PT WEDA BAY NICKEL

ENVIRONMENTAL MANAGEMENT PLAN
Nickel and Cobalt Mining and Processing Project

Central Halmahera and East Halmahera Regency, North Maluku Province, Indonesia

February 2009
STATEMENT LETTER

I am who sign below:

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On behalf of the proponent for the Weda Bay Nickel and Cobalt Mining and Processing Project, at Central Halmahera and East Halmahera Regency, North Maluku Province, Indonesia, I state that:

1. We will implement the commitments of the environmental management and monitoring plans as stated in the environmental management plan (RKL) and the environmental monitoring plan (RPL) of the Weda Bay Nickel and Cobalt Mining and Processing Project.

2. We will be responsible and will accept sanctions based on prevailing regulations if we are proven ignoring the implementation of environmental management and monitoring plans accordingly.

This statement letter is prepared in honesty to be used for any relevant purpose.

Jakarta, February 2009  
PT. Weda Bay Nickel

Duty Stamp

Alain Giraud  
President Director
FOREWORD

PT Weda Bay Nickel (WBN) is proposing to develop a nickel and cobalt mine and a processing plant in Central Halmahera, North Maluku. WBN is the holder of a Seventh Generation Contract of Work (CoW) for nickel mining in an area currently reduced from 120,500 ha to 54,874 ha in Central Halmahera and East Halmahera Regency, acknowledged by the Government of Indonesia in Presidential Decree No. B.53/PRESS/1/1998 dated 19 January 1998. WBN intends to begin mining activities and processing nickel and cobalt ores, a project that covers all stages of activities including the construction of all the required facilities and infrastructure. This study is aimed at preventing and mitigating potential negative impacts and to optimize the positive impacts.


WBN expresses its appreciation to all parties who have contributed to this Environmental Management Plan.

Jakarta, February 2009
PT. Weda Bay Nickel

Alain Giraud
President Director
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CHAPTER I
INTRODUCTION

1.1 OBJECTIVES AND PURPOSES

1.1.1 Objectives

The objectives of the Environmental Management Plan are as follows:

- To comply with all relevant Indonesian regulations concerned with pollution control, waste management, and environmental quality monitoring.
- To ensure that the activities of WBN meet the requirements of sustainable environmental-based management in order to extract natural resources to the benefit of the national economy and even more so for the benefit of the socio-economic situation in both, the Central Halmahera and the East Halmahera Regency.
- To manage environmental changes due to nickel and cobalt mining and processing activities to maintain and enhance environmental quality.
- To maximize the positive impacts (benefits) and to prevent, control, and minimize the negative impacts (risks).

The Environmental Management Plan (RKL) intends to maintain balance between the environmental components in project area (see Map 1) by:

- Determining actions for anticipating, preventing and controlling negative impacts and maximizing positive impacts of the nickel and cobalt mining and processing activities of WBN.
- Involving authorized institutions in the environmental management in the project area.
- Providing sufficient funds to implement the RKL and RPL commitments in order to maintain the existing environmental condition.

1.1.2 Purposes

The purposes of Environment Management Plan are as follows:

- To provide guidance and overarching principles for the environmental management and monitoring in the project area of WBN.
- To attempt to maintain the environmental quality of Central Halmahera and East Halmahera Regency, North Maluku Province despite the WBN Project.
• To maintain the environmental quality around the mining area in Central Halmahera and East Halmahera Regency, North Maluku Province.

• To maximize and improve positive impacts and minimize negative impacts due to nickel and cobalt mining and processing activities.

• To present coordination mechanisms with Government authorities involved in environmental management.

1.2 **ENVIRONMENTAL POLICY**

The environmental policy of WBN is included in the company policy. As a company mission, WBN complies with all existing relevant Indonesian laws and regulations in the field of environment, health and safety (EHS) and to participate in community development activities around the mining area. WBN is committed to employ international best practices related to environmental, health and safety management. WBN realizes that, to be successful, environmental management has to be integrated in all stages of mining and processing activities. The following Environmental Policy will apply to the Weda Bay Project:

• Controlling and reducing the environmental impact of the group’s industrial activities;

• Controlling the risks and impact associated with the products sold by the group;

• Promoting continuous improvement;

• Factoring the environment into every project stage;

• Strict compliance with regulations;

• Developing self-knowledge to improve and to communicate;

• Anticipating regulatory changes from a sustainable development perspective; and

• Contributing to the development of scientific knowledge.

Successful performance of environmental management will be reflected by the:

• Availability of an work environment for employees that allows one to perform duties without injury risk or work related disease;

• Prevention of pollution;

• Rehabilitation of post mining areas to safe and productive conditions as required by applicable regulations and permits;

• Conservation of biodiversity;

• Compliance with government laws along with company’s commitment;
Accomplishment of the aspirations from all stakeholders including employees, local communities, government, shareholders, and customers of WBN;

Utilization of efficient resources; and

Sustainable enhancement and continuous improvement.

To achieve best management, the company will implement an environmental health and safety management system (EHS - MS) as follows:

Identify EHS risks related to all job aspects of WBN;

Determine objectives and targets for all management efforts of significant risks;

Implement plans, standards and procedures to manage and to monitor risks; and

Routinely audit, evaluate and report EHS performance.

The organization chart for mining and processing activities of WBN is presented in Appendix A.

1.3 RKL FUNCTIONS

The main function of environmental management is to ensure efficient nickel and cobalt mining and processing activities while maintaining environmental quality.

The Environmental Management Plan (RKL) supporting the nickel and cobalt mining and processing project of WBN will be used and is required not only by the management of WBN but also by relevant Government authorities. The functions and the importance of the RKL document are:

To guide the project proponent in managing the environment around the project site.

To guide the project proponent, government and authorized institutions in performing environmental management based on each function and task.

To assist the government in decision-making, planning and environmental management.

To assist the local government in environmental monitoring and management as an effort for environmental conservation.

To prevent conflicts between community and project proponent.

To avoid environmental damages and to maximize positive impacts for communities and local government.
CHAPTER II
ENVIRONMENTAL MANAGEMENT APPROACH

2.1 Technology Approach

Existing and available proven processes and technologies are applied to prevent, control, and to reduce negative impacts from project activities. Technologies will be applied as early as possible to ensure appropriate environmental protection. Specific technologies are as follows:

- **Air Pollution Management Technology**
  The vent gases from Primary Neutralization reactors are collected and cleaned by demisters before being released to the atmosphere through a stack.

- **Effluent Management Technology**
  Effluent treatment consists of neutralization using lime milk to precipitate residual metals. Lime milk is added proportionally to the effluent flow rate. A reducing agent is added in order to reduce possible traces of Cr⁶⁺. The slurry gravitates from the reactor to a buffer tank.

- **Residue Management Technology**
  The neutralized slurries of the two residues originating from ore processing will be dewatered using filter press. The compacted filter cake will be transported either by truck or conveyor to the Residue Storage Facility (RSF) for dry-stacking.

- **Reclamation Technology and Erosion Controls**
  - Provide a nursery for propagating local plants.
  - Survey and mapping of local plants seed sources.
  - Monitor rehabilitation success.
  - Use cover crops to control erosion and to increase land productivity.
  - Apply standard operating procedures to land preparation (slope, erosion control, drainage, sediment control (e.g. sediment pond) and topsoil restoration).
  - Conduct research with relevant institutions to produce various local plants.
  - Increase topsoil storage and utilization through topsoild conservation.
  - Apply multi-species planting standard.
  - Try several alternative patterns of integrated land rehabilitation.
2.2 **Socio-Economic Approach**

The following approaches are steps which will be taken by the proponent in an effort to overcome significant impacts through actions based on social interaction and government aid. Such activities include the following:

- Actively involving host communities in environmental management.
- Giving priority to local recruitment according to skills, knowledge and requirements of WBN.
- Cooperating with third parties in supplying goods and services to enhance the regional economy.
- Providing public facilities for host communities considering project viability.
- Fostering social interaction with host communities to avoid social jealousy.

2.2.1 **Anticipative Approach**

This approach is similar to the preventive efforts for impacts (predicted) that can be avoided; if impacts cannot be avoided, the impacts are reduced to a minimum.

The first step is to disclose information about project activities. Information is presented in clear format, simple and in a language easily understood by host communities; this will help avoiding difference in perception between the proponent and host communities.

Anticipative approach will be implemented periodically in form of public meetings.

2.2.2 **Direct and Indirect Approach**

**Direct approach** is in form with direct consultation with project affected people.

**Indirect approach** is through informal figures (public figures, religion leaders, custom figures, and others) that lead non governmental organizations and who are considered to be role models by communities.
2.2.3 Segmentary Approach

The segmentary approach is a per-segment approach best adopted if the problem has become too complicated and if problems are linked to each other.

To solve such problems, a mediator experienced in conducting segmentary approach is needed, without ignoring any resistance to reach solution between related parties.

This approach is also effective in handling problems of social unrest either related to project employee demobilization or local communities who perceive loss of grasp of earning after construction stage.

2.2.4 Simulative Approach

This approach is more geared towards solving socio-economic-cultural impacts after construction stage is completed. Social adaptation of local communities with the project will not be completed when operation commences. Villagers will likely still look for their new identity as a result of the integration of traditional and industrial patterns.

A variety of stimulants must be provided to rest any unbalance as a result of primary impacts in order to prevent derivative (secondary) impacts.

2.2.5 Qualitative and Quantitative Approach

The qualitative approach is directed to measure environmental management success related to socio-cultural parameters. Parameters such as culture, tradition, or people perception can not be approached by exact science. Therefore, analogical methods and value judgment play important roles in qualitative approach.

The quantitative approach can be used as guidance to evaluate environmental management success of socio-economic parameters. Quantitative calculations can be applied to measure increase/decrease of community income in period before and after the project, business progression/retrogression, assets, selling turnover, working capital and others.

2.2.6 Community Development Approach

Community development programs can greatly aid in managing environmental impacts as a result of project activities. The participation of
host communities in environmental management is integral to this approach.

2.3 **INSTITUTIONAL APPROACH**

The project proponent can not be the only party responsible for implementing environmental management activities; the involvement of related institutions is also needed:

- Coordinate with Directorate General of Mineral, Coal and Geothermal in management and monitoring of the environment, and occupational health and safety.
- Coordinate with authorized agencies in solving rising social problems.
- Coordinate with NGO and local informal figures in implementing community development programs.
- Socialize to local communities about purposes and benefits of nickel and cobalt mining and processing project proposed by WBN.

2.4 **ENVIRONMENTAL MANAGEMENT APPROACH**

Committing to environmental management, the project proponent plans to carry out environmental management in a formal manner based on relevant national and international standards.
CHAPTER III
ENVIRONMENTAL MANAGEMENT PLAN

3.1  
**Pre-Construction Stage**

3.1.1  
**Soils**

3.1.1.1  
**Soil Erosion**

A. **Source of Impact**
   - Test pit establishment.

B. **Indicator of Impacts**
   - Increase of erosion rate.

C. **Management Objectives**
   - To minimize soil erosion.

D. **Management Efforts**
   - Minimal land clearing of area has been implemented, limited only to required sites for activities
   - Top soil has been removed from the land clearing sites and stored in specified area for reuse in reclamation
   - Adequate and stable slope and berm for the pit has been used
   - Surface water run-off on the overburden placement site and test pit site was managed by constructing drainage channels and directing the run-off water to sedimentation ponds
   - The overburden and the open area were immediately revegetated by cover crops, fast growing plant species.

E. **Management Location**
   - Test pit.

F. **Management Period**
   - Preconstruction Period.

G. **Management Institution**
   **Conductor**
   - Mine Engineering Department

   **Supervisor**
   - Department of Energy and Mineral Resources, Republic of Indonesia
• Bapedalda of North Maluku Province
• Office of Mine and Energy of North Maluku Province
• Environmental Management Agency (Badan Pengelola Lingkungan Hidup) of Central Halmahera Regency
• Environmental Agency (Badan Lingkungan Hidup) of East Halmahera Regency
• Office of Mine and Energy of Central Halmahera Regency
• Office of Mine and Energy of East Halmahera Regency

**Reporting**

• Department of Energy and Mineral Resources, Republic of Indonesia
• Bapedalda of North Maluku Province
• Office of Mine and Energy of North Maluku Province
• Environmental Management Agency (Badan Pengelola Lingkungan Hidup) of Central Halmahera Regency
• Environmental Agency (Badan Lingkungan Hidup) of East Halmahera Regency
• Office of Mine and Energy of Central Halmahera Regency
• Office of Mine and Energy of East Halmahera Regency

3.1.2 *Surface Water Quality*

3.1.2.1 *TSS*

A. **Source of Impact**

• Test pit establishment.

B. **Indicator of Impacts**

• Increase of TSS concentration in surface water
• To comply with applicable regulations on effluent water standard of nickel mining (State Minister of Environment Regulation No. 9 Year 2006)

C. **Management Objectives**

• To control of TSS content in surface water run-off

D. **Management Efforts**

• TSS was managed in conjunction with Soil erosion control measures
• Check dam has been constructed to limit TSS close to the source
• Sedimentation ponds in the test pit area have been constructed and operated
• All surface water runoff from test pit were directed into sedimentation ponds

E. Management Location
• Test pit.

F. Management Period
• Preconstruction Period.

G. Management Institution

Conductor
• Mine Engineering Department
• Environmental, Health and Safety Department

Supervisor
• Department of Energy and Mineral Resources, Republic of Indonesia
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3.1.3 Terrestrial Flora and Fauna

3.1.3.1 Species structure and composition as well as wildlife habitat

A. Source of Impact
   • Test pit establishment.

B. Indicator of Impacts
   • Disturbance to biodiversity.

C. Management Objectives
   • To protect the rare and endangered species of flora and fauna.

D. Management Efforts
   • Area of land clearing has been minimized, only limited to required sites for activities
   • Inventory of existing flora and fauna has been conducted in the test pit area prior to opening
   • Native plant species seedlings from the test pit area has been collected for use in reclamation
   • Develop a rehabilitation program

E. Management Location
   • Test pit.

F. Management Period
   • Preconstruction Period.

G. Management Institution
   
   Conductor
   • Mine Engineering Department
   • Environmental, Health and Safety Department

   Supervisor
   • Department of Energy and Mineral Resources, Republic of Indonesia
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### 3.1.4 Aquatic Biota

#### 3.1.4.1 Abundance of Plankton and Benthos

**A. Source of Impact**

- Test pit establishment.

**B. Indicator of Impacts**

- Change of aquatic biota abundance.

**C. Management Objectives**

- Minimize disturbance to aquatic biota.

**D. Management Efforts**

- Effort for disturbance to aquatic biota through soil erosion control, management of hydrology, and control of TSS has been established.

**E. Management Location**

- Test pit.

**F. Management Period**

- Preconstruction Period.

**G. Management Institution**

- **Conductor**
  - Mine Engineering Department
  - Environmental, Health and Safety Department
Supervisor

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3.1.5 Socio Economics

3.1.5.1 Job Opportunities

A. Source of Impact
- Activities of Survey and Exploration, Test pit establishment

B. Indicator of Impacts
- Number of local and non local employees (outsiders) recruited by WBN
- Number of local contractors engaged in the project

C. Management Objectives
- Optimize job opportunities for local communities
- To prioritize hiring of skilled people from the local communities
- To contribute in reducing local unemployment in the CoW area

D. Management Efforts
• Number of local people employment by WBN and contractor companies has been increased
• Training for selected local people to enhance their qualification for employment with WBN and contract companies has been provided

E. Management Location
• Project area.

F. Management Period
• Preconstruction Period.

G. Management Institution
Conductor
• Human Resources Department
• External Relations Department

Supervisor
• Department of Energy and Mineral Resources, Republic of Indonesia
• Bapeda Maluku Province
• Office of Mine and Energy of North Maluku Province
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3.1.5.2 Community Income

A. Source of Impact
   • Land Acquisition for mine project.

B. Indicator of Impacts
   • Increase of community income.

C. Management Objectives
   • To implement fair compensation to those involve in land acquisition

D. Management Efforts
   • Encourage local community to save money/ income for improvement of their livelihood e.g. education, sanitary condition

E. Management Location
   • Project area.

F. Management Period
   • Preconstruction period.

G. Management Institution
   Conductor
   • External Relations Department

   Supervisor
   • Department of Energy and Mineral Resources, Republic of Indonesia
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3.1.5.3 Land Ownership

A. Source of Impact
• Land acquisition for mine project.

B. Indicator of Impacts
• Change of land ownership
• Community unrest due to the issues of land acquisition

C. Management Objectives
• To reduce and avoid the community unrest due to land acquisition.

D. Management Efforts
• Prepare comprehensive exploration and mining activities plans and coordinate with relevant authorities in case that the area which to be explored and mined are occupied by local community.
• Gather information on land status and area used or occupied by community.
• Trace and record a land ownership history to avoid multiple claims from family member of land owner.
• Document the land compensation process to avoid multiple future claims on the land.
• Coordinate and cooperate with relevant local government and authorities (“kepala desa”, “camat” and National Land Agency) during the land acquisition process.
• Land and vegetation compensation shall be determined through mutual agreement between WBN and land owners and in accordance with applicable laws and regulations.

E. Management Location
• Project area.

F. Management Period
• Preconstruction period.
G. Management Institution

Conductor
- External Relation Department

Supervisor
- Department of Energy and Mineral Resources, Republic of Indonesia
- Bapedalda of North Maluku Province
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3.1.5.4 Livelihood

A. Source of Impact
- Land acquisition for mine project.

B. Indicator of Impacts
- Change of Community livelihood when agricultural lands are acquired for mine project
  - Change of livelihood from income received

C. Management Objectives
- To reduce the community unrest because of change of livelihood pattern
• To reduce adverse effect of sudden change of livelihood that requires new skills

D. **Management Efforts**

• Encourage local community to save their income for improvement of their livelihood

• Prioritizing employee recruitment from local communities in accordance to our needs.

E. **Management Location**

• Project area.

F. **Management Period**

• Preconstruction period.

G. **Management Institution**

**Conductor**

• External Relation Department

**Supervisor**

• Department of Energy and Mineral Resources, Republic of Indonesia

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• Office of Mine and Energy of North Maluku Province

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3.2 CONSTRUCTION STAGE

3.2.1 Soils

3.2.1.1 Soil Erosion

A. Source of Impact
   • Land clearing for support facilities.

B. Indicator of Impacts
   • Increase of erosion rate.

C. Management Objectives
   • To control effect of soil erosion.

D. Management Efforts
   • Minimize the area of land clearing when possible, limit only to required sites for activities and land clearing is conducted progressively
   • For large areas to be cleared, create upstream diversion to avoid run-on to the cleared area.
   • Remove top soil from the land clearing sites and store in specified area or reuse immediately in reclamation.
   • Where practicable stabilize soil with local grasses

E. Management Location
   • Project area.

F. Management Period
   • Construction stage.

G. Management Institution

Conductor
   • Construction Department
   • Environmental, Health and Safety Department

Supervisor
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3.2.2 Hydrology

3.2.2.1 Surface Run Off Flow Rate

A. Source of Impact
• Land clearing for support facilities.

B. Indicator of Impacts
• Increased surface water run off rate.

C. Management Objectives
• To minimize disturbance on surface water run-off rate

D. Management Efforts
• Management of hydrology is in conjunction with management of soil erosion, TSS, and rehabilitation.
• Conduct study on capacity of the upstream river and conjunction with other activities for villages

E. Management Location
• Project area.

F. Management Period
• Construction stage.

G. Management Institution

Conductor
• Construction Department
• Environmental, Health and Safety Department

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3.2.3 Noise

3.2.3.1 Noise

A. Source of Impact
• Construction of temporary residential facility (construction camp), mine roads, processing facility and RSF (Residue Storage Facility)
• Construction of port

B. Indicator of Impacts
• Increase of noise
• Compliance with noise level standard (State Minister of Environment No. 48 Year 1996)

C. Management Objectives
To minimize noise generated by chainsaw and equipment used in earthworks
To reduce the impact of noise on local communities

D. Management Efforts
• Identify specific Construction activities which are likely to generate nuisance noise in the community and schedule these activities to limit 24 hours exposure.
• Inform and socialise with the affected communities on the potential for nuisance noise levels prior to the commencement of relevant activities.

