6 THE ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) PROCESS

6.1 INTRODUCTION

The purpose of this ESIA is to examine how the proposed Yara Dallol Potash Project will lead to a measurable difference in the quality of the environment and the quality of life of impacted individuals and communities. Over the past decades, environmental impact assessments have expanded to include social impact assessments as well as public consultation/stakeholder engagement in the planning and decision-making process to avoid, reduce, or mitigate adverse impacts and to maximise the benefits of the project proposed. More recently, the emphasis has moved to the ESIA producing robust social and environmental management plans which can effectively implement the recommended mitigation measures (developed in partnership with the proponent) identified in the ESIA during the life of the project and culminating with an effective decommissioning plan.

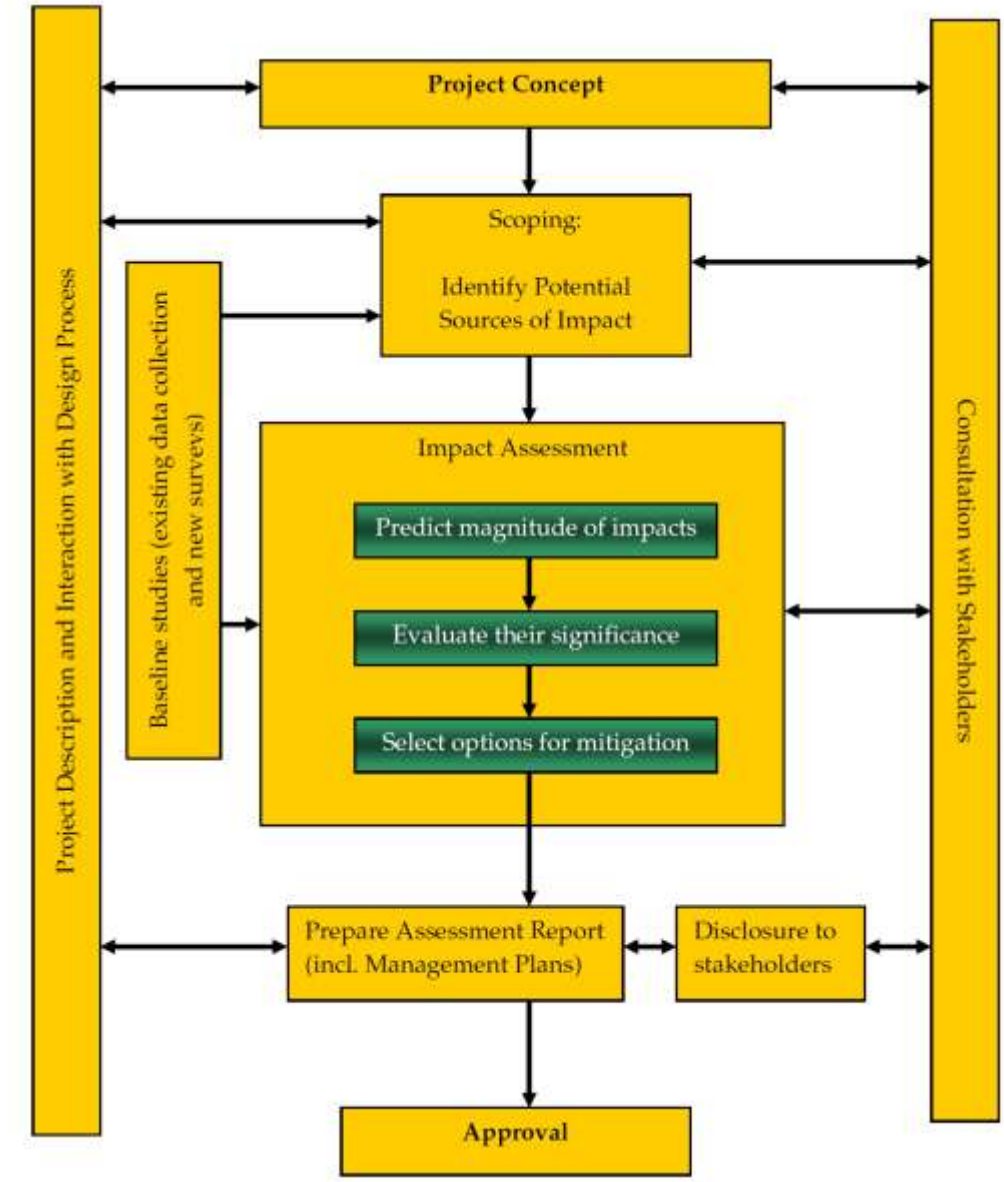
The key stages for this ESIA are:

- Scoping (and site screening/selection);
- Stakeholder engagement;
- Baseline data collection;
- Project description and interaction with design and decision-making bodies;
- Assessment of impacts and identification of mitigation measures;
- Integrated management system and plans; and
- Reporting and disclosure.

Figure 6.1 illustrates a generic overview of the ESIA process. It must be noted that this is not a linear process, but one where several stages are carried out in parallel and where the assumptions and conclusions are revisited and modified as the project and ESIA progress.

