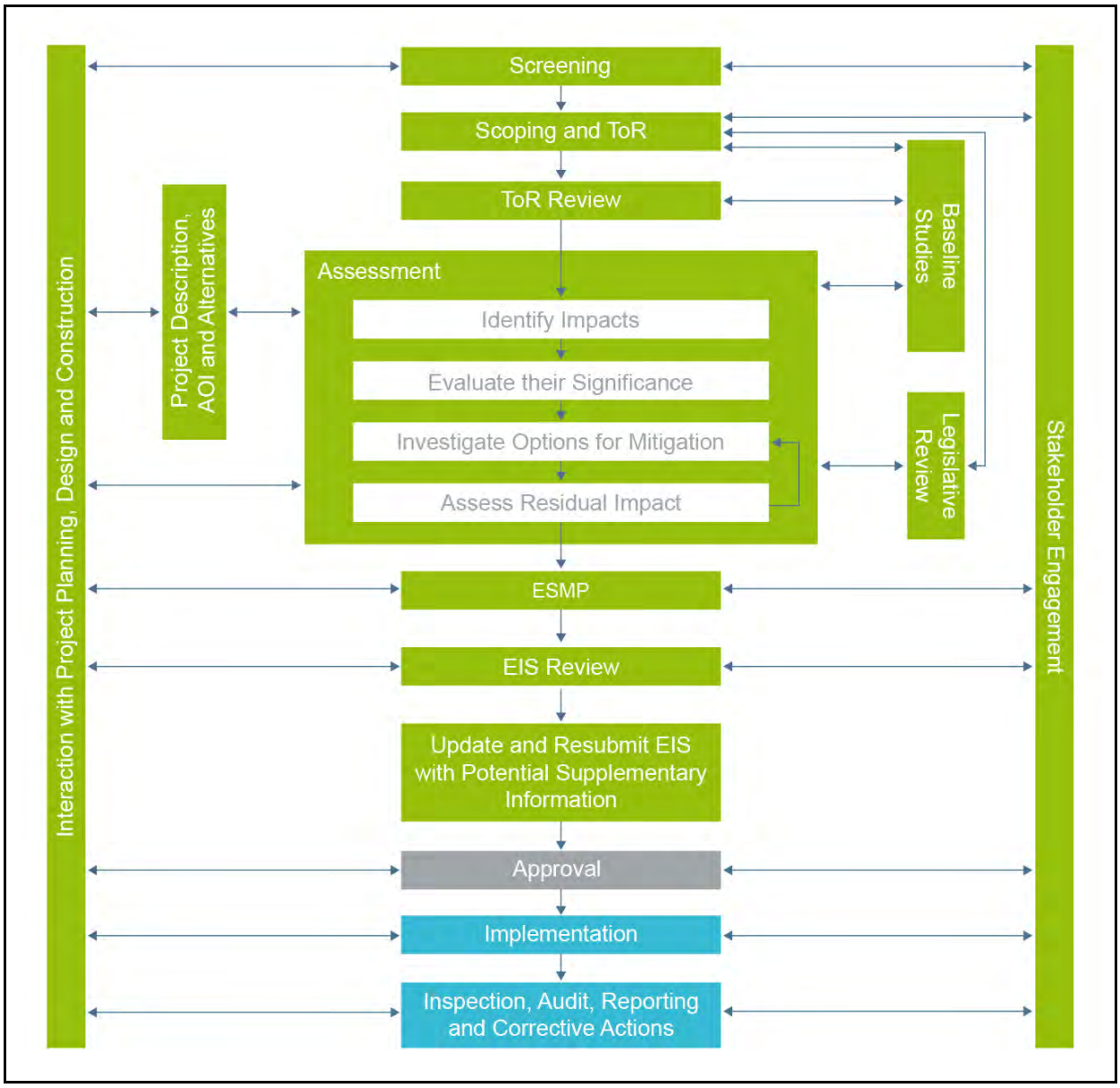

Figure 5.2-1 Key Steps in the Tilenga Feeder Pipeline Environmental and Social Impact Assessment Process

5.3 Valued Environmental and Social Components

Environmental and social features and receptors assessed in this ESIA are referred to as valued environmental and social components (VECs). Project and cumulative impacts on VECs, listed in Section 6, are assessed in this ESIA.

The IFC defines VECs as “environmental and social attributes that are considered important in assessing risks”, (IFC 2013). These attributes may be:

- physical features, habitats, wildlife populations (e.g., biodiversity)
- ecosystem services
- natural processes (e.g., water and nutrient cycles, microclimate)
- social conditions (e.g., health, economics), or
- cultural aspects (e.g., traditional spiritual ceremonies).

VECs are valued and have high sensitivity to project interactions by definition. For VECs that exhibit gradations of sensitivity, a ranking system has been used to describe their sensitivity and documented in Section 6, Environmental Baseline Conditions and in Section 8, Impact Identification and Evaluation. For VECs with standards and thresholds, for example, air quality, compliance to the standard or threshold may also be used to establish magnitude (see Section 5.5.2.5), or to inform significance directly.

