ORDER OF THE MINISTER OF ENVIRONMENT AND GREEN DEVELOPMENT OF MONGOLIA

The 10th of April, 2014 Number A-117 Ulaanbaatar

On approval of methodology

On the basis of Article 7.7 of the Law on Environmental Impact Assessment and Government Resolution No. 374 of 2013 on the "Approval of Procedures", it is ORDERED as follows:

1. To approve the "Methodology for conducting strategic and cumulative environmental impact assessment" as per Annex 1, and the "Methodology for environmental impact assessment" as per Annex 2.

2. To instruct the Department of Environment and Natural Resources /Enkhbat.D/ to follow the methodologies for assessment.

3. In connection with the issuance of this order, to consider Order A-2 of the Minister of Environment and Tourism dated January 4, 2010 "On approval of methodological guidelines" as revoked.

Minister */signed and stamped/* S. Oyun

/illegible registration number (might be 00207)/

Annex 1 to the Order A-117 of the Minister of Environment and Green Development dated April 10, 2014

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METHODOLOGY FOR STRATEGIC AND CUMULATIVE ENVIRONMENTAL IMPACT ASSESSMENT

SECTION 1.

METHODOLOGY FOR STRATEGIC ENVIRONMENTAL ASSESSMENT

Contents

1.1 Overview

According to the revised version of the Law on Environmental Impact Assessment approved by the State Great Khural of Mongolia in May, 2012, the line ministry that initiates the development of a development policy, programme or plan has to commission an environmental impact assessment with the participation of a team of professional organisations authorised by the State Central Administrative Body in charge of environmental matters, academic and research institutes in the sector, independent experts and specialists, and submit the assessment report along with the draft policy document to the State Central Administrative Body in charge of environmental matters in order to receive conclusions and recommendations before submitting the policy document to the Government for discussion.

In order to fulfil the purpose of the law and enhance the implementation of procedures, it is essential to conduct strategic environmental assessment of the development policy document (policy, programme, plan) in accordance with the approved methodology, and to draw up optimal conclusions and recommendations incorporating those options that have the least adverse impact on the environment, society and the health of the residents, taking into consideration recommendations, requirements, and methodologies developed in this field by international organisations, the experience of peer countries, and the particularities of our country. A quality strategic environmental assessment informs planners, decision-makers and the public affected by the decision on the policies and decisions they plan to implement, facilitates the search for and selection of the most environmentally, socially and community-friendly alternatives, and ensures democratic decision making process. This enhances public confidence in the accuracy of policies and decisions and provides an opportunity for cost-effective and time-efficient environmental assessment when drafting policy documents.

The assessment methodology reflects the main objectives, scope, principles, and implementation sequence of the assessment, the methods and techniques used in the assessment, and the form of reporting the results.

MINISTRY OF ENVIRONMENT AND GREEN DEVELOPMENT

1.2 Main objectives of strategic environmental assessment

According to Article 3.1.3 of the Law on Environmental Impact Assessment, the term "**strategic environmental assessment**" refers to a process of which main goal is identification, in the process of developing national, regional or sectoral policy, programme or plan, of potential risks, adverse impacts and consequences of their implementation that may affect the environment, society, and human health, taking into consideration climate change trends and natural disasters.

The law also stipulates that the line ministry that initiates a development policy, programme or plan shall select a strategic environmental assessment team through an open call for tenders, discuss the results with the professional evaluation council under the State Central Administrative Body in charge of environmental matters, and present the conclusions and recommendations of the assessment to the Government meeting convened to discuss the matter.

The Strategic Environmental Assessment Team, from the initial stage of developing the development policy, programme or plan, determines its scope, assesses the current state and prospects of the affected natural resources, ecosystems and public health, identifies policy options with the least adverse impacts, thereby ensuring environmental protection and green development objectives, and writes reports and develops conclusions and recommendations.

The overall strategic environmental assessment process is illustrated in Figure 1.1.