The following sections provide detail on how each stage of the ESIA process has been applied to the proposed Project.

Figure 6.1 The ESIA Process



6.2 *SITE SCREENING ASSESSMENT*

Prior to commencing the scoping phase of the ESIA process, Yara Dallol BV requested that ERM undertake an initial site screening assessment that was used to identify a preliminary siting and layout options for the proposed Project's potash processing plant and evaporation ponds, taking into account high level social, cultural heritage and biodiversity sensitivities.

By integrating social and environmental considerations as early as possible into the mine and process design, it was intended that any potential impacts to the social and ecological environments as a result of the proposed Project could be avoided, or at least minimised at the early stage of the Project's design. These results were also used as a starting point for the respective specialist studies during the ESIA process.

6.3 SCOPING

The purpose of the scoping phase was to identify key sensitivities and those activities with the potential to contribute to, or cause, potentially significant impacts to environmental and socio-economic receptors and resources and to evaluate siting, layout and technology alternatives for the Project proposed. The key objectives of scoping were to:

- Identify the potentially most significant impacts;
- Obtain stakeholder views through consultation; and
- Develop the Terms of Reference (ToR) for the ESIA through consultation so as to ensure that the ESIA process and associated reporting output are focused on the key issues.

The ESIA process focuses on these key issues through the collection of information on existing environmental and social conditions; engagement with stakeholders; understanding the impacts to the physical, biophysical and social environment; and developing the measures to avoid/control and monitor these impacts.

The ToR for the ESIA (the Scoping Report), formed the basis for this ESIA. The Scoping Report was submitted to and approved by the Federal Democratic Republic of Ethiopia's Ministry of Mines (Reference number: MA229/66) on 12 June 2014 (refer to *Annex A* of *Part II*).

Issues that were raised by stakeholders during the scoping phase were taken into account in the ESIA ToR. A list of these issues is included in the Stakeholder Engagement Programme (SEP) (*Annex C* of *Part II*).

6.4 STAKEHOLDER ENGAGEMENT

The key principle of consultation is to ensure that the views of stakeholders are taken into account and reported throughout the ESIA process. The objective is to ensure the assessment is robust, transparent and has considered the full range of issues or perceptions, and to an appropriate level of detail.

Box 6.1 Definition of Stakeholders

Stakeholders include those individuals, groups or organisations who themselves could be directly affected by the proposed Project (Project affected people) and those individuals or organisations who, although not directly affected by the proposed Project, represent those affected or have a regulatory duty, an interest, influence or secondary involvement in the proposed Project (secondary stakeholders).

Detailed stakeholder engagement started during the scoping phase and continued throughout the assessment ensuring that legislative requirements

and Project standards (as defined in *Chapter 5*) were met, that stakeholder concerns were addressed in the assessment and that sources of existing information and expertise were identified.

Consultation was undertaken at a number of stages during the development of the Project. An overview of the Stakeholder Engagement Plan (SEP) for this ESIA process is attached to *Annex C* (*Part II*), and is summarised in *Chapter 7* of this document. This SEP includes a full list of stakeholders that were consulted throughout the ESIA process.

6.5 *BASELINE DATA COLLECTION*

One of the main objectives of the ESIA process was to collect suitable data on the physical, biophysical and social environment, so as to understand what receptors and resources have the potential to be *significantly* affected by the proposed Project. *Chapters 8* and *9* describe the baseline conditions that have been used to make the assessment of both social and environmental impacts (the impact assessments are presented in *Chapter 11* and *10* respectively). The description of the baseline aims at providing sufficient detail to meet the following objectives:

- Identify the key conditions and sensitivities in areas potentially affected by the proposed Project;
- Provide a basis for extrapolation of the current situation, and development of future scenarios without the proposed Project;
- Provide data to aid the prediction and evaluation of possible impacts of the proposed Project;
- Understand stakeholder concerns, perceptions and expectations regarding the proposed Project;
- Allow the Project proposed to develop appropriate mitigation measures later in the ESIA process; and
- Provide a benchmark to assess future changes and to assess the effectiveness of mitigation measures.

6.6 *INTERACTION WITH DESIGN AND DECISION-MAKING PROCESS*

The interaction between the ESIA team and the design and decision-making process is one of the key areas in which an ESIA can influence how a project develops. It includes involvement in defining the Project and identifying those activities with the potential to cause environmental and socio-economic impacts (e.g. physical presence, noise, workforce, traffic, local employment, procurement). Project planning, decision-making and refinement of the Project

description continue throughout the assessment process as a result of the development of the proposed Project and in response to the identified impacts.

During the ESIA process, there was extensive liaison between Novopro (the project development and engineering consultants for the Yara Dallol DFS), Yara Dallol BV, Yara International and ERM with regard to identifying impacts and potential mitigation measures. Examples of key areas covered between ERM and Novopro include:

- Development of early design criteria so as to ensure that the high level placement of infrastructure (such as the Process Plant, Evaporation ponds, Tailings Management Area (TMA), Staff living Quarters etc.) was such that it avoided areas characterised as being highly sensitive. Areas characterised as being highly sensitive contained one or more of the following attributes – groundwater fed pools containing the rare Killifish species, the critical salt pan fringe habitat type, key tourist areas (*viz.* Mount Dallol), significant burial sites, and key grazing areas for communities. These areas were thus avoided during the early stages of design. These key sensitivities are discussed in further detail in *Chapter 8* and *9* of this ESIA.