A preliminary list of VECs was identified during the impact scoping activity. The list was refined during, and after, the scoping phase based on:

- stakeholder engagement, including affected communities, to identify stakeholder concerns
- desk-based review of literature to identify public and scientific concerns
- surveys undertaken during and after scoping
- existing definitions of VECs in the IFC performance standards, such as labour and working conditions (Performance Standard 2)
- VECs included in Scoping Reports for upstream petroleum projects planned for the region.

During ESIA preparation the titles of two VECs changed slightly from those used in the scoping phase to reflect further baseline information received. A list of the priority VECs, summarising the key reasons for their selection, is provided in Section 6.1.

The baseline condition of the area of influence (AOI) for each VEC is described in Section 6 and more information is included in the baseline reports in Appendix A.

Ecosystem services has been considered for each VEC in Section 6 and the assessment of ecosystem services has been integrated into the impact assessment of VECs included in Section 8.

Human rights were also considered for social VECs in Section 6 and an assessment of potential impacts on human rights has been integrated into the impact assessment of social VECs included in Section 8.

5.4 Scoping

An impact scoping process was conducted in concordance with Ugandan environmental impact assessment legislation, regulation and guidelines described in Section 4. A Scoping Report was prepared and submitted to the NEMA on 25 July 2017.

Two key objectives of scoping were to identify potentially significant impacts that could be caused from interaction between the pipeline's activities and the VECs, that require evaluation in the ESIA, and to establish the ESIA terms of reference (ToR). During the scoping phase, pipeline interactions with VECs were evaluated for:

- beneficial impacts. The potential to enhance beneficial impacts has been assessed in the ESIA.
- not significant impacts. The mitigation measures required to render these impacts not significant have been included in the ESIA.
- potentially significant impacts, which are the focus of the impact assessment, and for which mitigation measures have been included in the ESIA.

The scoping impact identification process was based on:

- a social and environmental identification (SENVID) process, comprising workshops and meetings with subject matter experts, the pipeline project team (PPT) and the engineering team
- a site visit to identify technical, environmental and social sensitivities and measures to avoid or reduce potential impacts
- stakeholder engagement.

Impact identification and risk analysis during scoping were based on the teams' collective pipeline, environmental and social impact knowledge and experience including:

- general and specific pipeline project engineering design
- impact assessment lessons learned from other pipeline projects
- other oil and gas projects in Uganda
- environmental and social conditions within the project area acquired during route and site selection studies and knowledge of documentation available at the time of the assessment.

The results of the scoping study were used to develop the ToR that included, among other requirements:

- the scope of work of the baseline studies to be undertaken to gain a better understanding of the environmental and social context of the AOIs
- the impact assessments to be undertaken.

The scoping report was approved on 19 September 2017 by the National Environment Management Authority. The approval included comments, which have been addressed in this ESIA. A concordance table on where the comments have been addressed in the ESIA is included in Appendix K.

5.5 Impact Assessment

This ESIA systematically identifies, describes and assesses the potential impacts from the Tilenga feeder pipeline on VECs.

An impact, as defined by the international standard ISO 14001:2015 is “any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organisation’s environmental aspects”. Throughout the document an ‘impact’ is taken to be a negative impact. Where there is a positive impact this is described as ‘beneficial’. An environmental aspect is defined as an “element of an organisation’s activities or products or services that can interact with the environment”. Environment is defined as “surroundings in which an organisation operates, including air, water, land, natural resources, flora, fauna, humans and their interrelation.”

5.5.1 Identification of Project Impacts

Impacts have been identified and categorised according to aspect, which is an element of an activity causing an impact. The list of aspects has been numbered for identification and is included in Appendix E, Impact Assessment Tables.

This ESIA assesses impacts from normal operations, abnormal operations or unplanned events. This assessment has been an iterative process, as engineering has progressed and the project has become better defined.

5.5.2 Normal Project Construction and Operations

The assessment of impacts from normal project operations, described in Section 8, considered:

- project impacts, generic and location specific
- cumulative impacts
- transboundary impacts

Minor unplanned events have been included in the assessment of normal project operations, e.g., spills during refuelling or from the failure of a hydraulic hose.

5.5.2.1 Project Impacts – Generic and Location Specific

Generic

Generic impacts could occur from several aspects and can be non-location and location specific, such as:

- soil erosion from rain fall on bare soil along the pipeline right-of-way (RoW)
- sediment runoff to watercourses.

Location Specific

Location-specific impacts are those that occur from aspects:

- at specific locations that can be defined by KP points or KP ranges, e.g., at a particular river crossing, within a specific habitat or related to a specific soil type, proposed construction facility or aboveground installation.

- at locations where there is a particular environmental condition that could have implications for impacts, e.g., side slopes
- at locations where there is a particularly sensitive VEC, e.g., a shallow aquifer with overlying permeable geology.

Location-specific impacts are often associated with activity that has the potential to affect VECs at a specific location. For some impacts it is possible to define a kilometre point (KP) or range of KPs but for other impacts an activity may occur during construction and the locations will only be known when detailed design has progressed, e.g., benching of side slopes. In such instances mitigation is described but no KPs are allocated.