E. Management Location
• Project Area.

F. Management Period
• Construction Stage.

G. Management Institution

Conductor
• Environmental, Health and Safety Department
• Construction Department
• External Relations Department

Supervisor
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3.2.4 Air Quality

3.2.4.1 TSP and Dustfall

A. Source of Impact

• Construction of temporary residential facility, mine roads, processing facility and RSF

B. Indicator of Impacts

• Change in TSP concentration in ambient air

• Increase of dustfall

C. Management Objectives

• To reduce impacts on air quality

D. Management Efforts

• Dust suppression, using sprayed water, in work areas susceptible to dust.

• Placement of appropriate sheeting on roads to limit dust generation.

• Use concrete or adapted building techniques to limit diffuse dust when relevant

E. Management Location

• Project area.

F. Management Period

• Construction Stage.

G. Management Institution

Conductor

• Construction Department

• Environmental, Health and Safety Department

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### 3.2.5 Surface Water Quality

#### 3.2.5.1 TSS

**A. Source of Impact**
• Land clearing for support facilities

**B. Indicator of Impacts**
• Increase of TSS content
• Compliance with applicable nickel mining activity effluent standard (State Minister of Environment Regulation No 9 Year 2006)

**C. Management Objectives**
• To minimize impacts on TSS

**D. Management Efforts**
• Manage TSS in conjunction with management of Soil Erosion and diffuse emissions.
• Direct surface water runoff from the construction site into sediment trap/silt fence
• Construct silt fences and check dams.
• Periodically dredge the sediment trap and place the dredged materials in the reclamation sites

E. Management Location
• Project area.

F. Management Period
• Construction stage.

G. Management Institution

Conductor
• Construction Department
• Environmental, Health and Safety Department

Supervisor
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3.2.6  Sea Water Quality

3.2.6.1  TSS, Turbidity and Oil and Grease

A. Source of Impact
   • Mobilization of equipment and Materials
   • Construction of Port

B. Indicator of Impacts
   • Increase of TSS, Turbidity and Oil and Grease rate

C. Management Objectives
   • To reduce impacts on sea water quality and associated significant secondary impacts to other environmental components.

D. Management Efforts
   • Plan and schedule mobilization that will minimize impact on sea water quality
   • Where possible or appropriate, use stacker to load and unload the materials to minimize spill
   • Equip the port with oil spill control equipment, and conduct regular refreshment training on spill control
   • Request ship owner or contractor to provide waste storage facilities on board.

E. Management Location
   • Port area.

F. Management Period
   • Construction stage.

G. Management Institution
   Conductor
   • Mine Maintenance Department
   • Construction Department
   • Environmental, Health and Safety Department

   Supervisor
   • Department of Energy and Mineral Resources, Republic of Indonesia
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### 3.2.7 Terrestrial Flora and Fauna

#### 3.2.7.1 Species Structure and Composition as well as Wildlife Habitat

**A. Source of Impact**

• Land clearing

**B. Indicator of Impacts**

• Disturbance to biodiversity
  
  • Degree of employee understanding on the importance of protecting potentially endangered flora and fauna species

**C. Management Objectives**

• To protect the rare and endangered species of flora and fauna
  
  • To increase the awareness of WBN employees and contractors about protecting potentially endangered flora and fauna.

**D. Management Efforts**

• Flora and fauna base line study for characterization have been conducted
  
  • Identify flora species of conservation and economic value, for use in rehabilitation program.
• Develop Permanent Plots for assessing impacts on forest structure and as conservation areas for flora and fauna.
• Post sign board “No Hunting of Protected Fauna” at the strategic places
• Prepare and implement policy on prohibiting WBN’s employees and contractors to hunt, rear, trade protected fauna and flora.
• Conduct regular campaign on biodiversity (the importance of protecting endangered flora and fauna) to employees in cooperation with relevant local non-government organizations
  • Develop program of specific flora development for rehabilitation

E. Management Location
• Project area.

F. Management Period
• Construction stage.

G. Management Institution
  Conductor
• Environmental, Health and Safety Department
• External Relations Department
  Supervisor
• Department of Energy and Mineral Resources, Republic of Indonesia
• Bapedalda of North Maluku Province
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3.2.8  Freshwater Aquatic Biota

3.2.8.1 Abundance of Plankton and Benthos

A. Source of Impact
• Land clearing and site preparation

B. Indicator of Impacts
• Change of aquatic biota abundance

C. Management Objectives
• Minimize disturbance to aquatic biota

D. Management Efforts
• Impacts on Freshwater aquatic biota will be managed in conjunction with management of soil erosion and TSS.

E. Management Location
• Project Area.

F. Management Period
• Construction stage.

G. Management Institution
   Conductor
• Construction Department
• Environmental, Health and Safety Department

   Supervisor
• Department of Energy and Mineral Resources, Republic of Indonesia
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3.2.9 *Marine Biota*

3.2.9.1 *Abundance of coral reef fish and coral life form*

A. **Source of Impact**
   - Land clearing and site preparation
   - Port construction

B. **Indicator of Impacts**
   - Change of marine biota abundance

C. **Management Objectives**
   - Minimize disturbance to marine biota

D. **Management Efforts**
   - Impacts on marine biota will be managed in conjunction with management of seawater quality, surface water quality and soil erosion.

E. **Management Location**
   - Project Area.

F. **Management Period**
   - Construction Stage.

G. **Management Institution**

   **Conductor**
   - Construction Department
   - Environmental, Health and Safety Department

   **Supervisor**
   - Department of Energy and Mineral Resources, Republic of Indonesia
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3.2.10 Socio Economics

3.2.10.1 Job Opportunities

A. Source of Impact
• Employment of construction workforces
• Port construction

B. Indicator of Impacts
• Number of local and non local employees (outsiders) recruited by WBN
• Number of local contractors engaged in the project

C. Management Objectives
• To optimize job opportunities for local communities
• To prioritize hiring of skilled people from the local communities
• To contribute in reducing local unemployment in the CoW area

D. Management Efforts
• Maximize number of local people employment by WBN and contractor companies
• Assist in providing training for selected local people to enhance their qualification for employment with WBN and contract companies

E. Management Location

• Villages around Project Area

F. Management Period

• Construction Stage.

G. Management Institution

Conductor

• Human Resources Department
• External Relations Department

 Supervisor

• Department of Energy and Mineral Resources, Republic of Indonesia
• Bapedalda of North Maluku Province
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3.2.10.2 Community Income

A. Source of Impact

• Construction workforce employment
• Construction of temporary residential facility, mine roads, processing facility and RSF
• Workforce release

B. Indicator of Impacts

• The level of engagement of local people, local contractors and general community in various activities related to WBN operation

C. Management Objectives

• To increase the level of engagement of the local community’s in economic activities

D. Management Efforts

• Community will manage income by themselves in conjunction with job and business opportunities.

E. Management Location

• Villages around Project Area.

F. Management Period

• Construction stage.

G. Management Institution

Conductor

• External Relations Department

Supervisor

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3.2.10.3 Business opportunity

A. Source of Impact
• Construction of temporary residential facility, mine roads, processing facility and RSF
• Port construction

B. Indicator of Impacts
• The establishment of additional cooperatives in the local community

C. Management Objectives
• To stimulate on the initiative and business of local individuals and cooperatives

D. Management Efforts
• Conduct a comprehensive inventory of WBN needs in terms of goods and services that could be provided by the local people that satisfy WBN standard.
• Encourage the purchase of local goods and services if meets with quality standard.
• In accordance with WBN capability, assist the community in improving the quality of local goods and services

E. Management Location
• Villages around Project Area.

F. Management Period
• Construction stage.

G. Management Institution

Conductor
• External Relations Department

Supervisor
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3.2.10.4 *Livelihood Pattern*

**A. Source of Impact**

• Construction workforce employment.

**B. Indicator of Impacts**

• Change of livelihood pattern in Community.

**C. Management Objectives**

• To maintain or to improve livelihood of host communities
• To minimize the settlement of unplanned immigrants attracted by the Project.

**D. Management Efforts**

• Establishing Codes of Conduct for workforce
• Isolate construction camp and outside construction workers from host communities to avoid negative influence of construction activities on current community livelihood
• Prevent host community members from residing in the construction camp
• Preparation of host communities for construction by socialization of construction activities
E. Management Location
   • Villages around Project Area.

F. Management Period
   • Construction stage.

G. Management Institution
   Conductor
   • Human Resources Department
   • External Relations Department

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3.2.11 Socio Cultural

3.2.11.1 Migration, Assimilation and acculturation, Alteration of social values and norms and Community unrest

A. Source of Impact
• Construction workforce employment

B. **Indicator of Impacts**
• Interaction between local community and incomers

C. **Management Objectives**
• To reduce the community unrest because of assimilation and acculturation.
• To reduce adverse effects of changes in social values and norms (entry of vices, lowering of moral standards)

D. **Management Efforts**
• Prepare socialization program to stakeholders relating to the impacts associated with the Project.
• Coordinate construction activities with relevant government authorities to minimize uncontrolled induced migration
• Recruitment of host community members will be based on competence. Recruitment and demobilization of remaining workforce will be back to point of origin.

E. **Management Location**
• Villages around Project Area.

F. **Management Period**
• Construction Stage.

G. **Management Institution**

**Conductor**
• Human Resources Department
• External Relations Department

**Supervisor**
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3.2.12 Public Health

3.2.12.1 Prevalence of Diseases and Public Health Services and Sanitation

A. Source of Impact

- Construction workforce employment

B. Indicator of Impacts

- Potential increase in prevalence of diseases
- Inadequacy of public health services and degradation of sanitation

C. Management Objectives

- To create possible disease prevalence awareness amongst host communities
- Maintain or improve existing public sanitation
- Avoid construction related traffic accidents
- Control of construction related dust.

D. Management Efforts

- Conduct regular campaign on possible disease prevalence awareness among employee and host community
- Request EPCM (Engineering Procurement Construction Management) contractor to establish construction waste management plan prior to construction
- Request medical check-ups of all Project employers
- Establish Codes of Conduct for construction workforce
- Ensure EPCM contractor establishes a traffic management plan (land and sea transportation)
• Ensure EPCM contractor establishes a dust mitigation plan prior to construction
• Coordinate and implement efforts with relevant Government authorities
• Establish a Health policy in line with Corporate (Eramet) one’s

E. Management Location
• Villages around Project Area.

F. Management Period
• Construction stage.

G. Management Institution
Conductor
• Human Resources Department
• External Relations Department

Supervisor
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• Office of Mine and Energy of East Halmahera Regency
3.3  **Operation Stage – Workforce Employment**

3.3.1 **Socio Economics**

3.3.1.1 **Job Opportunities**

A. **Source of Impact**
   - Operations workforce employment

B. **Indicator of Impacts**
   - Number of local and non local employee (outsiders) recruited by WBN

C. **Management Objectives**
   - To optimize job opportunities for local communities
   - To prioritize hiring of skilled people from local communities
   - To contribute in reducing local unemployment in the CoW area

D. **Management Efforts**
   - Maximize number of local people employment by WBN and contractor companies
   - Assist in specifying training for selected local people to enhance their qualification for employment with WBN and contract companies

E. **Management Location**
   - Village around Project Area.

F. **Management Period**
   - Operation stage.

G. **Management Institution**

   **Conductor**
   - Human Resources Department
   - External Relations Department

   **Supervisor**
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3.3.1.2 Community Income

A. Source of Impact
• Operations workforce employment

B. Indicator of Impacts
• The level of engagement of local people, local contractors and general community in various activities related to WBN operation

C. Management Objectives
• To increase the level of engagement of the local community’s in the economic activities

D. Management Efforts
• Community will manage income by themselves in conjunction with job and business opportunities

E. Management Location
• Village around Project Area.

F. Management Period
• Operation stage.

G. Management Institution
Conductor
• External Relations Department
Supervisor
- Department of Energy and Mineral Resources, Republic of Indonesia
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3.3.1.3 Livelihood Pattern

A. Source of Impact
- Operations workforce employment

B. Indicator of Impacts
- Change of livelihood pattern in Community

C. Management Objectives
- To maintain or to improve livelihood of host communities
- In coordination with local authorities, to minimize the settlement of unplanned migrants attracted by the Project

D. Management Efforts
- Establishing Codes of Conduct for workforce
- Isolate Permanent Accommodation Facility from host communities to avoid negative influence on current community livelihood
• Prevent non-employee host community members from residing in the Permanent Accommodation Facility.
• Coordinate with relevant government authorities to minimize uncontrolled induced migration
• Preparation of host communities for operation stage by socialization of operational activities

E. Management Location
• Village around Project Area

F. Management Period
• Operation stage.

G. Management Institution

Conductor
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• Office of Mine and Energy of East Halmahera Regency
3.3.2 Socio Cultural

3.3.2.1 Migration, Assimilation and acculturation, Alteration of social values and norms, Community unrest

A. Source of Impact
   • Operations workforce employment

B. Indicator of Impacts
   • Interaction between local community and incomers.

C. Management Objectives
   • To reduce the community unrest because of assimilation and acculturation.
   • To reduce adverse effects of changes in social values and norms (entry of vices, lowering of moral standards)

D. Management Efforts
   • Prepare and implement social stakeholders’ engagement programs.
   • Coordinate with relevant government authorities to minimize uncontrolled induced migration.

E. Management Location
   • Village around Project Area.

F. Management Period
   • Operation stage.

G. Management Institution
   Conductor
   • External Relations Department
   Supervisor
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- Office of Mine and Energy of East Halmahera Regency

3.3.3 Public Health

3.3.3.1 Prevalence of Diseases, Public Health Services and Sanitation

A. Source of Impact
- Operations workforce employment

B. Indicator of Impacts
- Potential increase in prevalence of diseases
- Inadequacy of public health services and degradation of sanitation

C. Management Objectives
- To create possible disease prevalence awareness amongst host communities
- Maintain or improve existing public sanitation

D. Management Efforts
- Conduct regular campaign on possible disease prevalence awareness among employee and host community
- Request medical check-ups for all employee and from all Project employers
- Coordinate and implement efforts with relevant Government authorities

E. Management Location
- Village around Project Area

F. Management Period
- Operation stage.
G. Management Institution

Conductor

- External Relations Department

Supervisor

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3.4 Operation Stage of Ore Mining

3.4.1 Air Quality

3.4.1.1 TSP and Dust Fall

A. Source of Impact

- Removal and placement of overburden and mining and stockpiling of ore
- Ore transportation by trucks

B. Indicator of Impacts
• Change in TSP (mainly PM10) concentration in ambient air
• Compliance to applicable ambient air quality standard (Government Regulation No. 41 Year 1999)

C. Management Objectives
• To reduce impacts on air quality

D. Management Efforts
• In dry period, reduce airborne TSP levels caused by road traffic by using adequate technique of conception and periodically suppressing dust using water spray on the mine road
• Avoid villages in the design of mine haul roads.
• Reduce truck speed to applicable and safe speed limit when the traffic passes close to villages.

E. Management Location
• Project Area.

F. Management Period
• Operation stage.

G. Management Institution
Conductor
• Mine Engineering Department
• Ore Transportation Department
• Environmental, Health and Safety Department

Supervisor
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3.4.2 Topography

3.4.2.1 Landform

A. Source of Impact
• Removal and placement of overburden and mining and stockpiling of ore

B. Indicator of Impacts
• Change of topography in term of elevation and slope in the mine area related to ore mining and overburden placement

C. Management Objectives
• To manage slope stability of the overburden placement
• To adjust the topography of the overburden placement site in order to minimize soil erosion and support reclamation

D. Management Efforts
• Optimize the mining plans based on pit slope stability criteria and adapted progressive mining plan.
• When practicable, partially backfill the mined-out area with overburden and adjust the topography and slope based on secure geotechnical factors.
• Adjust drainage of the final overburden placement site to ensure long term stability.
• Spread top soil in the final overburden site and implement re-vegetation plans for reclamation.

E. Management Location
• Project area.

F. Management Period
• Operation stage.

G. Management Institution
   Conductor
• Mine Engineering Department
• Mine Operations Department
• Environmental, Health and Safety Department

**Supervisor**

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### 3.4.3 Soils

#### 3.4.3.1 Soil Erosion

**A. Source of Impact**

• Land clearing for mine area
• Stripping and stockpiling of topsoil
• Removal and placement of overburden and mining and stockpiling of ore
• Reclamation of mined areas

**B. Indicator of Impacts**

• Increase of erosion rate

**C. Management Objectives**
To minimize soil erosion.

D. Management Efforts

- Minimize the area of land clearing when possible operate progressively, limit only to required sites for activities
- Remove the top soil from the land clearing sites and store in specified area or reuse immediately
- Protect the topsoil storage area by constructing berm and planting cover crops in case top soil will not be used within 3 years
- Where necessary construct silt fences and check dams.
- Manage surface water run-off on the overburden placement site and active mining sites by constructing drainage channel and directing the run-off water to sedimentation ponds
- Develop a re-vegetation plan
- As soon as possible revegetate the final overburden and the open area by cover crops, fast growing plant species

E. Management Location

- Project area.

F. Management Period

- Operation stage.