1.3 Principles and performance criteria for conducting strategic environmental assessment

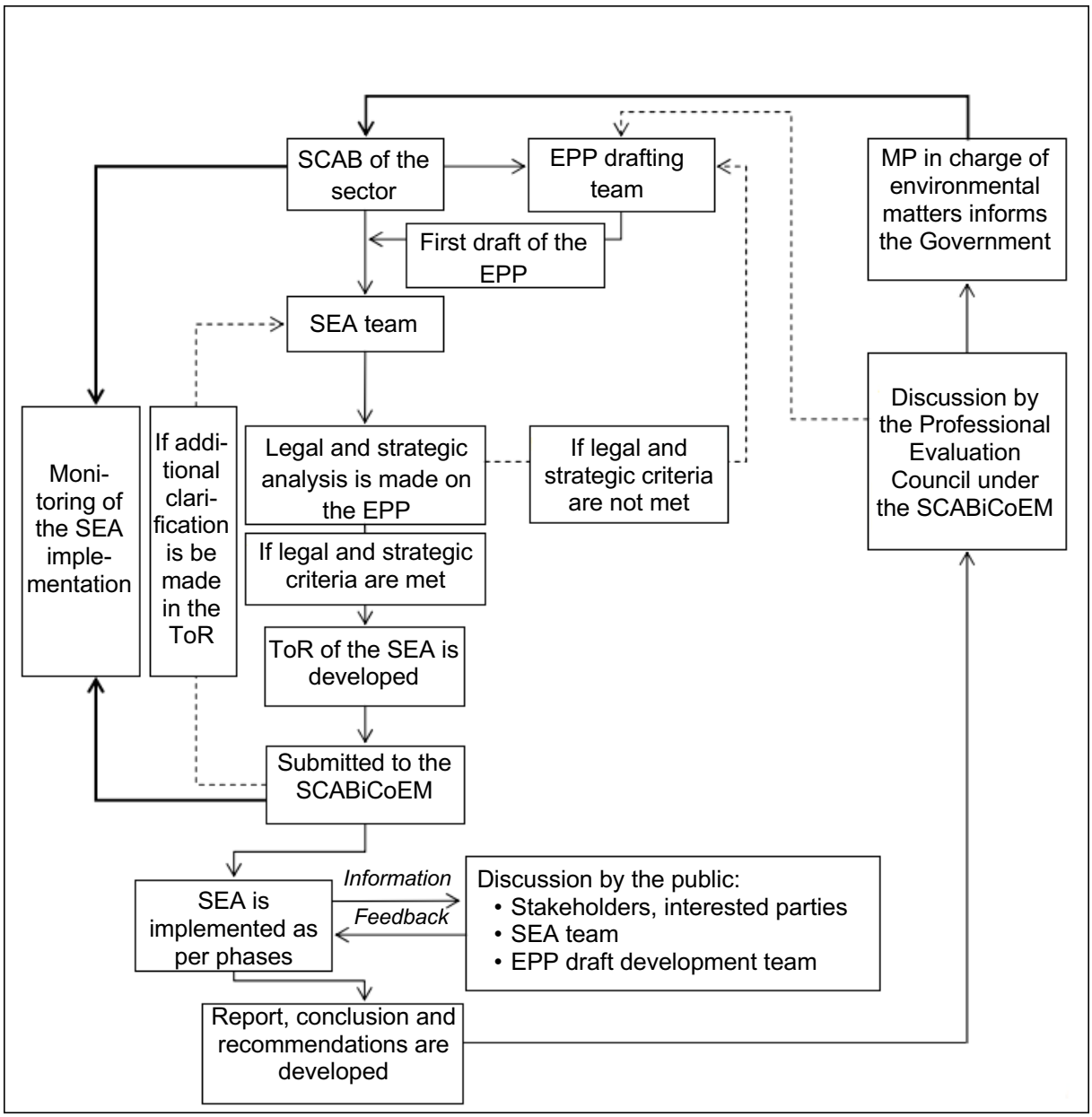
The following principles are stipulated in legal documents for conducting strategic environmental assessment and making decisions during the development of any development policy, programme or plan. Assessors, the public, decision-makers and all stakeholders shall abide by these principles, which include the following:

- Environmental protection and green development goals shall be defined and reflected in the policy documents from the initial phase of their development;
- Options to prevent potential adverse impacts, including options to be rejected during implementation shall be considered during the planning phase;
- The results and conclusions of the strategic environmental assessment shall be based on scientific grounds, facts and evidence;
- Information should be made available to the parties in an accessible (electronic) and transparent form, and public participation should be ensured in each phase of the strategic assessment;
- Stakeholders shall be responsible for the assessment process; and
- The decision-making process of State Bodies should be open and transparent.

Moreover, the process of conducting the strategic environmental assessment, its results, conclusions and recommendations have to meet the following criteria:

A comprehensive, multi-faceted approach is adopted, ensuring that sustainable (green) development is prioritised, that it focuses on the key issues, that it is based on sufficient and objective information, that the responsibilities of key and co-implementing parties are clarified, that transparency and access to information as well as public participation are ensured, etc.

Figure 1.1. General scheme of the strategic environmental assessment process



Note: SEA – Strategic Environmental Assessment, SCABiCoEM – State Central Administrative Body in charge of Environmental Matters, EPP – Environmental Protection Plan, MP – Member of Parliament, ToR – Terms of Reference

1.4 Phases of strategic environmental assessment

The development and implementation of any development policy, programme or plan involves the following common phases. These include: initiating, planning, developing options, selecting the optimal option, making decisions, authorising, constructing, using, closing etc. Strategic environmental assessment is carried out in the initial phases of these activities, i.e. initiating, planning, developing options, selecting the optimal option, decision-making and authorising.

The strategic environmental assessment process will proceed through the following steps, with Figure 1.2 summarizing the scope of each phase.