Location-specific impacts usually require:

- specific mitigation measures in addition to, or instead of, standard good practice mitigation measures, or
- additional monitoring, inspection and audit and communication with stakeholders to ensure that general mitigation measures are effective.

Examples of generic impacts of the project are summarised in Appendix E2 and location-specific impacts in Appendix E3.

5.5.2.2 Impact Types

Impacts can be classified as following:

- **direct** – impacts that are from a direct interaction between a planned project activity and the receiving environment (e.g., between occupation of the RoW and pre-existing habitats) (RoW clearing causes habitat loss, if habitat is present)
- **indirect**– impacts that are from the primary interactions between the project and its environment because of subsequent interactions in the environment (e.g., loss of habitat affects the viability of a species population)
- **induced** – impacts that result from other activities but which would not occur in the absence of the project (e.g., new business set up to cater for increased traffic on roads)
- **in-combination –** in-combination impacts could occur when different types of impacts affect the same VEC; examples include different impacts on the same habitat or on community health that collectively cause a greater impact than the summed individual impacts. Given that individual impacts are expected to be mitigated, and that many of the impacts are assessed qualitatively, in-combination impacts are not considered
- **transboundary** – project or cumulative impacts that extend or occur across a national boundary.

5.5.2.3 Cumulative Impacts

Cumulative impacts have been identified and assessed in accordance with the IFC Good Practice Handbook on Cumulative Impact Assessment and Management: Guidance for the Private Sector in Emerging Markets (2013), in addition to the legislation and guidance listed in Section 5.2. The Handbook suggests that government and regional planners have ultimate responsibility for cumulative impact assessments (CIA), a broad approach on that scale is therefore not within

the limits of this ESIA. Figure 5.5-1 summarises the CIA process adopted for the Tilenga feeder pipeline, which is based on internationally recognised good practice from the Canadian Effect Assessment Practitioners Guide (1999) as referenced in the IFC Good Practice Handbook.

