GOVERNMENT OF THE REPUBLIC OF THE UNION OF MYANMAR

MINISTRY OF NATURAL RESOURCES AND ENVIRONMENTAL CONSERVATION

ENVIRONMENTAL CONSERVATION DEPARTMENT

Environmental Impact Assessment Guidelines for the Mining Sector

MINING

GUIDELINES FOR ENVIRONMENTAL IMPACT ASSESSMENT

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Environmental Impact Assessment Guidance for the Mining Sector

Environmental impact assessment guidance for the mining sector includes:

- Exploration: Guidelines for Preparation of an Environmental Management Plan
- Mining: Guidelines for Environmental Impact Assessment
- Technical Guidance for Environmental Impact Assessment of Mining
- Guide for Review of Environmental Assessment Documentation
- Guide for Preparing an Environmental Compliance Certificate for a Mining Project
- Guide for Environmental Compliance Monitoring and Inspection

Proponents and their consultants should select guidance that is most relevant to the proposed project, either guidance for exploration, new mines, or existing mines. When conducting the assessment of impacts, the more detailed *Technical Guidance for Environmental Impact Assessment of Mining* should be used as a reference.

Environmental Reviewers including Environmental Conservation Department (ECD) staff, ECD consultants, and members of the Interdepartmental EIA Review Committee should refer to *Guide for Review of Mining Environmental Assessment Documentation*.

ECD staff responsible for preparing Environmental Compliance Certificates should refer to *Guide for Preparing an Environmental Compliance Certificate for a Mining Project.*

ECD staff responsible for compliance monitoring and environmental and social staff of mining companies should refer to *Guide for Environmental Compliance Monitoring and Inspection*.

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I. INTRODUCTION

1. These Guidelines cover screening and categorization, scoping, and conduct on environmental impact assessment for new and existing mines. The Guidelines draw on the overall approach provided in the draft General Technical Guidelines for Environmental Impact Assessment (2017). However, the guidance is specific to the mining sector.

Content of the Guidelines

2. The Guidelines have six main parts:

i. Screening and Categorization, which applies to all new mines;
ii. Scoping and Terms of Reference, which applies to EIA Type Projects;
iii. Guidelines for Preparation of an Environmental Impact Assessment for an EIA Type Project, which provides detailed on how to conduct the environmental assessment and the format of the EIA Report;
iv. Guidelines for Preparation of Initial Environmental Examinations;
v. Guidelines for Stand-alone Environmental Management Plans for New Mines, which recommends a simplified approach to the environmental assessment of medium and small-scale mines; and
vi. Guidelines for Preparation of Standalone Environmental Management Plan for Existing Mines.

3. In addition, a detailed presentation of the main environmental and social impacts that must be addressed during the environmental assessment is provided in Appendix 1. The recommended environmental quality standards for mines are provided in Appendix 3.

Use of the Guidelines

4. These guidelines are to guide Project Proponents and EIA Consultants in the assessment of environmental and social impacts of mining projects and activities covered by the Myanmar Procedure (2015). However, they are also a useful reference for Environmental Reviewers including the Interdepartmental EIA Review Committee.

Screening and Categorization

5. All proposals for new mines must undergo environmental screening. Proponents are to prepare and submit a Project Proposal to the Environmental Conservation Department (ECD). Based on the area of the mine, the estimated annual production, and environmental and social factors, the mine is categorized. Based on the results of screening, the Environmental Conservation Department (ECD) will determine the environmental category as (i) EIA Type Project; (ii) IEE Type Project; or (iii) EMP required. ECD will then notify the Project Proponent.

Scoping and Terms of Reference

6. Projects categorized as an “EIA Type, must undergo an environmental impact assessment. The first step is Scoping, which is a process for identifying the issues to be addressed, the information to be collected, the analyses to be undertaken, and consultation with

stakeholders. A Scoping Report is required - with a table of contents for the EIA Report and Terms of Reference for the conduct of the environmental impacts assessment.

Environmental Impact Assessment

7. The conduct of the EIA investigation has the following basic steps:
   i. Defining the Geographic Boundaries of the Assessment
   ii. Defining the Time Frame for the Assessment
   iii. Preparing the Project Description
   iv. Analysis of Alternatives
   v. Description of the Natural and Social Environment
   vi. Assessment of Impacts
   vii. Designing Mitigation Measures
   viii. Cumulative Impact Assessment
   ix. Designing Environmental Quality Monitoring Programs
   x. Risk Assessment and Emergency Response Planning
   xi. Community Engagement and Community Development Planning
   xii. Environmental Management Planning

Initial Environmental Examination

8. In general, the scope the analysis required of an IEE is more limited than for an EIA. Under the EIA Procedure (2015), a scoping report is not required for an IEE. However, the IEE investigation follow the same approach as for an EIA investigation. Collection of environmental quality baseline data may be more limited in scale. Public Consultation activities may be limited in frequency and the number of stakeholders consulted. Analysis of Alternatives and Cumulative Impact Assessment may not be required.

New Mines: Stand-alone Environmental Management Plan

9. New mine projects that do require and EIA or IEE, will normally be required to prepare a Stand-alone Environmental Management Plan. Most small-scale mines will require a Stand-alone Environmental Management Plan. Collection of environmental quality baseline data is not required. Public Consultation activities are limited and are to be directed at the community and township level. Analysis of Alternatives and Cumulative Impact Assessment is not required.

Existing Mines: Stand-alone Environmental Management Plan

10. For existing mines, many of the environmental and social impacts may have already occurred. These past and present impacts need to be assessed. Environmental and social conditions will have changed. A new environmental baseline needs to be established. Most mines will have previous environmental assessments, have conducted monitoring, and may have been subject to an environmental inspection. The mine will have history of engagement with communities and have a community development plan to support the communities.

11. The mine's past and present environmental assessment and environmental and social management practices, its past and present environmental and social impacts; and its past and present community engagement and community development activities must be documented and assessed in preparation of the Stand-alone Environmental Management Plan.

II. SCREENING AND CATEGORIZATION

12. The Myanmar EIA Procedure (2015) requires that all new projects or expansions of existing projects must undergo environmental screening to determine the degree and nature of the environmental assessment required.

A. Preparing and Submitting the Project Proposal

13. To initiate the screening and categorization process, the Project Proponent submits a Project Proposal (see Part D below) for screening to the Environmental Conservation Department (ECD) of the Ministry of Natural Resources and Environmental Conservation. In accordance with the Myanmar EIA Procedure (2015), based on the Project Proposal, the Project will be screened and the environmental category determined (see Part C below).

B. Determining the Categorization

14. Based on environmental screening, projects are categorized based on three sets of considerations.

i. Project type and size factors, as set out in EIA Procedure (2015) Annex A 'Categorization of Economic Activities for Assessment Purposes for Mining Activities";
ii. Legally protected national, regional or state areas, as set out in article 25 of the EIA Procedure; and
iii. Additional Factors as set in article 28 of the EIA Procedure (2015)

15. Based on these considerations the Project are categorized as either

i. an EIA Type Project, or
ii. an IEE Type Project, or
iii. a Non IEE or EIA Type Project, and therefore not required to undertake any environmental assessment.

16. In practice, projects not categorized as an EIA Type Project or and IEE Type Project, are normally required to prepare a stand-alone environmental management plan.

1. Screening and Categorization for Mines

17. Table 1 lists the project type and size factors for mining activities, as set out in EIA Procedure (2015) Annex A 'Categorization of Economic Activities for Assessment Purposes'.

18. Table 1. Project type and size factors for Categorization (Annex A, EIA Procedure (2015))

MINING			
No.	**Type of Economic Activity**	**Criteria for IEE Type Economic Activities**	**Criteria for EIA Type Economic Activities**
148	Extraction of Rock, Gravel or Sand from a River or Marine Waters	≥ 1,000 m^3/a but < 50,000 m^3/a	≥ 50,000 m^3/a
149	Construction, Building and Ceramic Minerals Extraction (aggregates, limestone, slates, clay, gypsum, feldspar, silica sands, granite, kaolin, bentonite, marble, and quartzite)	< 200 acre and < 100,000 t/a	≥ 200 acre or ≥ 100,000 t/a
150	Extraction and Refining of Industrial Minerals (barite, fluorite, phosphate, potash, salt, soda ash, asbestos)	< 200 acre and < 100,000 t/a ore	≥ 200 acre or ≥ 100,000 t/a ore
151	Extraction of Ferrous, Non-Ferrous Metal and Precious Metal Ore Except Gold (iron, manganese, silver, copper, tin, antimony, lead, nickel, zinc, chromium, bauxite), and Precious Stone	< 50 acre and < 50,000 t/a	≥ 50 acre or ≥ 50,000 t/a
152	Refining of Metal Mineral Ore (without using hazardous chemicals)	< 50,000 t/a	≥ 50,000 t/a
153	Refining of Metal Mineral Ore (using hazardous chemicals)	< 25,000 t/a	≥ 25,000 t/a
154	Extraction and Refining of Gold Ore (without using hazardous chemicals)	< 20 acre	≥ 20 acre
155	Extraction and Refining of Gold Ore (using hazardous chemicals)	< 20 acre and < 25,000 t/a	≥ 20 acre or ≥ 25,000 t/a
156	Coal Mining (underground and surface)	< 100,000 t/a coal	≥ 100,000 t/a coal
157	Mining, including Dredging of Heavy Mineral Sands (tungsten, ilmenite, rutile, zircon, titanium, monazite)	≥ 1,000 m^3/a but < 50,000 m^3/a	≥ 50,000 m^3/a

20. **Additional Factors.** In making its determination as to the type of environmental assessment a Project or Project expansion will require, ECD considers the following factors in accordance with Ministry guidance:

i. the need for the Project to deal with an emergency situation;
ii. the interest of public health and safety;
iii. the interest of national security;
iv. the lifespan of the Project;
v. protection of cultural and religious norms, and historical and religious heritage;
vi. protection of areas having a fragile ecosystem;
vii. areas affected by cyclones, strong storms, flooding, earthquake (including the Sagaing Fault) and areas vulnerable to natural disaster;
viii. protection of water resources (lakes, reservoirs, rivers, groundwater aquifers) that serve or may in the future serve as primary sources of public drinking water;
ix. recreation zones and pearl production areas;
x. conservation and protection of biodiversity;
xi. introduction of exotic or alien species;
xii. adoption of new technologies;
xiii. population density;
xiv. national, regional and global climate change conditions;
xv. likely transboundary impacts;
xvi. likely residual impacts or effects occurring some years after Project closure; and
xvii. other factors as the Ministry may determine.

C. Submission of the Project Proposal

21. The Project Proponent submits the Project Proposal together with *Application Form of Project Proposal to the* Environmental Conservation Department (ECD).

22. ECD will reply to the Project Proponent with the categorization, either “EIA Type Project”, “IEE Type Project” or “EMP Type Project”.

D. Required Contents of the Project Proposal

23. Table 2 provides the required contents for a Project Proposal.

Table 2. Required Contents of the Project Proposal.

Section	Contents
Title Page	Name of Project, Name of Project Proponent; Date
Executive Summary	One to two pages
Overview	Brief overview the proposed project including the rationale
Project Status (new, existing, or project expansion)	State whether this is a new project, existing project, project expansion
Description of the Project Proponent	Proponent name (organization) and contact details address, telephone, fax, e-mail and website. Contact person.
Proponent's Environmental and Social Management System (ESMS)	Information should include of (i) environmental and social policies; (ii) senior management responsibilities; (iii) environmental and social staff; (iv) corporate EIA and environmental and social management procedures; and (v) ESMS monitoring and reporting requirements.
Brief Project Description	• Project justification and need • Project Location (including detailed map) • Basic Components, Facilities, and Activities • Site Layout Map or Schematic Diagram • Construction • Operations • Ore Extraction • Ore Processing • Waste Rock: Stockpiles, Dumps, and Tailings • Transportation Facilities • On-site and Off-site Support Facilities • Water Management • Mine Closure • Employment, Local Hiring, and Local Purchasing • Amount and type of emissions to air, effluent discharges to water; amount and type solid waste and hazardous waste • Project Development and Implementation Schedule • Construction Material and Equipment Use • Water Use and Energy Use
Environment and Social Description	Overview of environment and social conditions including: major water bodies, existing forests and other land uses; and social and economic conditions. If available, provide supporting maps and tables of data.
Potential Environmental and Social Impacts	Summary of the major potential environmental and social impacts
Proposed Screening Category	Recommended Assessment Category (EIA Type Project; IEE Type Project; or EMP required).
Supporting Documents	If available, attach supporting environmental assessment documentation, and a summary of the project feasibility studies.

III. SCOPING AND TERMS OF REFERENCE

24. Scoping is the first phase of the assessment process for EIA type Projects. Scoping is the process of determining the issues to be addressed, the information to be collected, and the analysis and consultation required to assess the environmental impacts of a project. Various methods are applied to:

i. identify concerns of the stakeholders a proposed project;
ii. evaluate these concerns to determine the key issues for the purposes of the EIA (and to eliminate those issues which are not considered important); and
iii. assess the issues, and document and report on the assessment.

25. Scoping involves preliminary identification and assessment of the likely environmental and social impacts and risks of the Project. Based on results of scoping, the EIA studies and analyses can be focused on critical and important matters. A key output of scoping is the preparation of Terms of Reference (TOR) for EIA studies to be undertaken in the next phase of the EIA process. If sufficiently detailed, the Project Proponent can use the TOR for contracting consultants to undertake EIA studies[1].

26. The TOR should provide those preparing the EIA report with explicit direction on preparing the EIA report. It should be specific about the information requirements and level of detail to be included in each major section of the report.

A. Scoping Report

27. The recommended general content of a scoping report is presented in Table 3. Scoping should focus on the overall Project context and identify the main issues of concern. The level of detail and amount of data should be sufficient to determine the spatial and temporal study boundaries and to define the depth and breadth and set the limits for EIA. It is important only to present data that is relevant to these preliminary assessments.

[1] This Guideline is based on the Environmental Impact Assessment General Technical Guidelines (2017), draft September 2017.

Table 3. Scoping Report Contents.

Report Section	Key Content
Acronyms and Definitions	– All acronyms used in the report – Definitions of terms and vocabulary
Executive Summary	– Brief presentation of the Project and a summary of potential impacts and risks associated with the Project; and the likelihood that such impacts and risks can be effectively mitigated
Project Context	– Background and brief history of the Project – Presentation of the Project Proponent and consultants
Policy, Legal and Institutional Framework	– Corporate environmental and social policies – Applicable Myanmar policy and legal framework – Relevant international conventions and treaties – Myanmar government institutional framework – International policies, guidelines and standards
Project Description	– Description of the Project size, installations, technology, infrastructure and production with overview maps and site layout maps for each Project phase and, where relevant, alternatives for each Project phase – Presentation of other projects or developments related to the construction or operation of the proposed Project
Project Alternatives	– Description of each alternative in detail with prediction and valuation of all major potential environmental and social impacts and risks – Only include reasonably feasible alternatives that are within the scope and area of business of the Project Proponent – State the reasons for selection of the preferred alternative
Description of the Natural and Social Environment	– Identification of the spatial and temporal study limits – Description of the administrative, physical, biological, social, economic, cultural and visual characteristics of the study area – Preliminary identification of environmental and social components (sensitive environmental, social, cultural and visual) in the study area – Identification of other developments in the Project area relevant to consideration of cumulative impacts
Preliminary Impact Assessment	– Preliminary identification and assessment of potential environmental and social impacts and risks based – The assessment should be divided into Project phases i.e. pre-construction, construction, operation and (if applicable) decommissioning, closure and post-closure; for each phase, divide the assessment into themes and geographic areas/sites – Preliminary assessment of the likelihood that identified impacts and risks can be properly mitigated
Community Engagement and Community Development	– stakeholder and potential affected people analysis – the results of consultation during the scoping stage – a community engagement strategy – proposed consultation and participation activities – procedures for disclosure and dissemination of information – a grievance redress mechanism – a program for joint environmental and social monitoring and reporting – approach to community development planning
Terms of Reference	– Detailed table of content for the EIA report and ESMP with descriptions of required studies, activities, methodologies and expert input

Source: Draft Environmental Impact Assessment General Technical Guidelines (2017).