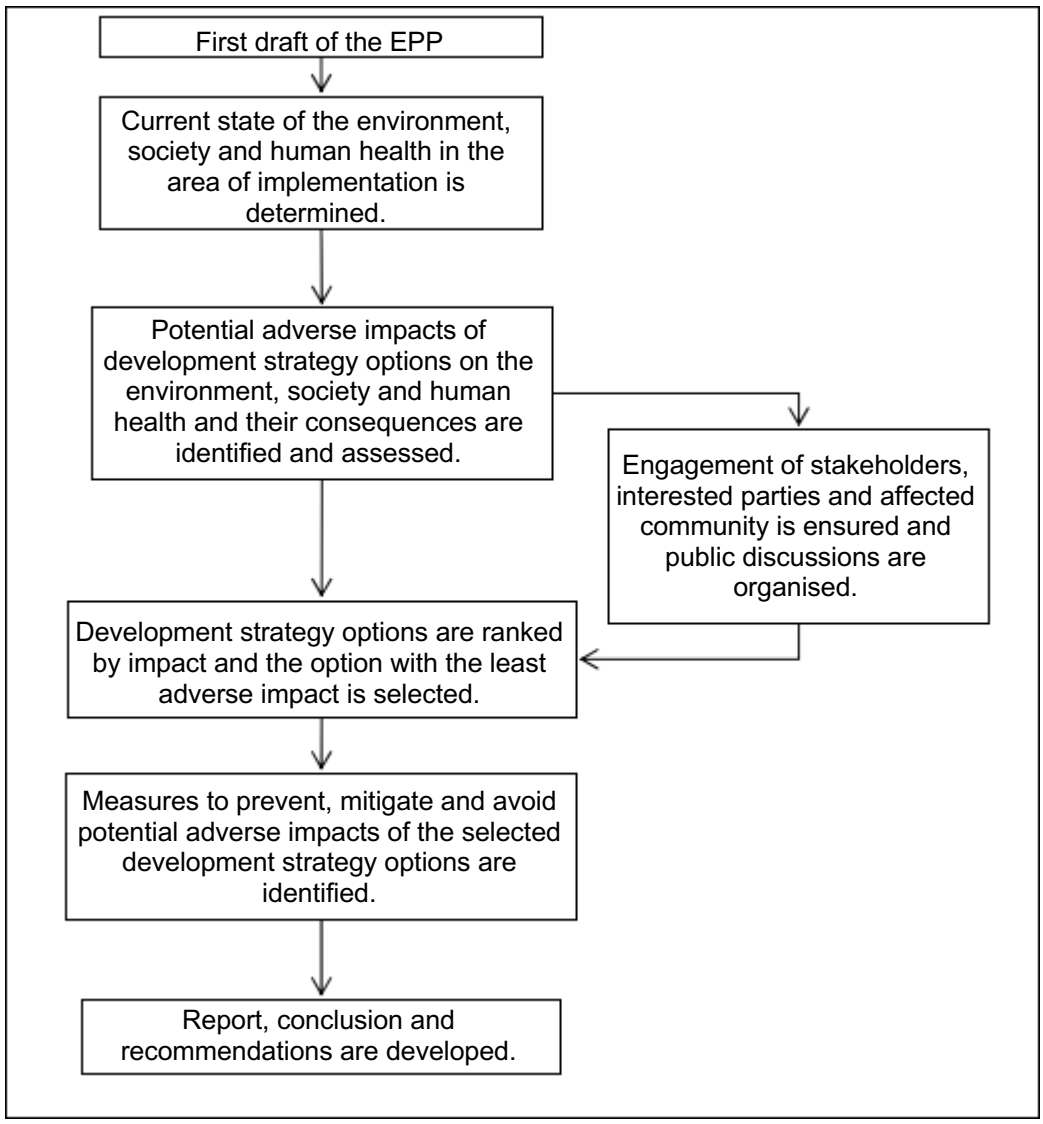


Figure 1.2. Scheme of strategic environmental assessment performance

These include:

1. **The phase of defining the main objectives, requirements and scope of the strategic environmental assessment** – In this phase, the main goal and objectives of the draft policy, programme or plan are analyzed to determine whether there is a need for strategic environmental assessment. If there is a need to conduct strategic environmental assessment, the scope and main objectives of the strategic environmental assessment are identified.
2. **The phase of conducting the strategic environmental assessment** – In this phase, potential risks to the environment of the region and territory, society, and health of the residents from the implementation of the draft policy, programme or plan, or specific part of the plan are identified, potential adverse and cumulative impacts are assessed, and options with the least adverse impacts are selected. Key outcomes of the strategic assessment, options to be selected, measures to avoid, mitigate, and remedy the adverse impacts, and assessment conclusions and recommendations are developed in this phase as well.
3. **The phase of informing and discussing the results of the strategic environmental assessment process** – In this phase, the interested parties and potentially affected citizens and residents are informed of the key outcomes of the strategic environmental

assessment and the options considered, get involved in the assessment process, and contribute their views/input.

4. **The phase of monitoring and evaluation** – In this phase, the main outcomes of the strategic environmental assessment, the implementation of the recommendations, and the cumulative impact of the selected options are evaluated. The accuracy and quality of the policy documents and strategic environmental assessment are also evaluated.

1.5 Defining the main objectives, requirements and scope of strategic environmental assessment

Work in this phase will focus on defining the goals, objectives, and scope of the strategic environmental assessment, and developing guidelines for the assessment, which should meet the following requirements:

- The goal of the strategic environmental assessment shall focus on identifying and assessing the potential risks and negative impacts on environment, society and human health from the implementation of development policy, programme or plan in the sector, comparing the potential risks, negative impacts, and consequences of the development objectives and options selected for their implementation, and selecting the optimal option for their implementation;
- The objectives of the strategic environmental assessment shall focus on conducting the assessment in a quality manner in accordance with legal requirements and appropriate methodologies, identifying key issues with consideration of many aspects, creating favourable conditions for selecting the optimal option, and ensuring public participation and transparency of information; and
- The scope of the strategic environmental assessment shall be determined on the basis of the requirements of environmental and sectoral legislations, environmental policies, climate change perspectives, frequency of natural disasters, potential risks, development policies, and the scope and area of impact of measures.