G. Management Institution

Conductor

- Mine Operations Department
- Environmental, Health and Safety Department

Supervisor

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3.4.4 Hydrology

3.4.4.1 Surface Run off Flow Rate

A. Source of Impact
  • Land clearing for mine area

B. Indicator of Impacts
  • Surface water run off rate.

C. Management Objectives
  • To minimize surface water run-off rate

D. Management Efforts
  • Leverage topography to respect natural catchment area in conjunction with top soil placement, artificial drainage channel and revegetation efforts.
  • Management of hydrology is in conjunction with management of soil erosion, TSS, and rehabilitation.
  • Integrate in the mining method the requirements of surface run off management

E. Management Location
  • Project area.

F. Management Period
  • Operation stage.

G. Management Institution
  Conductor
  • Mine Operations Department
  • Environmental, Health and Safety Department
  Supervisor
  • Department of Energy and Mineral Resources, Republic of Indonesia
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3.4.5  **Surface Water Quality**

3.4.5.1  **TSS**

A. **Source of Impact**

• Land clearing for mine area
• Stripping and stockpiling of topsoil
• Removal and placement of overburden and mining and stockpiling of ore
• Reclamation of mined areas

B. **Indicator of Impacts**

• Increase of TSS content
• Compliance with applicable regulation on effluent water quality standard for nickel mining activity (State Minister of Environment Regulation No. 9 Year 2006)

C. **Management Objectives**

• To control TSS content in surface water runoff and effluent from mining area
D. Management Efforts
- Manage TSS in conjunction with Soil Erosion and air quality (diffuse emissions).
- Construct and operate sedimentation ponds in the active mine and post mined-area
- Direct surface water runoff from mine pit and mining area into sedimentation ponds
- Manage slope stability; minimize soil erosion and surface water run-off by applying efforts mentioned in item landscape, soil erosion and surface water run-off rate

E. Management Location
- Project area.

F. Management Period
- Operation stage.

G. Management Institution
  
  Conductor
  - Mine Operations Department
  - Environmental, Health and Safety Department
  
  Supervisor
  - Department of Energy and Mineral Resources, Republic of Indonesia
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3.4.5.2 Fe, Mg, Mn, Trace metals

A. Source of Impact
• Removal and placement of overburden and mining and stockpiling of ore

B. Indicator of Impacts
• Compliance with applicable regulation on effluent water quality standard for nickel mining activity (State Minister of Environment Regulation No. 9 Year 2006)

C. Management Objectives
• To minimize all contaminants

D. Management Efforts
• Develop testwork to predict the potential for the release of trace metals from mining operations, and to understand mechanisms involved in their release, if relevant.
• If relevant, develop and implement strategies for mitigating the release of trace metals based on the mechanisms identified in the testwork.

E. Management Location
• Project area.

F. Management Period
• Operation stage.

G. Management Institution

Conductor
• Mine Engineering Department
• Mine Operations Department
• Environmental, Health and Safety Department

Supervisor
• Department of Energy and Mineral Resources, Republic of Indonesia
• Bapedalda of North Maluku Province
• Office of Mine and Energy of North Maluku Province
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**3.4.6 Terrestrial Flora and Fauna**

**3.4.6.1 Species composition and structure as well as wildlife habitat**

A. **Source of Impact**
- Land clearing
- Reclamation of mined area

B. **Indicator of Impacts**
- Disturbance to biodiversity
- Degree of employee and community understanding on the importance of protecting potentially extinct flora and fauna species

C. **Management Objectives**
- To protect the rare and endangered species of flora and fauna
- To increase the awareness of WBN employees and contractors about biodiversity conservation.

D. **Management Efforts**
- Update and maintain database of identified flora and fauna species including protected status
- Identify flora species of conservation and economic value, for use in rehabilitation program
- Develop a SOP for handling endemic, endangered and protected species
- Identify and cooperate with appropriate institutions and/or non-government organization for ex-situ conservation of protected fauna.
• Develop Permanent Plots for assessing impacts on forest structure and as conservation areas for flora and fauna.
• At WBN nursery facilities, include propagation of native plant species for reclamation programs
• Prepare and implement policy on prohibiting WBN’s employees and contractors to hunt, rear, trade of protected flora and fauna.
• Conduct regular education campaigns on biodiversity management and environmental protection to employees and community in general

E. Management Location

• Project area.

F. Management Period

• Operation stage.

G. Management Institution

Conductor
• Environmental, Health and Safety  Department
• External Relations Department

Supervisor
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### 3.4.7 Freshwater Aquatic Biota

#### 3.4.7.1 Abundance of Plankton and Benthos

**A. Source of Impact**
- Stripping and stockpiling of topsoil
- Removal and placement of overburden and mining and stockpiling of ore
- Reclamation of mined areas

**B. Indicator of Impacts**
- Change of Aquatic Biota abundance

**C. Management Objectives**
- Minimize disturbance to aquatic biota

**D. Management Efforts**
- Minimize disturbance to aquatic biota through management of soil erosion, TSS and surface flow rate.

**E. Management Location**
- Project area.

**F. Management Period**
- Operation stage.

**G. Management Institution**

**Conductor**
- Mine Engineering Department
- Mine Operations Department
- Environmental, Health and Safety Department

**Supervisor**
- Department of Energy and Mineral Resources, Republic of Indonesia
- Bapedalda of North Maluku Province
- Office of Mine and Energy of North Maluku Province
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3.4.8 Socio Economics

3.4.8.1 Business Opportunities and Community Income
A. Source of Impact
• Land clearing
• Reclamation of mined areas
B. Indicator of Impacts
• The level of participation of local people, local contractors and general community in various activities related to WBN operation
C. Management Objectives
To increase the level of the local community’s participation in economic activities related to construction
D. Management Efforts
• Identify and promote the development of business opportunities other than direct employment
• Give preference (by WBN and contractors) to purchasing local products and services if it meets quality standards and demand
• In accordance with WBN capability, assist host communities to improve the quality of local goods and services
• Assist community members in developing business skills (e.g. financial planning, quality control etc)
E. Management Location
• Villages around Project Area
F. Management Period
• Operation stage.

G. **Management Institution**

**Conductor**

• Human Resources Department
• External Relations Department

**Supervisor**

• Department of Energy and Mineral Resources, Republic of Indonesia
• Bapedalda of North Maluku Province
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3.4.9 **Socio Cultural**

3.4.9.1 **Livelihoods of Indigenous People (IP)**

A. **Source of Impact**

• Land clearing

B. **Indicator of Impacts**

• Presence or absence of valid complaints
• Community related incidents

C. **Management Objectives**
To minimize impacts of mining activities towards IP

D. Management Efforts

- Develop Project internal Code of Conduct related to interactions with IP
- Coordinate related company efforts with local government authorities and institutions

E. Management Location

- Villages around Project Area

F. Management Period

- Operation stage.

G. Management Institution

Conductor

- External Relations Department

Supervisor

- Department of Energy and Mineral Resources, Republic of Indonesia
- Bapedalda of North Maluku Province
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3.5 **Operation Stage of Ore Processing**

3.5.1 **Air Quality**

3.5.1.1 **SOx and H2S**

A. **Source of Impact**
   
   - Hydrometallurgical process (i.e. Atmospheric leaching)

B. **Indicator of Impacts**
   
   - Increase of SOx and H2S
   - Compliance to applicable emission standard (State Minister of Environment Decree No. 13 Year 1995) and odor standard (State Minister of Environment Decree No. 50 Year 1996)

C. **Management Objectives**
   
   - To reduce impacts of SOx and H2S on air quality

D. **Management Efforts**
   
   - Use efficient and properly maintained equipment to reduce the concentration of SOx and H2S in ambient air quality.
   - Apply appropriate ‘good common practice’ technology in the processing plant to control SOx and H2S emission

E. **Management Location**
   
   - Ore processing plant.

F. **Management Period**
   
   - Operation stage.

G. **Management Institution**

   **Conductor**
   
   - Hydrometallurgical Plant Department
   - Environmental, Health and Safety Department

   **Supervisor**
   
   - Department of Energy and Mineral Resources, Republic of Indonesia
   - Bapedalda of North Maluku Province
   - Office of Mine and Energy of North Maluku Province
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3.5.2 Surface Water Quality

3.5.2.1 TSS

A. Source of Impact
• Solid residue management

B. Indicator of Impacts
• Increase of TSS content
• Compliance with applicable regulation on effluent water quality standard for nickel mining activity (State Minister of Environment Regulation No. 9 Year 2006)

C. Management Objectives
• To reduce TSS rate

D. Management Efforts
• Construct and operate RSF in accordance with applicable regulations
• Construct and operate leachate collection and polishing pond
• Construction of appropriate surface drainage on RSF to limit scouring.
• Direct internal surface drainage to sediment ponds.

E. Management Location
• RSF.

F. Management Period
• Operation stage.

G. Management Institution


**Conductor**
- Hydrometallurgical Plant Department
- Environmental Department

**Supervisor**
- Department of Energy and Mineral Resources, Republic of Indonesia
- Bapedalda of North Maluku Province
- Office of Mine and Energy of North Maluku Province
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3.5.2.2 *pH, water hardness, Mg, Fe, Mn, Trace metals*

A. **Source of Impact**
- Solid residue management

B. **Indicator of Impacts**
- Change of constituents content in surface water
- Compliance with applicable regulation on effluent water quality standard for nickel mining activity (State Minister of Environment Regulation No. 9 Year 2006)

C. **Management Objectives**
- To control contaminants concentration in effluent water

D. **Management Efforts**
Construct and operate RSF in accordance with applicable regulations
Construct and operate leachate collection and polishing pond
Implement a waste water treatment plant if requested, manage residues back to RSF
Construct surface drainage on RSF to limit contact of water with exposed residue and collect it with waste water treatment plant if required.
Construct diversion drainage around the RSF and design the RSF surface drainage to limit the water ingress in the RSF and the volume in contact with the solid residue

E. Management Location
- RSF.

F. Management Period
- Operation stage.

G. Management Institution
Conductor
- Hydrometallurgical Plant Department
- Environmental, Health and Safety Department
Supervisor
- Department of Energy and Mineral Resources, Republic of Indonesia
- Bapedalda of North Maluku Province
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3.5.3 Groundwater Quality

3.5.3.1 pH, Mg, Fe, Mn and Trace metals (Co, Cu, As, Cd, Zn, Ni, Pb, Cr(6+) and SO4)

A. Source of Impact
• Solid residue management (i.e. Placement of filter cake)

B. Reference/Indicator of Impacts
• Change of constituents content in ground water

C. Management Objectives
• To reduce impacts on groundwater quality

D. Management Efforts
• Construct and operate RSF in accordance with applicable regulations
• Construct and operate leachate collection and polishing pond
• Construct surface drainage on RSF to limit the water ingress into the RSF.
• Construct diversion drainage around the RSF and design the RSF surface drainage to limit the water ingress in the RSF and the volume in contact with the solid residue

E. Management Location
• RSF

F. Management Period
• Operation Stage.

G. Management Institution
Conductor
• Hydrometallurgical Plant Department
• Environmental, Health and Safety Department
Supervisor
• Department of Energy and Mineral Resources, Republic of Indonesia
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### 3.5.4 Sea Water Quality

#### 3.5.4.1 TSS, temperature, Turbidity, Mg, Fe, Mn, Trace Metals and SO4

**A. Source of Impact**

• Wastewater management

**B. Indicator of Impacts**

• Change of the constituent in sea water
• Compliance with applicable regulation on effluent water quality standard for nickel processing activity (State Minister of Environment Regulation No. 9 Year 2006)

**C. Management Objectives**

• To reduce impacts on sea water quality and associated significant secondary impacts to other environmental components

**D. Management Efforts**

• Minimize the number of discharge points (concept of optimizing the locations & the design of the outlets)
• Construct and operate waste water treatment plant so the water effluent comply with the applicable regulations
• Use diffuser or similar technology to disperse discharge water.

**E. Management Location**

• Ore processing plant
F. Management Period
   • Operation Stage.

G. Management Institution
   Conductor
   • Hydrometallurgical Plant Department
   • Environmental, Health and Safety Department
   Supervisor
   • Department of Energy and Mineral Resources, Republic of Indonesia
   • Bapedalda of North Maluku Province
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3.5.5 Freshwater Aquatic Biota

3.5.5.1 Abundance of Plankton, Benthos and nekton

A. Source of Impact
   • Solid residue management
   • Wastewater management

B. Indicator of Impacts
   • Change of aquatic biota abundance
C. Management Objectives
   • Minimize disturbance to aquatic biota

D. Management Efforts
   • Disturbance to freshwater aquatic biota will be managed through solid residue management

E. Management Location
   • RSF.

F. Management Period
   • Operation stage.

G. Management Institution
   Conductor
   • Hydrometallurgical Plant Department
   • Environmental, Health and Safety Department
   Supervisor
   • Department of Energy and Mineral Resources, Republic of Indonesia
   • Bapedalda of North Maluku Province
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3.5.6 Marine Biota

3.5.6.1 Abundance of Plankton, Benthos, coral reef fishes and coral life forms

A. Source of Impact
   • Wastewater management (discharge to marine environment)

B. Indicator of Impacts
   • Change of marine biota abundance

C. Management Objectives
   • Minimize disturbance to marine biota

D. Management Efforts
   • Disturbance to marine biota through wastewater management
   • Wastewater treatment to comply with applicable effluent standard

E. Management Location
   • Ore processing plant

F. Management Period
   • Operation stage.

G. Management Institution
   Conductor
   • Hydrometallurgical Plant Department
   • Environmental, Health and Safety Department
   Supervisor
   • Department of Energy and Mineral Resources, Republic of Indonesia
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3.6 Operation Stage of Limestone Quarrying and Processing Activities

3.6.1 Air Quality

3.6.1.1 TSP and Dustfall

A. Source of Impact
  • Limestone quarrying
  • Limestone transportation, stockpiling and crushing

B. Indicator of Impacts
  • Change in TSP (mainly PM10) concentration in ambient air
  • Compliance to applicable ambient air quality standard (Government Regulation No. 41 Year 1999)

C. Management Objectives
  • To reduce impacts on air quality

D. Management Efforts
  • In dry period, reduce airborne TSP levels caused by road traffic by periodically suppressing dust using water spray in the unpaved road
  • Mining road and limestone transport system will be designed to avoid villages

E. Management Location
  • Limestone Quarry

F. Management Period
  • Operation stage

G. Management Institution

Conductor
  • Limestone Quarry Department
  • Environmental, Health and Safety Department

Supervisor
  • Department of Energy and Mineral Resources, Republic of Indonesia
• Bapedalda of North Maluku Province
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### 3.6.1.2 \( \text{SO}_2 \) and \( \text{NO}_2 \)

**A. Source of Impact**

- Lime production.

**B. Indicator of Impacts**

- Increase in \( \text{SO}_2 \) and \( \text{NO}_2 \) concentration

**C. Management Objectives**

- To reduce impacts on air quality

**D. Management Efforts**

- Use appropriate recognized technology to minimize air emission

**E. Management Location**

- Lime Kiln.

**F. Management Period**

- Operation stage.

**G. Management Institution**

**Conductor**
• Energy and Utilities Department
• Environmental, Health and Safety Department

**Supervisor**
• Department of Energy and Mineral Resources, Republic of Indonesia
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3.6.1.3 **TSP, Dust Fall and CO₂**

A. **Source of Impact**
• Lime production.

B. **Indicator of Impacts**
• Increase of Dustfall and CO₂

C. **Management Objectives**
• To reduce impacts on air quality

D. **Management Efforts**
• Use appropriate recognized technology to minimize air emission
• Dust collection prior to discharge through stack at lime kiln

E. **Management Location**
• Lime Kiln

F. Management Period
• Operation stage.

G. Management Institution

Conductor
• Energy and Utilities Department
• Environmental, Health and Safety Department

Supervisor
• Department of Energy and Mineral Resources, Republic of Indonesia
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3.6.2 Noise

3.6.2.1 Noise

A. Source of Impact
• Limestone quarrying

B. Indicator of Impacts
• Increase of noise.
C. Management Objectives
- To reduce the impact of noise and vibration

D. Management Efforts
- Implement controlled blasting technique.
- Inform local communities of blasting schedule and operate a noise management plan (limit hours for blasting).

E. Management Location
- Limestone Quarry.

F. Management Period
- Operation stage.

G. Management Institution
   Conductor
   - Limestone Quarry Department
   - Environmental, Health and Safety Department
   Supervisor
   - Department of Energy and Mineral Resources, Republic of Indonesia
   - Bapedalda of North Maluku Province
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3.6.3  Vibration

3.6.3.1  Vibration

A.  Source of Impact

- Limestone quarrying

B.  Indicator of Impacts

- Complaint on Vibration
- Structural damage of infrastructures

C.  Management Objectives

- To reduce or avoid if practically possible the effects of vibration

D.  Management Efforts

- Implement controlled blasting technique
- Plan carefully the schedule of blasting that will minimize disturbance

E.  Management Location

- Limestone Quarry.

F.  Management Period

- Operation Stage.

G.  Management Institution

Conductor

- Limestone Quarry Department
- Environmental, Health and Safety Department

Supervisor

- Department of Energy and Mineral Resources, Republic of Indonesia
- Bapedalda of North Maluku Province
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• Office of Mine and Energy of East Halmahera Regency

3.6.4 Topography

3.6.4.1 Landform

A. Source of Impact
• Limestone quarrying

B. Indicator of Impacts
• Change in landform

C. Management Objectives
• To manage slope stability of the quarry mine site

D. Management Efforts
• Integrate slope stability criteria into the mining plan and adapted progressive mining plans.
• Minimize the visual impact of activities

E. Management Location
• Limestone Quarry

F. Management Period
• Operation Stage.

G. Management Institution
Conductor
• Limestone Quarry Department
• Environmental, Health and Safety Department

Supervisor
• Department of Energy and Mineral Resources, Republic of Indonesia
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3.6.5 **Soil**

3.6.5.1 **Soil Erosion**

A. **Source of Impact**
• Land clearing
• Stripping and piling of topsoil

B. **Indicator of Impacts**
• Soil Erosion rate and its downstream effects (i.e. siltation)

C. **Management Objectives**
• To minimize soil erosion

D. **Management Efforts**
• Minimize the area of land clearing whenever possible and operate progressively, limit clearing only to required for the activities
• Prior to land clearing and where possible or relevant construct diversion drainage around areas to be cleared
• Remove top soil from land clearing sites and store in specified areas that will make it readily available reuse
• Protect the topsoil storage area by constructing berms and planting cover crops when top soil will not be used within 3 years
• Manage surface water run-off on the overburden placement site and active mining sites by constructing drainage channel and directing the run-off water to sedimentation ponds
• Develop a re-vegetation plan
• If required, protect the open slope area from erosion by appropriate methods (e.g. crushed rock sheeting, cover crops etc)

E. Management Location
• Lime Quarry.

F. Management Period
• Operation stage.

G. Management Institution
Conductor
• Limestone Quarry Department
• Environmental, Health and Safety Department

Supervisor
• Department of Energy and Mineral Resources, Republic of Indonesia
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3.6.6 Hydrology

3.6.6.1 Surface Runoff Flow Rate

A. Source of Impact
   • Land Clearing

B. Indicator of Impacts
   • Surface water run off rate

C. Management Objectives
   • To minimize surface water run-off rate

D. Management Efforts
   • Leverage topography to respect natural catchment area in conjunction with top soil placement, artificial drainage channel and revegetation efforts.