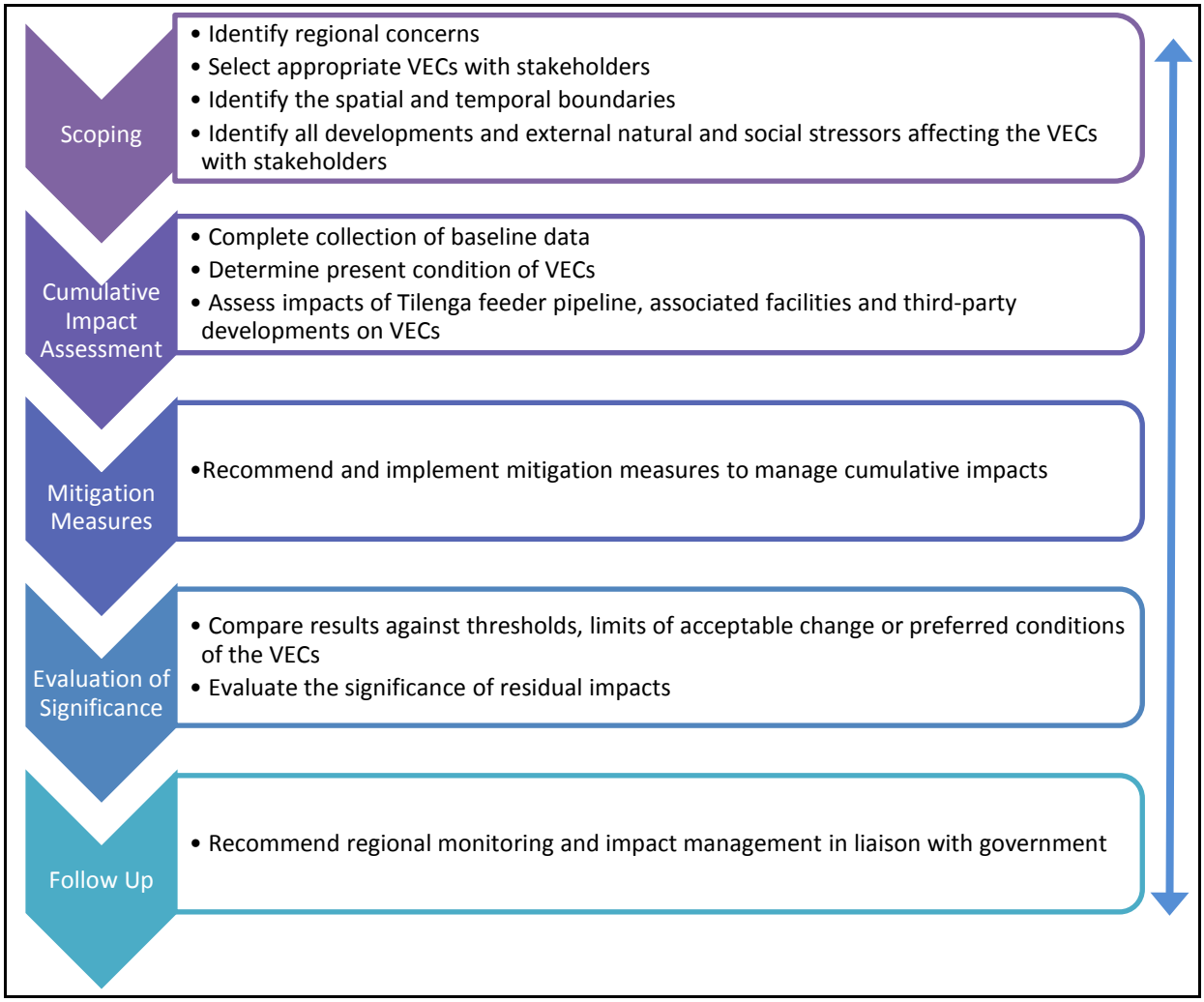

Figure 5.5-1 Cumulative Impact Assessment Process

Identification of Regional Concerns

Stakeholder engagement was conducted during scoping and during baseline data collection. This included national, regional, district and community level stakeholders, industry and the scientific community and the engagement identified regional environmental and social concerns to inform VECs.

VECs

The project VECs have been used for the CIA, see Section 5.3.

Spatial and Temporal Boundaries

The spatial boundaries and temporal boundaries i.e., area of influence (AOI) is provided in Section 6.3.

The spatial boundary defined for each VEC is the same for project and cumulative impacts. The temporal boundaries (duration) of project impacts have been refined for the CIA to reflect the likely temporal duration of each cumulative impact.

Identification of Activities and Developments with Potential for Cumulative Impacts

Cumulative impacts comprise impacts from past and present activities that are the basis for the baseline conditions, see Section 6 and Appendix A, the project residual impacts, and future developments within the AOI of the Tilenga feeder pipeline VECs. Collectively, the project residual impacts and impacts from future developments are termed sources of cumulative impact (SCI).

Planned developments include:

- associated facilities
- third-party developments that are reasonably defined, reasonably predictable or foreseeable[1].

Associated facilities are defined in IFC Performance Standard 1, paragraph 8, as "facilities that are not funded as part of the project and that would not have been constructed or expanded if the project did not exist and without which the project would not be viable." This can therefore apply to both new and existing developments where project requirements exceed the associated facility's capacity and substantial expansion is required. The EACOP project and some other developments have been identified, based on this definition, as associated facilities.

Third-party developments were identified by:

- review of the national, district and subcounty development plans
- review of sectoral plans, e.g., the National Transport Master Plan
- information requests to key ministries and planning authorities responsible for approving environmental impact assessments
- information requests to NEMA on third-party projects within 20 km of the pipeline route, as cumulative impacts are unlikely to extend further
- review of international finance institutions' (IFI) websites for projects receiving or applying for funding
- review of river basin business plans
- review of other publicly available information on key developments in the region, such as websites of known developers, and the press
- consultation with stakeholders, which began during scoping.

An initial screening process was conducted to identify developments that are reasonably defined, reasonably predictable or foreseeable. The screening criteria were:

- Is the development reasonably defined, as described in IFC Performance Standard 1?

[1] Definition of projects that are "reasonably defined", taken from IFC Performance Standard 1. Definition of projects that are "reasonably predictable" or that are "foreseeable future developments", taken from the IFC Good Practice Handbook

  - Is the location confirmed?
  - Is an ESIA publicly available?
- Is the development reasonably predictable or a foreseeable future development, as defined in the IFC CIA Handbook?
  - What is the likelihood of the project occurring?
  - Is it described as a “Core Project” in the National Development Plan?
  - Has the third-party ESIA been submitted or approved six months or more before submission of this ESIA?
  - Will the project occur within the same timescale as the Uganda Tilenga feeder pipeline?
- What is the nature of the development?
  - Are there likely to be cumulative impacts with the Uganda Tilenga feeder pipeline based on the type and nature of the impacts of the third-party development?
- Do the Tilenga feeder pipeline VECs AOIs overlap with the third-party development AOIs?

The screened-in SCIs were mapped and compared with the location of the Tilenga feeder pipeline VECs AOIs. Each SCI has been given a unique identification number to assist with mapping and screening.

For an SCI impact to be assessed as cumulative, the Tilenga feeder pipeline VEC AOI and the SCI VEC AOIs must overlap and the residual impacts of the Tilenga feeder pipeline and the SCI must occur in the same timescale see Figure 5.5-2 Transboundary cumulative impacts have been identified by identifying where the shared AOI and impacts may cross a national border.