- Impacts to local community livelihoods and the biological environment as a result of proposed groundwater extraction during the operational phase of the proposed Project. This includes impacts attributed to potential loss of key resource areas, such as the Salt Pan Fringe habitat. This habitat type extends north-south across the Project Area and provides key livelihood materials for communities living in and around the Project Area. From a biodiversity perspective, the Salt Pan Fringe habitat is highly sensitive and supports the highest species diversity in the Project Area, and contains populations of the rare Killifish species.

- A mitigation workshop was held over a period of 3 days (15 to 17 September 2014), between the ERM (ESIA consultants), MWH (the groundwater consultants), Novopro and Yara Dallol BV, which was aimed at discussing the proposed mitigation measures, prior to finalisation of this ESIA. This workshop aimed therefore to agree on the mitigation measures proposed between all parties involved with the planning and implementation of the Project.

6.7 COMMUNITY HEALTH RISK ASSESSMENT

In this context health is understood to be a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity. When considering health it is necessary to conduct specific risk assessment studies to contextualise potential impacts on workers and community health. In the case of the proposed Project this includes the contextualisation of potential impacts on community and workers health, safety and security as a

result of proposed mining activities. Human health risk assessment is conducted in a holistic framework, which has to take into consideration all pathways and routes of exposure. Typical health impacts may include:

- Changes to prevalence or seasonality of communicable and non-communicable diseases;
- Changes to prevalence of respiratory issues;
- Changes to prevalence of sexually transmitted infections;
- Changes to numbers of accidents and injuries;
- Exposure to potentially hazardous materials;
- Changes to nutritional status;
- Impacts to health care and recreational facilities;
- Impacts psychosocial and lifestyles; and
- Impacts to employee and worker labour, accommodation and working conditions.

The health risk and impact assessment included the collection of a range of baseline secondary and primary data to understand the general existing health profile and infrastructure. This included collection of data on:

- Health infrastructure and health care system;
- Trained medical personnel per community;
- Traditional medicine and practices (midwifery etc.);
- Access / constraints to achieving health;
- Key health indicators – life expectancy, maternal mortality, infant mortality, etc.;
- Morbidity and mortality data;
- Health profile (prevalence of diseases including vector borne, non-communicable and communicable diseases);
- Lifestyle indicators – smoking, alcohol use, drug use, etc.;
- Road traffic and other accidents and emergencies;
- Health concerns affecting specific aspects of the population (e.g., farmers, fishermen, etc.); and
- Self-reported health status and perceptions on overall well-being.

The health assessment considered the direct, indirect and induced consequences of the proposed Project to existing health baseline in relation to the specific vulnerabilities of potentially impacted stakeholders. Vulnerabilities may include:

- Groups suffering from existing acute / chronic illness;
- Frequent incidence/ high prevalence of health conditions;
- High rates of maternal/child mortality;
- Low life expectancy;
- Poor food security; and
- High instances of vector borne diseases.

6.8 ASSESSMENT OF IMPACTS AND MITIGATION

The impact assessment stage comprises a number of steps that collectively assess the manner in which the proposed Project will interact with elements of the physical, biological, cultural or human environment to produce impacts to resources/receptors. The steps involved in the impact assessment stage are described in greater detail below.

Please Note – the environmental impact assessment detailed below is an approach that combines *Impact Magnitude* and *Receptor Sensitivity* to determine **Impact Significance**. For determination of groundwater, air quality and noise impacts however, one can usually predict noise levels quantitatively and compare them against Impact Assessment Standards that take into account Receptor Sensitivity and/ or the source of noise or air contaminants to develop suitable criteria.

For example, the IFC EHS Guidelines standard sets different levels for industrial areas than for residences. Other standards can be more prescriptive, offering numerical guidance to determine criteria and assessment of impacts, and can also be source specific. For example, industrial noise is different to road traffic noise, as is, rail traffic and aircraft noise. Thus the impact assessment process for air quality and noise will be different to that detailed in *Section 6.8.1* below. The air quality and noise impact assessment methodology is detailed in *Section 6.8.2* and *Section 6.8.3* respectively.

Furthermore, the overall approach to the rating and evaluation of social (including visual and cultural heritage) impacts is similar to what is detailed in *Section 6.8.1* below; however, the impact criteria used to define social sensitivities is disparate, and is detailed in *Annex D* of *Part II* of *Part II* of this ESIA.

6.8.1 *Impact Assessment*

The impact characteristic terminology used is summarised in *Table 6.1*.