E. Management Location
   • Limestone Quarry.

F. Management Period
   • Operation stage.

G. Management Institution

Conductor
   • Limestone Quarry Department
   • Environmental, Health and Safety Department

Supervisor
   • Department of Energy and Mineral Resources, Republic of Indonesia
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   • Office of Mine and Energy of North Maluku Province
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### 3.6.7 Hydrogeology

#### 3.6.7.1 Change of Groundwater Flow Pattern

**A. Source of Impact**
- Limestone quarrying

**B. Indicator of Impacts**
- Change groundwater level and flow

**C. Management Objectives**
- To minimize changes on groundwater level and flow

**D. Management Efforts**
- As far as possible, leverage topography to respect natural catchment area

**E. Management Location**
- Limestone Quarry.

**F. Management Period**
- Operation Stage.

**G. Management Institution**

**Conductor**
- Limestone Quarry Department
- Environmental Department
Supervisor

- Department of Energy and Mineral Resources, Republic of Indonesia
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3.6.8 Surface Water Quality

3.6.8.1 TSS, pH and Hardness

A. Source of Impact

- Land clearing
- Stripping and piling of topsoil
- Limestone quarrying

B. Indicator of Impacts

- Change of TSS, pH and Hardness rate
- Compliance with applicable regulation on effluent water quality standard

C. Management Objectives

- To reduce TSS rate
• To buffer pH and hardness

D. Management Efforts

• Minimize the area of land clearing whenever possible operate progressively, limit clearing to only required for activities
• Integrate slope stability criteria into the mining plan.
• Prior to land clearing and where possible construct diversion drainage around areas to be cleared
• Manage surface water run-off on the top soil stockpiles, lime stockpile and active lime quarry by constructing drainage channel and directing the run-off water to sedimentation ponds

E. Management Location

• Lime Quarry.

F. Management Period

• Operation stage.

G. Management Institution

Conductor

• Limestone Quarry Department
• Environmental, Health and Safety Department

Supervisor

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3.6.9 Terrestrial Flora and Fauna

3.6.9.1 Species composition and structure and quality of wildlife habitat

A. Source of Impact
• Land clearing
• Limestone quarrying

B. Indicator of Impacts
• Disturbance to biodiversity
• Degree of employee and community understanding on the importance of protecting potentially extinct flora and fauna species

C. Management Objectives
• To protect the rare and endangered species of flora and fauna
• To increase the awareness of WBN employees and contractors about biodiversity conservation.

D. Management Efforts
• Update and maintain database line of identified flora and fauna species including protected status
• Identify flora species of conservation and economic value, for use in rehabilitation program
• Develop a SOP for handling endemic, endangered and protected species
• Identify and cooperate with appropriate institutions and/or non-government organization for ex-situ conservation of protected fauna.
• Develop Permanent Plots for assessing impacts on forest structure and as conservation areas for flora and fauna.
• At WBN nursery facilities, include propagation of native plant species for reclamation programs
• Prepare and implement policy on prohibiting WBN’s employees and contractors to hunt, rear, trade of protected flora and fauna.
• Conduct regular education campaigns on biodiversity management and environmental protection to employees and community in general

E. **Management Location**

• Limestone Quarry.

F. **Management Period**

• Operation stage.

G. **Management Institution**

**Conductor**

• Environmental Department
• External Relations Division

**Supervisor**

• Department of Energy and Mineral Resources, Republic of Indonesia
• Bapedalda of North Maluku Province
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3.6.10 *Freshwater Aquatic Biota*

3.6.10.1 *Abundance of Plankton and Benthos*

A. **Source of Impact**
   - Land clearing
   - Stripping and piling of topsoil

B. **Indicator of Impacts**
   - Change of Aquatic Biota abundance

C. **Management Objectives**
   - Minimize disturbance to aquatic biota

D. **Management Efforts**
   - Manage disturbance to freshwater aquatic biota through soil erosion, TSS and surface flow rate

E. **Management Location**
   - Limestone Quarry.

F. **Management Period**
   - Operation stage.

G. **Management Institution**
   **Conductor**
   - Limestone Quarry Department
   - Environmental, Health and Safety Department

   **Supervisor**
   - Department of Energy and Mineral Resources, Republic of Indonesia
   - Bapedalda of North Maluku Province
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3.6.11 *Socio Economics*

3.6.11.1 *Business Opportunities and Community Income*

A. **Source of Impact**
   • Land clearing

B. **Indicator of Impacts**
   • The level of participation of local people, local contractors and general community in various activities related to WBN operation

C. **Management Objectives**
   • To increase the level of the local community’s participation in economic activities related to construction

D. **Management Efforts**
   • Identify and promote the development of business opportunities other than direct employment
   • Give preference (by WBN and contractors) to purchasing local products and services if it meets quality standards and demand
   • In accordance with WBN capability, assist host communities to improve the quality of local goods and services
   • Assist community members in developing business skills (e.g. financial planning, quality control etc)

E. **Management Location**
   • Villages around Project Area

F. **Management Period**
   • Operation stage.

G. **Management Institution**

   **Conductor**
• External Relations Department

**Supervisor**

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### 3.7 OPERATION STAGE OF OPERATION SUPPORT FACILITIES

#### 3.7.1 Air Quality

##### 3.7.1.1 \( \text{SO}_2, \text{NO}_2 \text{ and } \text{H}_2\text{S} \)

A. **Source of Impact**

• Sulphuric Acid Plant
  • Power plant

B. **Reference/Indicator of Impacts**

• Increase of \( \text{SO}_2, \text{NO}_2 \text{ and } \text{H}_2\text{S} \)

C. **Management Objectives**

• To reduce impacts of \( \text{SO}_2, \text{NO}_2 \text{ and } \text{H}_2\text{S} \) on air quality
D. Management Efforts

- Use of efficient and properly maintained equipment to minimize the generation of SO$_2$, NO$_2$, and H$_2$S in ambient air quality.
- Built or purchase ‘good common practise’ processing equipment or facilities

E. Management Location

- Sulphuric Acid Plant

F. Management Period

- Operation Stage.

G. Management Institution

Conductor

- Energy and Utilities Department
- Environmental, Health and Safety Department

Supervisor

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3.7.2 Noise

3.7.2.1 Noise

A. Source of Impact
   • Power Plant.

B. Reference/Indicator of Impacts
   • Increase of noise.

C. Management Objectives
   • To reduce Noise.

D. Management Efforts
   • Control of noise through the use of berms and mufflers or noise insulation materials.
   • Effort to use appropriate equipment to reduce noise

E. Management Location
   • Power plant.

F. Management Period
   • Operation Stage.

G. Management Institution
   Conductor
   • Energy and Utilities Department
   • Environmental, Health and Safety Department

   Supervisor
   • Department of Energy and Mineral Resources, Republic of Indonesia
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3.7.3 Hydrology

3.7.3.1 Change of Kobe River Flow

A. Source of Impact
   • Water supply for mine project

B. Reference/Indicator of Impacts
   • Change of Flow Rate.

C. Management Objectives
   • To minimize surface water run-off rate

D. Management Efforts
   • Monitor flow rate in Kobe River and switch to alternative supply or adjust the production level when flow reaches critical minimum level.

E. Management Location
   • Project Area.

F. Management Period
   • Operation Stage.

G. Management Institution
   Conductor
   • Energy and Utilities Department
   • Environmental, Health and Safety Department

   Supervisor
   • Department of Energy and Mineral Resources, Republic of Indonesia
• Bapedalda of North Maluku Province
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### 3.7.4 Surface Water Quality

#### 3.7.4.1 Oil and grease

A. **Source of Impact**
   • Maintenance facilities

B. **Reference/Indicator of Impacts**
   • Increase of oil and grease.

C. **Management Objectives**
   • To minimize oil and grease contamination

D. **Management Efforts**
   • Operate oil catchers on the effluent treatment plant to separate oil from water.
   • Maintain effluent treatment plant to ensure optimum performance.
   • Diversion of untreated waste water to effluent treatment plant or oil catchers.
E. Management Location

- Workshop Area.

F. Management Period

- Operation Stage.

G. Management Institution

Conductor

- Engineering and Maintenance Department
- Environmental, Health and Safety Department

Supervisor

- Department of Energy and Mineral Resources, Republic of Indonesia
- Bapedalda of North Maluku Province
- Office of Mine and Energy of North Maluku Province
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3.7.4.2 Nutrients (BOD, COD, Ammonia, Nitrate and Nitrite)

A. Source of Impact

- Non-process waste management

B. Reference/Indicator of Impacts
• Change in Surface Water Quality

C. Management Objectives
• To comply with applicable regulation on effluent water quality standard
• To minimize all contaminants

D. Management Efforts
• Construct an engineered landfill to limit run-off to surface water.
• Separate, treat and dispose of hazardous wastes in accordance with Government Regulations.

E. Management Location
• Landfill

F. Management Period
• Operation Stage.

G. Management Institution
  Conductor
• Energy and Utilities Department
• Environmental, Health and Safety Department

  Supervisor
• Department of Energy and Mineral Resources, Republic of Indonesia
• Bapedalda of North Maluku Province
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3.7.5  Groundwater Quality

3.7.5.1 Nutrients (BOD, COD, Ammonia, Nitrate and Nitrite)

A. Source of Impact
• Non-process waste management

B. Reference/Indicator of Impacts
• Change in Groundwater Water Quality

C. Management Objectives
• To reduce impacts on groundwater quality
• To comply with applicable regulation

D. Management Efforts
• Construct Landfill in accordance with applicable regulations
• Construct and operate leachate collection and polishing pond
• Separate, treat and dispose of hazardous wastes in accordance with Government Regulations.
• Implement piezometers to control the quality of the ground water

E. Management Location
• Landfill.

F. Management Period
• Operation Stage.

G. Management Institution

Conductor
• Energy and Utilities Department
• Environmental, Health and Safety Department

Supervisor
• Department of Energy and Mineral Resources, Republic of Indonesia
• Bapedalda of North Maluku Province
• Office of Mine and Energy of North Maluku Province
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• Office of Mine and Energy of East Halmahera Regency

### 3.7.6 Socio Economics

#### 3.7.6.1 Business Opportunities

**A. Source of Impact**
• Permanent Accommodation Facility.

**B. Reference/Indicator of Impacts**
• Number of local and non local employees (outsiders) recruited by WBN
• Number of local contractors engaged in the project

**C. Management Objectives**
• Develop long term mining related capacity in host communities
• Optimize job opportunities for local communities
• Develop skill local employee communities members

**D. Management Efforts**
• Assist in providing training for selected local people to enable their employment with WBN and contractors
• Maximize transfer of local people involved in construction into operation phase
• Distribute employment opportunities adequately amongst host communities

E. Management Location
• Villages around Project Area

F. Management Period
• Operation Stage.

G. Management Institution
Conductor
• Human Resources Department
• External Relations Department

Supervisor
• Department of Energy and Mineral Resources, Republic of Indonesia
• Bapedalda of North Maluku Province
• Office of Mine and Energy of North Maluku Province
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• Office of Mine and Energy of East Halmahera Regency
3.7.6.2 Community Income

A. Source of Impact
   • Permanent Accommodation Facility

B. Indicator of Impacts
   • Number of local and non local employees (outsiders) recruited by WBN
   • Number of local contractors engaged in the project

C. Management Objectives
   • Develop long term mining related capacity in host communities
   • Optimize job opportunities for local communities
   • Develop skill local employee communities members

D. Management Efforts
   • Assist in providing training for selected local people to enable their employment with WBN and contractors
   • Maximize transfer of local people involved in construction into operation phase
   • Distribute employment opportunities adequately amongst host communities

E. Management Location
   • Villages around Project Area

F. Management Period
   • Operation stage.

G. Management Institution

Conductor
   • Human Resources Department
   • External Relations Department

Supervisor
   • Department of Energy and Mineral Resources, Republic of Indonesia
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3.8 **OPERATION STAGE - OTHER INFRASTRUCTURE**

3.8.1 **Sea Water Quality**

3.8.1.1 **TSS and pH**

A. **Source of Impact**
• Operation of dedicated port and barge loader

B. **Indicator of Impacts**
• Increase in TSS and change in pH of sea water

C. **Management Objectives**
• To reduce impacts on sea water quality and associated significant secondary impacts to other environmental components
• To comply with applicable regulation on sea water quality standard

D. **Management Efforts**
• Minimize the number of discharge points (concept of optimizing the locations & the design of the outlets)
• Construct and operate waste water treatment plant so the water effluent comply with the applicable regulations
• Limit spillage through appropriate materials handling procedures.

E. **Management Location**
• Port area.
F. Management Period
   • Operation Stage.

G. Management Institution
   Conductor
   • Port Operations Department
   • Logistics Operation Department
   • Environmental, Health and Safety Department

   Supervisor
   • Department of Energy and Mineral Resources, Republic of Indonesia
   • Bapedalda of North Maluku Province
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3.8.1.2 Hydrocarbon, Oil and Grease

A. Source of Impact
   • Operation of dedicated port and barge loader

B. Indicator of Impacts
   • Increase of oil and grease
C. Management Objectives

- To reduce impacts on sea water quality and associated significant secondary impacts to other environmental components.

D. Management Efforts

- Limit spillage through appropriate materials handling procedures.
- Where possible use stacker to load and unload the materials to minimize spill
- Equip the port with oil spill control equipment, and conduct regular refreshment training on spill control
- Provide waste storage facilities on board.

E. Management Location

- Port Area.

F. Management Period

- Operation stage.

G. Management Institution

Conductor

- Port Operations Department
- Logistics Operations Department
- Environmental, Health and Safety Department

Supervisor

- Department of Energy and Mineral Resources, Republic of Indonesia
- Bapedalda of North Maluku Province
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3.8.2 Oceanography

3.8.2.1 Change of current pattern

A. Source of Impact
• Operation of port

B. Indicator of Impacts
• Change in beach sedimentation and erosion pattern

C. Management Objectives
• Minimise impacts of port operations in current pattern

D. Management Efforts
• Conduct oceanographic study to determine the presence and characteristics of natural current pattern in the port area.
• Use properly designed structures in constructing the port facilities.

E. Management Location
• Port area.

F. Management Period
• Operation stage.

G. Management Institution

Conductor
• Port Operations Department
• Environmental, Health and Safety Department

Supervisor
• Department of Energy and Mineral Resources, Republic of Indonesia
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• Office of Mine and Energy of North Maluku Province
• Environmental Management Agency (Badan Pengelola Lingkungan Hidup) of Central Halmahera Regency
• Environmental Agency (Badan Lingkungan Hidup) of East Halmahera Regency
• Office of Mine and Energy of Central Halmahera Regency
• Office of Mine and Energy of East Halmahera Regency

### 3.8.3 Marine Biota

#### 3.8.3.1 Abundance of Plankton, Benthos, coral reef fishes and coral life forms

**A. Source of Impact**
• Operation port

**B. Indicator of Impacts**
• Change of marine biota abundance

**C. Management Objectives**
• Minimize disturbance to marine biota

**D. Management Efforts**
• Manage disturbance to marine biota through management of Seawater quality at the Port

**E. Management Location**
• Port area

**F. Management Period**
• Operation stage.
G. Management Institution

Conductor

- Port Operations Department
- Logistics Operations Department
- Environmental, Health and Safety Department

Supervisor

- Department of Energy and Mineral Resources, Republic of Indonesia
- Bapedalda of North Maluku Province
- Office of Mine and Energy of North Maluku Province
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- Office of Mine and Energy of East Halmahera Regency

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- Office of Mine and Energy of East Halmahera Regency

3.8.4 Air Quality

3.8.4.1 TSP and dustfall

A. Source of Impact

- Operation port

B. Indicator of Impacts

- Change in TSP concentration in ambient air
- Increase of dust fall
• Compliance to applicable ambient air quality standard (Government Regulation No. 41 Year 1999)

C. Management Objectives
• To reduce impact on air quality

D. Management Efforts
• Where possible, use stacker to load and unload the materials to minimize dust generated.
• For bulk material, suppress dust generation in transfer points of conveyors.
• For bulk material, in-coming reagents and outgoing products to be appropriately packaged to limit dust escaping.

E. Management Location
• Port area

F. Management Period
• Operation stage.

G. Management Institution

Conductor
• Port Operations Department
• Logistics Operations Department
• Environmental, Health and Safety Department

Supervisor
• Department of Energy and Mineral Resources, Republic of Indonesia
• Bapedalda of North Maluku Province
• Office of Mine and Energy of North Maluku Province
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• Office of Mine and Energy of East Halmahera Regency

3.8.5 Noise

3.8.5.1 Noise

A. Source of Impact
• Operation port and dedicated airport

B. Indicator of Impacts
• Increase of noise

C. Management Objectives
• To minimize noise

D. Management Efforts
• Schedule arrivals in line with PT WBN activities to the Port and Airport to, as much as possible, avoid night time.
• Socialize impacts of noise with affected communities.

E. Management Location
• Port and airport area

F. Management Period
• Operation stage.

G. Management Institution

Conductor
• Port Operations Department
• Airport Operations Department
• Environmental Health and Safety Department

Supervisor
• Department of Energy and Mineral Resources, Republic of Indonesia
• Bapedalda of North Maluku Province
• Office of Mine and Energy of North Maluku Province
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• Office of Mine and Energy of Central Halmahera Regency
• Office of Mine and Energy of East Halmahera Regency

3.8.6 Socio Economics

3.8.6.1 Accessibility

A. Source of Impact
• Dedicated airport

B. Indicator of Impacts
• Increase in mobility of local people

C. Management Objectives
• Minimize negative impacts on communities

D. Management Efforts
• Coordinate efforts with local authorities to maximize the benefits of the airport.

E. Management Location
• Villages around dedicated airport

F. Management Period
• Operation stage.

G. Management Institution

Conductor
• External Relations Department

Supervisor
• Department of Energy and Mineral Resources, Republic of Indonesia
• Bapedalda of North Maluku Province
• Office of Mine and Energy of North Maluku Province
• Environmental Management Agency (Badan Pengelola Lingkungan Hidup) of Central Halmahera Regency
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• Office of Mine and Energy of East Halmahera Regency

3.9 Community Development

3.9.1 Provision of Educational Facilities and Services

3.9.1.1 Educational facilities and services for local communities

A. Source of Impact
• Increase of demands for educational facilities and educational services

B. Indicator of Impacts
• Distribution of available educational facilities in WBN CoW area
C. Management Objectives

- To assist local government in provision of necessary educational facilities and services under WBN CD Program
- To ensure the responsible and effective use of CD Program funds provided by WBN

D. Management Efforts

- Prioritize isolated villages in the provision of education facilities through the use of funds of the WBN’s CD Program
- Conduct inventory of the needs and establish data base before executing any projects related to education. All education programs are integrated with local government planning to avoid overlapping of the project implementation
- Assist local government, in provision of education improvement in accordance with the capability of WBN

E. Management Location

- Some villages within WBN’s CoW Area in Central and East Halmahera Regency

F. Management Period

- Operation stage.

G. Management Institution

Conductor

- External Relations Department

Supervisor

- Department of Energy and Mineral Resources, Republic of Indonesia
- Bapedalda of North Maluku Province
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- Office of Mine and Energy of East Halmahera Regency

Reporting

- Department of Energy and Mineral Resources, Republic of Indonesia
- Bapedalda of North Maluku Province
3.9.2 Provision of Public Health Service

3.9.2.1 Health facility and services

A. Source of Impact

- Increase of local demands for health services

B. Indicator of Impacts

- Distribution of public health facilities and services within WBN’s COW area Central and East Halmahera Regency

C. Management Objectives

- To assist local government in health facilities distribution under WBN CD Program

D. Management Efforts

- Assist local government, in accordance with the capability of WBN, in provision of public health facilities and health services meet the minimum community requirement
- Conduct a health mapping to understand current status of health infrastructure, paramedic skills, type of disease, population growth versus current infrastructure, etc so that program intervention will address the core problems existing in the community
- Health related programs are to be integrated with local government’s to avoid overlapping project execution
- Carry out regular socialization to community regarding the importance of having a clean environment and the benefit of having preventive behaviour rather than curative

E. Management Location

- Some villages within WBN’s CoW Area in Central and East Halmahera Regency.