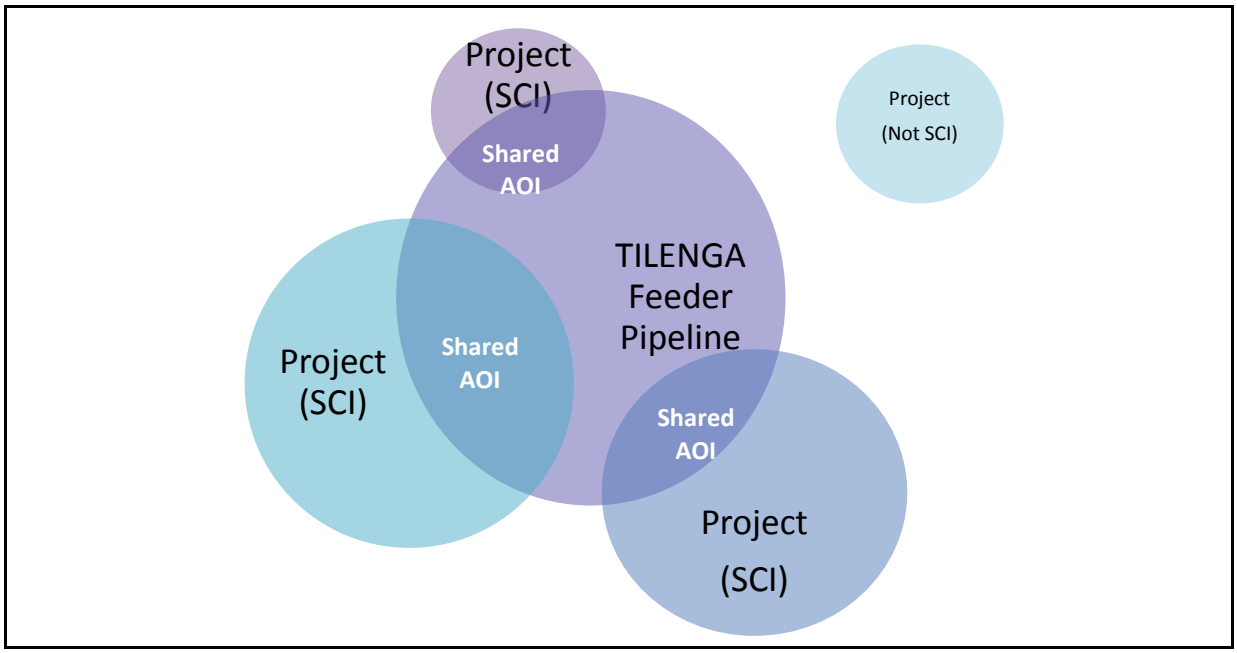

Figure 5.5-2 Schematic of the Shared Areas of Influence

The initial screening of the developments to be included in the CIA was refined by a further process that defined interactions between Tilenga feeder pipeline VECs and the screened-in developments into three categories:

- Category 1: High risk of potential cumulative impacts and the Tilenga feeder pipeline project is an important contributor to the cumulative impacts on a VEC.
- Category 2: High risk of potential cumulative impacts but the Tilenga feeder pipeline is a small contributor to the cumulative impacts on a VEC.
- Category 3: The residual Tilenga feeder pipeline impacts have a limited contribution to cumulative impacts.

When the interactions are categorised as 1 or 2, the cumulative impacts are described and assessed in the VEC CIAs in Section 8.

In the VEC CIAs the potential impacts on the VEC are summarised and described based on the information available. When information is limited, professional judgement is used to predict the likely impacts of the third-party project.

Section 2.6 contains the list of developments included in the CIA.

Appendix H includes information on the SCIs and the screening process and comprises:

- H1: a description of the screened-in developments.
- H2: location maps of the screened-in developments.
- H3: a matrix showing the interactions between the Tilenga feeder pipeline VECs and the impact interaction category (1, 2, or 3, see above).
- H4: a matrix showing the developments screened-out during the initial screening process.

Description of Present Condition of the VECs

The present condition, the sensitivity of the VEC to change, and any trends and stressors affecting the VECs are described in the baseline condition for each VEC in Section 6.

The VEC thresholds, limits of acceptable change or preferred condition have been defined on a case-by-case basis during the impact assessment process depending on the VEC and the nature of the cumulative impact being assessed. Where objective threshold values are included in the Project Standards, these are adopted if relevant to the cumulative impact. For most VECs, however, threshold values are not defined, and a preferred condition or limits of acceptable change have been used based on their pre-construction condition.

Cumulative Impact Assessment

The CIA includes:

- identifying potential activities and impacts from the SCI on VECs
- predicting the cumulative impact on the VECs from the Tilenga feeder pipeline and SCI
- predicting the contribution of the Tilenga feeder pipeline to the cumulative impact
- predicting the contribution of the SCI to the cumulative impact
- qualitatively determining the significance of the cumulative impact (see Section 5.5.2.5).

Transboundary and in-combination cumulative impacts are also identified and assessed in Section 8.

Where there is no cumulative impact identified on a VEC, this VEC is scoped out of the CIA. This is explained in Section 8.

5.5.2.4 Mitigation Measures

Project Impacts

Mitigation measures are actions or systems that have been or will be used to enhance the benefits provided by the project or avoid, remove, reduce or compensate for adverse impacts. Mitigation of potential impacts has been an integral part of the Tilenga feeder pipeline design and ESIA process that will continue through detailed design, construction, operation and decommissioning. This has included:

- an evaluation and selection of the pipeline corridor and aboveground installations (AGIs) based on environmental, social and engineering considerations. This evaluation is described in Section 3.
- avoidance of locations of high environmental and social sensitivity by planning a construction strategy that reduces the need for construction sites.