In addition, the following tasks need to be performed.

1.5.1 Making a list of information required for strategic environmental assessment

- In order to determine the adequacy of information for the strategic environmental assessment of the policy document, it is necessary to review the draft policy document developed by the initiator, collect research information that defines the development policy, objectives and strategic directions, as well as baseline information on the environment, economy and public health of the policy area, identify their sources, and collate them into a list; and
- If additional information is required, its content, accuracy, and source should be determined in advance.

1.5.2 Identifying the main implementers, stakeholders, and interested and affected parties of strategic environmental assessment

- The state central administrative body implementing the policy, programme or plan, as well as its co-implementers, stakeholders, affected and interested parties shall be identified on the basis of territorial and spatial affiliation, area of influence, legal authority, certification of ownership, legitimate interests, business and morality, and history and culture.

1.5.3 Developing guidelines for strategic environmental assessment

The results of the above steps are summarised and consequently, a draft guideline for conducting the strategic environmental assessment on the development policy, programme or

plan is developed and submitted to the state central administrative body in charge of environmental matters for comments.

The draft guideline shall include the main tasks and objectives to be carried out within the framework of strategic assessment, the body that will be in charge of policy implementation, its co-implementers and stakeholders, their cooperation methods, the schedule for the assessment, the documents to adhere to, the source of funding, the schedule for conducting the assessment, providing information to stakeholders, and organizing key discussions, and quality criteria for the assessment.

At this stage, it is necessary to include a schedule of cooperation, information dissemination, discussion and feedback with the initiators, main implementers, stakeholders, affected citizens, stakeholders and stakeholders of development policy, programme or plan. In this phase, it is also necessary to include a schedule of cooperation, information dissemination, discussion and feedback communication between the initiators, main implementers and stakeholders of the development policy, programme or plan, as well as between citizens and residents that might be affected and stakeholders whose interests are influenced.

1.6 Conducting strategic environmental assessment on draft development policy, programme or plan

The following sequence and methodological approach will be followed in conducting strategic environmental assessment on draft development policy, programme or plan:

1.6.1 Conducting legal and strategic environmental analysis on draft policy, programme or plan

The strategic environmental assessment team shall first conduct a legal and strategic environmental analysis on the first draft of the sector's development policy, programme or plan, and draw appropriate conclusions. These shall include:

1. To study and determine whether the main objectives and strategies of the policy, programme or plan as well as its implementation measures are in accordance with the current environmental law and legal environment through legal comparisons and legal environment analysis;
2. To study how the policy, programme or plan complies with the obligations under international conventions and agreements, to which Mongolia joined, on environmental protection and regional and cross-border impacts, and to identify conflicting issues;
3. To determine how the main strategies and measures of the sector's development policy, programme or plan are consistent with the strategies for environmental protection, green development and adaptation to climate change; and
4. To identify the highest governing body (Parliament or Government) that approves the draft policy, programme or plan.

The results of these analyses are summarised and how the objectives and measures of the sector's development policy, programme or plan are consistent with the law on environment, legal environment and the obligations under the international conventions and agreements, to which Mongolia joined, is determined. If the law or international obligations are violated, recommendations on how to comply with the law, rework the draft policy document, and eliminate legal violations shall be developed and submitted to the state central administrative body in charge of environmental matters.

Moreover, the compliance with the environmental, green growth, and climate change adaptation goals and objectives shall be studied and determined using matrix, overlap, and comparison methods, and consequently, opposing or conflicting goals and strategies shall be identified and recommendations on how to reconcile them shall be given.