F. Management Period


- Operation Stage

G. Management Institution

Conductor

- External Relations Department

Supervisor

- Department of Energy and Mineral Resources, Republic of Indonesia
- Bapedalda of North Maluku Province
- Office of Mine and Energy of North Maluku Province
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3.9.3 Farming and Agriculture Improvement Initiatives

3.9.3.1 Agriculture productivity in WBN’s COW area

A. Source of Impact

- Low agriculture knowledge on valuable commodities among young farmers
- Agriculture production input shortage
- Lack of high quality production input

B. Indicator of Impacts
• Availability of valuable agricultural commodities in WBN’s COW Area
• Production level of local agricultural commodities (coconut, nutmeg)

C. Management Objectives
• To assist local government in provision of important agriculture production factors
• To help increasing production level of several important local agricultural commodities

D. Management Efforts
• To assist farmers to acquire production facilities
• To assist farmers to get certain most important production factors such as fertilizer and high quality seeds
• Assist in promoting organic agriculture, so that the farmers could obtain a premium of production and price of their agriculture product
• Assist in training on various agriculture activities based on each locality’s comparative advantage

E. Management Location
• Some villages within WBN’s CoW Area in central and East Halmahera Regency.

F. Management Period
• Operation Stage

G. Management Institution
Conductor
• External Relations Department

Supervisor
• Department of Energy and Mineral Resources, Republic of Indonesia
• Bapedalda of North Maluku Province
• Office of Mine and Energy of North Maluku Province
• Environmental Management Agency (Badan Pengelola Lingkungan Hidup) of Central Halmahera Regency
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- Office of Mine and Energy of East Halmahera Regency

3.9.4 Fishery and Marine Culture

3.9.4.1 Fishery productivity in Weda Bay

A. Source of Impact
- Low fishery and marine culture knowledge of local fishermaen
- Fishery equipment shortage

B. Indicator of Impacts
- Availability of fishery and marine culture product in Weda Bay
- Production level of local fishery

C. Management Objectives
- To help increasing production level of several important local fishery products

D. Management Efforts
- Help fishermen to acquire fish and marine culture production facilities
- Help fisher to get certain most important fishery equipment
- Assist in training on various fishery and marine culture activities based on each locality’s comparative advantage

E. Management Location
- Some villages within WBN’s CoW Area in Central and East Halmahera Regency

F. Management Period
- Operation Stage.
G. Management Institution

Conductor

- External Relations Department

Supervisor

- Department of Energy and Mineral Resources, Republic of Indonesia
- Bapedalda of North Maluku Province
- Office of Mine and Energy of North Maluku Province
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- Office of Mine and Energy of Central Halmahera Regency
- Office of Mine and Energy of East Halmahera Regency

3.9.5 Local Business Development

3.9.5.1 Level of participation by the local community in various economic activities

A. Source of Impact

- Lack of full and equitable participation of local people in local business opportunities
- Low business skill of local community
- Limited access to sources of funding and capitals

B. Indicator of Impacts
• Number of businesses owned and operated by local communities
• Types of goods and services provided
• Value of local economic activities

C. Management Objectives
• To raise the participation of the locals in the economic activities

D. Management Efforts
• Encourage the use of local product and services by WBN and contractors
• Assist in training of the locals and opportunities to participate in local business endeavors.
• Increase the involvement of local communities through entrepreneurship, in local business endeavors.
• Assist the community to improve the quality of local goods and services.

E. Management Location
• Some villages within WBN’s CoW Area in Central and East Halmahera Regency

F. Management Period
• Operation Stage

G. Management Institution
Conductor
• External Relations Department

Supervisor
• Department of Energy and Mineral Resources, Republic of Indonesia
• Bapedalda of North Maluku Province
• Office of Mine and Energy of North Maluku Province
• Environmental Management Agency (Badan Pengelola Lingkungan Hidup) of Central Halmahera Regency
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• Office of Mine and Energy of Central Halmahera Regency
• Office of Mine and Energy of East Halmahera Regency

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3.10 OTHER SOLID AND LIQUID WASTES MANAGEMENT

3.10.1 Surface Water and Ground Water Quality

3.10.1.1 Traces of heavy metals, hazardous & toxic chemicals, and infectious waste

A. Source of Impact

- All PT WBN’s mining, ore processing and supporting infrastructure activities that potentially generate non-hazardous and hazardous wastes

B. Indicator of Impacts

- To comply with applicable regulation on effluent water quality standard
- To comply with applicable Hazardous and Toxic Waste Management (Government Regulation No. 18 Year 1999 and its amendment in Government Regulation No. 85 Year 1999)

C. Management Objectives

- To reduce impacts on surface water quality and groundwater quality.
- To ensure that B3 wastes are appropriately treated according to applicable regulations

D. Management Efforts

Solid waste:

- Collect all domestic non-B3 solid wastes from non-industrial activities (houses, offices, business, etc)
- Incinerate or burn non-reusable and non-recyclable wastes.
- Dispose of unused and unrecyclable wastes to landfills.
- Transport and place solid residue at the specified location

Liquid waste:
- Treat sewage generated by PT WBN’s activities at sewage treatment plants.
- Investigate options to re-use dried treatment solids generated from wastewater treatment plants.

**B3 Waste:**
- Collect and Incinerate infectious medical wastes at incinerator
- Ensure that no equipment containing PCBs, asbestos, ODS (ozone depleting substances) and other banned materials are purchased.
- Neutralize and securely store used lead acid batteries.
- Collect used oil and re-use as fuel at the ore processing plant
- Install secondary containments around flammable and hazardous materials as required.
- Regularly train appropriate employees in waste handling.
- Handle B3 wastes separately and ship to an approved B3 waste disposal facility.

**E. Management Location**
- Project area.

**F. Management Period**
- Operation stage.

**G. Management Institution**

**Conductor**
- Environmental, Health and Safety Department

**Supervisor**
- Department of Energy and Mineral Resources, Republic of Indonesia
- Bapedalda of North Maluku Province
- Office of Mine and Energy of North Maluku Province
- Environmental Management Agency (*Badan Pengelola Lingkungan Hidup*) of Central Halmahera Regency
- Environmental Agency (*Badan Lingkungan Hidup*) of East Halmahera Regency
- Office of Mine and Energy of Central Halmahera Regency
- Office of Mine and Energy of East Halmahera Regency

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• Office of Mine and Energy of East Halmahera Regency

Matrix of Summary of Environmental Management Plans (RKL) can be seen in Appendix A.
3.11 RECLAMATION AND CLOSURE MANAGEMENT PLAN ON POST OPERATION STAGE

The PT Weda Bay Nickel Nickel and Cobalt Mining and Ore Processing Project is designed to operate for 30 years and in accordance with Presidential Decree of Republic of Indonesia No. B.53/PRES/1/1998, If additional ore resources are discovered during operation, operation may continue based on a new agreement with the government at that time. It is important to consider, to identify and to start activities related to mine reclamation and closure during operation.

In accordance to Regulation of Minister of Energy and Mineral Resources No. 18 Year 2008 dated 29 May 2008 concerning Reclamation and Mine Closure, WBN will develop a Mine Reclamation and Closure Plan (MRCP) to be submitted to government, The MRCP will outline reclamation and mine closure aspects for all current operating mines. WBN will develop conceptual mine closure plans as part of the feasibility studies of future mines. WBN recognizes the importance of responsible management of their operations from discovery to closure. WBN is committed to adopting appropriate measures and to implementing appropriate risk management strategies based on sound science, valid data, effective stakeholder consultation (input from regulators) and the understanding of community cultures and needs in order to minimize environmental and community impacts. All of these commitments work to meet society’s requirements for metals while contributing to sustainable development and enhancing shareholder value.

The MRCP that will be prepared is a separate, yet complementary, activity from these RKL and RPL documents. Post-operation management activities (including relevant operational activities directly affecting mine closure) will continue to be implemented and further developed using a variety of technological and socio-economic approaches in accordance with the prevailing laws and regulations, and international practices.

Matrix of Reclamation and Mine Closure Plans Summary can be seen in Table III-1
**Table III-1  Reclamation and Mine Closure Management Plans Summary**

<table>
<thead>
<tr>
<th>Sector/Facilities</th>
<th>Issue/Impact</th>
<th>Phase</th>
<th>Considerations (All considerations reflect current thinking and may be modified in the Mine Closure Management Plan)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PLANNING</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| 1. Reclamation Plan | Reclamation of the disturbed land is implemented progressively during the operational phase of the mine life. | Operation through to Post Operation | • In accordance with Minister of Energy and Mineral Resources Regulation No. 18 Year 2008, WBN will prepare 5-year reclamation plan, detailed in yearly plan that cover (1) landuse before and after mining, (2) land clearing plan, (3) reclamation program and (4) reclamation cost plan.  
• The Reclamation Plan will be consistent with this RKL/RPL  
• The first 5-year reclamation plan will be prepared and submitted to appropriate government authority for approval prior to operation stage  
• The progressive return of biodiversity will be encouraged.  
• The establishment of naturally occurring plant species will be encouraged.  
• In general, consideration will be given to development of landscapes compatible with surrounding area, establish pioneer vegetation (preferably native species) and natural ecosystem establishment.  
• Reclamation of disturbed areas is to create a stable, and whenever practicable, productive locality that is acceptable to the local community and regulatory agencies.  

• Reporting of reclamation activities. | Operation through to Post Operation | Reclamation activities will be included in the RKL/RPL reports during the operational and post operational Phase.  
Reclamation activities will be based on annual plans  
Progressive ecosystem development of reclamation areas will include enhancement of structure and composition of terrestrial flora and fauna |
| 2. Mine Closure Plan | Mining is a temporary (or finite) use of land. | Operation through to Post Operation | • In accordance with Minister of Energy and Mineral Resources Regulation No. 18 Year 2008, WBN will prepare conceptual Mine Closure Plan for submittal to the appropriate government authority. Conceptual Mine Closure Plan at least covers (a) regional profile, (2) description of mining activities, (3) projection of final mine features at the closure period, (4) outcome of consultations with stakeholders, (5) mine closure program, (6) monitoring, (7) organization; and (8) closure cost plan.  
• Conceptual Mine Closure Plan will be prepared and submitted to appropriate government authority for approval prior to operation stage |
<table>
<thead>
<tr>
<th>Sector/Facilities</th>
<th>Issue/Impact</th>
<th>Phase</th>
<th>Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Closure issues must be considered from the design phase through to the operation phase to ensure that potentially significant impacts are understood.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• End land use objectives for areas impacted by the mining operation will be included in the Mine Closure Plan, and discussed with stakeholders.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Mine Closure Plan will include disturbed and active mining areas (all mining blocks in Central and East Halmahera Regencies, sedimentation ponds, and ore processing plant) as well as future mining operation.</td>
</tr>
<tr>
<td>MINING OPERATION</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Topography</td>
<td>• Landscape modification</td>
<td>Operation through to Post Operation</td>
<td>• At each mining sites, contour the overburden placement site to ensure long term stability.</td>
</tr>
<tr>
<td></td>
<td>• Change surface water pattern</td>
<td></td>
<td>• Surface water drainage channels may be constructed as deemed necessary and appropriate.</td>
</tr>
<tr>
<td></td>
<td>• Sedimentation ponds</td>
<td></td>
<td>• Sedimentation ponds as a fresh water reservoir and fresh water aquaculture.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Surface drainage channels will be constructed so as to direct surface water flows away from the completed open pits at each mining block.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Slope stability will be monitored continuously during active mining, and periodically after mining is completed until stability has been achieved.</td>
</tr>
<tr>
<td>2. Hydrology</td>
<td>• Mining activities and changes in topography may impact surface water flow</td>
<td>Operation through to Post Operation</td>
<td>• Surface drainage channels will be constructed to direct water away from completed open pits at each mining blocks and overburden placement sites.</td>
</tr>
<tr>
<td></td>
<td>patterns.</td>
<td></td>
<td>• The groundwater system at each mining blocks will be monitored throughout the remainder of mining operation, and through the post operational period as appropriate.</td>
</tr>
<tr>
<td></td>
<td>• Mining activities and changes in topography may impact surface and</td>
<td></td>
<td>• Surface water and groundwater quality will be monitored throughout the remainder of the mining operation, and through the post operational period.</td>
</tr>
<tr>
<td></td>
<td>groundwater quality.</td>
<td></td>
<td>• The flow and chemical characteristics of water discharging from sedimentation ponds will be monitored.</td>
</tr>
<tr>
<td>Sector/Facilities</td>
<td>Issue/Impact</td>
<td>Phase</td>
<td>Considerations</td>
</tr>
<tr>
<td>-------------------</td>
<td>------------------------------------------------------------------------------</td>
<td>-------------------------------------</td>
<td>----------------------------------------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| 3. Reclamation and Biodiversity | Changes in habitat structure (flora and fauna communities) due to nickel ores mining and overburden placement | Operation through to Post Operation | • The disturbed areas will be revegetated as they become available in accordance with the annual plans  
• Reclamation activities will be based on annual plans  
• Small scale experimental land use projects will be conducted during the operational phase to assess their long term economic viability and sustainability  
• The progressive return of biodiversity will be encouraged.  
• The development of self-sustaining plant communities will be encouraged.  
• Reclamation activities will be included in the RKL/RPL reports during the operational phase and post operational phases.  
• Progressive ecosystem development of reclamation areas will include enhancement of structure and composition of terrestrial flora and fauna  
• End land use objectives for areas impacted by the mining operation will be included in the Mine Closure Plan, and discussed with stakeholders |

**SUPPORTING INFRASTRUCTURE**

- Mine Infrastructure, Ore Processing Plant, Power Plant, Housing Compound, Logistic Roads, Dedicated Airport, Tanjung Ulu Post, Hospital and Environmental Laboratory
  - All Infrastructures
  - Upon completion of closure, land will be relinquished to appropriate governing authority
  - Public access and safety of employees.
  - Post Operation
  - All infrastructures at the mine closure will be managed as defined under the terms of Contract of Work (CoW)

**SOCIAL ECONOMIC CULTURE ASPECTS**

1. Employment
   - Decreased number of employees during mine post operation phase.
   - Local communities’ ability to adapt to a reduction of mine employment.
   - Potential net migrations out of the local area as people seek alternative employment opportunities.
   - Post Operation
   - Employees will be terminated consistent with governing regulations at the time.

2. Local and Regional Development
   - Decreased mine related economic activities at end of life of mine.
   - Operation through to Post Operation
   - Governing authorities will be encouraged to incorporate sustainable development approaches in local and regional development
<table>
<thead>
<tr>
<th>Sector/Facilities</th>
<th>Issue/Impact</th>
<th>Phase</th>
<th>Considerations</th>
</tr>
</thead>
</table>
| **3. Land Ownership Transfer** | • Upon completion of closure, land will be relinquished to appropriate governing authority. | Post Operation | • Under the terms of Contract of Work (CoW), WBN has the right to use the land for any and all purposes related to the exploration, mining, processing and production of mineral over the time period defined by the CoW.  
• Land within the CoW area will be relinquished to the appropriate governing authority at mine closure. |
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http://www.epa.gov/tn/chief/ap42

http://www.epa.gov/tn/chief/ap42/ch11
(metallic minerals processing)

http://www.mitrais.com

Appendix A

MATRIX OF SUMMARY OF ENVIRONMENTAL MANAGEMENT PLAN
## Matrix of Environmental Management Summary of PT Weda Bay Nickel

<table>
<thead>
<tr>
<th>Environmental Component/Activity</th>
<th>Parameter of Significant Impacts</th>
<th>Reference/Indicator of Impacts</th>
<th>Management Objectives</th>
<th>Management Efforts</th>
<th>Management Location</th>
<th>Management Period</th>
<th>Management Institution</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A. Pre-Construction Stage</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soils</td>
<td>Soil Erosion</td>
<td>Test Pit establishment</td>
<td>Increase of erosion rate</td>
<td>To minimize soil erosion</td>
<td>Test Pit</td>
<td>Preconstruction Period</td>
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<td>Surface Water Quality</td>
<td>TSS</td>
<td>Test Pit establishment</td>
<td>Increase of TSS concentration in surface water</td>
<td>To comply with applicable regulations on effluent water standard of nickel mining (State Minister of Environment Regulation No. 9 Year 2006)</td>
<td>Test Pit</td>
<td>Preconstruction Period</td>
<td>Mine Engineering Department</td>
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<tr>
<td>Terrestrial Flora and Fauna</td>
<td>Species structure and composition as well as wildlife habitat</td>
<td>Test Pit establishment</td>
<td>Disturbance to biodiversity</td>
<td>To protect the rare and endangered species of flora and fauna</td>
<td>Test Pit</td>
<td>Preconstruction Period</td>
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<tr>
<td>Aquatic Biota</td>
<td>Abundance of Plankton and Benthos</td>
<td>Test Pit establishment</td>
<td>Change of aquatic biota abundance</td>
<td>Minimize disturbance to aquatic biota through soil erosion control, management of hydrology, and control of TSS has been established.</td>
<td>Test Pit</td>
<td>Preconstruction Period</td>
<td>Mine Engineering Department, Environmental, Health and Safety Department</td>
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</tbody>
</table>

**Terrestrial Flora and Fauna**
- Test Pit establishment
- Disturbance to biodiversity
- To protect the rare and endangered species of flora and fauna
- To protect the rare and endangered species of flora and fauna
- Inventory of existing flora and fauna has been conducted in the test pit area prior to opening
- Native plant species seedlings from the test pit area have been collected for use in reclamation
- Develop a rehabilitation program

**Aquatic Biota**
- Test Pit establishment
- Change of aquatic biota abundance
- Minimize disturbance to aquatic biota
- Effort for disturbance to aquatic biota through soil erosion control, management of hydrology, and control of TSS has been established.
## Matrix of Environmental Management Summary of PT Weda Bay Nickel