The design and construction of pipelines has evolved over many years and a substantial body of good design, construction and operational practices that

contribute to impact mitigation exist. Standard good practices[2] are being implemented by the project, including permanent and construction facilities:

- minimisation of the overall footprint
- burying the entire pipeline along the route to reduce permanent habitat fragmentation, interference by third parties and security concerns
- measures to reduce sediment release during watercourse crossings
- measures to reduce sediment runoff to watercourses, such as silt fences
- reinstatement of the RoW and construction facilities after completion of construction
- waste reduction and waste segregation
- soil-management measures to enhance natural revegetation after reinstatement including topsoil segregation and erosion control

Design and good practices are described in Section 2 and the evaluation and choice of alternatives in Section 3.

The generic type impacts described in Section 5.5.2.1 are mitigated mostly by standard good practice. The ESIA process has included identifying potential significant impacts and technically and financially feasible and cost-effective means of mitigating location specific impacts described in Section 5.5.2.1. Where a potential significant impact has been identified, a hierarchy of options for mitigation has been considered including:

- avoid at source – remove the source of the impact
- abate at source – reduce the source of the impact
- attenuate – reduce the impact between the source and the VEC
- abate at VEC – reduce the impact at the VEC
- remedy – correct the impact after it has occurred
- compensate or offset – replace in kind or with a different resource of equal or better value. In accordance with IFC Performance Standard 6, in areas assessed as natural habitat or critical habitat there is a requirement to achieve no net loss or net gain of biodiversity, respectively, through the application of biodiversity offsets. The Tilenga feeder pipeline will develop and implement a Biodiversity Action Plan incorporating enhancement and conservation measures to meet this requirement.

The application of mitigation measures is an iterative process, as shown in Figure 5.2-1. The iteration process continues until an impact is deemed as not significant as reasonably practicable. Residual impacts are those that remain after the completion of this process.

The key management plans for mitigating project generic and location specific impacts are described in Section 8. The specific mitigation measures are included in Appendix E4.

[2] These are referred to in IFC guidelines as good international industry practice.

Cumulative Impacts

For the Tilenga feeder pipeline the planned management of cumulative impacts is based on the category of cumulative impact which are described in Section 5.5.2.3.

Category 1: High risk of potential cumulative impacts and the Tilenga feeder pipeline is an important contributor to the cumulative impacts on a VEC. The residual impacts from the Tilenga feeder pipeline represent a main contributor to the predicted cumulative impacts on a VEC.

In addition to implementing project mitigation measures, the Tilenga feeder pipeline will design and implement monitoring or management strategies to appropriately manage cumulative impacts to the extent that it has leverage or influence over the other developers. This will be greater for associated facilities and third-party projects being developed by partners to the Tilenga feeder pipeline.

Category 2: High risk of potential cumulative impacts but the Tilenga feeder pipeline is a small contributor to the cumulative impacts on a VEC.

The Tilenga feeder pipeline will design and implement mitigation measures commensurate with the magnitude and significance of its residual contribution to the cumulative impacts. However, the project will use best efforts to engage other developers, governments, and other stakeholders in acknowledging the cumulative impact and in designing management strategies to mitigate them.

Category 3: The residual Tilenga feeder pipeline impacts have a limited contribution to cumulative impacts. The Tilenga feeder pipelines contribution to the cumulative impacts on a VEC is negligible.

No cumulative impact mitigation measures are considered necessary.

The Tilenga feeder pipeline will concord to IFC Guidance Note 42, which specifies that commercially reasonable attempts should be made to engage relevant stakeholders (e.g., government authorities, affected communities, other developers) in the assessment, design and implementation of coordinated mitigation measures to manage the potential cumulative impacts resulting from multiple developments in the project's area of influence.

When engaging with other parties, the Tilenga feeder pipeline will endeavour to:

- inform others of the potential cumulative impact
- exchange information to assist in the further definition of the cumulative impact as needed
- discuss and agree on responsibilities for the management of cumulative impacts, if required
- agree on monitoring measures as appropriate.

IFC Guidance Note 40 states that CIAs typically require the cooperation of many diverse stakeholders to agree and coordinate the implementation of potential management and mitigation measures associated with the cumulative impacts and the active participation of government authorities to:

- assess the incremental contribution of each project to the cumulative impacts
- monitor and enforce the implementation of the mitigation measures corresponding to each project.

5.5.2.5 Impact Significance

Project Impacts

The significance of Tilenga feeder pipeline impacts on VECs is determined based on scoring VEC sensitivity and the impact:

- magnitude
- duration
- extent.

For normal project operations, an impact is assumed to occur, i.e., 100% probability of occurrence, so assessing the likelihood of an impact is not necessary.

Significance has been determined for impacts before the proposed mitigation has been applied (see Appendix E2 for generic impacts and E3 for location-specific impacts) and determined again on the residual impact after the proposed mitigation. The pre-mitigation significance determination for each VEC is included in Appendix E and the residual impact significance determination is shown in Section 8 and Appendix E.