Table 6.1 Impact Characteristic Terminology

Characteristic	Definition	Designations
Type	A descriptor indicating the relationship of the impact to the Project (in terms of cause and effect).	Direct Indirect Induced
Extent	The "reach" of the impact (e.g., confined to a small area around the Project Footprint, projected for several kilometres, etc.).	Local Regional International
Duration	The time period over which a resource / receptor is affected.	Temporary Short-term Long-term Permanent

Characteristic	Definition	Designations
Scale	The size of the impact (e.g., the size of the area damaged or impacted, the fraction of a resource that is lost or affected, etc.)	[no fixed designations; intended to be a numerical value]
Frequency	A measure of the constancy or periodicity of the impact.	[no fixed designations; intended to be a numerical value]

In the case of *type*, the designations are defined universally (i.e., the same definitions apply to all resources/receptors and associated impacts). For these universally-defined designations, the definitions are provided in *Table 6.2*.

Table 6.2 Designation Definitions

Designation	Definition
Type	
Direct	Impacts that result from a direct interaction between the Project and a resource/receptor (e.g., between occupation of a plot of land and the habitats which are affected).
Indirect	Impacts that follow on from the direct interactions between the Project and its environment as a result of subsequent interactions within the environment (e.g., viability of a species population resulting from loss of part of a habitat as a result of the Project occupying a plot of land).
Induced	Impacts that result from other activities (which are not part of the Project) that happen as a consequence of the Project (e.g., influx of camp followers resulting from the importation of a large Project workforce).
Extent	
Local	Defined on a resource/receptor-specific basis.
Regional	
International	
Duration	
Temporary	Defined on a resource/receptor-specific basis.
Short-term	
Long-term	
Permanent	

In the case of *extent* and *duration*, the designations themselves (shown in *Table 6.1*) are universally consistent, but the definitions for these designations will vary on a resource/receptor basis (e.g., the definition of what constitutes a "short term" duration for a noise-related impact may differ from that of a "short term" duration for a habitat-related impact). This concept is discussed further below.

In the case of *scale* and *frequency*, these characteristics are not assigned fixed designations, as they are typically numerical measurements (e.g., number of acres affected, number of times per day, etc.).

The terminology and designations are provided to ensure consistency when these characteristics are described in an impact assessment deliverable. However, it is not a requirement that each of these characteristics be discussed for every impact identified.

An additional characteristic that pertains only to unplanned events (e.g., traffic accident, operational release of toxic gas, community riot, etc.) is *likelihood*. The likelihood of an unplanned event occurring is designated using a qualitative (or semi-quantitative, where appropriate data are available) scale, as described in *Table 6.3*.

Table 6.3 Definitions for Likelihood Designations

Likelihood	Definition
Unlikely	The event is unlikely but may occur at some time during normal operating conditions.
Possible	The event is likely to occur at some time during normal operating conditions.
Likely	The event will occur during normal operating conditions (i.e., it is essentially inevitable).

Likelihood is estimated on the basis of experience and/or evidence that such an outcome has previously occurred.

It is important to note that likelihood is a measure of the degree to which the unplanned event is expected to occur, *not* the degree to which an impact or effect is expected to occur as a result of the unplanned event. The latter concept is referred to as *uncertainty*, and this is typically dealt with in a contextual discussion in the impact assessment deliverable, rather than in the impact significance assignment process.

In the case of impacts resulting from unplanned events, the same resource/receptor-specific approach to concluding a magnitude designation is utilised, but the 'likelihood' factor is considered, together with the other impact characteristics, when assigning a magnitude designation. There is an inherent challenge in discussing impacts resulting from (planned) Project activities and those resulting from unplanned events. To avoid the need to fully elaborate on an impact resulting from an unplanned event prior to discussing what could be a very low likelihood of occurrence for the unplanned event, this methodology incorporates likelihood into the magnitude designation (i.e., in parallel with consideration of the other impact characteristics), so that the "likelihood-factored" magnitude can then be considered with the resource/receptor sensitivity/vulnerability/importance in order to assign impact significance. Rather than taking a prescriptive (e.g., matrix) approach to factoring likelihood into the magnitude designation process, it is recommended that this be done based on professional judgment, possibly assisted by quantitative data (e.g., modelling, frequency charts) where available.

Once the impact characteristics are understood, these characteristics are used (in a manner specific to the resource/receptor in question) to assign each impact a *magnitude*. In summary, magnitude is a function of the following impact characteristics:

- Extent;
- Duration;
- Scale;
- Frequency; and
- Likelihood.

Magnitude essentially describes the degree of change that the impact is likely to impart upon the resource/receptor. As in the case of extent and duration, the magnitude designations themselves (i.e., negligible, small, medium, large) are universally used and across resources/receptors, but the definitions for these designations will vary on a resource/receptor basis, as is discussed further below. The universal magnitude designations are:

- Positive;
- Negligible;
- Small;
- Medium; and
- Large.

The magnitude of impacts takes into account all the various dimensions of a particular impact in order to make a determination as to where the impact falls on the spectrum (in the case of adverse impacts) from *negligible* to *large*. Some impacts will result in changes to the environment that may be immeasurable, undetectable or within the range of normal natural variation. Such changes can be regarded as essentially having no impact, and should be characterised as having a *negligible* magnitude. In the case of *positive* impacts no magnitude will be assigned.