<table>
<thead>
<tr>
<th>Environmental Component/Activity</th>
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<tbody>
<tr>
<td>Socio Economics</td>
<td>Job Opportunities</td>
<td>Activities of Survey and Exploration, Test pit establishment</td>
<td>Number of local and non local employees (outsiders) recruited by WBN</td>
<td>Number of local people employment by WBN and contractor companies has been increased</td>
<td>Project Area</td>
<td>Preconstruction Period</td>
<td>Human Resources Department, External Relations Department</td>
</tr>
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<td></td>
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<td></td>
<td>To prioritize hiring of skilled people from the local communities</td>
<td>Training for selected local people to enhance their qualification for employment with WBN and contract companies has been provided</td>
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<td>Department of Energy and Mineral Resources, Republic of Indonesia, Bapedalda of North Maluku Province, Office of Mine and Energy of North Maluku Province, Environmental Management Agency (Badan Pengelola Lingkungan Hidup) of Central Halmahera Regency, Environmental Agency (Badan Lingkungan Hidup) of East Halmahera Regency, Office of Mine and Energy of Central Halmahera, Office of Mine and Energy of East Halmahera, Office of Mine and Energy of Central Halmahera, Office of Mine and Energy of East Halmahera</td>
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<td>To contribute in reducing local unemployment in the CoW area</td>
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<td>Department of Energy and Mineral Resources, Republic of Indonesia, Bapedalda of North Maluku Province, Office of Mine and Energy of North Maluku Province, Environmental Management Agency (Badan Pengelola Lingkungan Hidup) of Central Halmahera Regency, Environmental Agency (Badan Lingkungan Hidup) of East Halmahera Regency, Office of Mine and Energy of Central Halmahera, Office of Mine and Energy of East Halmahera, Office of Mine and Energy of Central Halmahera, Office of Mine and Energy of East Halmahera</td>
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<td></td>
<td>Community Income</td>
<td>Land Acquisition for mine project</td>
<td>Increase of community income</td>
<td>Encourage local community to save money/ income for improvement of their livelihood e.g. education, sanitary condition</td>
<td>Project Area</td>
<td>Preconstruction Period</td>
<td>External Relations Department</td>
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<td></td>
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<td>To implement fair compensation to those involve in land acquisition</td>
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</tbody>
</table>
| • Land Ownership                 | • Land Acquisition for mine project | • Change of land ownership due to the issues of land acquisition | • To reduce and avoid the community unrest due to land acquisition | • Prepare comprehensive exploration and mining activities plans and coordinate with relevant authorities in case that the area which to be explored and mined are occupied by local community. | • Department of Energy and Mineral Resources, Republic of Indonesia  
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 • Office of Mine and Energy of North Maluku Province  
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 • Office of Mine and Energy of Central Halmahera  
 • Office of Mine and Energy of East Halmahera |
| • Livelihood                     | • Land Acquisition for mine project | • Change of Community livelihood when agricultural lands are acquired for mine project  
 • Change of livelihood from income received | • To reduce the community unrest because of change of livelihood pattern  
 • To reduce adverse effect of sudden change of livelihood that requires new skills | • Encourage local community to save their income for improvement of their livelihood  
 • Prioritizing employee recruitment from local communities in accordance to our needs | • Department of Energy and Mineral Resources, Republic of Indonesia  
 • Bapedalda of North Maluku Province  
 • Office of Mine and Energy of North Maluku Province  
 • Environmental Management Agency (Badan Pengelola Lingkungan Hidup) of Central Halmahera Regency  
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<td><strong>B. Construction Stage</strong></td>
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<tr>
<td>Soils</td>
<td>Soil Erosion</td>
<td>Land clearing for support facilities</td>
<td>Increase of erosion rate</td>
<td>To control effect of soil erosion</td>
<td>Minimize the area of land clearing when possible, limit only to required sites for activities and land clearing is conducted progressively. For large areas to be cleared, create upstream diversion to avoid run-on to the cleared area. Where practicable stabilize soil with local grasses</td>
<td>Project Area</td>
<td>Construction Stage</td>
<td>Department of Energy and Mineral Resources, Republic of Indonesia Bapedalda of North Maluku Province Office of Mine and Energy of North Maluku Province Environmental Management Agency (Badan Pengelola Lingkungan Hidup) of Central Halmahera Regency Environmental Agency (Badan Lingkungan Hidup) of East Halmahera Regency Office of Mine and Energy of Central Halmahera Office of Mine and Energy of East Halmahera</td>
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<tr>
<td>Hydrology</td>
<td>Surface Run Off Flow Rate</td>
<td>Land clearing for support facilities</td>
<td>Increased Surface water run off rate</td>
<td>To minimize disturbance on surface water run-off rate</td>
<td>Management of hydrology is in conjunction with management of soil erosion, TSS, and rehabilitation. Conduce study on capacity of the upstream river and conjunction with other activities for villages</td>
<td>Project Area</td>
<td>Construction Stage</td>
<td>Department of Energy and Mineral Resources, Republic of Indonesia Bapedalda of North Maluku Province Office of Mine and Energy of North Maluku Province Environmental Management Agency (Badan Pengelola Lingkungan Hidup) of Central Halmahera Regency Environmental Agency (Badan Lingkungan Hidup) of East Halmahera Regency Office of Mine and Energy of Central Halmahera Office of Mine and Energy of East Halmahera</td>
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<tr>
<td>Noise</td>
<td>Increase of noise</td>
<td>Compliance with noise level standard (State Minister of Environment No. 48 Year 1996)</td>
<td>To minimize noise generated by chainsaw and equipment used in earthworks</td>
<td>To reduce the impact of noise on local communities</td>
<td>Identify specific Construction activities which are likely to generate nuisance noise in the community and schedule these activities to limit 24 hours exposure.</td>
<td>Environmental, Health and Safety Department</td>
<td>Construction Stage</td>
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<td>Inform and socialize with the affected communities on the potential for nuisance noise levels prior to the commencement of relevant activities.</td>
<td>Construction Department</td>
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<td>To reduce the impact of noise on local communities</td>
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<td>Air Quality</td>
<td>TSP and Dustfall</td>
<td>Construction of temporary residential facility, mine roads, processing facility and RSF</td>
<td>Change in TSP concentration in ambient air</td>
<td>Increase of dustfall</td>
<td>To reduce impacts on air quality</td>
<td>Dust suppression, using sprayed water, in work areas susceptible to dust.</td>
<td>Project Area</td>
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<td>To reduce impacts on air quality</td>
<td>Placement of appropriate sheeting on roads to limit dust generation.</td>
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<td>Use concrete or adopted building techniques to limit diffuse dust when relevant</td>
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<tr>
<td>Surface Water Quality</td>
<td>TSS</td>
<td>Land clearing for support facilities</td>
<td>Increase of TSS content Compliance with applicable nickel mining activity effluent standard (State Minister of Environment Regulation No 9 Year 2006)</td>
<td>To minimize impacts on TSS</td>
<td>Manage TSS in conjunction with management of Soil Erosion and diffuse emissions Direct surface water runoff from the construction site into sediment trap /silt fence Construct silt fences and check dams Periodically dredge the sediment trap and place the dredged materials in the reclamation sites</td>
<td>Project Area</td>
<td>Construction Stage</td>
<td>Department of Energy and Mineral Resources, Republic of Indonesia Bapedalda of North Maluku Province Office of Mine and Energy of North Maluku Province Environmental Management Agency (Badan Pengelola Lingkungan Hidup) of Central Halmahera Regency Environmental Agency (Badan Lingkungan Hidup) of East Halmahera Regency Office of Mine and Energy of Central Halmahera Office of Mine and Energy of East Halmahera</td>
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<tr>
<td>Sea Water Quality</td>
<td>TSS, Turbidity and Oil and Grease Mobilization of equipment and Materials Construction of Port</td>
<td>Increase of TSS, Turbidity and Oil and Grease rate</td>
<td>To reduce impacts on sea water quality and associated significant secondary impacts to other environmental components,</td>
<td>Plan and schedule mobilization that will minimize impact on sea water quality Where possible or appropriate, use stacker to load and unload the materials to minimize spill Equip the port with oil spill control equipment, and conduct regular refreshment training on spill control Request ship owner or contractor to provide waste storage facilities on board.</td>
<td></td>
<td>Port Area</td>
<td>Construction Stage</td>
<td>Department of Energy and Mineral Resources, Republic of Indonesia Bapedalda of North Maluku Province Office of Mine and Energy of North Maluku Province Environmental Management Agency (Badan Pengelola Lingkungan Hidup) of Central Halmahera Regency Environmental Agency (Badan Lingkungan Hidup) of East Halmahera Regency Office of Mine and Energy of Central Halmahera Office of Mine and Energy of East Halmahera</td>
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<tbody>
<tr>
<td>Terrestrial Flora and Fauna</td>
<td>Species structure and composition as well as wildlife habitat</td>
<td>Land clearing</td>
<td>Disturbance to biodiversity</td>
<td>To protect the rare and endangered species of flora and fauna</td>
<td>Flora and fauna base line study for characterization have been conducted</td>
<td>Project Area</td>
<td>Construction Stage</td>
<td>Environmental, Health and Safety Department, Republic of Indonesia</td>
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<td></td>
<td>To increase the awareness of WBN employees and contractors about protecting potentially endangered flora and fauna</td>
<td>Identify flora species of conservation and economic value, for use in rehabilitation program.</td>
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<td>Bapedalda of North Maluku Province</td>
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<td></td>
<td>Develop Permanent Plots for assessing impacts on forest structure and as conservation areas for flora and fauna.</td>
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<td>Post sign board &quot;No Hunting of Protected Fauna&quot; at the strategic places</td>
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<td>Environmental Management Agency (Badan Pengelola Lingkungan Hidup) of Central Halmahera Regency</td>
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<td></td>
<td>Prepare and implement policy on prohibiting WBN's employees and contractors to hunt, rear, trade protected flora and fauna.</td>
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<td>Environmental Agency (Badan Lingkungan Hidup) of East Halmahera Regency</td>
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<td></td>
<td>Conduct regular campaign on biodiversity (the importance of protecting endangered flora and fauna) to employees in cooperation with relevant local non-government organizations</td>
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<td></td>
<td>Develop program of specific flora development for rehabilitation</td>
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<td>Office of Mine and Energy of East Halmahera Regency</td>
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<tr>
<td>Freshwater Aquatic Biota</td>
<td>Abundance of Plankton and Benthos</td>
<td>Land clearing and site preparation</td>
<td>Change of aquatic biota abundance</td>
<td>Minimize disturbance to aquatic biota</td>
<td>Impacts on Freshwater aquatic biota will be managed in conjunction with management of soil erosion and TSS.</td>
<td>Project Area</td>
<td>Construction Stage</td>
<td>Department of Energy and Mineral Resources, Republic of Indonesia</td>
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<tbody>
<tr>
<td><strong>Marine Biota</strong></td>
<td>Abundance of coral reef fish and coral life form</td>
<td>Land clearing and site preparation</td>
<td>Change of marine biota abundance</td>
<td>Minimize disturbance to marine biota</td>
<td>Impacts on marine biota will be managed in conjunction with management of seawater quality, surface water quality and soil erosion.</td>
<td>Project Area</td>
<td>Construction Stage</td>
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<tr>
<td><strong>Socio Economics</strong></td>
<td>Job Opportunities</td>
<td>Employment of construction workforces</td>
<td>Number of local and non local employees (outsiders) recruited by WBN</td>
<td>To optimize job opportunities for local communities</td>
<td>To contribute in reducing local unemployment in the CoW area</td>
<td>Villages around Project Area</td>
<td>Construction Stage</td>
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<tr>
<td></td>
<td></td>
<td>Port construction</td>
<td>Number of local contractors engaged in the project</td>
<td>To prioritize hiring of skilled people from the local communities</td>
<td>Maximize number of local people employment by WBN and contractor companies</td>
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<td>Assist in providing training for selected local people to enhance their qualification for employment with WBN and contract companies</td>
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- **Conductor**
- **Supervisor**
- **Reporting**
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<tr>
<th>Environmental Component/Activity</th>
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</thead>
<tbody>
<tr>
<td><strong>Community Income</strong></td>
<td>Construction workforce employment</td>
<td>• The level of engagement of local people, local contractors and general community in various activities related to WBN operation</td>
<td>• To increase the level of engagement of the local community’s in economic activities</td>
<td>• Community will be manage income by themselves in conjunction with job and business opportunities</td>
<td>• Villages around Project Area</td>
<td>• Construction Stage</td>
<td>• Department of Energy and Mineral Resources, Republic of Indonesia • Bapedalda of North Maluku Province • Office of Mine and Energy of North Maluku Province • Environmental Management Agency (Badan Pengelola Lingkungan Hidup) of Central Halmahera Regency • Environmental Agency (Badan Lingkungan Hidup) of East Halmahera Regency • Office of Mine and Energy of Central Halmahera Regency • Office of Mine and Energy of East Halmahera Regency</td>
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<tr>
<td><strong>Business opportunity</strong></td>
<td>Construction of temporary residential facility, mine roads, processing facility and BFS</td>
<td>• The establishment of additional cooperatives in the local community</td>
<td>• To stimulate on the initiative and business of local individuals and cooperatives</td>
<td>• Conduct a comprehensive inventory of WBN needs in terms of goods and services that could be provided by the local people that satisfy WBN standard. • Encourage the purchase of local goods and services if meets with quality standard • In accordance with WBN capability, assist the community in improving the quality of local goods and services</td>
<td>• Villages around Project Area</td>
<td>• Construction Stage</td>
<td>• Department of Energy and Mineral Resources, Republic of Indonesia • Bapedalda of North Maluku Province • Office of Mine and Energy of North Maluku Province • Environmental Management Agency (Badan Pengelola Lingkungan Hidup) of Central Halmahera Regency • Environmental Agency (Badan Lingkungan Hidup) of East Halmahera Regency • Office of Mine and Energy of Central Halmahera Regency • Office of Mine and Energy of East Halmahera Regency</td>
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<tr>
<td>• Livelihood Pattern</td>
<td>• Construction workforce</td>
<td>• Change of livelihood pattern in Community</td>
<td>• To maintain or to improve livelihood of host communities</td>
<td>• To minimize the settlement of unplanned immigrants attracted by the Project</td>
<td>• Establishing Codes of Conduct for workforce</td>
<td>• Villages around Project Area</td>
<td>• Construction Stage</td>
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<tr>
<td></td>
<td>employment</td>
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<td>• Isolate construction camp and outside construction workers from host communities to avoid negative influence of construction activities on current community livelihood</td>
<td>• Prevent host community members from residing in the construction camp</td>
<td>• Human Resources Department</td>
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<td></td>
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<td>• Preparation of host communities for construction by socialization of construction activities</td>
<td>• Preparation of host communities for construction by socialization of construction activities</td>
<td>• Department of Energy and Mineral Resources of North Maluku Province</td>
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<td>• Change of livelihood pattern in Community</td>
<td>• Change of livelihood pattern in Community</td>
<td>• Office of Mine and Energy of North Maluku Province</td>
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<tr>
<td>• Migration</td>
<td>• Assimilation and acculturation</td>
<td>• Interaction between local community and incomers</td>
<td>• To reduce the community unrest because of assimilation and acculturation</td>
<td>• To reduce adverse effects of changes in social values and norms (entry of vices, lowering of moral standards)</td>
<td>• Prepare socialization program to stakeholders’ relating to the impacts associated with the Project</td>
<td>• Villages around Project Area</td>
<td>• Construction Stage</td>
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<tr>
<td></td>
<td>• Alteration of social values and norms</td>
<td>• Interaction between local community and incomers</td>
<td>• To reduce the community unrest because of assimilation and acculturation</td>
<td>• To reduce adverse effects of changes in social values and norms (entry of vices, lowering of moral standards)</td>
<td>• Coordinate construction activities with relevant government authorities to minimize uncontrolled induced migration</td>
<td>• Villages around Project Area</td>
<td>• Construction Stage</td>
</tr>
<tr>
<td></td>
<td>• Migration</td>
<td>• Construction workforce employment</td>
<td>• Interaction between local community and incomers</td>
<td>• Interaction between local community and incomers</td>
<td>• Recruitment of host community members will be based on competence. Recruitment and demobilization of remaining workforce will be back to point of origin.</td>
<td>• Human Resources Department</td>
<td>• Human Resources Department</td>
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**Matrix of Environmental Management Summary of PT Weda Bay Nickel**

- **Conductor:** Department of Energy and Mineral Resources, Republic of Indonesia
- **Supervisor:** Office of Mine and Energy of North Maluku Province
- **Reporting:** Office of Mine and Energy of East Halmahera Regency
  - Department of Energy and Mineral Resources, Republic of Indonesia
- Bapedalda of North Maluku Province
- Office of Mine and Energy of North Maluku Province
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<tbody>
<tr>
<td>Public Health</td>
<td>• Prevalence of Disease</td>
<td>• Construction workforce employment</td>
<td>• Potential increase in prevalence of diseases</td>
<td>• To create possible disease prevalence awareness amongst host communities</td>
<td>• Conduct regular campaign on possible disease prevalence awareness among employee and host community</td>
<td>• Villages around Project Area</td>
<td>• Construction Stage</td>
</tr>
<tr>
<td></td>
<td>• Public Health Services and Sanitation</td>
<td>• Inadequacy of public health services and degradation of sanitation</td>
<td>• To improve existing public sanitation</td>
<td>• Request EPCM (Engineering Procurement Construction Management) contractor to establish construction waste management plan prior to construction</td>
<td>• Request medical check-ups of all Project employers</td>
<td>• Department of Energy and Mineral Resources, Republic of Indonesia</td>
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<td>• Avoid construction related traffic accidents</td>
<td>• Establish Codes of Conduct for construction workforce</td>
<td>• Establish EPCM contractor establishes a traffic management plan (land and sea transportation)</td>
<td>• Bapedalda of North Maluku Province</td>
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<td>• Control of construction related dust.</td>
<td>• Ensure EPCM contractor establishes a dust mitigation plan prior to construction</td>
<td>• Coordinate and implement efforts with relevant Government authorities</td>
<td>• Office of Mine and Energy of North Maluku Province</td>
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<td>• Establish a Health policy in line with Corporate (Eramet) one’s</td>
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### C. Operation Stage – Workforce Employment

| SocioEconomics                   | Job opportunities               | Operations workforce employment | Number of local and non local employee (outiders) recruited by WBN | To optimize job opportunities for local communities | To prioritize hiring of skilled people from local communities | To contribute in reducing local unemployment in the CoW area | Maximizes number of local people employment by WBN and contractor companies | To assist in specifying training for selected local people to enhance their qualification for employment with WBN and contract companies | Village around Project Area | Operation Stage | Department of Energy and Mineral Resources, Republic of Indonesia |
|                                  |                                 |                                |                                                               |                                               |                                               |                                               |                                                        |                                                        | | Human Resources Department | External Relations Department | Bapedalda of North Maluku Province |
|                                  |                                 |                                |                                                               |                                               |                                               |                                               |                                                        |                                                        | | Office of Mine and Energy of North Maluku Province | Environmental Management Agency (Badan Lingkungan Hidup) of Central Halmahera Regency |
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|                                  |                                 |                                |                                                               |                                               |                                               |                                               |                                                        |                                                        | | Department of Energy and Mineral Resources, Republic of Indonesia | Bapedalda of North Maluku Province |
|                                  |                                 |                                |                                                               |                                               |                                               |                                               |                                                        |                                                        | | Office of Mine and Energy of North Maluku Province | Environmental Management Agency (Badan Lingkungan Hidup) of Central Halmahera Regency |
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|                                  |                                 |                                |                                                               |                                               |                                               |                                               |                                                        |                                                        | | Office of Mine and Energy of East Halmahera Regency | | | Department of Energy and Mineral Resources, Republic of Indonesia |
|                                  |                                 |                                |                                                               |                                               |                                               |                                               |                                                        |                                                        | | Bapedalda of North Maluku Province | Office of Mine and Energy of North Maluku Province |
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<td>Community income</td>
<td>Operations workforce employment</td>
<td>The level of engagement of local people, local contractors and general community in various activities related to WBN operation</td>
<td>To increase the level of engagement of the local community’s in the economic activities</td>
<td>Community will manage income by themselves in conjunction with job and business opportunities</td>
<td>Village around Project Area</td>
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<td>Operations workforce employment</td>
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<td>In coordination with local authorities, to minimize the settlement of unplanned migrants attracted by the Project</td>
<td>Isolate Permanent Accommodation Facility from host communities to avoid negative influence on current community livelihood</td>
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<td>Prevent non-employee host community members from residing in the Permanent Accommodation Facility.</td>
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<td>Environmental Management Agency (Badan Pengelola Lingkungan Hidup) of Central Halmahera Regency</td>
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<td>Coordinate with relevant government authorities to minimize uncontrolled induced migration</td>
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<td>Preparation of host communities for operation stage by socialization of operational activities</td>
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**Environmental Resources Management**  
RKL Matrix V2.24 Feb9.docx  
WEDA BAY NICKEL
## Matrix of Environmental Management Summary of PT Weda Bay Nickel