Magnitude of Impact

The magnitude of impact is a measure of the degree of change that will be caused by an aspect or activity. The grading is as follows:

- negligible = 2
- small = 4
- medium = 6
- large = 8
- very large = 10.

Grading is from 1 to 10 to give greater weight to magnitude than duration, extent or sensitivity. The magnitude of change to a VEC from a project aspect is the most important criteria for determining impact significance and essentially was weighted twice as important as the other criteria. Where there is no change in magnitude, the other criteria are essentially not relevant.

Impacts recorded as beneficial are not graded.

Appendix D includes magnitude tables for the VECs, using quantitative measures when possible. Professional judgement has been used when quantitative information is not available, e.g., for dust emissions from construction equipment. Even though air and noise impacts can be compared to standards (e.g., a national legal standard, international standard, and project standard), gradings have nevertheless been defined. If a standard has been exceeded the impact is automatically deemed significant.

For the cultural heritage VEC, Category 1 tangible cultural heritage and Category 2[3] tangible cultural heritage with strong intangible elements, impacts are nonreplicable, so the cultural heritage sensitivity range is based on a maximum

[3] See Appendix D for information on the cultural heritage categories

score of ten, as per the following section on sensitivity, and the magnitude score were halved:

- negligible = 1
- small = 2
- medium = 3
- large = 4
- very large = 5.

Duration of Impact

Impact duration (is the length of time over which an impact may occur. Table 5.5-1 shows the grading.

Table 5.5-1 Impact Duration Grading

Score	Duration	Example
1	Transient: <1 year	Noise, dust and air emissions from construction activities on the RoW Disruption of movement of people and animals across the RoW
2	Short term: 1–5 years	Noise, dust, air, solid and liquid waste emissions from construction facilities Almost all other construction impacts except for habitat degradation or loss and impacts on sensitive soils
3	Medium term: 6–15 years	Recovery of some sensitive soils, flora, fauna and habitats
4	Long term: 16–25 years	Mainly operational impacts that end when the project ends
5	Very long term: >25 years	Permanent land take Impacts that may exist after the end of the project, e.g., removal of mature forest

Extent of Impact

The extent of impact describes the geographical area that may be impacted by the proposed development. Table 5.5-2 shows the grading.

Table 5.5-2 Impact Extent Grading

Score	Environmental VECs	Socio-economic VEC
1	Site, e.g., the impact is restricted to the boundaries of: • the construction RoW • construction facilities and access roads • the operational RoW • AGIs and permanent access roads	Some individuals in the potentially affected communities (PACs)
2	Local, e.g., affecting communities, habitats or land that are close to the construction working areas or facilities or AGIs	Entire PACs

Score	Environmental VECs	Socio-economic VEC
3	Subnational, e.g., affecting habitat that may support species of regional importance, impact on an individual of a species that may have a national designation, but the impact is only on the subnational, and not national population	Districts or regions
4	National, e.g., effects on local population of species that have effects on the national population	National
5	International, e.g., greenhouse gases and transboundary species	International

Sensitivity

The sensitivity of a VEC based on its vulnerability, value and resilience is graded as follows:

- very low = 1
- low = 2
- moderate = 3
- high = 4
- very high = 5.

For the cultural heritage VEC, Category 1 - tangible cultural heritage and Category 2 - tangible cultural heritage with strong intangible elements, the sensitivity scoring has been doubled to account for the lack of resilience of such features, and their high value and vulnerability as follows:

- very low = 2
- low = 4
- moderate = 6
- high = 8
- very high = 10.

Impact Significance Score

For the determination of impact significance, the following formula is used:

magnitude + extent + duration + VEC sensitivity = significance score.

A score of 19 or more is considered a significant impact.

Impact significance scoring has been undertaken for each VEC, except for Category 3 - intangible cultural heritage with a less well defined tangible component, where a narrative approach has been applied. This is owing to the:

- sensitivity and value of a Category 3 receptor being defined by the local community who visit, use or engage in an intangible practice that is not objectively measurable. It takes a greater amount of time and the development of relationships of confidence and trust to enable a valuation of the sensitivity associated with intangible cultural heritage, making it difficult to get a real sense of importance to the communities during the baseline work, see Section 6.4.3.16.

- spatial extent of sites often not being defined clearly and may not be relevant to an understanding of the magnitude of effects, e.g., a sacred tree occupies a small area, but the belief system attached to it may extend to the whole PAC.

A qualitative determination of the significance of a limited number of impacts has been undertaken, as described within the VEC assessments in Section 8.

Cumulative Impacts

Residual cumulative impacts have been assessed, taking into consideration:

- residual impacts of the Tilenga feeder pipeline
- the additional management strategies and mitigation measures proposed to manage cumulative impacts, see Section 5.5.2.3.

The significance of cumulative impacts has been determined qualitatively, based on a predicted exceedance of VEC thresholds, limit of acceptable change or preferred condition.

If the governmental agencies identify the need to implement regional management or regional monitoring plans, the project will participate in their development and implementation.