B. Scoping for Mining Projects

28. The EIA General Technical Guidelines (2017) outlines the general approach to scoping and recommended format for the Scoping Report. *Preparation of an Environmental Impact Assessment* (Section IV below) outlines the basic steps in conducting an environmental impact assessment. These basic steps in Section IV should be followed during scoping.

29. This section highlights four aspects that need to be carefully considered during scoping:

i. Preparation of the project description;
ii. Analysis of alternatives;
iii. Identification of environmental and social issues associated mining projects; and
iv. Community engagement and community development planning.

1. Preparing the Project Description

30. A well-defined project description is essential to ensure meaning scoping. The project description should include a statement of the purpose with a justification of the need for the project. The project description should provide enough detail to support the identification of the environmental and social risks. The description should cover all phases from site preparation through construction to operation to closure.

31. *Section IV: Preparation of an Environmental Impact Assessment – Box 1* lists all the basic elements of the Project description. The project description is to provide information on (i) mining method, (ii) processing system; (iii) waste rock: stockpiles, dumps, and tailings; (iv) transportation facilities; (v) water management; (vii) mine closure; and (viii) employment, local hiring, and local purchasing. The description should provide details on amount and type of emissions to air, effluent.

Detailed Guidance is Available:

Preparing a Project Description- Technical Guidance for Environmental Impact Assessment of Mining

2. Analysis of Alternatives

32. Scoping is often done at a stage in Project development where basic decisions such as choice of technology or Project location are still under consideration. It is therefore an important to identify and conduct an initial assessment of such choices or alternatives. Final decisions on certain alternatives may require further in-depth studies that lie beyond the scoping phase. In such cases, the scoping report should identify the potential choices and alternatives and their likely impacts and the TOR for EIA studies should then describe the further studies that may be required.

Detailed Guidance is Available:

Analysis of Alternative- Technical Guidance for Environmental Impact Assessment of Mining

3. Identification of Environmental and Social Issues.

33. Scoping should identify the main environmental and social issues associated with the proposed project. There are many potential issues depending on the environmental conditions and proposed project. Appendix 1 summarizes common environmental and social issues that may need to be considered during the preparation of the EIA Report.

34. The Scoping Report is to include a summary table of all relevant environmental and social issues. A narrative description is it to be prepared for each issue.

Detailed Guidance is Available:

Appendix 1. Environmental and Social Issues during the Mining Life Cycle.

4. Community Engagement and Community Development Planning

a. Community Engagement

35. The *Draft Guidelines on Public Participation in Myanmar's EIA Process (2017) pr*ovide a recommended approach and detailed guidance on the conduct of public consultation and disclosure. The Guidelines recommend activities for planning public participation including: (i) identification of the potential affected people and other stakeholders; (ii) identification of issues and initial assessment of potential impacts; (iii) content of the public participation plan; (iv) resourcing the public participation plan; (v) implementing the public participation plan; (vi) designation of a focal responsible to the plan; (vii) specific procedures for promoting participation of vulnerable groups, indigenous people and ethnic groups, and people in conflict-affected areas.

36. During Scoping, the Project Proponent should:

i. Identify the potential affected people and other stakeholders;
ii. consult with all stakeholders to identify issues and concerns about potential impacts; and
iii. a prepare a community engagement plan.

37. The Community Engagement Plan is to include:

i. the stakeholder and potential affected people analysis;
ii. the results of consultation during the scoping stage;
iii. a community engagement strategy;
iv. proposed consultation and participation activities;
v. procedures for disclosure and dissemination of information;
vi. a grievance redress mechanism; and
vii. a program for joint environmental and social monitoring and reporting to communities.

b. Community Development

38. Community development is the set of activities undertaken by the Mine Operator to directly benefit the community. Such activities include: i) support for education; (ii) infrastructure improvement; (iii) support health care; (iv) social welfare support; (v) promotion of economic development; and (vi) local employment and local procurement programs.

39. The preparation of the community development plan is one of most important tasks to be undertaken during the preparation of the EIA. At the scoping stage, the Project Proponent should outline the main elements of community development plan and describes the steps that will be taken to prepare the community development plan.

Detailed Guidance is Available:

Community Engagement and Community Development - Technical Guidance for Environmental Impact Assessment of Mining

C. Indicative Terms of Reference for Environmental Impact Assessment

40. Under the Myanmar Procedure (2015), the environmental impact assessment requirements are set out in (Chapter V). The Proponent must appoint a licensed Third Person or Organization (EIA Team) to carry out the EIA investigation and reporting. Prior to commencement of the EIA, the Project Proponent shall inform the Department in writing as to the identity of the duly licensed person(s) and/or organization it has selected to undertake the EIA investigation and reporting (Article 45, EIA Procedure 2015).

41. During the Scoping Stage, the Terms of Reference (TOR) for the EIA are prepared. The TOR defines the scope of the environmental assessment, the responsibilities or obligations of the EIA Team, and Table of Contents for the EIA Report. The draft TOR and cost of the environmental impact assessment are to be discussed and agreed to between ECD and the Project Proponent.

42. The TOR should prescribe the approach to satisfying the environmental impact assessment requirements including:

i. Preparation of the project description
ii. Analysis of Alternatives
iii. Preparation of Environmental and Social Description
iv. Assessment of Environmental and Social Impacts
v. Risk Assessment
vi. Cumulative Impact Assessment
vii. Community Engagement and Community Development
viii. Environmental and Social Management Planning; and
ix. Preparation of an Environmental Impact Assessment Report

43. **Field Studies**. The detailed terms of reference for each of the main environmental and social impact assessment field studies are to be included. If information is inadequate or not

immediately available to determine the details of these studies, the TOR should be flexible enough to accommodate these studies as further information is obtained and new issues may emerge during the assessment preparation.

1. Conducting the Environmental Impact Assessment

44. During the project design, the EIA should be undertaken as part of the feasibility study. The EIA Team should work closely with the technical planning and design group to ensure that environmental considerations are integrated into the project design. Representatives of the Project Proponent should participate as members of the EIA Team. Their participation in field work, public consultations and report writing will increase their understanding of the environmental issues and will help build institutional capacity in EIA.

45. The EIA Team is to:

i. coordinate with concerned government agencies and the Environmental Conservation Department;
ii. prepare a project description, define the study area, develop the environmental baseline, prepare site maps, and other relevant maps for the study area;
iii. collect environmental baseline data including data on (i) air quality, (ii) water quality, (iii) water usage, (iv) biodiversity, (v) land use, and (vi) sensitive receptors;
iv. identify potential environmental impacts based on the information obtained on the proposed project and the baseline environmental conditions of the study area;
v. conduct environmental risk assessments as necessary;
vi. identify alternatives and analyze the environmental impacts of each alternative and propose measure to avoid or prevent impacts;
vii. estimate the magnitudes of environmental impacts and assess the significance of the impacts;[2]
viii. assess the cumulative impacts;
ix. recommend environmental mitigation measures and estimate the mitigation costs;
x. recommend environmental monitoring programs and estimate the monitoring costs;
xi. conduct public consultation and ensure information disclosure; and develop plans for public consultation, grievance redress, and information disclosure during project implementation;
xii. prepare a community engagement plan;
xiii. prepare a community development plan;
xiv. assess the Proponent's capacity to implement the Environmental and Social ManagmentPlan and other relevant EIA recommendations, and recommend measures for capacity building, if necessary;

[2] The assessment of the significance should include consideration of whether the adverse impacts are (i) not significant, (ii) not significant acceptable after mitigation measures are applied, or (iii) significant - unacceptable adverse impacts to people and their livelihoods, or because there will be an irreversible impact on the ecosystem.

xv. prepare an Environmental and Social Management Plan to be implemented by the Proponent proposed mitigation measures, environmental monitoring and reporting requirements, related institutional or organizational arrangements, capacity development and training measures, implementation schedule, cost estimates, and performance indicators; and

xvi. prepare draft and final EIA reports to meet the requirement of the Myanmar EIA Procedure (2015).

2. The Environmental Impact Assessment Report

46. **Coverage of All Issues and Concerns**. The EIA Report is to address all the issues and concerns that were identified during the Scoping Stage and raised during consultation during the preparation of the EIA Report.

47. The recommended format for an EIA Report for mining projects is in Appendix 2.

48. The EIA team is to prepare a draft EIA Report. The draft EIA report is to be reviewed during consultations with stakeholders. Based on the results of the review, the final EIA Report is to be prepared for submission to ECD.

IV. PREPARATION OF AN ENVIRONMENTAL IMPACT ASSESSMENT

A. Scoping Report and Terms of Reference

49. As discussed above, scoping is the first phase of the assessment process for EIA type Projects. The Scoping Report includes the Terms of Reference for conducting the environmental impact assessment and preparation of the EIA Report. The Scoping Report also include the Table of Contents for the EIA Report. The environmental assessment is to be based on the Terms of Reference and the Table of Contents.

B. EIA Investigation

50. Under the EIA Procedure (2015), the EIA investigation is to consider all biological, physical, social, economic, health, cultural and visual components of the study area, together with all pertinent legal matters relating to the environment, people and communities (including land use, resources use, and ownership of and rights to land and other resources) that may be affected by the Project during all Project phases including pre-construction, construction, operation, decommissioning, closure, and post-closure, and shall identify and assess all Adverse Impacts, risks, Cumulative Impacts and Residual Impacts for environment, social and health.

51. The investigations shall include necessary data collection, technical studies, modelling, field surveys, field sampling, laboratory analysis, engineering designs and calculations, and consultations to determine mitigation measures to be undertaken to ensure that all Residual Impacts are acceptable to the Ministry and interested and affected persons.

52. The Project Proponent is to use, comply with applicable national and international standards adopted as by the Government. In the absence of relevant national or adopted international standards, such standards are to be agreed with the Ministry.

53. The EIA shall consider the views, concerns, and perceptions of stakeholders, communities and individuals that could be affected by the Project or who otherwise have an interest in the Project. The EIA shall include the results of consultations with the public, affected populations and other stakeholders on the environmental and social issues. The concerns raised during such consultations shall be considered in assessing impacts, designing mitigation.

1. Defining the Geographic Boundaries for the Assessment

54. The geographic boundaries for the assessment must be defined. The first step is to include the area that will be directly affected by the mining operations. The next step is to identify the environmental and social components that will be affected. The assessment area may need to broadened - depending on the environmental and social components located in the area, and upon the magnitude of the anticipated impacts. The assessment area to study must be large enough to include all valued environmental and social component that might be significantly affected by the project.

55. The geographic extent of the assessment area must be clearly delineated on a geo-referenced map. Once the assessment area is well defined, studies to gather the baseline conditions for valued environmental and social components must be developed.

2. Defining the Time Frame for the Assessment

56. The time frame for the assessment must be defined. For a mining project, the time frame includes all stages of the mine life cycle including: (i) prospecting and exploration; (ii) preconstruction (iii) construction (iii) operation; (iv) closure; and post closure.

3. Preparation of Project Description

57. The project description should include a clear statement of the purpose and need with a justification of for the project. The description should cover all phases from site preparation through construction to operation to closure. The project description (Box 1) is also to provide information on (i) mining method, (ii) processing system; (iii) waste rock: stockpiles, dumps, and tailings; (iv) transportation facilities; (v) water management; (vii) mine closure; and (viii) employment, local hiring, and local purchasing. The description should provide details on amount and type of emissions to air, effluent discharges to water, and solid waste disposal.

58. The project description should provide enough detail to support an accurate definition of the environmental and social risks associated with the project.

Box 1. Basic Elements of a Project Description

- Project justification and need
- Project Location (including detailed map)
- Basic Components, Facilities, and Activities
- Site Layout Map or Schematic Diagram
- Construction
- Operations
- Ore Extraction
- Ore Processing
- Waste Rock: Stockpiles, Dumps, and Tailings
- Transportation Facilities
- Mining Support Facilities
- Offsite Ancillary Facilities
- Water Management
- Mine Closure
- Employment, Local Hiring, and Local Purchasing
- Amount and type of emissions to air, effluent discharges to water; amount of type solid waste disposal; and amount and type of hazardous waste
- Project Development and Implementation Schedule
- Construction Material and Equipment Use
- Water Use
- Energy Use

Detailed Guidance is Available:

Project Description - Technical Guidance for Environmental Impact Assessment of Mining

4. Analysis of Alternatives

59. The EIA Procedure (2015) requires an analysis of project alternatives for all EIA Type projects to determine the best method of achieving project objectives while minimizing environmental and social impacts. It is recommended that the analysis of alternative be conducted during the Scoping Stage. The analysis brings environmental and social considerations into early decision making (at the stage of feasibility study), providing the main opportunity to avoid and, if avoidance is not possible, minimize adverse environmental impacts and risks. A serious analysis of alternatives can also reduce the project cost, assist in gaining greater public support for the project, and improve the likelihood of project approval.

60. **No – Project Alternative**. The analysis of alternatives should address the "no project" alternative. This will generally indicate the (i) beneficial outcome and net contribution to development that would be foregone without the project, and (ii) the main adverse impacts that would be avoided without the project. It should consider alternative land uses (i.e., other than mining).

61. **Alternative Technologies.** Reasonable technically and economically feasible project options that would reduce potential adverse environmental and socioeconomic impacts should be considered. These may include alternative designs, technologies, site design and facility design options for the project location including proposals by stakeholders, for modifications or new project options posing lower impact. Consideration should be given to:

i. alternative mining methods (i.e., underground versus open-pit versus heap leaching);
ii. alternative ore processing methods and facilities; and
iii. alternative size of the mine and sequencing of the mine development and operation.

62. **Alternative Locations**. Due to the fixed location of mineral ore bodies, there may not be readily identifiable alternative locations for mineral extraction. However, an alternative analysis of proposed mining projects should nevertheless consider:

i. alternative sites for alternative sites for mining facilities (waste rock dumps; processing facilities; and tailing ponds);
ii. alternative alignments for roads, rail lines or pipelines within the mine site;
iii. alternative sites of storage of materials (including hazardous materials); and
iv. and alternative modes and routes for transportation access to the mine site.

Detailed Guidance is Available:

Analysis of Alternatives - Technical Guidance for Environmental Impact Assessment of Mining

5. Description of the Natural and Social Environment

63. The description of existing natural and social baseline environment conditions should provide sufficient, relevant and updated information on the physical, biological, economic, social, cultural and visual components.

64. Baseline social, cultural and livelihood data provided in this section is distinct from data that would be considered in a separate description of baseline conditions for purposes of compensation and resettlement. Generally, baseline social, cultural and livelihood data should be aggregated on district, village or community level with due consideration to any particular vulnerable groups.

65. Many environmental components can be best represented as spatial data through various types of maps. In addition to the basic physical features and infrastructure of the study area, it is valuable to have maps identifying vegetation types/communities, animal habitat, and major population centers.

66. EIA General Technical Guidelines (2017) include a recommended list of environmental and social components to allow for consistent terminology in organizing the data assembled for environmental components (Table 4). For a detailed listing of the environmental and social components - See Appendix 2. Contents of an Environmental Assessment Report Section 6 Description of Natural and Social Environment. It is not necessary to gather information on all the components listed. The baseline studies should concentrate on identifying those environmental components that may be significantly impacted by the project.

67. The description of natural and social baseline environment data should present the relationships and interactions between different components, habitats or ecological processes. This will enable particularly sensitive or important ecosystems to be identified. For example, the presence and abundance of certain fish species may be an important health determinant (i.e. food security) for the local population. In this context, the migration pattern and reproductive behavior of such fish species may be impacted or disrupted by the Project, necessitating that these aspects be clearly described.