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<tr>
<th>Environmental Component/Activity</th>
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<th>Reporting</th>
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<tbody>
<tr>
<td><strong>Socio Cultural</strong></td>
<td>Migration</td>
<td>Operations workforce employment</td>
<td>To reduce the community unrest because of assimilation and acculturation. To reduce adverse effects of changes in social values and norms (entry of vices, lowering of moral standards)</td>
<td>Prepare socialization program to stakeholders Coordinate with relevant government authorities to minimize uncontrolled induced migration.</td>
<td>Village around Project Area</td>
<td>Operation Stage</td>
<td>Department of Energy and Mineral Resources, Republic of Indonesia</td>
<td>Bapedalda of North Maluku Province</td>
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<td></td>
<td>Assimilation and acculturation</td>
<td>Interaction between local community and incomes</td>
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<td></td>
<td>Alteration of social values and norms</td>
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<tr>
<td></td>
<td>Community unrest</td>
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<td>Bapedalda of North Maluku Province</td>
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<tr>
<td><strong>Public Health</strong></td>
<td>Prevalence of Diseases</td>
<td>Operations workforce employment</td>
<td>Potential increase in prevalence of diseases Inadequacy of public health services and degradation of sanitation</td>
<td>To create possible disease prevalence awareness amongst host communities Maintain or improve existing public sanitation</td>
<td>Village around Project Area</td>
<td>Operation Stage</td>
<td>Department of Energy and Mineral Resources, Republic of Indonesia</td>
<td>Bapedalda of North Maluku Province</td>
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**Environmental Resources Management WEDA BAY NICKEL**

RKL 011/NV.TC/2009/DOS

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<tbody>
<tr>
<td><strong>D. Operation Stage - Ore Mining</strong></td>
<td><strong>Air Quality</strong></td>
<td>TSP</td>
<td>Change in TSP (mainly PM10) concentration in ambient air</td>
<td>To reduce impacts on air quality</td>
<td>In dry period, reduce airborne TSP levels caused by road traffic by using adequate technique of conception and periodically suppressing dust using water spray on the mine road.</td>
<td>Project Area</td>
<td>Operation Stage</td>
<td>Mine Engineering Department</td>
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<td></td>
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<td>Dust Fall</td>
<td>Compliance to applicable ambient air quality standard (Government Regulation No. 41 Year 1999)</td>
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<td>Avoid villages in the design of mine haul roads. Reduce truck speed to applicable and safe speed limit when the traffic passes close to villages.</td>
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<td>Department of Mines and Energy, North Maluku Province</td>
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<td></td>
<td><strong>Topography</strong></td>
<td>Landform</td>
<td>Change of topography in term of elevation and slope in the mine area related to ore mining and overburden placement</td>
<td>To manage slope stability of the overburden placement; To adjust the topography of the overburden placement site in order to minimize soil erosion and support reclamation</td>
<td>Optimize the mining plans based on pit slope stability criteria and adapted progressive mining plan.</td>
<td>Project Area</td>
<td>Operation Stage</td>
<td>Mine Engineering Department</td>
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<tr>
<td>Soil</td>
<td>• Soil Erosion</td>
<td>• Land clearing for mine area</td>
<td>• Stripping and stockpiling of topsoil</td>
<td>• Removal and placement of overburden and mining and stockpiling of ore</td>
<td>• Reclamation of mined areas</td>
<td>• To minimize soil erosion</td>
<td>• Minimize the area of land clearing when possible operate progressively, limit only to required sites for activities</td>
<td>• Project Area</td>
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<tr>
<td>Hydrology</td>
<td>• Surface Run Off Flow Rate</td>
<td>• Land clearing for mine area</td>
<td>• Surface water run-off rate</td>
<td>• To minimize surface water run-off rate</td>
<td>• Leverage topography to respect natural catchment area in conjunction with top soil placement, artificial drainage channel and revegetation efforts.</td>
<td>• Management of hydrology is in conjunction with management of soil erosion, TSS, and rehabilitation.</td>
<td>• Integrate in the mining method the requirements of surface run-off management</td>
<td>• Project Area</td>
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<tr>
<td>Surface Water Quality</td>
<td>TSS</td>
<td>Increase of TSS content</td>
<td>To control TSS content in surface water runoff and effluent from mining area</td>
<td>Project Area</td>
<td>Operation Stage</td>
<td>Mine Operations Department Environmental, Health and Safety Department</td>
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<td>Compliance with applicable regulation on effluent water quality standard for nickel mining activity (State Minister of Environment Regulation No. 9 Year 2006)</td>
<td>Manage TSS in conjunction with Soil Erosion and air quality (diffuse emissions), Construct and operate sedimentation ponds in the active mine and post mined-area, Direct surface water runoff from mine pit and mining area into sedimentation ponds, Manage slope stability, minimize soil erosion and surface water run-off rate</td>
<td>Department of Energy and Mineral Resources, Republic of Indonesia Bapedalda of North Maluku Province Office of Mine and Energy of North Maluku Province Environmental Management Agency (Badan Pengelola Lingkungan Hidup) of Central Halmahera Regency Environmental Agency (Badan Lingkungan Hidup) of East Halmahera Regency Office of Mine and Energy of Central Halmahera Regency Office of Mine and Energy of East Halmahera Regency</td>
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<td>Fe, Mg, Mn, Trace metals</td>
<td>Compliance with applicable regulation on effluent water quality standard for nickel mining activity (State Minister of Environment Regulation No. 9 Year 2006)</td>
<td>To minimize all contaminants</td>
<td>Develop testwork to predict the potential for the release of trace metals from mining operations, and to understand mechanisms involved in their release, if relevant. If relevant, develop and implement strategies for mitigating the release of trace metals based on the mechanisms identified in the testwork</td>
<td>Project Area</td>
<td>Operation Stage</td>
<td>Mine Engineering Department Mine Operations Department Environmental, Health and Safety Department</td>
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**References/Indicators**
- TSS: Total Suspended Solids
- Fe, Mg, Mn: Ferrum, Magnesium, Manganese

**Management Institutions**
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- Bapedalda of North Maluku Province
- Office of Mine and Energy of North Maluku Province
- Environmental Management Agency (Badan Pengelola Lingkungan Hidup) of Central Halmahera Regency
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</table>
| **Terrestrial Flora and Fauna** | Species composition and structure as well as wildlife habitat | - Land clearing  
- Reclamation of mined area | - Disturbance to biodiversity  
- Degree of employee and community understanding on the importance of protecting potentially extinct flora and fauna species | - To protect the rare and endangered species of flora and fauna  
- To increase the awareness of WBN employees and contractors about biodiversity conservation. | - Update and maintain database of identified flora and fauna species including protected status  
- Identify flora species of conservation and economic value, for use in rehabilitation program  
- Develop a SOP for handling endemic, endangered and protected species  
- Identify and cooperate with appropriate institutions and/or non-government organization for in-situ conservation of protected fauna.  
- Develop Permanent Plots for assessing impacts on forest structure and as conservation areas for flora and fauna.  
- At WBN nursery facilities, include propagation of native plant species for reclamation programs  
- Prepare and implement policy on prohibiting WBN’s employees and contractors to hunt, rear, trade of protected flora and fauna.  
- Conduct regular education campaigns on biodiversity management and environmental protection to employees and community in general | - Project Area  
- Operation Stage | - Environmental, Health and Safety Department  
- External Relations Department | - Department of Energy and Mineral Resources, Republic of Indonesia  
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- Office of Mine and Energy of North Maluku Province  
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- Office of Mine and Energy of East Halmahera Regency |
| **Freshwater Aquatic Biota** | Abundance of Plankton and Benthos | - Stripping and stockpiling of topsoil  
- Removal and placement of overburden and mining and stockpiling of ore | - Change of Aquatic Biota abundance | - Minimize disturbance to aquatic biota  
- Minimize disturbance to aquatic biota through management of soil erosion, TSS and surface flow rate. | - Project Area  
- Operation Stage | - Mine Engineering Department  
- Mine Operations Department  
- Environmental, Health and Safety Department | - Department of Energy and Mineral Resources, Republic of Indonesia  
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<th>Management Efforts</th>
<th>Management Location</th>
<th>Management Period</th>
<th>Conductor</th>
<th>Supervisor</th>
<th>Reporting</th>
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</thead>
<tbody>
<tr>
<td>Socio Economics</td>
<td>Business Opportunities</td>
<td>Land clearing</td>
<td>The level of participation of local people, local contractors and general community in various activities related to WBN operation</td>
<td>To increase the level of the local community’s participation in economic activities related to construction</td>
<td>Identify and promote the development of business opportunities other than direct employment</td>
<td>Villages around Project Area</td>
<td>Operation Stage</td>
<td>Human Resources Department</td>
<td>Environmental Agency (Badan Pengelola Lingkungan Hidup) of Central Halmahera Regency</td>
<td>Department of Energy and Mineral Resources, Republic of Indonesia</td>
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<tr>
<td></td>
<td>Community Income</td>
<td>Reclamation of mined areas</td>
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<td>Give preference (by WBN and contractors) to purchasing local products and services if it meets quality standards and demand</td>
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<td>External Relations Department</td>
<td>Department of Mine and Energy of Central Halmahera Regency</td>
<td>Bapedalda of North Maluku Province</td>
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<td>In accordance with WBN capability, assist host communities to improve the quality of local goods and services</td>
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<td></td>
<td>Assist community members in developing business skills (e.g. financial planning, quality control etc)</td>
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<td>Environmental Management Agency (Badan Pengelola Lingkungan Hidup) of Central Halmahera Regency</td>
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<td></td>
<td>Livelihoods of indigenous people (IP)</td>
<td>Land clearing</td>
<td>Presence or absence of valid complaints</td>
<td>To minimize impacts of mining activities towards IP</td>
<td>Develop Project internal Code of Conduct related to interactions with IP</td>
<td>Villages around Project Area</td>
<td>Operation Stage</td>
<td>External Relations Department</td>
<td>Environmental Agency (Badan Lingkungan Hidup) of East Halmahera Regency</td>
<td>Office of Mine and Energy of East Halmahera Regency</td>
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<td>Community related incidents</td>
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<td>Coordinate related company efforts with local government authorities and institutions</td>
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**Conductor:** Department of Energy and Mineral Resources, Republic of Indonesia
**Supervisor:** Bapedalda of North Maluku Province
**Reporting:** Office of Mine and Energy of North Maluku Province

**Department of Energy and Mineral Resources, Republic of Indonesia**
Bapedalda of North Maluku Province
Office of Mine and Energy of North Maluku Province
Environmental Management Agency (Badan Pengelola Lingkungan Hidup) of Central Halmahera Regency
Environmental Agency (Badan Lingkungan Hidup) of East Halmahera Regency
Office of Mine and Energy of Central Halmahera Regency
Office of Mine and Energy of East Halmahera Regency
### Matrix of Environmental Management Summary of PT Weda Bay Nickel

#### E. Operation Stage - Ore Processing

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<tr>
<th>Parameter of Significant Impacts</th>
<th>Sources of Impacts</th>
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<th>Management Objectives</th>
<th>Management Efforts</th>
<th>Management Location</th>
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<th>Management Institution</th>
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<tr>
<td><strong>Air Quality</strong></td>
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<tr>
<td><strong>SOx and H2S</strong></td>
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<td><strong>Hydrometallurgical process (i.e., Atmospheric leaching)</strong></td>
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<tr>
<td>Increase of SOx and H2S</td>
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<tr>
<td>Compliance to applicable emission standard (State Minister of Environment Decree No. 13 Year 1995) and odor standard (State Minister of Environment Decree No. 50 Year 1996)</td>
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<tr>
<td>To reduce impacts of SOx and H2S on air quality</td>
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<td>Use efficient and properly maintained equipment to reduce the concentration of SOx and H2S in ambient air quality.</td>
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<td>Apply appropriate ‘good common practice’ technology in the processing plant to control SOx and H2S emission</td>
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<td><strong>Surface Water Quality</strong></td>
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<td><strong>TSS</strong></td>
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<tr>
<td><strong>Solid residue management</strong></td>
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<td>Increase of TSS content</td>
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<td>Compliance with applicable regulation on effluent water quality standard for nickel mining activity (State Minister of Environment Regulation No. 9 Year 2006)</td>
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<tr>
<td>To reduce TSS rate</td>
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<tr>
<td>Construct and operate RSF in accordance with applicable regulations</td>
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<td>Construct and operate leachate collection and polishing pond</td>
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<td>Construction of appropriate surface drainage on RSF to limit scouring.</td>
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<td>Direct internal surface drainage to sediment ponds.</td>
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<tr>
<td>Groundwater Quality</td>
<td>pH, Mg, Fe, Mn, Trace metals</td>
<td>Solid residue management (i.e. Placement of filter cake)</td>
<td>Change of constituents content in groundwater</td>
<td>To reduce impacts on groundwater quality</td>
<td>Construct and operate RSF in accordance with applicable regulations</td>
<td>RSF</td>
<td>Operation Stage</td>
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</table>

### Notes
- Solid residue management
- Change of constituents in surface water
- Compliance with applicable regulations
- To control contaminants concentration in effluent water
- Implement a waste water treatment plant if requested, manage residues back to RSF
- Construct surface drainage on RSF to limit contact with water and collect it with waste water treatment plant if required.
- Construct diversion drainage around the RSF and design the RSF surface drainage to limit the water ingress into the RSF and the volume in contact with the solid residue

### References
- Department of Energy and Mineral Resources: Republic of Indonesia
- Bapedalda of North Maluku Province
- Office of Mine and Energy of North Maluku Province
- Environmental Management Agency (Badan Pengelola Lingkungan Hidup) of Central Halmahera Regency
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<tbody>
<tr>
<td><strong>Marine Biota</strong></td>
<td>• Abundance of Plankton, Benthos, coral reef fishes and coral life forms</td>
<td>• Wastewater management (discharge to marine environment)</td>
<td>• Change of marine biota abundance</td>
<td>• Minimize disturbance to marine biota</td>
<td>• Disturbance to marine biota through wastewater management</td>
<td>• Ore processing plant</td>
<td>• Operation Stage</td>
<td>• Hydrometallurgical Plant Department</td>
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<td><strong>F. Operation Stage - Limestone Quarrying and Processing Activities</strong></td>
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<tr>
<td><strong>Air Quality</strong></td>
<td>• TSP</td>
<td>• Dustfall</td>
<td>• Limestone quarrying</td>
<td>• Limestone transportation, stockpiling and crushing</td>
<td>• Change in TSP (mainly PM10) concentration in ambient air</td>
<td>• Compliance to applicable ambient air quality standard (Government Regulation No. 41 Year 1999)</td>
<td>• To reduce impacts on air quality</td>
<td>• In dry period, reduce airborne TSP levels caused by road traffic by periodically suppressing dust using water spray in the unpaved road</td>
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<td>Environmental Component/Activity</td>
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<tr>
<td>• SO₂, NO₂</td>
<td>• Lime production</td>
<td>• Increase in SO₂ and NO₂ concentration</td>
<td>• To reduce impacts on air quality</td>
<td>• Use appropriate recognized technology to minimize air emission</td>
<td>• Operation Stage</td>
<td>• Energy and Utilities Department</td>
<td>• Department of Energy and Mineral Resources, Republic of Indonesia</td>
<td>• Department of Energy and Mineral Resources,Republic of Indonesia</td>
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<td>• TSP, Dust Fall and CO₂</td>
<td>• Lime production</td>
<td>• Increase of Dustfall and CO₂</td>
<td>• To reduce impacts on air quality</td>
<td>• Use appropriate recognized technology to minimize air emission</td>
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<tr>
<td>Noise</td>
<td>Noise</td>
<td>Limestone quarrying</td>
<td>Increase of noise vibration</td>
<td>To reduce the impact of noise and vibration</td>
<td>Implement controlled blasting technique.</td>
<td>Limestone Quarry</td>
<td>Operation Stage</td>
<td>Department of Energy and Mineral Resources, Republic of Indonesia&lt;br&gt; Bapedalda of North Maluku Province&lt;br&gt; Office of Mine and Energy of North Maluku Province&lt;br&gt; Environmental Management Agency (Badan Pengelola Lingkungan Hidup) of Central Halmahera Regency&lt;br&gt; Environmental Agency (Badan Lingkungan Hidup) of East Halmahera Regency&lt;br&gt; Office of Mine and Energy of Central Halmahera Regency&lt;br&gt; Office of Mine and Energy of East Halmahera Regency</td>
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<td>Vibration</td>
<td>Vibration</td>
<td>Limestone quarrying</td>
<td>Complaint on Vibration&lt;br&gt; Structural damage of infrastructures</td>
<td>To reduce or avoid if practically possible the effects of vibration</td>
<td>Implement controlled blasting technique&lt;br&gt; Plan carefully the schedule of blasting that will minimise disturbance</td>
<td>Limestone Quarry</td>
<td>Operation Stage</td>
<td>Department of Energy and Mineral Resources, Republic of Indonesia&lt;br&gt; Bapedalda of North Maluku Province&lt;br&gt; Office of Mine and Energy of North Maluku Province&lt;br&gt; Environmental Management Agency (Badan Pengelola Lingkungan Hidup) of Central Halmahera Regency&lt;br&gt; Environmental Agency (Badan Lingkungan Hidup) of East Halmahera Regency&lt;br&gt; Office of Mine and Energy of Central Halmahera Regency&lt;br&gt; Office of Mine and Energy of East Halmahera Regency</td>
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<td>Topography</td>
<td>Landform</td>
<td>Limestone quarrying</td>
<td>Change in landform</td>
<td>To manage slope stability of the quarry mine site</td>
<td>Integrate slope stability criteria into the mining plan and adapted progressive mining plans. Minimize the visual impact of activities</td>
<td>Limestone Quarry Department</td>
<td>Operation Stage</td>
<td>Department of Energy and Mineral Resources, Republic of Indonesia, Bapedalda of North Maluku Province, Office of Mine and Energy of North Maluku Province, Environmental Management Agency (Badan Pengelola Lingkungan Hidup) of Central Halmahera Regency, Environmental Agency (Badan Lingkungan Hidup) of East Halmahera Regency, Office of Mine and Energy of Central Halmahera Regency, Office of Mine and Energy of East Halmahera Regency</td>
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<tr>
<td>Soil</td>
<td>Soil Erosion</td>
<td>Land clearing, Stripping and piling of topsoil, Soil Erosion rate and its downstream effects (i.e. siltation)</td>
<td>To minimize soil erosion</td>
<td>Minimize the area of land clearing whenever possible and operate progressively, limit clearing only to required for the activities</td>
<td>Prior to land clearing and where possible or relevant construct diversion drainage around areas to be cleared, Remove top soil from land clearing sites and store in specified areas that will make it readily available reuse, Protect the topsoil storage area by constructing berms and planting cover crops when top soil will not be used within 3 years, Manage surface water run-off on the overburden placement site and active mining sites by constructing drainage channel and directing the run-off water to sedimentation ponds, Develop a re-vegetation plan, If required, protect the open slope area from erosion by appropriate methods (e.g. crushed rock sheeting, cover crops etc)</td>
<td>Limestone Quarry Department, Environmental, Health and Safety Department</td>
<td>Operation Stage</td>
<td>Department of Energy and Mineral Resources, Republic of Indonesia, Bapedalda of North Maluku Province, Office of Mine and Energy of North Maluku Province, Environmental Management Agency (Badan Pengelola Lingkungan Hidup) of Central Halmahera Regency, Environmental Agency (Badan Lingkungan Hidup) of East Halmahera Regency, Office of Mine and Energy of Central Halmahera Regency, Office of Mine and Energy of East Halmahera Regency</td>
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**Management Institution**