Human Rights

Many social impacts can be understood in human rights[4] terms. This includes recognising project-affected individuals and communities as human rights-holders with legal entitlements, including the right of legal redress for impacts on their human rights. Thus, when a project creates social impacts, it may also have implications for its responsibility to respect human rights. A stand-alone HRIA is being conducted for the pipeline. As per international good practice for human rights impact assessment, this assessment is made in reference to international human rights laws and standards and focuses on the severity and likelihood of potential adverse impacts on affected stakeholders or rights-holders.

It is important to note that according to the UN Guiding Principles on Business and Human Rights, the criteria for assessing human rights uses a combination of severity and likelihood, which differs from the ESIA approach of determining significance. Regardless of this both processes identify risks present in the project baseline that could materialise as project impacts and both processes identify potential mitigation measures for those impacts.

The findings of the HRIA were used in the ESIA where this could further inform the social impact assessment. This inclusion does not therefore change the significance criteria used in the ESIA. Rather, the identification of risks in the project setting and mitigation measures that support proactive “human rights due diligence”[5] have been incorporated into the social impact assessment where they

[4] Human rights risks are understood to be the business enterprise’s potential adverse human rights impacts. Potential impacts should be addressed through prevention or mitigation, while actual impacts – those that have already occurred – should be a subject for remediation. See UN Guiding Principles on Business and Human Rights, 17 and Commentary.

[5] Companies must implement a system of human rights due diligence in order to identify, prevent, mitigate and account for how they address their adverse human rights impacts. The process should include assessing actual

are relevant to bolster the understanding of the project setting and the rationale for inclusion of mitigation in the ESMP.

5.5.3 Abnormal Operations and Unplanned Events

Abnormal operations and unplanned events include:

- geotechnical events (e.g., earthquakes, landslides)
- accidental events (e.g., fire, collision of vehicles with operational plant, damage of pipe due to unauthorised digging on land).

Section 9 describes the impact assessment for abnormal operations and unplanned events and includes:

- measures considered during engineering design to avoid risks
- description of the hazard analysis and risk assessment studies conducted to identify
  - risks during pipeline construction and operation
  - mitigation measures to reduce risks to as low as is reasonably practicable
- an assessment of impacts of traffic accidents during construction and identification of mitigation measures.

In addition, oil spill modelling (OSM, see Appendix I) for the potential impacts of oil spills has been conducted to inform the design of the pipeline and response planning.

The oil spill modelling included a qualitative assessment of environmental and social risks on the pipeline route and preliminary quantitative fate and transport modelling for locations sensitive to spills.

Qualitative Risk Framework

A qualitative model framework has been developed to assess risks posed to key VECs (surface water, groundwater, community health, biodiversity, land) from potential oil release on the pipeline route on land. The model framework takes account of VEC sensitivity, potential oil release volumes and the likelihood of a pipeline failure event.

Sensitivity screening was undertaken using the risk assessment model and applied to select and justify the most suitable locations for preliminary quantitative risk assessment (PQRA).

Preliminary Quantitative Risk Assessment

Risk-based-corrective-action fate and transport modelling of spills has been undertaken to assess the potential risks to VECs, including:

- the spatial extent of the area that may be affected
- the temporal extent, e.g., the length of time over which water quality standards might be exceeded.

and potential human rights impacts, integrating and acting upon the findings, tracking responses, and communicating how impacts are addressed. Human rights due diligence should be initiated as early as possible in the development of a new activity or business relationship. See UN Guiding Principle 17 and Commentary.

This has included modelling of:

- dissolved-phase oil migration in the ground, laterally to surface water VECs (base-flow contribution) and vertically to aquifers
- free-phase oil in-ground migration to either surface waters or groundwater
- the dispersion of oil as a result of spills directly into a watercourse.

Management and mitigation measures arising from the OSM for developing the oil spill contingency plan are identified.

A more fulsome description of the methodology is provided in the OSM in Appendix I.

Given the inherent uncertain nature of potential unplanned events, the potential variability of such events in terms of geographic location and coverage, and limitations of directly relevant event statistics, no significance determination has been undertaken but likelihood has been estimated.

5.5.4 Environmental and Social Management Plan

The development of an environmental and social management plan (ESMP) was part of the ESIA process.

The ESMP (Section 10) reflects the findings of the ESIA and is based on the impact assessment tables in Appendices E2 and E3 and the master commitments register in Appendix E4, described below.

The management plans that will be developed to support the implementation of commitments are in Section 10.

The aspects, potential project impacts, proposed mitigation measures and significance scores before and after mitigation (residual impact) for VECs are presented in three tables in Appendix E:

- Appendix E1 identifies the Tilenga feeder pipeline aspects that could interact with, and cause impacts on VECs.
- Appendix E2 identifies generic impacts caused by each aspect identified in Appendix E1 and provides a determination of significance of the impact before mitigation. The table also summarises the generic mitigation measures and provides post-mitigation significance.
- Appendix E3 identifies location-specific impacts caused by project aspects identified in Appendix E1 and, as Appendix E2, provides a determination of significance of the impact before mitigation, summarises the mitigation measures, and indicates post-mitigation significance.
- Appendix E4 includes the master commitments register, containing a list of mitigation measures and supporting management plans that are proposed.