Table 4. Natural and Social Environment Components

Component	Key Content
Methodology	– Method of identification of data to be collected: How, where and when – Data analysis method – Quality control – Means of data interpretation and presentation
Physical Components	– Topography and geomorphology: Landscape, elevations, – Geology and soils: Soil types, geologic formations and structures – Meteorological data: Rainfall pattern (intensity, duration and frequency of rainfall events), evaporation, temperature, wind speed and direction – Surface water and runoff: River basins, lakes, wetlands, rivers and streams – Surface water quality – Groundwater: Aquifers, flow direction, monitoring and extraction wells

Component	Key Content
	– Groundwater quality – Air quality and noise
Biological Components	– Vegetation cover – Fauna and flora: Abundance and spatial distribution of rare, endangered and vulnerable species, and for species of economic or health and nutritional importance – Land use and concessions: Residential, upland agriculture, rice paddy, industrial, industrial plantation, mining concessions, hydropower concessions, agricultural and forestry concessions, tourism concessions – National protected areas, production forest areas, fish conservation areas and other conservation, protection and reserved areas and zonings – Biodiversity and Natural Habitat
Social Components	
Demographic	– Maps with population distribution (number of people, density) – Charts indicating the population growth forecasts and growth rates – Number of households and mean household sizes – Immigration and emigration rates – Map with the spatial distribution of ethnic groups – Age and gender distribution
Social Profile	– Social organizations – Mean adult educational achievement level, and adult literacy level of the population – Access to education services, and barriers to educational achievement – Gender issues – Vulnerable groups: Characteristics and number of people in each group
Living Conditions	– Size and types of houses and household plots – Access to electricity (grid or other source; and number and percentage of households) – Type of water supply available (number and percentage of households) – Type of sanitation facilities (number and percentage of households)
Income and Livelihood	– Mean annual household income – Main sources of income – Business ownership – Land ownership – Number and spatial distribution of poor villages, households and people – Subsistence agriculture: Number, spatial distribution of households and land size distribution – Commercial agriculture: Number, spatial distribution of households and land size distribution
Health Profile	– Mortality and morbidity – Incidence of diseases

Component	Key Content
	– Accidents and injuries e.g. construction, drowning, road-traffic related, spills and releases, UXO – Social health determinants – Cultural health practices
Economic Components	
General Economics	– Charts displaying the structure and size of the main economic sectors at national, state/region and district and township levels as appropriate – Summary of the main elements in socio-economic development plans relevant to the Project
Infrastructure and Services in Project Area	– State/region and district and township offices as appropriate – Road and rail network, bridges, transportation hubs and terminals – Airports, airstrips, ports, ferry routes – Location of markets – Location, type and capacity of educational facilities – Location, type and capacity of health services – Location of meeting halls, temples and places of worship – Sporting facilities – Irrigation systems and facilities – Water supply services – Electricity supply services – Waste collection services
Other Projects in the Area	– Map and key information of existing and future large public and private investment projects such as hydropower, mining, infrastructure, agriculture and forestry, and urban development
UXO	– Recent studies of UXO relevant to the project area – UXO Maps relevant to project area – Consultation with groups work to clear areas of UXO
Visual Resources	– Landscapes – Seascapes – Cultural landmarks
Cultural Resources	– Location and characteristics of cultural heritage sites – Tourism spots and areas – Historical and archaeological sites and sites of high scientific value – Religious sites and objects – Sites, structures and objects with high aesthetic value – Traditional knowledge and beliefs, and cultural practices

Source: EIA General Technical Guidelines (2017)

6. Assessment of Impacts

68. The environmental and social impacts are to be assessed. There are many potential issues depending on the environmental conditions and proposed project. Only impacts that may be caused by a specific mining operation need to be assessed.

a. Identification of Impacts

69. As a guide to impacts caused by mining, Appendix 1 summarizes potential environmental and social impacts that need to be considered during the preparation of the EIA Report.

70. **Impacts associated with each phase of the Mine Life Cycle**. Appendix 1, Tables A1 – A4 summarize potential environmental impacts associated with mine life cycle from exploration through mine development and operation to mine closure

71. **Toxic Materials in the Mining Operational Process.** Many ore processing methods use toxic materials. The impacts on these toxic materials (e.g., mercury and cyanide) are on the environment and people are discussed in Appendix 1, Box A5.

72. **Occupational Health and Safety**. In addition to environmental issues, the environmental assessment should identify potential occupation health and safety concerns associated with mining projects (Appendix 1, Table A6)

73. **Community Health and Safety**. The environmental assessment should identify potential community health and safety concerns associated with mining projects (Appendix 1, Table A7.

74. **Broader Social Impacts**. The assessment is to consider broader social issues beyond environment, health, and safety. It is necessary to consider: (i) community engagement and grievance mechanisms; (ii) community impacts and development; (iii) land acquisition and resettlement; (iv) labor; (v) women and children; and security and conflict. Appendix 1, Table A8 provides a summary of the main issues to be addressed.

Detailed Guidance is Available:

Appendix 1. Environmental and Social Issues during the Mining Life Cycle.

b. Presentation of the Impacts

75. The EIA Report is to include a summary table of all relevant environmental and social impacts. The table should contain:

i. Activities with potential for causing and impact – an activity is the basic element of a project or plan that has potential to affect any aspect of the environment. Projects are composed of activities;
ii. Environmental and social components affected – Components are basic elements of the physical, biological, social, or economic environment. Environmental and social component are impacted by activities; and
iii. Environmental impact, with an estimate or judgement of the significance of impact on physical, biological, social or economic environment.

76. In addition, a written narrative description of each impact is to be presented.

7. Designing Mitigation Measures

77. **Mitigation Hierarchy.** Mitigation measures need to designed to avoid, minimize, restore and rehabilitate, or offset adverse environmental and social impacts. Programs or activities need to be designed to enhance the project's positive benefits. The mitigation hierarchy for mining projects is shown in Box 2.

Box 2. Mitigation Hierarchy for Mining Projects

Avoidance
- Mine site selection
- Transportation corridor alignments
- Mine layout for facilities

Minimize
- Pollution and waste
- Minimize land take and disturbance
- Minimize use of borrow pits for construction materials (i.e., sand and gravel)
- Minimize use of water
- Minimize use of energy

Restore and Rehabilitate
- Exploration drilling sites
- Rehabilitation of disturbed areas (e.g., borrow pits; stream crossings)
- Restoration of mining areas after mining closure
- Replanting of vegetation and trees
- Restocking of fish and wildlife

Offset
- For conservation purposes - provide land or water bodies and/or facilities to offset biodiversity impacts
- Provide facilities or compensation to offset social and economic impacts

Enhance
- Community Development Programs to provide additional resources to enhance a projects positive social and economic benefits.

78. Mitigation measures can be broadly grouped in eleven categories (Table 5). All of these mitigation measures need to be considered for every mine. For detailed guidance on designing mitigation measures see *Technical Guidance to Environmental Impact Assessment of Mining*.

Table 5. Summary of Required Mitigation Measures

1. Pollution Control and Prevention
• Air Pollution Abatement and Control Systems
• Noise and Vibration
• Water Supply and Wastewater treatment systems
• Waste Rock Management
• Erosion Prevention and Control
2. Mine Site Environmental Good Practices
• Conservation of top soils by proper removal, storage and replacement
• Proper handling, storage of fuels, chemicals, explosives
• Proper handling and disposal of solid and hazardous wastes
• Personal Protective Equipment provided and used by workers
3. Mine Closure Planning and Management
4. Biodiversity Conservation
5. Traffic and Access Control
6. Conservation of water, energy, and borrow materials
7. Land Acquisition and Resettlement Planning
8. Community Health and Safety
9. Occupational Health and Safety
10. Protection of Physical Cultural Resources
11. Community Engagement and Community Development

Detailed Guidance is Available:

Technical Guidance for Environmental Impact Assessment of Mining provides detailed guidance on most mitigation measures

a. Environmental Quality Standards for Mines

79. The EIA Report must list the environmental standards used to (i) assess impacts; (ii) design mitigation measures; and (iii) compare with baseline environmental monitoring data.

80. Appendix 3 lists the standards that are recommended. These include:

i. Effluent Standards for Mining Sites;
ii. Effluent Standards for Work Camps, Sanitary Facilities, Domestic Wastewater;
iii. Ambient air quality standards;
iv. Ambient Noise Standards; and
v. Blasting Standards.

81. These can be considered as minimum standards. If necessary, more stringent standards may be adopted based on international good practices.

Detailed Guidance is Available:

Appendix 3. Compliance with Environmental Standards

8. Designing Environmental Quality Monitoring Programs

82. The design of environmental quality monitoring includes:

i. formulation of the environmental monitoring objectives;
ii. choice environmental parameters to monitor;
iii. choosing the sampling sites (i.e., specific locations);
iv. determining the sampling period (e.g., days, months, years)
v. determining the sampling frequency (e.g., hourly, daily, weekly, seasonally)
vi. design the sampling protocols
vii. sampling
viii. analysis of sampling data, which may include laboratory analysis;
ix. interpretation of results; and
x. reporting.

83. **Sampling Protocols**. Develop sampling and analysis protocols to ensure quality assurance during sampling.

84. **Conduct Sampling Programs.** Based on the sampling schedule and protocols, the basic air, water, and noise sampling is to be undertaken**.**

85. **Laboratory Analysis of Water Quality Data.** Conduct the laboratory analysis of water quality data.

86. **Prepare Baseline Monitoring Report.** The report is to include the overall environmental monitoring program design and including sampling protocols used. The report should present the

detailed results of the sampling programs. It should outline the method and approach. It should clearly indicate the environmental baseline values for all parameters which will be used to evaluation construction stage environmental monitoring programs.

87. **Prepare Terms of Reference for Environmental Monitoring Program.** Environmental monitoring programs will be conducted during the pre-construction; construction; operation, and mine closure phases. An indicative environmental monitoring program is provided (Table 6). Note that in practice, a detailed monitoring programs need to be designed based on minerals being mines and the specific mine site characteristics

Table 6. Indicative Environmental Quality Monitoring Program

Environmental Component or Issue	Location	Objective	Frequency and timing	Monitoring Responsibility
Acid Mine Drainage	Waste Rock Dumps In Pit Heap Leach Pads	• Monitoring of stored waste materials to determine acid mine drainage potential • Monitoring Drainage water emanating from materials	Mine dependent	Mining Operator
Surface Water Usage and Water Transfers	At water sources	• Monitoring of water usage and water transfers	Mine dependent	Mining Operator
Surface Water Quality	At onsite and offsite water bodies affected by the mine	• Detecting changes in surface water quality • Checking for compliance with Water Quality Standards	Mine dependent	Mining Operator
Groundwater Quality	At key receptors	• Detecting changes in ground water quality • Checking for compliance with Groundwater Quality Standards	Mine dependent	Mining Operator
Air Quality	At key receptors	• Detecting changes in air quality • Checking for compliance with Air Quality Standards	Mine dependent	Mining Operator
Noise and Vibration	At key receptors	• Detecting changes in noise levels • Checking for compliance with Noise Standards	Mine dependent	Mining Operator
Erosion and Sedimentation	At risk areas	• Checking for erosion potential • Estimating rates of erosion	Mine dependent	Mining Operator

Key Receptors - residential, education, religious and healthcare sites near mine

9. Risk Assessment

88. Risk assessment is the analysis and mitigation of risks of natural disasters and major industrial mining accidents with respect to consequences for the Project and resulting environmental and social impacts. The risk assessment of the EIA report should deal with risks posed by natural hazards and mining industrial hazards associated with each Project phase[3].

89. **Natural Hazards and Disaster Risk**. Typical natural hazards in Myanmar include floods, storms and cyclones, droughts, landslides, earthquakes, and UXO[4].

90. **Mining Industrial Hazards.** Typical mining industrial hazards are:

i. Dam failures;
ii. Landslide and slope failures;
iii. Fire;
iv. Explosions;
v. Chemical spills, leakages, and other unintended release of chemicals or radioactive materials;
vi. Electrical failures, equipment malfunctioning; and
vii. Mechanical and structural failures and equipment malfunction.

91. **Risk Assessment Approach.** The following approach is recommended. For natural hazards:

i. Identify of types of natural hazards and disasters based on historical records and analysis of likely hazardous geologic and atmospheric events;
ii. Consider future climate change scenarios and implications for frequency and consequences of natural hazards; and
iii. Estimate spatial patterns, frequency, duration and intensity of the natural hazard.

92. For industrial hazards:

i. Identify types of industrial hazards based on the Project design and layout, use and handling of hazardous materials combined with case studies, and literature search;
ii. Analyze cause and effect events that might lead to industrial hazards, and the probability of occurrence; and
iii. Analyze the severity of industrial hazards including spatial patterns, frequency, duration and intensity of the hazards.

[3] General Technical EIA Guidelines (2017).

[4] UXO is not a natural hazard but is included here as it is a hazard not related to the design and operations of a Project

93. For all hazards

i. Assess the extent and probability of damages, taking into account the planned Project location, layout and design of components, exposure routes and media in the surrounding environment, location of local communities and environmental and social components;
ii. Calculate overall risk and compare with acceptable levels; and
iii. Identify needed risk mitigation measures.

94. The analysis should represent the range of potential impacts of potential accidents and destructive natural events, including those from likely scenarios as well as those from low-probability to high-consequence scenarios. The analysis of risk should be considered in the design of all structures as well as in the development of spill and catastrophic failure contingency plans. The analysis of risk should be considered in the design control technologies, tailings ponds, waste rock dumps stockpiles, processing plants, emission controls, and closure activities.

95. **Emergency Response Plans.** Emergency response plans are to be designed to deal with accidental spills, dam failures, fires, explosions, cyclones, unforeseen weather events, earthquakes, volcanic eruptions and other events. Emergency response plans are to include information on:

i. emergency resources (e.g., fire-fighting equipment; spill clean-up equipment; first aid supplies; medical clinics; emergency vehicles)
ii. communication systems;
iii. administration of the plan;
iv. emergency response procedures (e.g., emergency notification, evacuation, fire suppression, spill clean-up; medical support);
v. communication of the procedures;
vi. emergency preparedness training; and
vii. debriefing and post-traumatic stress procedure.

Detailed Guidance is Available:

Risk Assessment- Technical Guidance for Environmental Impact Assessment of Mining

10. Cumulative Impact Assessment

96. Under the EIA Procedure (2015), a cumulative impact assessment may be required as part of the environmental impact assessment. The decision on whether a cumulative impact assessment should be made at the scoping phase. The decision will depend on whether the Project is likely to contribute significantly to cumulative impacts and/or whether cumulative impacts originating from other developments are likely to significantly affect the Project.

97. Cumulative impacts need to be assessed in mining;

i. when series of mining developments occur within an area will impact the same environmental or social components (perhaps common water bodies or watercourses, wildlife populations, community health, community loss of access to assets, or multiple land takes); or
ii. when a large mining project requires major infrastructure investments (e.g., power transmission lines, major roads needed to provide to access the site, new towns), to support mining operations.

98. It is important is that during the process of identifying environmental and social impacts and risks project Proponent's recognize that: (i) recognize that their activities may contribute to cumulative impacts on valued environmental and social components on which other existing or future developments may also have detrimental effects, and (ii) mitigation measures be designed to avoid and/or minimize these impacts to the greatest extent possible[5].

99. **Cumulative Impact Defined.** Cumulative impacts result from the successive, incremental, and/or combined effects of an action, project, or activity when added to other existing, planned, and/or reasonably anticipated future ones. For practical reasons, the identification and management of cumulative impacts are limited to those effects generally recognized as important on the basis of scientific concerns and/or concerns of affected communities.

100. **Valued Environmental and Social Component**. For a cumulative impact assessment to be effective in supporting good overall environmental and social risk management, its scope must be focused. Good practice is to limit the assessment and management strategies on the most important environmental and social components.

101. Valued Environmental and Social Components[6] (VECs) are those environmental and social attributes that are considered to be important in assessing risks. They may be:

i. physical features, habitats, wildlife populations (e.g., biodiversity),
ii. ecosystem services,
iii. natural processes (e.g., water and nutrient cycles, microclimate),

[5] Good Practice Handbook on Cumulative Impact Assessment and Management. International Finance Corporation. 2011.

[6] Good Practice Handbook on Cumulative Impact Assessment and Management. International Finance Corporation. 2011.

iv. social conditions (e.g., health, economics), or
v. cultural aspects (e.g., traditional spiritual ceremonies).