In addition to characterising the magnitude of impact, the other principal step necessary to assign significance for a given impact is to define the sensitivity/vulnerability/importance of the impacted resource/receptor. There are a range of factors to be taken into account when defining the sensitivity/vulnerability/importance of the resource/receptor, which may be physical, biological, cultural or human. Where the resource is physical (for example, a water body) its quality, sensitivity to change and importance (on a local, national and international scale) are considered. Where the resource/receptor is biological or cultural (for example, the marine environment or a coral reef), its importance (for example, its local, regional, national or international importance) and its sensitivity to the specific type of impact are considered. Where the receptor is human, the vulnerability of the individual, community or wider societal group is considered.

Other factors may also be considered when characterising sensitivity/vulnerability/importance, such as legal protection, government policy, stakeholder views and economic value.

As in the case of magnitude, the sensitivity/vulnerability/importance designations themselves are universally consistent, but the definitions for

these designations will vary on a resource/receptor basis. The universal sensitivity/vulnerability/importance designations are:

- Low;
- Medium; and
- High.

Once magnitude of impact and sensitivity/vulnerability/importance of resource/receptor have been characterised, the significance can be assigned for each impact.

Impact significance is designated using the matrix shown in *Table 6.4*.

Table 6.4 Impact Significances

		Sensitivity/Vulnerability/Importance of Resource/Receptor		
		Low	**Medium**	**High**
Magnitude of Impact	**Negligible**	Negligible	Negligible	Negligible
	Small	Negligible	Minor	Moderate
	Medium	Minor	Moderate	Major
	Large	Moderate	Major	Major

The matrix applies universally to all resources/receptors, and all impacts to these resources/receptors, as the resource/receptor- or impact-specific considerations are factored into the assignment of magnitude and sensitivity designations that enter into the matrix. *Box 6.2* provides a context for what the various impact significance ratings signify.

Box 6.2 *Context of Impact Significances*

An impact of ***negligible*** significance is one where a resource/receptor (including people) will essentially not be affected in any way by a particular activity or the predicted effect is deemed to be 'imperceptible' or is indistinguishable from natural background variations.

An impact of ***minor*** significance is one where a resource/receptor will experience a noticeable effect, but the impact magnitude is sufficiently small (with or without mitigation) and/or the resource/receptor is of low sensitivity/ vulnerability/ importance. In either case, the magnitude should be well within applicable standards.

An impact of ***moderate*** significance has an impact magnitude that is within applicable standards, but falls somewhere in the range from a threshold below which the impact is minor, up to a level that might be just short of breaching a legal limit. Clearly, to design an activity so that its effects only just avoid breaking a law and/or cause a major impact is not best practice. The emphasis for moderate impacts is therefore on demonstrating that the impact has been reduced to a level that is as low as reasonably practicable (ALARP). This does not necessarily mean that impacts of moderate significance have to be reduced to minor, but that moderate impacts are being managed effectively and efficiently.

An impact of ***major*** significance is one where an accepted limit or standard may be exceeded, or large magnitude impacts occur to highly valued/sensitive resource/receptors. An aim of impact assessment is to get to a position where the Project does not have any major residual impacts, certainly not ones that would endure into the long term or extend over a large area. However, for some aspects there may be major residual impacts after all practicable mitigation options have been exhausted (i.e. ALARP has been applied). An example might be the visual impact of a facility. It is then the function of regulators and stakeholders to weigh such negative factors against the positive ones, such as employment, in coming to a decision on the Project.

6.8.2 Air Quality Impact Assessment

With respect to the interpretation of significance in relation to air quality impacts, the IFC defines the significance of impacts to air quality and these are applied in the assessment in the broader context of the ESIA approach. The **magnitude** of impacts was quantified using predictive techniques based on detailed dispersion modelling. The magnitude of the impact is the 'Process Contribution (PC)'; this is the impact arising solely from Project related emissions. In order to consider the **significance** of those impacts, consideration is required of the existing baseline. The PC added to the existing baseline is described as the Predicted Environmental Concentration (PEC).

The significance of the predicted impacts was ascertained by means of comparison to air quality standards and guidelines as set out in *Chapter 5*, with due consideration of the existing baseline. The significance of a given impact is determined by whether or not the impact results in air quality standards being exceeded or contributes a substantial proportion of airborne pollutants in the local airshed.

The IFC make a differentiation in the significance of impacts, based upon the existing baseline. Essentially, this is whether air quality standards are exceeded or not due to baseline concentrations.

The IFC General EHS Guidelines state:

"Projects with significant sources of air emissions, and potential for significant impacts to ambient air quality, should prevent or minimize impacts by ensuring that:

- *Emissions do not result in pollutant concentrations that reach or exceed relevant ambient quality guidelines and standards by applying national legislated standards, or in their absence, the current WHO Air Quality Guidelines, or other internationally recognized sources.*

- *Emissions do not contribute a significant portion to the attainment of relevant ambient air quality guidelines or standards. As a general rule, this Guideline suggests 25 percent of the applicable air quality standards to allow additional, future sustainable development in the same airshed [i.e. in an undegraded airshed]".*

And:

"An airshed should be considered as having poor air quality [degraded] if nationally legislated air quality standards or WHO Air Quality Guidelines are exceeded significantly".