- **Conductor**
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  - Bapedalda of North Maluku Province
  - Office of Mine and Energy of North Maluku Province
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- **Supervisor**
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- **Reporting**
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<th>Management Location</th>
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<td>• Operation Stage</td>
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<td>• Stripping and piling of topsoil</td>
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<td>• To buffer pH and hardness</td>
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<td>Terrestrial Flora and Fauna</td>
<td>Species composition and structure and quality of wildlife habitat</td>
<td>• Land clearing</td>
<td>• Disturbance to biodiversity</td>
<td>• To protect the rare and endangered species of flora and fauna</td>
<td>• Limestone Quarry</td>
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**Environmental Resources Management**

**Wedata Bay Nickel**
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<tr>
<td><strong>Freshwater Aquatic Biota</strong></td>
<td>• Abundance of plankton and benthos</td>
<td>• Land clearing, stripping and piling of topsoil</td>
<td>• Change of Aquatic Biota abundance</td>
<td>• Minimize disturbance to aquatic biota</td>
<td>• Limestone Quarry</td>
<td>• Operation Stage</td>
<td>• Limestone Quarry Department • Environmental, Health and Safety Department</td>
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<tr>
<td><strong>Socio Economic</strong></td>
<td>• Business Opportunity</td>
<td>• Land clearing</td>
<td>• The level of participation of local people, local contractors and general community in various activities related to WBN operation</td>
<td>• To increase the level of the local community’s participation in economic activities related to construction</td>
<td>• Villages around Project Area</td>
<td>• Operation Stage</td>
<td>• External Relations Department</td>
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<td>• Community Income</td>
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</table>
## G. Operation Stage – Operation of Supporting Facilities

### Air Quality
- SO₂, NOₓ, and H₂S
- Sulphuric Acid Plant
- Power plant
- Increase of SO₂, NOₓ, and H₂S
- To reduce impacts of SO₂, NOₓ, and H₂S on air quality
- Use of efficient and properly maintained equipment to minimize the generation of SO₂, NOₓ, and H₂S in ambient air quality.
- Built or purchase ‘good common practise’ processing equipment or facilities
- Sulphuric Acid Plant
- Operation Stage
- Energy and Utilities Department
- Environmental, Health and Safety Department
- Department of Energy and Mineral Resources, Republic of Indonesia
- Bapedalda of North Maluku Province
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### Noise
- Noise
- Power Plant
- Increase of noise
- To reduce Noise
- Control of noise through the use of berms and mufflers or noise insulation materials.
- Effort to use appropriate equipment to reduce noise
- Power plant
- Operation Stage
- Energy and Utilities Department
- Environmental, Health and Safety Department
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<th>Management Efforts</th>
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<th>Management Institution</th>
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</thead>
</table>
| Hydrology                        | Change of Kobe River Flow        | Water supply for mine project | Change of Flow Rate            | To minimize surface water run-off rate | Monitor flow rate in Kobe River and switch to alternative supply or adjust the production level when flow reaches critical minimum level. | Project Area | Operation Stage | • Energy and Utilities Department  
  • Environmental, Health and Safety Department  
  • Department of Energy and Mineral Resources, Republic of Indonesia  
  • Bapedalda of North Maluku Province  
  • Office of Mine and Energy of North Maluku Province  
  • Environmental Management Agency (Badan Pengelola Lingkungan Hidup) of Central Halmahera Regency  
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  • Office of Mine and Energy of Central Halmahera Regency  
  • Office of Mine and Energy of East Halmahera Regency |}

| Surface Water Quality            | Oil and grease                   | Maintenance facilities | Increase of oil and grease contamination | To minimize oil and grease contamination | Operate oil catchers on the effluent treatment plant to separate oil from water.  
  Maintain effluent treatment plant to ensure optimum performance.  
  Diversion of untreated waste water to effluent treatment plant or oil catchers. | Workshop Area | Operation Stage | • Engineering and Maintenance Department  
  • Environmental, Health and Safety Department  
  • Department of Energy and Mineral Resources, Republic of Indonesia  
  • Bapedalda of North Maluku Province  
  • Office of Mine and Energy of North Maluku Province  
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<th>Supervisor</th>
<th>Reporting</th>
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<tr>
<td></td>
<td>Nutrients (BOD, COD, Ammonia, Nitrate, Nitrile)</td>
<td>Non-process waste management</td>
<td>To comply with applicable regulation on effluent water quality standard</td>
<td>Construct an engineered landfill to limit run-off to surface water</td>
<td>Landfill</td>
<td>Operation Stage</td>
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<td>Change in Surface Water Quality</td>
<td>To minimize all contaminants</td>
<td>Separate, treat and dispose of hazardous wastes in accordance with Government Regulations.</td>
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<td>Office of Mine and Energy of Central Halmahera Regency</td>
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<tr>
<td>Groundwater Quality</td>
<td>Nutrients (BOD, COD, Ammonia, Nitrate, Nitrile)</td>
<td>Non-process waste management</td>
<td>To reduce impacts on groundwater quality</td>
<td>Construct landfill in accordance with applicable regulations</td>
<td>Landfill</td>
<td>Operation Stage</td>
<td>Energy and Utilities Department</td>
<td>Environmental, Health and Safety Department</td>
<td>Department of Energy and Mineral Resources, Republic of Indonesia</td>
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<tr>
<td></td>
<td></td>
<td>Change in Groundwater Quality</td>
<td>To comply with applicable regulation</td>
<td>Construct and operate leachate collection and polishing pond</td>
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<td>Bapedalda of North Maluku Province</td>
<td>Office of Mine and Energy of North Maluku Province</td>
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<td>Separate, treat and dispose of hazardous wastes in accordance with Government Regulations.</td>
<td>Implement piezometers to control the quality of the ground water</td>
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**Environmental Resources Management**

**WEDA BAY NICKEL**

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<td>Permanent Accommodation Facility</td>
<td>• Number of local and non local employees (outsiders) recruited by WBN</td>
<td>• Develop long term mining related capacity in host communities</td>
<td>• Assist in providing training for selected local people to enable their employment with WBN and contractors</td>
<td>• Villages around Project Area</td>
<td>• Operation Stage</td>
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<td>• Optimize job opportunities for local communities</td>
<td>• Maximize transfer of local people involved in construction into operation phase</td>
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<td>• Develop skill local employee communities members</td>
<td>• Distribute employment opportunities adequately amongst host communities</td>
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<td><strong>Permanent Accommodation Facility</strong></td>
<td>• Number of local and non local employees (outsiders) recruited by WBN</td>
<td>• Develop long term mining related capacity in host communities</td>
<td>• Assist in providing training for selected local people to enable their employment with WBN and contractors</td>
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<td>• Develop skill local employee communities members</td>
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<td><strong>Sea Water Quality</strong></td>
<td>• TSS, pH</td>
<td>Operation of dedicated port and barge loader</td>
<td>Increase in TSS and change in pH of sea water</td>
<td>To reduce impacts on sea water quality and associated significant secondary impacts to other environmental components</td>
<td>Minimize the number of discharge points (concept of optimizing the locations &amp; the design of the outlets) Construct and operate waste water treatment plant so the water effluent comply with the applicable regulations Limit spillage through appropriate materials handling procedures.</td>
<td>Port Area</td>
<td>Operation Stage</td>
<td>Department of Energy and Mineral Resources, Republic of Indonesia Bapedalda of North Maluku Province Office of Mine and Energy of North Maluku Province Environmental Agency (Badan Lingkungan Hidup) of East Halmahera Regency Office of Mine and Energy of East Halmahera Regency</td>
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<tr>
<td></td>
<td>• Hydrocarbon, Oil and Grease</td>
<td>Operation of dedicated port and barge loader</td>
<td>Increase of oil and grease</td>
<td>To reduce impacts on sea water quality and associated significant secondary impacts to other environmental components.</td>
<td>Limit spillage through appropriate materials handling procedures. Where possible use stacker to load and unload the materials to minimize spill Equip the port with oil spill control equipment, and conduct regular refreshment training on spill control Provide waste storage facilities on board.</td>
<td>Port Area</td>
<td>Operation Stage</td>
<td>Department of Energy and Mineral Resources, Republic of Indonesia Bapedalda of North Maluku Province Office of Mine and Energy of North Maluku Province Environmental Agency (Badan Lingkungan Hidup) of East Halmahera Regency Office of Mine and Energy of East Halmahera Regency</td>
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**Environmental Resources Management**

WEDA BAY NICKEL
<table>
<thead>
<tr>
<th>Environmental Component/Activity</th>
<th>Parameter of Significant Impacts</th>
<th>Sources of Impacts</th>
<th>Reference/Indicator of Impacts</th>
<th>Management Objectives</th>
<th>Management Efforts</th>
<th>Management Location</th>
<th>Management Period</th>
<th>Management Institution</th>
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<tbody>
<tr>
<td>Oceanography</td>
<td>Change of current pattern</td>
<td>Operation of port</td>
<td>Change in beach sedimentation and erosion pattern</td>
<td>Minimise impacts of port operations in current pattern</td>
<td>Conduct oceanographic study to determine the presence and characteristics of natural current pattern in the port area. Use properly designed structures in constructing the port facilities.</td>
<td>Port area</td>
<td>Operation Stage</td>
<td>Port Operations Department, Environmental, Health and Safety Department</td>
</tr>
<tr>
<td>Marine Biota</td>
<td>Abundance of Plankton, Benthos, coral reef fishes and coral life forms</td>
<td>Operation port</td>
<td>Change of marine biota abundance</td>
<td>Minimise disturbance to marine biota through management of Seawater quality at the Port.</td>
<td>Manage disturbance to marine biota through management of Seawater quality at the Port.</td>
<td>Port area</td>
<td>Operation Stage</td>
<td>Port Operations Department, Logistics Operations Department, Environmental, Health and Safety Department</td>
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</tbody>
</table>

Conductor | Supervisor | Reporting |
---|---|---|
Department of Energy and Mineral Resources, Republic of Indonesia | Bapedalda of North Maluku Province | Office of Mine and Energy of North Maluku Province |
Environmental Management Agency (Badan Pengelola Lingkungan Hidup) of Central Halmahera Regency | Environmental Agency (Badan Lingkungan Hidup) of East Halmahera Regency | Office of Mine and Energy of East Halmahera Regency |
Office of Mine and Energy of North Maluku Province | Office of Mine and Energy of Central Halmahera Regency | Office of Mine and Energy of East Halmahera Regency |
### Matrix of Environmental Management Summary of PT Weda Bay Nickel

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<tr>
<td><strong>Air Quality</strong></td>
<td>• TSP and dustfall</td>
<td>• Operation port</td>
<td>• Change in TSP concentration in ambient air&lt;br&gt;• Increase of dust fall&lt;br&gt;• Compliance to applicable ambient air quality standard (Government Regulation No. 41 Year 1999)</td>
<td>• To reduce impact on air quality&lt;br&gt;• Where possible, use stacker to load and unload the materials to minimize dust generated.&lt;br&gt;• For bulk material, suppress dust generation in transfer points of conveyors.&lt;br&gt;• For bulk material, in-coming reagents and outgoing products to be appropriately packaged to limit dust escaping.&lt;br&gt; • Port area</td>
<td>• Operation stage&lt;br&gt;• Port Operations Department&lt;br&gt;• Logistics Operations Department&lt;br&gt;• Environmental, Health and Safety Department</td>
<td>Port area</td>
<td>Operation stage</td>
<td>Port Operations Department&lt;br&gt;Logistics Operations Department&lt;br&gt;Environmental, Health and Safety Department</td>
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<tr>
<td><strong>Noise</strong></td>
<td>• Noise</td>
<td>• Operation port and dedicated airport</td>
<td>• Increase of noise&lt;br&gt;• To minimize noise&lt;br&gt; • Port and airport area</td>
<td>• Schedule arrivals in line with PT WBN activities to the Port and Airport to, as much as possible, avoid night time.&lt;br&gt; • Socialize impacts of noise with affected communities</td>
<td>• Operation stage&lt;br&gt;• Port Operations Department&lt;br&gt;• Airport Operations Department&lt;br&gt;• Environmental Health and Safety Department</td>
<td>Port and airport area</td>
<td>Operation stage</td>
<td>Port Operations Department&lt;br&gt;Airport Operations Department&lt;br&gt;Environmental Health and Safety Department</td>
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<td>Socio Economics</td>
<td>Accessibility</td>
<td>Dedicated airport</td>
<td>Increase in mobility of local people</td>
<td>Minimize negative impacts on communities</td>
<td>Coordinate efforts with local authorities to maximize the benefits of the airport.</td>
<td>Villages around dedicated airport</td>
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<td>I. Community Development</td>
<td>Provision of Educational Facilities and Services</td>
<td>Educational facilities and services for local communities</td>
<td>Increase of demands for educational facilities and educational services</td>
<td>Distribution of available educational facilities in WBN CoW area</td>
<td>To assist local government in provision of necessary educational facilities and services under WBN CD Program</td>
<td>To ensure the responsible and effective use of CD Program</td>
<td>Some villages within WBN’s CoW Area in Central and East Halmahera Regency</td>
<td>Operation Stage</td>
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<tr>
<td>Provision of Public Health Service</td>
<td>Agriculture and Productivity in WBN’s COW Area</td>
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<td>Health facility and services</td>
<td>Increase of local demands for health services</td>
<td>Distribution of public health facilities and services within WBN’s COW area Central and East Halmahera Regency</td>
<td>To assist local government in health facilities distribution under WBN CD Program</td>
<td>Assist local government, in accordance with the capability of WBN, in provision of public health facilities and health services meet the minimum community requirement</td>
<td>Some villages within WBN’s COW Area in Central and East Halmahera Regency</td>
<td><strong>Conductor</strong></td>
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<tr>
<td>Improve Public Health Service</td>
<td>Operation Stage</td>
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## Matrix of Environmental Management Summary of PT Weda Bay Nickel

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<tr>
<th>Environmental Component/Activity</th>
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<tbody>
<tr>
<td>Fishery and Marine Culture</td>
<td>Fishery productivity in Weda Bay</td>
<td>Low fishery and marine culture knowledge of local fishermen</td>
<td>Availability of fishery and marine culture product in Weda Bay</td>
<td>To help increasing production level of several important local fishery products</td>
<td>Some villages within WBN’s CoW Area in Central and East Halmahera Regency</td>
<td>Operation Stage</td>
<td>External Relations Department</td>
<td>Department of Energy and Mineral Resources, Republic of Indonesia</td>
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<td></td>
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<td>Fishery equipment shortage</td>
<td>Production level of local fishery</td>
<td>To assist fishermen to acquire fish and marine culture production facilities</td>
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<td>To assist fisher to get certain most important fishery equipment</td>
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<td>Assist in training on various fishery and marine culture activities based on each locality’s comparative advantage</td>
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<tr>
<td>Local Business Development</td>
<td>Level of participation by the local community in various economic activities</td>
<td>Lack of full and equitable participation of local people in local business opportunities</td>
<td>Number of businesses owned and operated by local communities</td>
<td>To raise the participation of the locals in the economic activities</td>
<td>Some villages within WBN’s CoW Area in Central and East Halmahera Regency</td>
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<td>Types of goods and services provided</td>
<td>Encourage the use of local product and services by WBN and contractors</td>
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<td>Value of local economic activities</td>
<td>Assist in training of the locals and opportunities to participate in local business endeavors.</td>
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<td>Increase the involvement of local communities through entrepreneurship, in local business endeavors.</td>
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<td>Assist the community to improve the quality of local goods and services.</td>
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<td>J. Other Solid and Liquid Wastes Management</td>
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<tbody>
<tr>
<td>Surface Water and Ground Water Quality</td>
<td>Surface Water and Ground Water Quality</td>
<td>All PT WBN's mining, ore processing and supporting infrastructure activities that potentially generate non-hazardous and hazardous wastes</td>
<td>To comply with applicable regulation on effluent water quality standard</td>
<td>To reduce impacts on surface water quality and groundwater quality</td>
<td>• Collect all domestic non-B3 solid wastes from non-industrial activities (houses, offices, business, etc)</td>
<td>Project area</td>
<td>Operation Stage</td>
<td>Environmental, Health and Safety Department</td>
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<td>• Incentrate or burn non-reusable and non-recyclable wastes.</td>
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<td>• Dispose of unused and unrecyclable wastes to landfill.</td>
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<td>• Transport and place solid residue at the specified location</td>
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<td>Liquid waste:</td>
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<td>Environmental Management Agency (Badan Pengelola Lingkungan Hidup) of Central Halmahera Regency</td>
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<td>• Treat sewage generated by PT WBN's activities at sewage treatment plants.</td>
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<td>Environmental Agency (Badan Lingkungan Hidup) of East Halmahera Regency</td>
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<td>• Investigate options to re-use dried treatment solids generated from wastewater treatment plants.</td>
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<td>B3 Waste:</td>
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<td>• Collect and incinerate infectious medical wastes at incinerator</td>
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<td>• Ensure that no equipment containing PCBs, asbestos, ODS (ozone depleting substances) and other banned materials are purchased.</td>
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<td>Office of Mine and Energy of East Halmahera Regency</td>
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<td>• Neutralize and store used lead acid batteries.</td>
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<td>• Collect used oil and re-use as fuel at the ore processing plant</td>
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<td>• Install secondary containments around flammable and hazardous materials as required.</td>
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<td>• Regularly train appropriate employees in waste handling.</td>
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<td>• Handle B3 wastes separately and ship to approved B3 waste disposal facility</td>
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</tbody>
</table>

**Management Reporting**

- Department of Energy and Mineral Resources, Republic of Indonesia
- Bapedalda of North Maluku Province
- Office of Mine and Energy of North Maluku Province
- Environmental Management Agency (Badan Pengelola Lingkungan Hidup) of Central Halmahera Regency
- Environmental Agency (Badan Lingkungan Hidup) of East Halmahera Regency
- Office of Mine and Energy of Central Halmahera Regency
- Office of Mine and Energy of East Halmahera Regency
Appendix B

**Organization Chart of PT. Weda Bay Nickel**