102. **Recommended Approach**. It is recommended that the cumulative impact assessment follow the general approach outlined in the *Good Practice Handbook on Cumulative Impact Assessment and Management* prepared by International Finance Corporation (2013). This approach has six basic steps:

i. Step 1. Assess the potential impacts and risks of a proposed development over time, in the context of potential effects from other developments and natural environmental and social external drivers on a chosen Valued Environmental and Social Component (VEC).
ii. Step 2. Verify that the proposed development's cumulative social and environmental impacts and risks will not exceed a threshold[7] that could compromise the sustainability or viability of selected VECs.
iii. Step 3. Confirm that the proposed development's value and feasibility are not limited by cumulative social and environmental impacts.
iv. Step 4. Support the development of governance structures for making decisions and managing cumulative impacts at the appropriate geographic scale (e.g., air shed, river catchment, town, regional landscape).
v. Step 5. Ensure that the concerns of affected communities about the cumulative impacts of a proposed development are identified, documented, and addressed.
vi. Step 6. Manage potential risks.

Detailed Guidance is Available:

Cumulative Impact Assessment- Technical Guidance for Environmental Impact Assessment of Mining

[7] The viability or sustainability of VECs, whether ecological, biological, or related to human communities, is their capacity to endure (i.e., for the ecosystem, community, or population to remain diverse and productive over time). This is reflected in the definition of sustainable use in the Convention on Biological Diversity: using the "components of biological diversity in a way and at a rate that does not lead to the long-term decline of biological diversity, thereby maintaining its potential to meet the needs and aspirations of future generations. A threshold is the point at which there is an abrupt change in an ecosystem quality, property or phenomenon, or where small changes in an environmental driver produce large responses in the ecosystem.

11. Community Engagement and Community Development

103. **Basic Requirements**. The EIA shall consider the views, concerns, and perceptions of stakeholders, communities and individuals that could be affected by the Project or who otherwise have an interest in the Project. The EIA shall include the results of consultations with the public, affected populations and other stakeholders on the environmental and social issues. The concerns raised during such consultations are to be considered in assessing impacts, designing mitigation measures, and in the development of management and monitoring plans.

104. As part of the EIA investigation, the Project Proponent is to:

i. timely disclose of all relevant information about the Project and its likely adverse impacts to the public and civil society through local and national media, the website(s) of the Project or Project Proponent, at public places such as libraries and community halls, and on sign boards at the Project site visible to the public, and provide appropriate and timely explanations in press conferences and media interviews;
ii. arrange consultation meetings at regional, state, Nay Pyi Taw Union Territory and local levels, with PAPs, authorities, community-based organizations and civil society;
iii. conduct consultations with concerned government organizations including the Ministry, the concerned sector ministry, regional government authorities; and
iv. arrange field visits for the Ministry and concerned government organizations.

a. Community Engagement

105. Building long term relationships with those affected by their mining activities can improve the identification and management of risks, as well as facilitate the long-term viability of their operations. Meaningful engagement that is proactive, inclusive, accountable, and transparent is more likely to result in good outcomes for both communities and mining companies.

106. A community engagement plan should have been prepared during the Scoping Stage.

107. **Summary of Public Consultations, and Disclosure Activities**. A summary of all public consultation and disclosure activities conducted since the planning of the mine started is to prepared. The results of consultations and other community engagement activities are to be documented. A summary of the main public issues and concerns and the Mine Operator's response to address the issues and concerns is to be presented.

108. **Updated Community Engagement Plan**. The Community Engagement Plan is to be revised and included in the EIA Report. The recommend contents are shown Box 3.

Box 3. Community Engagement Plan Contents

- the stakeholder and potential affected people analysis;
- the results of consultations during the EIA preparation;
- a community engagement strategy;
- proposed consultation and participation activities;
- procedures for disclosure and dissemination of information;
- a grievance redress mechanism; and
- a program for joint environmental and social monitoring and reporting to communities

b. Community Development

109. Community development is the set of activities undertaken by the Mine Operator to directly benefit the community. Such activities include: i) support for education; (ii) infrastructure improvement; (iii) support health care; (iv) social welfare support; (v) promotion of economic development; and (vi) local employment and local procurement programs.

110. **Community Development Plan**. A Community Development Plan is to be prepared. It may include:

i. support to improve eduction through constructing and repairing school buildings and provide grants to students to obtain better educaiton;
ii. support to improve basic infrastructure through repairing road, making draining improvements, and providing water supply and electrical supply;
iii. support to improve health through treatment for patients for local communities throuhgh a mobile clinic and raises awareness and knowledge through seminars on communicable diseases;
iv. support to economic development through promotion of small and medium enterprise development at the community level; and
v. program for employment of workers from local communities and purchases of goods and services from local suppliers.

Detailed Guidance is Available:

Community Engagement and Community Development - Technical Guidance for Environmental Impact Assessment of Mining

12. Mine Closure Plan

111. Mine closure is an integral part of the mining cycle. It is to be investigated and planned for before a mine begins to operate. Mine sites are rehabilitated and stabilized so they are suitable for a sustainable land use that is compatible with the surroundings. Closure must meet all regulatory requirements in the conditions of the Mining License. In addition, human resource management and community involvement and consultation is required.

112. Rehabilitation activities at a modern mine include: decommissioning the mine, providing surface drainage and erosion protection across the entire site, establishing self-sustaining vegetative cover, meeting water quality standards, and minimizing post-closure maintenance requirements. In planning for closure, there are four key objectives that must be considered:

i. protect public health and safety;
ii. alleviate or eliminate environmental damage;
iii. achieve a productive use of the land, or a return to its original condition or an acceptable alternative; and,
iv. to the extent achievable, provide for sustainability of social and economic benefits resulting from mine development and operations.

113. A Mine Closure Plan is to be prepared. The Plan is to include activities for progressive rehabilitation of the site over the life of the mine. This will minimize the effort and cost for the final rehabilitation. The Mine Closure Plan is to include requirements for updating. It is to be updated within two years of the start of operations. Thereafter, it should be updated every five years. Five years before mine closure, a Post Closure Plan is to be submitted with the Mine Closure Plan. The Post-Closure Plan is to include activities for post-closure monitoring and maintenance of all mine facilities, including surface and underground mine workings, tailings, leach pads, and waste disposal facilities. It is to include a plan and financing for long-term monitoring and maintenance.

114. The basic outline for a Mine Closure Plan is

i. objectives;
ii. general approach;
iii. remediation strategy;
iv. current setting;
v. open cut mine reclamation;
vi. underground mine reclamation;
vii. tailings impoundment;
viii. mine waste rock surface covers and rehabilitation;
ix. water management;
x. general site closure;
xi. land use;
xii. closure and reclamation schedule; and
xiii. interim plan and cost estimate.

Detailed Guidance is Available:

Mine Closure Plan - Technical Guidance for Environmental Impact Assessment of Mining

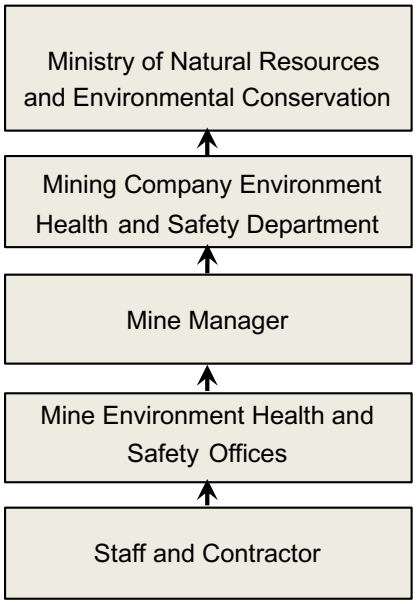
13. Environmental and Social Management Planning

115. Environmental and social management plans are required for all mining projects. Environmental and social management planning is guided by three key principles.

i. Avoid, Minimize, Restore, or Offset Impacts, and Enhance Positive Impacts and
ii. Prepare an Environmental and Social Management Plan; and
iii. Implement the Environmental and Social Management Plan and Monitor its Effectiveness.

116. **Environmental and Social Management Systems**. Some organizations have a well-defined corporate environmental and social management system, which includes (i) an environmental and social policy; (ii) qualified environmental and social staff including a senior officer, who has overall responsibility for environmental and social affairs; (iii) environmental and social management procedures; and (iv) reporting mechanisms for reporting on environmental and social management performance.

117. However, many do not. In these cases, the ESMS must established at the Mine Level. The figure adjacent shows an example of the institutional arrangements needed for the environmental and social management of a mine.



118. **Environmental Compliance Monitoring.** The Mine Operators are responsible to engage in self-monitoring monitoring of the implementation of all the commitments in the ESMP and/or the ECC. Mine Operators are to employ qualified and social environmental staff; and provide a budget for supervision and monitoring ESMP implementation and compliance with ECC conditions. The Mine Operators have to submit monitoring reports periodically to the Department of Mines and Environmental Conservation Department. The reports are required to be disclosed to the public.

119. **Preparing and Environmental and Social Management Plan**. For mining projects, the recommended contents for an environmental and social management plan is shown in Box 4.

Box 4. Basic Elements of an Environmental and Social Management Plan:

- Institutional arrangements for implementation of the ESMP
  - Responsibilities
  - Compliance Monitoring and Reporting
- A summary potential environmental and social impacts
- Mitigation measures
- Emergency response plans
- Environmental quality monitoring requirements
- Community Engagement and Community Development
- Grievance Redress Mechanism
- Capacity development and training programs
- Implementation schedule; and
- Cost estimate

120. The Environmental and Social Management Plan (ESMP) is to be used throughout the mine life cycle. It will guide the mine manager, mining company staff, and contractors in the implementation of environmental and social management measures. The ESMP must detail the institutional arrangements – including responsibilities and reporting requirements for ESMP implementation. The roles of mining companies staff at the corporate level are to be described. Staffing requirements and positions are to be identified. Training programs are to be planned.

121. The ESMP must summarize all the environmental and social impacts. It must describe mitigation measures to address all impacts. Emergency response plans are to be prepared and incorporated into the ESMP. All environmental quality monitoring requirements are to included.

122. Community engagement activities during implementation of the ESMP are to be described. Complaint management and grievance redress procedures are to be outlined. Plans for implementation of community development activities are to be included.

123. A detailed budget for all mitigation measures, rehabilitation programs, environmental monitoring programs, and community engage programs is to be provided. The schedule for implementation of all ESMP activities is to be included.

Detailed Guidance is Available:

Environmental Management Planning- Technical Guidance for Environmental Impact Assessment of Mining

14. Conclusion

124. The Conclusion should highlight the main environmental and social impacts and describe the mitigation measures and rehabilitation programs to address impacts. The Environmental and Social Management System for implementation, supervision, and monitoring of the ESMP is to be described. The budgeted amount for the ESMP is to be included.

125. The EIA Report must come to conclusion as to whether or not the project can be implemented without *significant adverse environmental and social impacts*.

C. Contents of Environmental Impact Assessment Report

126. Table 7 summarizes the main contents of an EIA report. A detailed outline is provided in Appendix 2.

Table 7. Format for an Environmental Impact Assessment Report for a Mine

Report Section	Key Content
Acronyms and Definitions	• All acronyms used in the report should be explained • Essential terms should be defined and explained
1. Executive Summary	• Brief description of Project components and their environmental and social setting • Summary of the key potential impacts and risks including cumulative impacts, mitigation measures and residual impacts • Summary of Community Engagement Plan • Summary of Community Development Plan • Summary of Environmental and Social Management Plans
2. Introduction	
Project Context	• Project background and brief history and the main findings of previous technical, economic, environmental or social studies • Presentation of the Project Proponent and EIA consultant team
Endorsement of the EIA	• Confirmation and Letter of Undertaking completed and signed by the Project Proponent • Endorsement by the Third Party EIA Consultant
3. Policy, Legal and Institutional Framework	• Corporate environmental and social policies • Myanmar policy and legal framework • International conventions and treaties relevant to the • Myanmar Government institutional framework • International policies, guidelines and standards (if applicable) • Environmental Quality Standards
4. Project Description	• Description of the Project and its objectives. • Description of the Project size, installations, technology, infrastructure, production, use of materials and resources and generation of waste and emissions together with overview maps and site layout maps for each Project phase. • For a detailed listing of the elements of the Project Description- See Appendix 2. Contents of an Environmental Assessment Report Section 4. Project Description

Report Section	Key Content
5. Analysis of Alternatives	• Methodology • Description of each alternative with prediction and evaluation of all major potential environmental and social impacts and risks • Only include reasonably feasible alternatives that are within the scope and area of business of the Project Proponent • State reasons for selection of the preferred alternative
6. Description of the Natural and Social Environment	• Only present data and information that are relevant and useful • Methodology • Description of the administrative, physical, biological, social, economic, cultural and visual characteristics of the wider area surrounding the Project site • Sensitive environmental, social, cultural and visual components • For a detailed listing of the environmental and social components - See Appendix 2. Contents of an Environmental Assessment Report Section 6 Description of Natural and Social Environment
7. Identification of Impacts and Mitigation Measures	• Methodology • Identification and assessment of environmental and social impacts and risks, and determination of mitigation measures and residual impacts by Project phase • For each Project phase, divide the assessment into themes and geographic areas/sites
8. Risk Assessment	• Methodology • Assessment of natural and industrial hazards • Emergency Response Plans
9. Cumulative Impact Assessment	• Methodology • Assessment by Project phase • Management framework for cumulative impacts

10. Community Engagement and Community Development	• Methodology
	• Community Engagement Planning
	  ○ Potentially Affected People and other stakeholders
	  ○ Results of consultations
	  ○ Issues identified by stakeholders
	  ○ Response to comments and recommendations
	  ○ Community engagement activities during implementation
	• Community Development Plan

11. Mine Closure Plan	• Objectives • General Approach • Remediation Strategy • Current Setting • Reclamation Measures • Future Land Use • Closure and Reclamation Schedule • Interim Plan and Cost Estimate

Report Section	Key Content

12. Environmental and Social Management Plan	• Institutional arrangements for implementation of the ESMP
	  ○ Responsibilities
	  ○ Compliance Monitoring and Reporting
	• A summary potential environmental and social impacts
	• Mitigation measures
	• Emergency response plans
	• Environmental quality monitoring requirements
	• Community Engagement and Community Development
	• Grievance Redress Mechanism
	• Capacity development and training programs
	• Implementation schedule; and
	• Cost estimate

13. Conclusion	• Conclusion as to whether or not the project can be implemented without *significant adverse environmental and social impacts*.

V. PREPARATION OF INITIAL ENVIRONMENTAL EXAMINATION

127. **Initial Environmental Examination Type Project** means a Project judged by MONREC to have some adverse impacts, but of lesser degree and/or significance than those for EIA-type Projects[8]. It means generally those which: (i) are limited in scope or size; (ii) have well known environmental and social impacts that are, for the most part, temporary, local and reversible; or (iii) have impacts which can be mitigated and managed by well-proven and available technologies and practices but with respect to which specific controls, measures and alternatives must be assessed, designed and implemented.

A. Scope of an Initial Environmental Examination (IEE).

128. In general, the scope the analysis required of an IEE is more limited than for an EIA. Under the EIA Procedure (2015), a scoping report is not required for an IEE. However, it is recommended that the proponent provide an overview of the scope of the IEE and a draft table of contents with the Project Proposal, which is submitted at the Screening Stage.

129. **Consideration of Alternatives and Cumulative Impact Assessment.** Consideration of alternatives and cumulative impact assessment may need to be included in the IEE report. However, the scope of these analyses depends upon the nature of project and its environmental setting. In some cases, there is no need to consider alternatives or conduct a cumulative impact assessment. The Proponent should consult with ECD as whether these analyses are needed.

B. IEE Investigation

130. For the IEE Investigation is to follow the same approach as for an EIA investigation (*See Section IV.B, Preparation of an Environmental Impact Assessment)*. Basic steps are:

i. defining the geographic boundaries of the assessment;
ii. defining the time frame for the assessment;
iii. preparing the project description;
iv. analysis of alternatives (*if required*);
v. description of the natural and social environment;
vi. assessment of impacts;
vii. designing mitigation measures;
viii. cumulative impact assessment (*if required*);
ix. designing environmental quality monitoring programs;
x. risk assessment and emergency response planning;
xi. community engagement and community development planning;
xii. mine closure planning; and
xiii. environmental and social management planning.

[8] Myanmar EIA Procedure (2015).