The IFC guidelines further state:

"Facilities or projects located within poor quality airsheds, and within or next to areas established as ecologically sensitive (e.g. national parks), should ensure that any increase in pollution levels is as small as feasible, and amounts to a fraction of the applicable short-term and annual average air quality guidelines or standards as established in the project-specific environmental assessment."

Within this study, a degraded airshed is defined in this assessment as locations where the baseline air quality is already in excess of the air quality standards. This is somewhat conservative, but allows pragmatic consideration of impacts.

Following on from the above, the significance of impacts refers to the PC, and PEC and whether the airshed is degraded. Using this approach, the significance criteria for air quality have been defined, as set out in *Table 6.5*. As set out in *Chapter 8*, the airshed for TSP, PM_{10} and $PM_{2.5}$ is considered to be degraded, and for NO_2 and SO_2 is considered to be undegraded.

Table 6.5 Magnitude Criteria for Assessment of Air Pollutants

Magnitude of impact	Undegraded airshed (i.e. baseline < AQS)	Degraded airshed (i.e. baseline > AQS)
Negligible	PC <25% of AQS	PC <10% of AQS
Small	PC between 25% and 50% of AQS and PEC <100% of AQS	PC between 10% and 30% of AQS
Medium	PC between 50% and 100% of AQS, and PEC <100% AQS; or	PC between 30% and 50% of AQS

Magnitude of impact	Undegraded airshed (i.e. baseline < AQS)	Degraded airshed (i.e. baseline > AQS)
	PC between 25% and 50% of AQS, and PEC >100% of AQS	
Large	PC > 100% of AQS; or	PC > 50% of AQS
	PC > 50% of AQS, and PEC >100% of AQS	
PC: Process Contribution PEC: Predicted Environmental Concentration AQS: Air Quality Standard		

6.8.3 *Noise Impact Assessment*

Noise impact assessment standards and guidelines generally give threshold levels that have the potential to create nuisance or disturbance, or they define changes in the noise levels above which significant noise impacts to the receptors amenity may be expected. In addition, typical noise impact assessment methodologies require an approach that combines impact **magnitude** with **receptor sensitivity** to determine **impact significance**, for the specific source under assessment (e.g. industrial noise), thus:

RECEPTOR SENSITIVITY x IMPACT MAGNITUDE

= IMPACT SIGNIFICANCE

Impact Significance

In applying guidance such as that described above it is necessary to scale impact magnitude into ranges required in an impact assessment. ERM adopts a standard noise impact assessment process and impact matrix that has been applied to this ESIA Project but modified to allow for the varying impacts associated with the duration or frequency of occurrence of potential construction and operational Project aspects. These include:

- "Short-term / Occasional" or "Temporary / Rare" duration or frequency values were considered but determined inapplicable to the proposed Project construction and site establishment scenarios;
- "Medium-term / Often" are adopted to assess Project construction impacts based on the nature of the proposed construction and associated schedule; and
- The "Long term / Constant" duration or frequency value is used to determine Project impacts for operational noise.

Predicted Project Noise Levels (PNL) from the construction and operational phases of the proposed Project are compared to criteria to determine

compliance, and to evaluate impacts for all applicable potential receptor locations and with reference to the duration/ frequency values and the respective sensitivities of the receptors.

ERM reiterates that in the first instance "unmitigated" noise levels are predicted, the magnitude of any exceedances are quantified, impacts evaluated and then "mitigated" noise levels are predicted for scenarios that warrant this consideration.

Determining Frequency / Duration Values

To determine the duration or frequency of the Project activity under assessment ERM has considered the proposed Project schedule but also the likely period of the noise emissions being assessed.

The Construction period is expected to be approximately 31 months, and is not a permanent feature of the proposed Project and would be considered to be of Medium duration. Whereas, Operations is a permanent feature and would be considered to be of Long Term / Constant duration as the life of mine is expected to be a minimum of 18 years.

Defining Impact Terminology

As is discussed in *Chapter 5*, the Ethiopian noise standard defines the daytime period from 06:00 hour to 21:00 hour and night time period from 21:00 hour to 6:00 hour. Both, the Ethiopian noise standards and the IFC have the same allowable noise levels for daytime, 55dB(A); and night time, 45dB(A) although the Ethiopian standard is based on shorter time interval of 15 minutes. Furthermore, the Project specific noise criteria will be a drawn from a combination of the Ethiopian and the *IFC EHS Guidelines 1.7 Noise* as follows:

- The daytime period will be defined as 6:00 to 21:00 and the night time period will be from 21:00 to 6:00.
- Disturbance criteria will be based on an $L_{Aeq,15min}$ assessment period.
- Amenity criteria (expressed as $L_{Aeq,period}$) is determined by adding 3dB to the existing baseline noise level or Assessment Background Level (ABL);
- Project Specific Noise Criteria (PSNC) will be determined by the most stringent of the IFC Disturbance and Amenity criterion; and the WHO Community Noise Guidelines (1999) values.