C. Baseline Data Collection

131. Environmental baseline studies are required for air quality, water quality, and noise in relation to sensitive receptors[9]. A biodiversity assessment may be needed where there are potential impacts on natural habitat, Key Biodiversity Areas or Protected Areas.

D. Community Engagement and Community Development

132. **Community Engagement Plan.** A community engagement plan is required**.** However, it is recommended that consultation first be undertaken at the Township level, involving those communities that will be potentially directly affected. Also include those communities that will be the beneficiaries of the community development plan. As necessary, consultations should be expanded to the State or Regional Level

133. **Community Development Plan**. A community development plan is required. It should describe the community development agreement. It may include activities for: i) support for education; (ii) infrastructure improvement; (iii) support health care; (iv) social welfare support; (v) promotion of economic development; and (vi) local employment and local procurement programs.

E. Contents of the IEE Report

134. In general, the contents of the IEE report are the same as for an EIA. However, as discussed above, there may or may not need to be sections on alternative analysis or cumulative impact assessment.

[9] Sensitive receptors include residential households, temples, monasteries, mosques, and hospitals/health clinics near the mine, mine access roads, and transportation routes.

Table 8. Format for an IEE Report

Report Section	Key Content
Table of Contents	
Acronyms and Definitions	• All acronyms used in the report should be explained • Essential terms should be defined and explained
1. Executive Summary	• Brief description of Project components and their environmental and social setting • Summary of the key potential impacts and risks including cumulative impacts, mitigation measures and residual impacts • Summary of Community Engagement Plan • Summary of Community Development Plan • Summary of Environmental and Social Management Plans
2. Introduction	
Project Context	• Project background and brief history and the main findings of previous technical, economic, environmental or social studies • Presentation of the Project Proponent and EIA consultant team
Endorsement of the EIA	• Confirmation and Letter of Undertaking completed and signed by the Project Proponent • Endorsement by the Third Party EIA Consultant
3. Policy, Legal and Institutional Framework	• Corporate environmental and social policies • Myanmar policy and legal framework • International conventions and treaties relevant to the • Myanmar Government institutional framework • International policies, guidelines and standards (if applicable)
4. Project Description	• Description of the Project and its objectives. • Description of the Project size, installations, technology, infrastructure, production, use of materials and resources and generation of waste and emissions together with overview maps and site layout maps for each Project phase. • For a detailed listing of the elements of the Project Description- See Appendix 2. Contents of an Environmental Assessment Report Section 4 Project Description
5. Analysis of Alternatives	*If required by ECD*
6. Description of the Natural and Social Environment	• Only present data and information that are relevant and useful for the assessment • Methodology • Description of the administrative, physical, biological, social, economic, cultural and visual characteristics of the wider area surrounding the Project site • Sensitive environmental, social, cultural and visual features within the study area • For a detailed listing of the environmental and social components - See Appendix 2. Contents of an Environmental Assessment Report Section 6 Description of Natural and Social Environment

Report Section	Key Content
7. Identification of Impacts and Mitigation Measures	• Methodology • Identification and assessment of environmental and social impacts and risks, and determination of mitigation measures and residual impacts by Project phase • For each Project phase, divide the assessment into themes and geographic areas/sites
8. Risk Assessment	• Methodology • Assessment of natural and industrial hazards • Emergency Response Plans
9. Cumulative Impact Assessment	*If required by ECD*.

10. Community Engagement and Community Development	• Methodology
	• Community Engagement Plan
	  ○ Potentially Affected People and other stakeholders
	  ○ Results of consultations
	  ○ Issues identified by stakeholders
	  ○ Response to comments and recommendations
	  ○ Community engagement activities during implementation
	• Community Development Plan

11. Mine Closure Plan	• Objectives • General Approach • Remediation Strategy • Current Setting • Reclamation Measures • Future Land Use • Closure and Reclamation Schedule • Interim Plan and Cost Estimate

12. Environmental and Social Management Plan	• Institutional arrangements for implementation of the ESMP
	  ○ Responsibilities
	  ○ Compliance Monitoring and Reporting
	• A summary potential environmental and social impacts
	• Mitigation measures
	• Emergency response plans
	• Environmental quality monitoring requirements
	• Community Engagement and Community Development
	• Grievance Redress Mechanism
	• Capacity development and training programs
	• Implementation schedule; and
	• Cost estimate

13. Conclusion	• Conclusion as to whether or not the project can be implemented without *significant adverse environmental and social impacts*.

VI. NEW MINES: PREPARATION OF A STAND-ALONE ENVIRONMENTAL MANAGEMENT PLAN

135. New mining projects that are not considered to be EIA Type Projects or IEE Type Projects will normally be required to prepare a Stand-alone Environmental Management Plan. Most small-scale mines will require a Stand-alone Environmental Management Plan.

A. Scope of Stand-alone Environmental Management Plan

136. Stand-alone Environmental Management Plans for New Mines need not include an analysis of alternatives or a cumulative impact assessment.

B. Stand-alone Environmental Management Planning

137. For Stand-alone Environmental Management Planning, a similar approach for an EIA investigation (see section IV.B) is recommended. The steps are:

i. Defining the Geographic Boundaries of the Assessment;
ii. Defining the Time Frame for the Assessment;
iii. Preparing the Project Description;
iv. Description of the Natural and Social Environment;
v. Assessment of Impacts;
vi. Designing Mitigation Measures;
vii. Designing Environmental Quality Monitoring Programs;
viii. Risk Assessment and Emergency Response Planning;
ix. Community Development and Community Engagement;
x. Mine Closure Planning and
xi. Environmental and Social Management Planning

C. Baseline Data Collection

138. There is no specific requirement to conduct baseline environmental quality monitoring. However, information on land use and sensitive receptors[10] must be provided. A biodiversity assessment may be needed in where there are potential impacts on natural habitat, key biodiversity areas, or protected areas. If the biodiversity assessment concludes that there will impacts on natural habitat, an IEE will be required.

D. Community Engagement and Community Development

139. **Community Engagement Plan.** A community engagement plan is required**.** However, it is recommended that consultation first be undertaken at the Township level, involving those communities that will be potentially directly affected. Also include those communities that will be

[10] Sensitive receptors include residential households, temples, monasteries, mosques, and hospitals/health clinics near the mine or mine access roads.

the beneficiaries of the community development plan. As necessary, consultations should be expanded to the State or Regional Level

140. **Community Development Plan**. A community development plan is required. It should describe the community development agreement. It may include activities for: i) support for education; (ii) infrastructure improvement; (iii) support health care; (iv) social welfare support; (v) promotion of economic development; and (vi) local employment and local procurement programs.

E. New Mines: Stand-alone Environmental Management Plan Report Format

Table 9. Format for Stand-alone Environmental Management Plan Report for New Mines

Report Section	Key Content
Table of Contents	
Acronyms and Definitions	• All acronyms used in the report should be explained • Essential terms should be defined and explained
1. Executive Summary	• Brief description of Project components and their environmental and social setting • Summary of the key potential impacts and risks including cumulative impacts, mitigation measures and residual impacts • Summary of Community Engagement Plan • Summary of Community Development Plan • Summary of Environmental and Social Management Plans
2. Introduction	
Project Context	• Project background and brief history and the main findings of previous technical, economic, environmental or social studies • Presentation of the Project Proponent and EIA consultant team
Endorsement of the EIA	• Confirmation and Letter of Undertaking completed and signed by the Project Proponent • Endorsement by the Third Party EIA Consultant
3. Policy, Legal and Institutional Framework	• Corporate environmental and social policies • Myanmar policy and legal framework • International conventions and treaties relevant to the • Myanmar Government institutional framework • International policies, guidelines and standards (if applicable)
4. Project Description	• Description of the Project and its objectives. • Description of the Project size, installations, technology, infrastructure, production, use of materials and resources and generation of waste and emissions together with overview maps and site layout maps • For a detailed listing of the elements of the Project Description- See Appendix 2. Contents of an Environmental Assessment Report Section 4 Project Description
5. Description of the Natural and Social Environment	• Only present data and information that are relevant and useful for the assessment • Description of the administrative, physical, biological, social, economic, cultural and visual characteristics of the area surrounding the Project site

Report Section	Key Content
	• Sensitive environmental, social, cultural and visual features within the study area • For a detailed listing of the environmental and social components - See Appendix 2. Contents of an Environmental Assessment Report Section 6 Description of Natural and Social Environment.
6. Identification of Impacts and Mitigation Measures	• Identification and assessment of environmental and social impacts and risks, and determination of mitigation measures and residual impacts by project stage
7. Risk Assessment	• Methodology • Assessment of natural and industrial hazards • Emergency Response Plans

8.Community Engagement and Community Development	• Methodology
	• Community Engagement Planning
	  o Potentially Affected People and other stakeholders
	  o Results of consultations
	  o Issues identified by stakeholders
	  o Response to comments and recommendations
	  o Community engagement activities during implementation
	• Community Development Planning

9. Mine Closure Plan	• Objectives • General Approach • Remediation Strategy • Current Setting • Reclamation Measures • Future Land Use • Closure and Reclamation Schedule • Interim Plan and Cost Estimate

10. Environmental and Social Management Plan	• Institutional arrangements for implementation of the ESMP
	  o Responsibilities
	  o Compliance Monitoring and Reporting
	• A summary potential environmental and social impacts
	• Mitigation measures
	• Emergency response plans
	• Environmental quality monitoring requirements
	• Community Engagement and Community Development
	• Grievance Redress Mechanism
	• Capacity development and training programs
	• Implementation schedule; and
	• Cost estimate

11. Conclusion	• Conclusion as to whether or not the project can be implemented without *significant adverse environmental and social impacts*.

VII. EXISTING MINES: PREPARATION OF A STAND-ALONE ENVIRONMENTAL MANAGEMENT PLAN

141. The EIA Procedure (2015) Section 8 provides for addressing the environmental issues associated with existing facilities, including mines. Section 8 requires that:

> "Any Project already in existence prior to the issuance of the Procedure, or the construction of which has already commenced prior to the issuance of the Procedure, and which, in either case, shall be required to undertake, within the timeframe prescribed by the Department, an *environmental compliance audit*, including on-site assessment to identify past and/or present concerns related to that Project's Environmental Impacts, and to:
>
> a) develop an EIA or IEE or EMP;
> b) obtain an ECC; and
> c) take appropriate actions to mitigate Adverse Impacts in accordance with the Law, the Rules, and other applicable laws."

142. For guidance on the preparation EIAs of existing mines use the guidance provide in Section IV above. For guidance on the preparation IEEs of existing mines use the guidance provide in Section V above.

143. Projects that are not considered to be EIA Type Projects or IEE Type Projects will normally be required to prepare a Stand-alone Environmental Management Plan

144. These Guidelines are for preparation of a Stand-alone Environmental Management Plan for an existing mine that is: (i) under construction; or (ii) in the operating stage; or (iii) in the closure stage.

145. **Previous Format for Standalone Environmental Management Plan for Existing Mines**. In late 2016, ECD requested that all existing mines prepare a Standalone Environmental Management Plan as a condition of license renewal. Those Standalone Environmental Management Plans were to prepared in a standard format that was issued by ECD (letter no. EIA-2/9 (937/2016) dated 7/11/2016). That standard format has been revised in this Guideline.

146. **Content of the Guidelines.** Section A of these Guidelines describes the steps in preparation of a Standalone Environmental Management Plan for Existing Mines. Section B discusses special considerations associated with environmental assessment of existing mines. Section C provides the recommended format for the Standalone Environmental Management Plan report.

147. **Use of the Guidelines.** These guidelines are for use by Project Proponents and EIA Consultants in the preparation Standalone Environmental Management Plans of existing mining projects and activities under by the Myanmar Procedure (2015). However, they are also a useful reference for Environmental Reviewers including the Interdepartmental EIA Review Committee.

A. Special Considerations for Existing Mines

148. Environmental assessments undertaken during the planning stages for new mines are based on the prediction of the impacts that might happen during construction, operation, and closure of the mine. However, for existing mines, many of the environmental and social impacts may have already occurred. These past and present impacts need to be assessed. Environmental and social conditions will have changed. A new environmental and social baseline needs to be established.

1. Previous Environmental Assessment Activities

a. IEE, EIAs, and EMPs

149. Mines that have been subjected to an environmental assessment process, whether it was the Myanmar EIA Procedures (2015) or procedures in place prior 2015, will have prepared environmental assessment documents (e.g., IEE Reports or EIA Reports and Environmental and Social Management Plans. These documents should be used as the starting point for the preparation of the Standalone Environmental Management Plan.

b. Environmental Compliance Certificates

150. An Environmental Compliance Certificate is the approval document for an EIA, IEE, an or a Stand-alone Environmental Management Plan. It is issued in accordance with the EIA Procedure (2015). The ECC is granted for a “specific, clearly identified project” as defined in the EIA Procedure (2015), Article 90. The ECC prescribes the environmental and social management conditions for a Project.

c. Environmental and Social Management System

151. Some Mining Companies have a well-defined corporate environmental and social management system (ESMS), which includes (i) an environmental and social policy; (ii) qualified environmental and social staff including a senior officer, who has overall responsibility for environmental and social affairs; (iii) environmental and social management procedures; and (iv) reporting mechanisms for reporting on environmental and social management performance. However, many do not.

152. In these cases, the ESMS must established at the Mine Level. The primary functions of an ESMS at the mine level are:

i. Implementation of the ESMP;
ii. supervision and monitoring of the implementation of the ESMP; and
iii. periodic reporting on compliance with ESMP and the ECC conditions.

d. Environmental and Social Monitoring Reports

153. As part of their monitoring and reporting responsibilities, Mine Operators are to prepare Environmental and Social Monitoring Reports. Well-prepared monitoring reports provide information on:

i. activities undertaken to implement the ESMP;
ii. activities for supervision and compliance monitoring the implementation of the ESMP or the ECC;

iii. environmental quality monitoring programs; and
iv. issues and problems that have arisen during implementation and actions taken to address the issue and problems.

154. These monitoring reports are to be used in the assessment of the actual impacts that have occurred to date, and to determine whether mitigation measures have been effective.

e. Mines with No Previous Environmental Assessment

155. If there has been no environmental assessment, and there is no IEE or EIA Report and/or Stand-alone Environmental Management Plan, the mine may still have an ESMS. In this case, the adequacy of the ESMS is to be assessed in terms of the requirements of the EIA Procedure (2015). Improvements are to be recommended to bring the mine ESMS in compliance with the EIA Procedure (2015).

f. Mines with No Environmental and Social Management System

156. In some cases, the mine may not have a functioning ESMS. In this case, the Stand-alone Environmental Management Plan needs to be prepared based on new consultations, new studies, and new analyses.

2. Environmental and Social Audit

157. For existing mines, particularly mines that have been operating for a number of years, environmental and social impacts have already occurred. Many the impacts can be directly observed. Other can be assessed through analysis of environmental quality monitoring data. It is necessary to document all the past and current impacts of the mine in the Standalone Environmental Management Plan report.

158. In practice, it is recommended the Mine Operator undertake an environment and/or social compliance audit, including on-site assessment, to identify past and present environmental and social issues and impacts. The objective of the compliance audit is to determine whether environmental and social management practices of the mine are in accordance with the EIA Procedure (2015). If an ECC has been issued, the audit should focus on compliance with the environmental and social conditions contained in the ECC.

159. Where corrective action is needed a plan is to be prepared. The Corrective Action Plan will define necessary remedial actions, the budget for such actions, and the time frame for resolution of the environmental and social issue.

B. Stand-alone Environmental Management Planning for Existing Mines

160. Unless specifically required by the Ministry Stand-alone Environmental Management Plans for existing mines need not include an analysis of alternatives or a cumulative impact assessment.

161. Basic steps for Stand-alone Environmental Management planning for existing mines are:

i. Defining the Geographic Boundaries of the Assessment;
ii. Defining the Time Frame for the Assessment;
iii. Preparing the Project Description;
iv. Description of the Natural and Social Environment;
v. Assessment of Impacts;
vi. Designing Mitigation Measures;
vii. Designing Environmental Quality Monitoring Programs;
viii. Risk Assessment and Emergency Response Planning;
ix. Community Engagement and Community Development;
x. Mine Closure Planning; and
xi. Environmental and Social Management Planning.

162. This section highlights the additional tasks that need to be undertaken to address the special considerations with respect to existing mines.

1. Project Description

163. The project description is an essential part of the Standalone Environmental Management Plan. The project description should include a clear statement of the purpose and need with a justification of for the project. The description should cover all phases from site preparation through construction to operation to closure. The project description is also to provide information on (i) mining method, (ii) processing system; (iii) waste rock: stockpiles, dumps, and tailings; (iv) transportation facilities; (v) water management; (vii) mine closure; and (viii) employment, local hiring, and local purchasing. The description should provide details on amount and type of emissions to air, effluent discharges to water, and solid waste disposal.

164. A detailed project description based on elements listed in *Preparation of an Environmental Impact Assessment* (Section IV, Box 1*)* is to be prepared. Any existing project description must be updated based on current conditions and current practices. Recent maps and site layout diagrams need to be provided. A complete listing of all facilities with locations indicated on maps and diagrams is to be provided. Current estimates of quantities of ore extraction, ore processing, water use, energy use, chemical inputs, emissions, effluents, solid waste, and hazardous waste are to be provided.

Detailed Guidance is Available:

Project Description - Technical Guidance for Environmental Impact Assessment of Mining

2. Description of the Natural and Social Environment

165. A description of current natural and social is to be prepared. The description of the natural and social baseline environment conditions should provide sufficient, relevant and updated information on the physical, biological, economic, social, cultural and visual components. Many components can be best represented as spatial data through various types of maps. In addition to the basic physical features and infrastructure of the study area, it is valuable to have maps identifying vegetation types/communities, animal habitat, and major population centers. See *Appendix 3, Section 6. Description of the Natural and Social Environmen*t for the recommended environmental and social components to be included.

166. **New Environmental and Social Baseline**. A new environmental and social baseline is to be prepared based on current environmental and social conditions. New environmental quality monitoring data for air, water, noise, and vibration is to be collected. As necessary, biodiversity assessments and new social surveys may be required.

3. Assessment of Impacts

167. The assessment of impacts must:

i. document the changes in the environmental and social baseline;
ii. assess past and present impacts and mitigation effectiveness; and
iii. assess the potential for future impacts.

a. Changes in the Environmental and Social Baseline

168. **Comparative Analysis.** If a previous environmental baseline was prepared for the mine, a comparative analysis with the new baseline conditions is to be undertaken. Changes are to be documented. Where possible, the causes of changes should be explained.

b. Assessment of Past and Present Impacts and Mitigation Effectiveness

169. The assessment is to:

i. determine what the actual environmental and social impacts have been and are;
ii. determine whether the measures designed to mitigate (i.e., avoid, minimize, restore and rehabilitate, offset, or enhance) environmental and social impacts have been effective; and;
iii. recommend corrective actions to address adverse environmental and social impacts.

170. Environmental sampling and laboratory analysis made need be conducted to provide the information needed to determine the effectiveness of environmental mitigation measures. If there a previous environmental baseline, the comparative analysis will identify changes in environmental and social conditions. These changes needed to analyzed and assessed to determine the actual impacts.

c. Assessment of Potential Future Impacts

171. If the mine will continue to operate. It is necessary to assess of the potential future environmental and social impacts. Existing assessments are to be updated on the new information provided on past and present environmental and social impacts.

d. Identification of Impacts

172. The impacts that need to be considered are summarized in Appendix 1.

Detailed Guidance is Available:

Appendix1. Environmental and Social Issues during the Mining Life Cycle.

4. Designing Mitigation Measures

a. Design of Corrective Actions

173. The first priority is to design corrective actions needed to address the current environmental and social issues and adverse impacts.

b. Design of Measures to Mitigate Future Impacts

174. The second priority is design mitigation measures to avoid, minimize, restore and rehabilitate, or offset adverse future environmental and social impacts. Programs or activities need to be designed to enhance the project's positive benefits.

c. Summary of Mitigation Measures

175. Mitigation measures can be broadly grouped into eleven categories (See Table 5, Section IV, *Preparation of an Environmental Impact Assessment*). All of these mitigation measures need to be considered for every mine. For detailed guidance on designing mitigation measures see *Technical Guidance to Environmental Impact Assessment of Mining*.

Detailed Guidance is Available:

Technical Guidance for Environmental Impact Assessment of Mining provides detailed guidance on most mitigation measures

5. Environmental Quality Monitoring Programs

176. As discussed above, new baseline environmental quality monitoring needs to be undertaken. The monitoring results need to be examine and interpreted. Based on the results a new environmental baseline is to be established.

177. **Description of the New Baseline.** This is to include the overall environmental monitoring program design and including sampling protocols used. The description should present the detailed results of the sampling programs. It should outline the method and approach. It should clearly indicate the environmental baseline values for all parameters which will be used to evaluation construction stage environmental monitoring programs.

6. Risk Assessment

178. The risk assessment included in the Standalone Environmental Management Plan report should follow the same approach as that described in EIA Investigation Section IV B.9. It should deal with risks posed by both natural hazards and mining industrial hazards associated with each project phase. The risk assessment should begin with an identification of hazards.

a. Chronology and Analysis of Natural Events and Industrial Accidents

179. A chronology[11] of natural hazard events and industrial accidents that have occurred during the life of the mine is to be prepared. Estimates of damage and loss of life are to be included. A description of the Mine Operator's and Government responses to each natural hazard event or industrial accident is to be included. Recommendations for improvement are to be developed.

b. The Emergency Response Plans

180. Based on the past experience, the emergency response plans are to be prepared and/or updated as necessary. These emergency response plans are to be designed to deal with accidental spills, dam failures, fires, explosions, cyclones, unforeseen weather events, earthquakes, volcanic eruptions and other events.

Detailed Guidance is Available:

Risk Assessment - Technical Guidance for Environmental Impact Assessment of Mining

7. Community Engagement and Community Development

181. All existing mines have a history of engagement with nearby communities. This history of community engagement and any community development activities need to be documented. An evaluation of the plans and programs is necessary to learn from experience to date.

a. Community Engagement

182. Building long term relationships with those affected by their mining activities can improve the identification and management of risks, as well as facilitate the long-term viability of their operations. Meaningful engagement that is proactive, inclusive, accountable, and transparent is more likely to result in good outcomes for both communities and mining companies.

183. **Summary of Public Consultations, and Disclosure Activities**. A summary of all public consultation and disclosure activities conducted since the planning of the mine started is to prepared. The results of consultations and other community engagement activities are to be documented. A summary of the main public issues and concerns and the Mine Operator's response to address the issues and concerns is to be presented.

184. **Community Engagement Plan**. A new or revised community engagement plan is to be prepared. It should include the requirements listed in Box 5.

[11] Chronology is "the arrangement of events and their dates in the order of their occurrence"

Box 5. Community Engagement Plan

- Stakeholder analysis
- Engagement strategy development
- Engagement strategy implementation
- Disclosure and dissemination of information
- Consultation and participation
- Grievance mechanisms
- Joint environmental and social monitoring and on-going reporting to impacted communities.

b. Community Development

185. Community development is the set of activities undertaken by the Mine Operator to directly benefit the community. Such activities include: i) support for education; (ii) infrastructure improvement; (iii) support health care; (iv) social welfare support; (v) promotion of economic development; and (vi) local employment and local procurement programs.

186. **Summary of Community Development Activities.** A summary of all community development activities conducted since the planning of the mine started is to prepared. The results of community development activities are to be documented. A summary of the existing community development is to be included.

187. **Community Development Plan**. A new or revised community developed plan is to be prepared. It may include:

i. Support to improve eduction through constructing and repairing school buildings and provide grants to students to obtain better educaiton;
ii. Support to improve basic infrastructure through repairing road, making draining improvements, and providing water supply and electrical supply;
iii. Support to improve health through treatment for patients for local communities throuhgh a mobile clinic and raises awareness and knowledge through seminars on communicable diseases;
iv. Support to economic development through promotion of small and medium enterprise development at the community level; and
v. Program for employment of workers from local communities and purchases of goods and services from local suppliers.

Detailed Guidance is Available:

Community Development - Technical Guidance for Environmental Impact Assessment of Mining

8. Mine Closure Plan

188. The mine closure management plan for existing mines is similar to that required for all mines (see Box 6). Mine closure is to be investigated and planned for before a mine begins to operate. Closure must meet all regulatory requirements in the conditions of the Mining License and the ECC. Rehabilitation activities include: decommissioning the mine, providing surface drainage and erosion protection across the site, establishing self-sustaining vegetative cover, meeting water quality standards, and minimizing post-closure maintenance requirements.

a. Summary of Ongoing and Completed Rehabilitation and Restoration Activities

189. A description of restoration and rehabilitation activities (e.g., progressive rehabilitation of waste rock dumps) undertaken to date is to be included.

b. Mine Closure Plan

A new of revised mine closure plan is to be prepared to take account of new conditions, new technologies, or constraints. It should include the contents of Box 6.

Box 6. Mine Closure Plan Contents

- Objectives
- General Approach
- Remediation Strategy
- Current Setting
- **Rehabilitation and Restoration to Date**
- Open Cut Mine Reclamation
- Underground Mine Reclamation
- Tailings Impoundment
- Mine Waste Rock Surface Covers and Rehabilitation
- Water Management
- General Site Closure
- Land Use
- Closure and Reclamation Schedule
- Interim Plan and Cost Estimate.

Detailed Guidance is Available:

Mine Closure Plan - Technical Guidance for Environmental Impact Assessment of Mining

9. Environmental and Social Management Planning

190. The environmental and social management plan for existing mines is similar to that required for all mines (see Box 7). Of course, the plan may be based on an existing environmental plan.

191. One important addition, is a corrective action plan to address adverse environmental and social impacts.

Box 7. Basic Elements of an Environmental Management Plan for an Existing Mine:

- Institutional arrangements for implementation of the ESMP
  - Responsibilities
  - Compliance Monitoring and Reporting
- A summary potential environmental and social impacts
- Mitigation measures
  - **Corrective Action Plan**
  - Measures to Mitigate Potential Future Impacts
- Emergency response plans
- Environmental quality monitoring requirements
- Community Engagement and Community Development
- Grievance Redress Mechanism
- Capacity development and training programs
- Implementation schedule; and
- Cost estimate

Detailed Guidance is Available:

Environmental Management Planning - Technical Guidance for Environmental Impact Assessment of Mining

10. Conclusion

192. The Conclusion should highlight the main environmental and social impacts and describe the mitigation measures and rehabilitation programs to address the impacts. Any corrective action plans are to be summarized.

193. The Environmental and Social Management System for implementation, supervision, and monitoring of the environmental and social management plan is to be described. The schedule and cost estimate for implementation of the Environmental and Social Management Plan is to be included.

194. In this section, the Standalone Environmental Management Plan must demonstrate that can be mine can be constructed and /or operated without *significant adverse environmental and social impacts*.

C. Existing Mines: Stand-alone Environmental Management Plan Report Format

195. This section summarizes the key contents for each section of the Stand-alone Environmental Management Plan for Existing Mines Report (Table 10).

Table 10. Standalone Environmental Management Plan Report Format for Existing Mines.

Report Section	Key Content
Table of Contents	
Acronyms and Definitions	• All acronyms used in the report should be explained • Essential terms should be defined and explained
1. Executive Summary	• Brief description of Project components and the environmental and social setting • Summary of the key potential impacts and risks including cumulative impacts, mitigation measures and residual impacts • Summary of Community Engagement Plan • Summary of Community Development Plan • Summary of Environmental and Social Management Plans
2. Introduction	
Project Context	• Project background and brief history and the main findings of previous technical, economic, environmental or social studies • Presentation of the Project Proponent and EIA consultant team
Endorsement of the Standalone Environmental Management Plan	• Confirmation and Letter of Undertaking completed and signed by the Project Proponent • Endorsement by the Third Party EIA Consultant
3. Policy, Legal and Institutional Framework	• Corporate environmental and social policies • Myanmar policy and legal framework • International conventions and treaties relevant to the • Myanmar Government institutional framework • International policies, guidelines and standards (if applicable)
4. Project Description	• Description of the Project and its objectives. • Description of the Project size, installations, technology, infrastructure, production, use of materials and resources and generation of waste and emissions together with overview maps and site layout maps • **Updated project description based on current conditions and mining plans**. • For a detailed listing of the elements of the Project Description- See Appendix 2. Contents of an Environmental Assessment Report Section IV Project Description
5. Description of the Natural and Social Environment	• Description of the administrative, physical, biological, social, economic, cultural and visual characteristics of the area surrounding the Project site • Sensitive environmental, social, cultural and visual features • **New Environmental Baseline is to be included.** • For a detailed listing of the environmental and social components - See Appendix 2. Contents of an Environmental Assessment Report Section 6 Description of Natural and Social Environment

Report Section	Key Content
6. Identification of Impacts and Mitigation Measures	• Identification and assessment of environmental and social impacts and risks, and determination of mitigation measures and residual impacts • Impacts of Past and Present Activities • **Corrective Action Plan to address adverse impacts** • Impact of Future Activities • Measures to Mitigate Future Impacts
7. Risk Assessment	• Identification of natural and industrial hazards • **Chronology of natural events and industrial accidents** • Assessment of natural and industrial hazards • **Revised Emergency Response Plans**
8. Community Engagement and Community Development	• **History of Community Engagement** • **New of Updated Community Engagement Plan** • **Summary of Community Development Activities** • **New or Update Community Development Plan**
9. Mine Closure Plan	• Objectives • General Approach • Remediation Strategy • Current Setting • **Rehabilitation Activities Undertaken** • Reclamation Measures • Future Land Use • Closure and Reclamation Schedule • Interim Plan and Cost Estimate

10. Environmental and Social Management Plan	• Institutional arrangements for implementation of the ESMP
	  ○ Responsibilities
	  ○ Compliance Monitoring and Reporting
	• A summary potential environmental and social impacts
	• Mitigation measures
	  ○ **Corrective Action Plan**
	  ○ Measures to Mitigate Potential Future Impacts
	• Emergency response plans
	• Environmental quality monitoring requirements
	• Community Engagement and Community Development
	• Grievance Redress Mechanism
	• Capacity development and training programs
	• Implementation schedule; and
	• Cost estimate

11. Conclusion	• Demonstration of how the mine can be constructed and/or without *significant adverse environmental and social impacts*.

Appendix 1. Environmental and Social Issues during the Mining Life Cycle.
Appendix 2. Contents of an Environmental Impact Assessment Report
Appendix 3. Compliance with Environmental Standards

Table A1. Environmental Issues from Mine Exploration

Action	Affected Environment	Potential Environmental Impact
CONSTRUCTION ACTIVITIES		
Camp, road, airstrip, drill pad and staging area construction Line cutting Topsoil removal	Soils and Geology Water Quality Vegetation Fish and Wildlife Land Use Air Quality Cultural Noise and Vibration Aesthetics Health and Safety	Erosion and Sedimentation
		Modification of streams and rivers due to crossings
		Spills
		Deforestation and loss or disturbance of habitat
		Fire
		Equipment emissions and fugitive dust
		Cultural and heritage site disturbance
		Noise and vibration from construction activities
		Aesthetic/visual impacts
		Health and safety of workers transported to the site, using equipment and working in inhospitable environments
EXPLORATION PROGRAMS		
Geophysical surveys Reconnaissance mapping and sampling Aerial photography	Water Quality Vegetation Fish and Wildlife	Erosion and sedimentation from off-road vehicle use
		Impacts on vegetation from off-road vehicle use
		Disturbance of wildlife from surface and airborne surveys
Trenching, tunneling, pitting and drilling to collect samples	Soils and Geology Water Quality Vegetation Fish and Wildlife Land Use Air Quality Cultural Noise and Vibration Aesthetics Health and Safety	Acid generation from exposed sulfide materials
		Erosion and sedimentation
		Metals leaching into surface water and groundwater
		Spills or leaks from mud pits
		Groundwater contamination from drilling fluids
		Deforestation and loss or disturbance of habitat
		Scarring of land in remote locations

Appendix 1. Environmental and Social Issues during the Mining Life Cycle

Action	Affected Environment	Potential Environmental Impact
		Equipment emissions and fugitive dust
		Cultural and heritage site disturbance
		Traditional uses disrupted
		Noise and vibration from drilling and blasting
		Health and safety of workers using equipment and working in inhospitable environments
Experimental mine	Same components as a for a large	Same as for a large mine accept on a smaller scale
Transportation	Water Quality Air Quality Health and Safety	Spills
		Emissions from vehicles and fugitive dust
		Transportation accidents
CAMP ACTIVITIES		
Camp operation	Fish and Wildlife	Animals attracted to garbage and food waste
		Migratory patterns, breeding/nesting behavior affected by presence of humans and noise from helicopters, planes and drill rigs
		Increased hunting and fishing (food for workers)
Solid and human waste disposal	Water Quality Aquatic Biota	Water quality degradation
		Depletion of aquatic biota from spills
Fuel storage and handling	Water Quality Aquatic Biota	Water quality degradation from spills
		Depletion of aquatic biota
Water supply	Water Quantity	Depletion of nearby water sources
Energy production	Air Quality	Emissions from generators
Transportation	Water Quality Air Quality Health and Safety	Spills
		Emissions from vehicles and fugitive dust
		Transportation accidents

Source: EIA Technical Review Guideline: Non-Metal and Metal Mining, Volume 1. Regional Document prepared under CAFTA DR Environmental Cooperation Program to Strengthen Environmental Impact Assessment (EIA) Review. US EPA 2011.