The PNL values summarised in *Table 6.6* are the values where noise impacts are expected to occur. The meaning of the four impact significance ratings used, in the context of a noise impact assessment, is as follows:

- **Negligible –** no detectable effects, no need to consider in decision making, no mitigation required;

- **Minor –** the effect may be detectable, but small enough that noise management practices would ensure impacts are reduced to be Negligible;

- **Moderate –** a detectable effect, an impact that is significant, noise management practices and/or mitigation should be considered. Mitigation is likely to affect design and cost; and

- **Major –** a detectable effect, an impact that is significant, noise management practices and mitigation must be considered. Mitigation will alter project design and cost. Impacts are undesirable if not addressed.

Hence, impacts rated as Moderate or above will be mitigated where practicable, feasible and reasonable with proportionately more emphasis as the rating increases. These criteria will provide the basis for developing performance standards and acoustic specifications for the proposed Project. Mitigation may not eliminate an impact, but would be expected to reduce its severity.

Please Note – the approach taken to develop Project-specific noise criteria that was adopted for the ESIA are presented in *Annex D* of *Part II*.

Table 6.6 Project Specific Noise Impact Assessment Criteria

Project Phase & Duration	Receptor Type	Period	Noise Impact Scale					
			Negligible		Minor		Moderate	Major
			PNL <	PNL >	PNL <	PNL >	PNL <	PNL >
Operation Long term / Constant	Residential Receptors with Very Low Background Noise Levels (*viz.* Asabuya Village)	Daytime	35	35	40	40	45	45
		Night time	30	30	35	35	40	40
	Other Residential and Tourist (*viz.* Mount Dallol) Receptors	Daytime	40	40	45	45	50	50
		Night time	35	35	40	40	45	45
	Lower Sensitivity Residential Receptors (*viz.* Military Camp)	Daytime	55	55	60	60	65	65
		Night time	45	45	50	50	55	55
Construction Medium-term / Often	Residential Receptors with Very Low Background Noise Levels (*viz.* Asabuya Village)	Daytime	40	40	45	45	50	50
		Night time	35	35	40	40	45	45
	Other Residential and Tourist (*viz.* Mount Dallol) Receptors	Daytime	45	45	50	50	55	55
		Night time	40	40	45	45	50	50
	Lower Sensitivity Residential Receptors (*viz.* Military Camp)	Daytime	60	60	65	65	70	70
		Night time	50	50	55	55	60	60

1. PNL = predicted $L_{Aeq,15min}$ Project Noise Level
2. Daytime = 6am to 9pm and Night time = 9pm to 6am

Please Note – the Ethiopian Military Camp will be considered a noise sensitive receptor; however, it is considered appropriate that it would have a lower sensitivity to noise than a residential receptor. The lower sensitivity is applied as the Military Camp is not a typical residential receptor, given that it operates 24 hours per day, there is likely to be noise generated on the Military Camp site during the Night Time period and there would be lesser expectation for lower noise levels during this period. This is described in more detail in *Annex D* of *Part II*

6.8.4 Mitigation of Impacts

Once the significance of a given impact has been characterised using the above mentioned methodologies, the next step is to evaluate what mitigation measures are warranted. In keeping with the Mitigation Hierarchy, the priority in mitigation is to first apply mitigation measures to the source of the impact (i.e., to avoid or reduce the magnitude of the impact from the associated project activity), and then to address the resultant effect to the resource/receptor via abatement or compensatory measures or offsets (i.e., to reduce the significance of the effect once all reasonably practicable mitigations have been applied to reduce the impact magnitude).

It is important to have a solid basis for recommending mitigation measures. The role of any given ESIA is to develop a consentable project, and to help develop the project in a responsible manner. Impact assessment is about identifying the aspects of a project that need to be managed, and demonstrating how these have been appropriately dealt with. As key influencers in the decision making process, the role of the impact assessment is not to stop development or propose every possible mitigation or compensatory measure imaginable, but rather to make balanced judgements as to what is warranted, informed by a high quality evidence base.

Additional mitigation measures should not be declared for impacts rated as not significant, unless the associated activity is related to conformance with an 'end of pipe' applicable requirement. Further, it is important to note that it is not an absolute necessity that all impacts be mitigated to a not significant level; rather the objective is to mitigate impacts to an *as low as reasonably possible* (ALARP) level.

Embedded controls (i.e., physical or procedural controls that are planned as part of the project design and are not added in response to an impact significance assignment), are considered as part of the project (prior to entering the impact assessment stage of the impact assessment process).

6.8.5 Residual Impact Assessment

Once mitigation measures are declared, the next step in the impact assessment process is to assign residual impact significance. This is essentially a repeat of the impact assessment steps discussed above, considering the assumed implementation of the additional declared mitigation measures.

6.8.6 Dealing with Uncertainty

Even with a final design and an unchanging environment, impacts are difficult to predict with certainty, but in projects such as the proposed Yara Dallol Potash Project where the design process is currently in progress, uncertainty stemming from on-going development of the Project design is inevitable, and the environment is typically variable from season to season and year to year. Where such uncertainties are material to ESIA findings, they

will be clearly stated and conservatively approached ('the precautionary approach') in order to identify the broadest range of likely residual impacts and necessary mitigation measures.