Table A2: Environmental Issues from Mine Development.

Action	Affected Environment	Potential Environmental Impact
CONSTRUCTION ACTIVITIES		
Construction of buildings, workshops, processing plant, and permanent camp	Soils and Geology Water Quality Vegetation Fish and Wildlife Land Use Air Quality Cultural Noise and Vibration Health and Safety Aesthetics	Erosion and sedimentation
		Spills
		Deforestation and loss of habitat
		Fire
		Equipment emissions and fugitive dust
		Cultural and heritage site disturbance
		Noise and vibration from construction activities
		Aesthetic/visual impacts
		Health and safety of workers transported to the site, using equipment and working in inhospitable environments
Construction of site access roads and power lines	Soils and Geology Water Quality Vegetation Fish and Wildlife Land Use Air Quality Cultural Noise and Vibration Aesthetics	Erosion and sedimentation
		Modification of streams and rivers due to crossings
		Acid generation from exposed sulfide materials
		Spills
		Deforestation and loss or disturbance of habitat
		Increased road access in remote areas may lead to: Increased fishing/hunting, stressing animal populations Human invasion of previously inaccessible areas
		Fire
		Equipment emissions and fugitive dust
		Cultural and heritage site disturbance
		Noise and vibration from construction activities
		Aesthetic/visual impacts

Appendix 1. Environmental and Social Issues during the Mining Life Cycle

Action	Affected Environment	Potential Environmental Impact
		Health and safety of workers transported to the site, using equipment and working in inhospitable environments
TRANSPORTATION		
Operation of vehicles and equipment	Water Quality Air Quality Health and Safety	Stream crossings
		Vehicle emissions and fugitive dust
		Transportation accidents
Fuel and chemical transportation, handling, and storage	Water Quality Air Quality Health and Safety	Spills and stream crossings
		Potential releases of volatile organic compounds and hazardous substances
		Transportation accidents
MINE PREPARATION		
Site preparation (topsoil and overburden removal)	Soils and Geology Water Quality Vegetation Fish and Wildlife	Erosion and sediment from site as well as waste dump areas
		Acid generation from exposed sulfide materials at site and at waste dump areas and metals leaching into surface water and ground water
		Modification of drainage patterns, streams and rivers
		Deforestation and loss or disturbance of habitat
		Disruption and dislocation local wildlife and migratory wildlife
Drainage control	Water Quality Water Quantity	Erosion and sedimentation
		Modification of drainage patterns, streams and rivers
		Changes in flood patterns
Initial dewatering	Water Quality Water Quantity	Increased total dissolved solids and potentially trace metals
		Increased volumes of water to surface streams
		Downstream erosion and changes in stream morphology and floodplains due to increased volume

Appendix 1. Environmental and Social Issues during the Mining Life Cycle

Action	Affected Environment	Potential Environmental Impact
		Drawdown of water table and depletion of springs, seeps, wells and streams
Blasting	Fish and Wildlife Air Quality Noise and Vibration	Noise and vibration from blasting disturbing human settlements and wildlife
		Fugitive dust
CAMP ACTIVITES		
Camp operation	Fish and Wildlife	Animals attracted to garbage and food waste
		Migratory patterns, breeding/nesting behavior affected by presence of humans and noise from helicopters, planes and drill rigs
		Increased hunting and fishing (food for workers)
Solid and human waste disposal	Water Quality Aquatic Biota	Water quality degradation Depletion of aquatic biota
Fuel storage	Water Quality Aquatic Biota	Water quality degradation from spills Depletion of aquatic biota from spills
Water supply	Water Quantity	Depletion of nearby water sources
Energy production	Air Quality	Emissions from generators
Transportation	Water Quality Air Quality Health and Safety	Spills
		Emissions from vehicles and fugitive dust
		Transportation accidents

Source: EIA Technical Review Guideline: Non-Metal and Metal Mining, Volume 1. Regional Document prepared under CAFTA DR Environmental Cooperation Program to Strengthen Environmental Impact Assessment (EIA) Review. US EPA 2011.

Table A3: Environmental Issues from Mine Operation

Action	Affected Environment	Potential Environmental Impact
MINING ACTIVITES		
Land disturbance from any type of mine involving excavation or dredging	Soils and Geology Water Quality Water Quantity Vegetation Fish and Wildlife Land Use Air Quality Cultural Noise and Vibration Aesthetics Health and Safety	Erosion and sedimentation including increased streambed erosion
		Spills/overflows from ponds during storm events or electricity failures
		Degradation of groundwater and surface water quality
		Lowering of water table, reduced well production, decreased stream, seep and spring flows
		Deforestation and loss of habitat
		Disruption of migration routes and nesting/breeding activities
		Areas made unproductive for non-mine uses, including fishing in the case of dredging
		Increased landslide and dam failure potential
		Equipment emissions and fugitive dust
		Cultural and heritage sites destruction
		Traditional uses disrupted
		Noise and vibration from blasting and other mining activities
		Open pits, in-stream dredging and other unsightly facilities
		Health and safety of workers transported to the site, using equipment and working in inhospitable environments
	Soils and Geology	Erosion and sedimentation

Appendix 1. Environmental and Social Issues during the Mining Life Cycle

Action	Affected Environment	Potential Environmental Impact
Land disturbance from waste disposal from hard rock mining activities including heap leach, waste rock and tailings dam facilities	Water Quality Water Quantity Vegetation Fish and Wildlife Land Use Cultural Aesthetics Health and Safety	Spills/overflows from ponds during storm events or electricity failures
		Containment failures (e.g. dam breaches)
		Acid rock drainage potential (metal and coal mining)
		Cyanide contamination of groundwater and surface water (Metal Mining)
		Increased potential for trace metals/other contaminants
		Deforestation and loss of habitat
		Poisoning of birds and other wildlife
		Disruption of migration routes/nesting/breeding activities
		Areas made unproductive for non-mine uses
		Disturbance or destruction of cultural and heritage sites
		Traditional uses disrupted
		Tailings dams and rock waste disposal sites are unsightly
		Health and safety of workers transported to the site, using equipment and working in inhospitable environments
Mining, power generation, processing, and transport	Air quality	Emissions from vehicles and machinery
		Fugitive dust
		Odors
Drainage and dewatering	Water Quality Water Quantity Aquatic Biota	Increased total dissolve solids and potentially trace metals
		Increased volumes of water to surface streams
		Salt water intrusion
		Downstream erosion and changes in stream morphology and floodplains due to increased volume

Appendix 1. Environmental and Social Issues during the Mining Life Cycle

Action	Affected Environment	Potential Environmental Impact
		Disturbance of spawning grounds and wetlands
		Lower of water table, reduced well production, decreased stream, seep and spring flows
TRANSPORTATION		
Operation of vehicles and equipment	Water Quality Air Quality Health and Safety	Disturbance (erosion and sedimentation) at stream crossings
		Vehicle emissions and fugitive dust
		Transportation accidents
Fuel and chemical transportation, handling, and storage	Water Quality Air Quality Health and Safety	Spills at stream crossings and in other sensitive areas
		Potential releases of volatile organic compounds and hazardous substances.
		Transportation accidents
CAMP ACTIVITIES		
Camp and mine operation	Fish and Wildlife	Animals attracted to garbage and food waste
		Migratory patterns, breeding/nesting behavior affectedly presence of humans and noise from helicopters, planes and drill rigs
		Increased hunting and fishing (food for workers)
	Socioeconomic Land Use	Increased employment opportunities at mine
		Increased indirect employment
		Land use pressures
		Pressure on agricultural and forest resources
		In-migration causing pressure on local community infrastructure and social/cultural changes
Solid and human waste disposal	Water Quality Aquatic Biota	Water quality degradation
		Depletion of aquatic biota
Fuel storage and handling	Water Quality Aquatic Biota	Water quality degradation from spills
		Depletion of aquatic biota from spills

Appendix 1. Environmental and Social Issues during the Mining Life Cycle

Action	Affected Environment	Potential Environmental Impact
Water supply	Water Quantity	Depletion of nearby water sources
Energy production	Air Quality	Emissions from generators
Transportation	Water Quality Air Quality Health and Safety	Spills
		Emissions from vehicles and fugitive dust
		Transportation accidents

Source: EIA Technical Review Guideline: Non-Metal and Metal Mining, Volume 1. Regional Document prepared under CAFTA DR Environmental Cooperation Program to Strengthen Environmental Impact Assessment (EIA) Review. US EPA 2011.

Table A4. Environmental Issues due to Mine Closure.

Action	Affected Environment	Potential Environmental Impact
REMOVAL, BACKFILLING AND SEALING		
Sealing of shafts, inclines and declines, or ventilation raises to prevent unauthorized access	Soils and Geology Water Quality Air Quality	Effects of seepage from backfill Formation of potentially unstable plugs Contaminated mine water drainage Emissions from equipment, and fugitive dust Health and safety of workers
Backfilling of pits with waste rock	Soils and Geology Water Quality Wildlife Air Quality	Slope and bench stability Groundwater and rainwater contamination Concern about unauthorized access Wildlife entrapment Contamination of groundwater or surface water by backfilled waste rock Health and safety of workers
Removal of buildings and foundations	Soils and Geology Water Quality Air Quality	 Emissions from equipment, and fugitive dust Health and safety of workers
Clean-up of workshops, fuel and reagents	Soils and Geology Water Quality Air Quality	Emissions from equipment, and fugitive dust Health and safety of workers Potential for hazardous spills
Disposal of scrap and waste materials	Soils and Geology Water Quality Air Quality	Emissions from equipment and fugitive dust Health and safety of workers Potential for hazardous spills
Rehabilitation of waste rock facilities	Soils and Geology Water Quality Air Quality	Slope stability Erosion and sedimentation Effects of contaminant leaching on surface water and groundwater Dust generation Visual impacts
Rehabilitation of tailings dam and heap leach facilities	Soils and Geology Water Quality Air Quality	Dam stability Changes in tailings geochemistry Effects of seepage past the dam and from the base of the facility to groundwater and surface water Discharge of contaminated water to groundwater and surface water Dust generation

Action	Affected Environment	Potential Environmental Impact
		Potential for wildlife entrapment and poisoning and unauthorized human entry
Restoration of surface drainage	Soils and Geology Water Quality Air Quality	Long term stability of restored drainage, especially around mine facilities such as pits, waste rock, tailings, and heap leach pads Erosion and sedimentation Emissions from equipment, and fugitive dust Health and safety of workers
Removal of water treatment facilities	Soils and Geology	Erosion and sedimentation Emissions from equipment, and fugitive dust Health and safety of workers
Removal of infrastructure	Soils and Geology	Erosion and sedimentation Emissions from equipment, and fugitive dust Health and safety of workers
RESTORATION ACTIVITIES		
Rehabilitation	Soils and Geology Water Quality Water Quantity Vegetation and Wildlife Land Use Air Quality Noise and Vibration	Subsidence of underground workings
		Long-term stability of waste rock piles and mining slopes
		Erosion and Sedimentation
		Interim and final pit lake water quality, effects on wildlife (e.g. poisoning) and on groundwater or surface water from flow-through pit waste
		Trace metals
		Acid rock drainage potential (metal and coal mines)
		Containment failures
		Disposal/discharge of heap leach and tailings drain down solutions
		Degradation of surface water and groundwater (ARD and trace metals)
		Long-term changes to groundwater balance (loss through pit lake evaporation)

Action	Affected Environment	Potential Environmental Impact
		Failure of vegetation to properly reestablish
		Failure to meet final land use requirements
		Emissions from vehicles and machinery
		Fugitive dust
		Odors
		Noise from restoration activities
	Socioeconomic	Change in labor force requirements
		Stress on community to recover
		Risk of abandonment of towns and infrastructure
POST CLOSURE		
Long-term maintenance of water treatment facilities	Water Quality	Potential for facilities to contaminate surface water and groundwater with ARD, suspended solids, trace metals, and other contaminants
Long-term maintenance of slopes, drainage control and vegetation	Water Quality Air Quality	Maintenance sometimes increases erosion
		Emission from vehicles
		Fugitive dust

Source: EIA Technical Review Guideline: Non-Metal and Metal Mining, Volume 1. Regional Document prepared under CAFTA DR Environmental Cooperation Program to Strengthen Environmental Impact Assessment (EIA) Review. US EPA 2011.

Box A5

Toxic Materials in the Mining Operational Process. Many ore processing methods use toxic materials. The impacts on these toxic materials on the environment and people need to considered.

Cyanide. Cyanide (CN-) is a naturally occurring chemical that is found in low concentrations throughout nature including in fruits, nuts, plants, and insects. It is used in mining to separate gold and silver, copper and zinc particles from ore. Alternatives exist but cyanide remains the separation method of choice and others can be equally risky to the environment and humans. Managing the risks of cyanide is one of the key challenges facing the mining industry.

Intake cyanide through ingestion, gas inhalation or absorption through the skin can kill within minutes. When used to recover residual gold after an initial use of mercury (sometimes the case in ASM) cyanide will dissolves both gold and any remaining mercury, forming mercury cyanide. Mercury cyanide readily turns into methyl mercury, a highly toxic mercury compound that readily makes its way into rivers and consequently fish consumed by humans. Cyanide leaching must not be used on tailings where mercury is present.

With proper management, cyanide can be used safely and without harming the environment despite its toxicity. A multi stakeholder group under the auspices of the United Nations Environment has developed an International Cyanide Code of Conduct managed by the international Cyanide Management Institute.

The code is a voluntary, risk based management process for the gold and silver mining industries. It covers the production, transport, storage, use and disposal of cyanide. Key elements of the code are transparency and third-party validation. It is intended to complement an operation's existing regulatory requirements.

Arsenic. Arsenic (As) is a naturally occurring element commonly found as an impurity in metal ores. It is also produced commercially for use in pesticides, metal alloys, wood preservatives etc. Arsenic can be toxic in large doses so the mining industry must put in place monitoring systems and prevent releases. It is a carcinogen. Arsenic is not used in the mining process but is either (1) a product of mining in its own right (arsenic is mined in countries such as China, Chile, Russia, Mexico, and the Philippines) or is (2) a by-product of mining, processing and refining of other minerals. Arsenic emissions from copper and gold smelting and coal combustion are the largest contribution of arsenic from the mining industry and have been the focus of pollution control technologies and increasingly stringent regulations. Arsenic can also be leached out of some metal ores by cyanide or acid rock drainage during excavation but can be captured and removed from wastewater before it is released into the environment.

Freshwaters and associated ecosystems may be impacted by arsenic runoff from contaminated sites, but groundwater contamination as a result of human activity is rare, as arsenic is strongly attracted to soil particles and sediments.

Box A5 Continued

Mercury. Mercury (Hg) is a naturally occurring but rare element. It can be released to the atmosphere, land and water from natural sources – such as weathering of mercury-containing rocks or volcanic eruptions – but also from human activities, including mining.

Mercury and mercury compounds are toxic to human health and the environment. It is extensively used to extract gold from ore in ASM. Although it amalgamation is inefficient, recovering less than 30% of the gold, it is a cheap way to extract gold. It is mixed with gold-containing materials, forming a mercury-gold amalgam that is then heated, vaporizing the mercury to obtain the gold. It is estimated that 30 per cent of the mercury used in the process is lost to the atmosphere. (European Commission, Environment DG, 2009).

Few countries' ASM operations still use mercury. However, it is still used in Myanmar. Where it is naturally present in ores, they take precautions to prevent its release into the environment. During processing, they usually use flotation or chemical leaching as the recovery methods. In flotation, a mixture of slurry (crushed ore and water) and frothing agents are added into a flotation machine. A tube releases air into the tank of the machine and an agitator creates air bubbles at the bottom of a tank. Minerals that are hydrophilic, such as gold, attach to the bubbles' surface and rise to the top of the tank. Other minerals fall to the bottom and are discarded as tailings. In chemical leaching the chemical properties of gold are used to leach it from ore, concentrate, or tailings. Cyanide is often the preferred chemical used in leaching. However, in contrast to mercury, cyanide does not persist in the environment.

Mercury use by ASM remains the issue of greatest concern. So much so, that in 2013 128 countries signed the Minimata Convention – a global, legally binding treaty to protect human health and the environment from the adverse effects of mercury. It calls upon nations to reduce, and where feasible eliminate mercury use in the ASM sector. By 2017 41 countries have ratified their commitment to this United Nations treaty (50 being needed to bring it in to affect). Myanmar is not yet a signatory to the Minimata Convention.

The Minamata Convention includes a ban on new mercury mines, the phase-out of existing ones, the phase out and phase down of mercury use in a number of products and processes, control measures on emissions to air and on releases to land and water, and the regulation of the informal sector of ASM gold mining.

It is possible to safely and economically recover gold without the use of mercury. Mercury-free techniques that are safer such as gravity concentration methods (e.g. panning, sluicing, centrifuges and vibrating tables), other concentration methods (e.g. flotation or magnets) or by direct smelting and chemical leaching.

It is also possible to use mercury in a retort in which the amalgam is heated in a closed system and evaporated mercury is condensed and recycled.

Sulphuric Acid- Acid Mine Drainage. Acidic water may leach from mine sites - especially tailings dams – often long after closure. The acid water is created when sulphide minerals are exposed to air and water producing sulphuric acid.

Table A6. Occupational Health and Safety Impacts.

Occupational Health and Safety Issue	Aspect to be Addressed
General workplace health and safety	Occupational health and safety hazards identified based on job safety analysis or comprehensive hazard or risk assessment Over Health and Safety Management Plan Emergency Response Plan Training on Occupational Health and Safety Safe lighting system throughout the mine site Signage in hazardous and risky areas Personal Protective Equipment for workers and visitors
Hazardous substances	Ensuring proper ventilation and dust / fume extraction systems to ensure that inhalation exposure levels for potentially corrosive, oxidizing, reactive or siliceous substances. Chemical de-contamination systems (e.g., eye wash and emergency shower systems) for workers and the need for rapid treatment. Materials Safety Data Sheets (MSDSs) for all hazardous materials held on site.
Use of explosives	Blasting and Explosive Management Plan to minimize occupational risks
Electrical safety and isolation	Identification of the of hazards and risks of all electrical systems and equipment. Electrical competency standards and safe work procedures for all electrical work, including construction, decommissioning and demolition of electrical equipment
Physical hazards	Identification of the physical hazards and risks of the threat of landslides, rock falls, face slumping, or land collapse in aboveground or underground mining environments; hazards related to transport (e.g. trucks, elevated haul roads, and railways), hazards related to height and falling, and use of fixed and mobile equipment, lifting and hoisting devices, and moving machinery.
Ionizing radiation	Identification of the hazards and risks of natural radiation Radiation dosimetry monitoring programs and workplace radiation assessments for any at-risk workers
Fitness for work	Mining operations often have a number of activities where fatigue or other causes of impaired fitness for work could produce potential for serious injury, equipment damage or environmental impact. A risk assessment to identify roles where “fitness for work” (including personal fitness) is required to ensure that the activity is completed with minimized risk.

Travel and remote site health	Mining operations are often located in very remote regions, with limited access to emergency or general medical services. Plans for medical evacuation
Thermal stress	Mining operations can require exposure of workers to extreme weather conditions. Proper Personal Protective Equipment is required. High temperature conditions generated by industrial processes can also result in thermal stress and should be considered in work assignments and working hours.
Noise and vibration	Noise source include vehicle engines, loading and unloading of rock into steel dumpers, chutes, power generation, and other source related to construction and mining activities. Additional examples of noise sources include shoveling, ripping, drilling, blasting, transport (including corridors for rail, road, and conveyor belts), crushing, grinding, and stockpiling Workers are to be provided with proper Personal Protective Equipment
Specific hazards in underground mining (Fires, explosions, confined spaces and oxygen deficient atmospheres)	A tracking system should be implemented to account for all persons working and traveling underground Ventilation - Ventilation and air cooling systems should be appropriate for the workplace activities and be able to maintain work area temperatures and concentrations of contaminants at safe levels. Ventilation operators and maintenance personnel should undergo adequate training with respect to issues such as explosive atmospheres, products of combustion, dust (particularly if silica is present) and diesel fumes.

Source: Environmental, Health and Safety Guidelines for Mining, International Finance Corporation. 2007.

Table A7. Community Health and Safety issues

Community Health and Safety Issue	Aspect to be Addressed
Tailings Dam Safety	Dams, wet tailing impoundments, and other major wet containment facilities represent a potential risk depending on their location with regards to human settlements and other community resources
Water Storage Dams and Ponds	Water storage dams can potentially create and change the existing pattern of disease vector breeding sites. In areas where malaria is common, the shorelines of the WSD may create a mosquito breeding site because of the presence of a large, shallow, and vegetated shoreline. In addition, the WSD may also create a new breeding site for the snail host of schistosomiasis, an important parasitic disease that is common in many tropical climates.
Land Subsidence	Land subsidence may occur as a result of underground or solution mining activities. Land subsidence may leave land prone to flooding and may otherwise damage property if it leaves farmland unsuitable for further use.
Noise and Vibration	Good practice in the prevention and control of noise sources to be established based on the prevailing land use and the proximity of noise receptors such as communities or community use areas.
Emergency Response	Emergency preparedness and response arrangements are to include framework for preparation of an Emergency Response Plan involving the mine, emergency response agencies, local authorities and communities
Communicable Diseases	The nature of mining projects (e.g. location in remote areas with long material / product supply chains) requires proactive and sustained interventions to minimize the incidence and transmission of communicable diseases caused by the influx of migrant workers, associated extended family members and other service workers at the site. Long haul transport activities may serve as disease conduits particularly for sexually transmitted infections. At the mine site, good international industry practice for solid waste management, surface water drainage, and sanitary wastewater management are usually effective in reducing vector borne and water related communicable diseases.
Community and Household Impacts	There can be significant household and community level impacts on the social determinants of health, e.g., drug, and alcohol abuse, domestic violence, and prostitution associated with the rapid influx of labor during construction and operational phases. The rapid influx of labor and their family members may also place a significant burden on existing community health facilities and resources.

Mine Closure Planning	Socio-economic considerations should be an integral part of mine closure planning with a goal to ensure that: Future public health and safety are not compromised; The after-use of the site is beneficial and sustainable to the affected communities in the long term; and Adverse socio-economic impacts are minimized and socio-economic benefits are maximized. The Mine Closure Plan should address beneficial future land use. The plan should be determined using a multi-stakeholder process that includes regulatory agencies, local communities, traditional land users, adjacent leaseholders, civil society and other impacted parties), be previously approved by the relevant national authorities, and be the result of consultation and dialogue with local communities and their government representatives.

Source: Environmental, Health and Safety Guidelines for Mining, International Finance Corporation. 2007

Table A8. Social Impacts.

Social Impacts	Aspect to be Addressed
Community Engagement and Grievance Mechanisms	Meaningful consultation with communities needs to be undertaken during the Scoping stage. It is recommended the Guideline on Public Participation in Myanmar's EIA Processes be followed. A Consultation Plan is to be developed. Consultation is to continue throughout mine cycle. During scoping, alternative mechanisms for handling complaints and other grievances should be discussed with the communities.
Community Development	Employment opportunities for local communities Local procurement Community development projects and investments
Community Impacts	Loss of livelihood (e.g., farming and fishing) Displacement of subsistence miners Influx of migrant workers Inflation and pressure on community services Cost of electricity and water Damage to physical culture resources (religious sites) Destruction of forest threatening medicinal plants
Land Acquisition and Resettlement	
Land ownership, access, and use	Land boundaries are not clearly demarcated Limited legal ownership or usage rights over the land on which people live and farm Even with legal ownership and usage rights, people may not have title certificates or other proof of ownership or usage rights Lands are designated as Vacant, Fallow, and Virgin (VFV) lands, allowing companies to gain access to these lands even where they are communally used Lack of information and documentation in land purchase transactions
Resettlement	Forced evictions, threats to rights-holders and relocations under duress Limited access to information and consultation in resettlement processes Alternative resettlement sites are often not suitable. Compensation for resettlement is ad hoc and does not reflect the actual cost of economic and physical displacement. Displacement of artisanal miners through formal mining activities.
Livelihood impacts	Damage to land, crops and water sources essential for agricultural activities

	Loss of communal grazing and farming areas when land is declared VFV People shift to daily wage workers and/or migrate as a result of having less land for farming
Labor	Occupational Health and Safety (see Table 7) Social Security and Health Benefits Drug use and HIV. Working hours, wages and leave Workers' accommodation and restrictions on movement
Women	Adverse social and health impacts including an increase in alcohol related abuse, domestic violence and genera social disruption. Influx of large male populations on local communities can increase likelihood of early sexual activity, HIV and other sexually transmitted infections, exploitation, and prostitution Some women. employed in mining. maintain their traditional domestic role as well as their mining job – effectively doubling their work load. Within the workplace women may face issues of sexual harassment and abuse, salary inequity, and discrimination. Resettlement and relocation for the purposes of mining often disproportionately affect women, resulting in negative physical, social, cultural, and economic displacement. Women are often excluded from negotiation and engagement stages of mining developments, due to cultural or work-related factors, including domestic responsibilities.
Children	Exposure of children to the risk of sexual exploitation and violence childhood pregnancy, contracting sexually transmitted diseases Child labor in the mining supply chain, particularly during construction, or in the informal mining sector where children might work parents, siblings and communities. Childhood poverty - where poorly mine employees do not have enough income to sustain a family, or where housing provided for employees and their families does not meet adequate standards. Children are more vulnerable than adults to the localized environmental impacts, particularly water, air and soil pollution Resettlement or relocation can lead to the loss of a child's home. Displacement and relocation can cause fundamental changes in family structures.
Security and Conflict	Company-community conflict Community insecurity near mine sites

	Conflict between formal mining operations and informal subsistence miners Conflict minerals and illicit trading flows Security forces

Source: Myanmar Mining Sector Wide Impact Assessment on Limestone, Gold and Tin. Consultant Draft. Myanmar Center for Responsible Business. 2016.

Contents of an Environmental Impact Assessment Document

Acronyms

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Compliance with Environmental Quality Standards

1. Effluent Standards for Mining Sites

The following standards apply to all mining activities including runoff and discharges from drill sites, sumps, pit, trenches, bulk sampling, underground exploration mining and waste rock. The standards also apply to runoff and discharges from roads, construction work sites and temporary sedimentation ponds.

Table A3.1. Effluent limit values for exploration and mining sites

Parameter	Unit	Effluent Limit Value	Reference
Arsenic	mg/l	0.1	Myanmar National Environmental Quality (Emission) Guidelines, December 2015.
Cadmium	mg/l	0.05	As above
Chemical oxygen demand	mg/l	150	As above
Chromium (hexavalent)	mg/l	0.1	As above
Copper	mg/l	0.3	As above
Cyanide	mg/l	1	As above
Cyanide (free)	mg/l	0.1	As above
Cyanide (weak acid dissociable)	mg/l	0.5	As above
Iron (total)	mg/l	2	As above
Lead	mg/l	0.2	As above
Mercury	mg/l	0.002	As above
Nickel	mg/l	0.5	As above
pH	S.U.[a]	6-9	As above
Temperature	°C	<3 degree differential	As above
Total suspended solids	mg/l	50	As above
Zinc	mg/l	0.5	As above

2. Effluent Standards for Work Camps, Sanitary Facilities, Domestic Wastewater

The following standards apply to domestic wastewater, and discharges, drainage and runoff from work camps, sanitation facilities and landfills.

Table A3.2. Wastewater, Storm Water Runoff, Effluent and Sanitary Discharges

Parameter	Unit	Guideline Value	Reference
5-day Biochemical oxygen demand	mg/l	50	National Environmental Quality (Emission) Guidelines, December 2015
Ammonia	mg/l	10	As above
Arsenic	mg/l	0.1	As above
Cadmium	mg/l	0.1	As above
Chemical oxygen demand	mg/l	250	As above
Chlorine (total residual)	mg/l	0.2	As above
Chromium (hexavalent)	mg/l	0.1	As above
Chromium (total)	mg/l	0.5	As above
Copper	mg/l	0.5	As above
Cyanide (free)	mg/l	0.1	As above
Cyanide (total)	mg/l	1	As above
Fluoride	mg/l	20	As above
Heavy metals (total)	mg/l	10	As above
Iron	mg/l	3.5	As above
Lead	mg/l	0.1	As above
Mercury	mg/l	0.01	As above
Nickel	mg/l	0.5	As above
Oil and grease	mg/l	10	As above
pH	S.U.[a]	6-9	As above
Phenols	mg/l	0.5	As above
Selenium	mg/l	0.1	As above

Silver	mg/l	0.5	As above
Sulphide	mg/l	1	As above
Temperature increase	°C	<3[b]	As above
Total coliform bacteria	100 ml	400	As above
Total phosphorus	mg/l	2	As above
Total suspended solids	mg/l	50	As above
Zinc	mg/l	2	As above

[a] Standard unit

[b] At the edge of a scientifically established mixing zone which takes into account ambient water quality, receiving water use, potential receptors and assimilative capacity; when the zone is not defined, use 100 meters from the point of discharge.

3. Ambient Air Quality Standards

Air quality should not exceed the levels presented in Table A3.3

Table A3.3. Ambient air quality standards

Substance	Averaging Period	Standard µg/m^3	Reference
Sulphur dioxide	24 hours 10 minutes	20 500	Myanmar National Environmental Quality (Emission) Guidelines, December 2015.
Nitrogen dioxide	1 year 1 hour	40 200	As above
Particulate matter PM_{10}	1 year 24 hours	20 50	As above
Particulate matter $PM_{2.5}$	1 year 24 hours	10 25	As above
Ozone	8-hour daily maximum	100	As above

4. Ambient Noise Standards

Noise impacts should not exceed the levels presented in Table A3.4, or result in a maximum increase in background levels of 3 dB at the nearest receptor location off-site.

Table A3.4. Ambient noise standards

Receptor	One Hour L_{Aeq} (dBA)		Reference
	Daytime 07:00-22:00	Nighttime 22:00-07:00	
Residential, institutional, educational	55	45	Myanmar National Environmental Quality (Emission) Guidelines, December 2015.
Industrial, commercial	70	70	As above

5. Air Blasting[1]

The maximum level for air blasting is 115 dB Linear. The level of 115 dB Linear may be exceeded on up to 5% of the total number of blasts over a period of 12 months; however, the level should not exceed 120 dB Linear at any time. Blasting is only permitted during daylight hours.

The recommended maximum level for ground vibration is 5 mm/s (peak particle velocity ppv). The ppv level of 5 mm/s may be exceeded on up to 5% of the total number of blasts over a period of 12 months. The level should not exceed 10 mm/s at any time.

[1] Australian and New Zealand Environment Council (ANZEC) Guidelines, 1990 and Best Practice Environmental Management in Mining, Noise, Vibration and Air Blast Control, Environment Australia, 1998.