Potential impacts may be assessed using tools ranging from quantitative techniques such as hydrodynamic modelling to qualitative techniques based on expert judgment and historical information. The accuracy of these assessment tools depends on the quality of the input data and available information. Where assumptions have been made, the nature of any uncertainties associated with the assumption is discussed. For qualitative predictions/assessments, some uncertainty is removed through consultation.

6.8.7 Cumulative Impacts/Effects

Cumulative impacts and effects are those that arise as a result of an impact and effect from the Project interacting with those from another activity to create an additional impact and effect. These are termed cumulative impacts and effects.

The impact assessment process will predict cumulative impacts/effects to which the proposed Project may contribute. The approach for assessing cumulative impacts and effects resulting from the proposed Project and another activity affecting the same resource/receptor is based on a consideration of the approval/existence status of the 'other' activity and the nature of information available to aid in predicting the magnitude of impact from the other activity.

A cumulative impact assessment for the proposed Project is detailed in *Chapter 12* of this ESIA report.

6.8.8 Management Systems Integration

Stakeholders and external decision-makers for the proposed Yara Dallol Potash Project will rely on the findings of the ESIA (e.g. the significance of residual impacts) in coming to their ultimate views. As an ESIA is based on predictions made in advance of an activity taking place, it effectively makes assumptions that the project will implement certain controls and mitigation measures. If the controls do not happen, then the ESIA is undermined as a tool for stakeholders and external decision-makers. It is important, therefore, that these 'assumptions', i.e. the mitigation / management measure recommendations detailed in *Chapters 10* and *11*, are commitments that will be implemented through the following environmental and social management plans that have been developed together with the proponent and as part of the ESIA process:

- Air Quality Management Plan
- Noise Management Plan
- Biodiversity Management Plan
- Emergency Response Plan

- Integrated Mine Closure Plan
- Spill Prevention Control and Containment Plan
- Waste Management Plan
- Water Management Plan
- Cultural Heritage Management Plan
- Community Health, Safety and Security Management Plan
- In-migration Management Plan
- Sourcing, Procurement and Recruitment Management Plan
- Worker Management Plan

It is also important that, over the life of the proposed Project, the vehicle by which the commitments set out in the aforementioned environmental and social management plans are turned into specific actions and implemented through Yara Dallol BV's Environmental and Social Management System. This System has been initiated through the development of these management plans and will continue to be developed as the Project proceeds. The Environmental and Social Management System is presented in *Chapter 13*. The implementation of such a system should ensure that any unforeseen impact or issues that may arise will be dealt with in an effective manner in accordance with the relevant Performance Standards, Environmental, Health and Safety Guidelines and the laws and regulations of Ethiopia. In this way, stakeholders and external decision-makers should have confidence in the ESIA as a tool to aid their decision-making on the proposed Project.

Once potential impacts have been identified and mitigation measures developed and described in the ESIA, their *integration* within the proposed Project is required in order to ensure their future implementation. In order for this to be successful, a statement of the responsibility, timing and reporting requirements associated with each measure or set of measures is generally issued. It is also required as part of the Environmental and Social Management System to develop procedures by which these measures will be monitored and to include mechanisms that allow for their on-going development in order to minimise impacts to ALARP levels, or to achieve continuous improvement throughout the Project's duration.

6.8.9 Reporting and Disclosure

This draft ESIA report together with the various subsidiary management plans were disclosed to registered stakeholders for a four week duration (01 December 2014 to 01 January 2015) at a federal, regional and local level.

A Grievance Procedure, as required by the IFC Performance Standards has been established for the Project and will provide long-term input to the proposed Project.

6.8.10 Uncertainty and Change Management

As Project design is finalised, and as additional baseline data is gathered, a greater level of certainty regarding the impacts of the proposed Yara Dallol

Potash Project will emerge. Accordingly, Project design changes may occur that need to be accommodated by Yara Dallol BV and its associated contractors. Similarly, the organisational structure and roles and responsibilities provided under *Chapter 13* may also change as the Project progresses.

The ESIA process does not stop with submission of the Final ESIA report. Therefore, the ESIA Management Plans will require a mechanism to manage change. At times these changes may be material, potentially influencing the original findings of the ESIA, and hence, the basis for its approval. Such a mechanism to manage change, or a change management system, must ensure that changes to the scope of the proposed Project are subjected to a robust social and environmental assessment process. Any changes to Project scope will be evaluated for their degree of significance, and will be incorporated into the appropriate Yara Dallol BV documentation as follows:

- Minor changes will be reflected in updates to the applicable Management Plans; and

- Substantive design / technology changes that might potentially alter the ESIA findings (i.e. those that result in changes to the predicted significance of environmental and socio-economic impacts) will be subject to re-assessment, further stakeholder consultation, supplementary reporting and revision of the Project's Environmental and Social Management Plans. Typically, such substantive changes will be submitted as an addendum to this ESIA.