Once the draft policy, programme or plan fully meets the above criteria, the selected team shall conduct the strategic environmental assessment as per the following steps:

1.6.2 Identifying natural resources, ecosystem state, values and perspectives that will be affected by the implementation of development policy, programme or plan

When conducting the strategic environmental assessment as the development policy, programme or plan is developed, the environmental and social conditions as well as specifics of the target area need to be carefully studied. In other words, the current status of key environmental components of the region, such as land surface, landscaping, water, soil, flora, fauna and population should be identified by the environmental baseline assessment methodology. In the course of this study, special attention should be paid to identifying areas, ecological conditions, its protection and vulnerabilities, which are of special importance to the local residents and ecosystems. Environmental protection activities in the region also need to be considered.

Natural resource and ecosystem status indicators should include the information required for the strategic objectives and planning options identified in the previous phase, and should identify sensitive areas, biodiversity, and ecosystem components that need to be addressed. For the development planning of a particular sector, it is necessary to determine at an appropriate level the initial or baseline parameters of the environment (soil, water or air) that are most affected.

In other words, there is a need to ensure a balance between human development and environmental sustainability, as certain social changes will occur in response to changes in the state of natural resources and ecosystems through the implementation of the development policy. To achieve this, the issues need to be comprehensively addressed, as illustrated in the figure below, and the current state of the ecosystem, perspectives, values, direct and indirect social impacts, and their interdependent relations need to be identified.

Traditional methods of environmental impact assessment, such as expert assessment, methods of determining the value of important components of ecosystems, natural disaster management risk assessment method, spatial and temporal change mapping methods based on remote sensing, public opinion polls, sensitivity analysis method, and system analysis methods, as well as other methods such as methods for economic assessment of natural resources and ecosystem service cost method, methods for assessing system sustainability, advanced environmental modeling methods (ecological, surface and groundwater, climate change models, etc.), and network- analytical methods are used in assessing the implementation of policy, programme or plan, the natural resources affected, the state of ecosystems, and their values and perspectives, and in studying the above interdependent relations. For example, recommendations for using the geographic information system model are elaborated in Information Box 1.

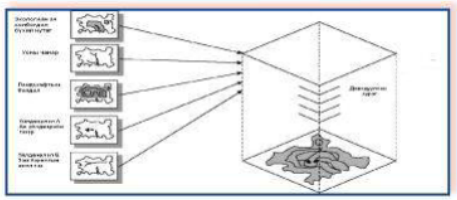
Information box 1

Geographic Information System Recommendations

Definition: Geographic Information System can be used to qualitatively assess changes due to human activities and other impacts over large areas.

Basic Equation: Methodologies should be selected from the geographic information system depending on the purpose of the study (for example, supervised / unsupervised classification method to study changes in land use, Spatial Analysis method for spatial analysis, etc.).

Input data: Depends on what analysis is to be performed. For example, the following databases can be used to identify spatial overlaps of impacts.



Result: This model can be used to make spatial mapping of regions, basins and territories.

Processing: This model works on Windows and UNIX OS.

Design source:

1. http://www.esri.com

For example, temporal and spatial overlapped mapping method of geographic information system can be used in determining changes in the parameters of social and environmental historical information and the size of the affected area, environmental modeling method (ecological VELMA and Century models, RIBASIM, HBV, TOPLAST models of water runoff, MODFLOW model of underground water, WRF or Hadley models of regional climate change, or other models with similar or equivalent accuracy) can be used in determining the extent, boundaries, intensity, frequency and duration of adverse and potential cumulative impacts on ecosystems, and their relationship (climate change, air, soil and water pollution estimates, environmental sustainability, current state and future trends of pasture carrying capacity, etc.) to determine), or the current and future value of the ecosystem and the ecosystem service cost calculation methods can be used in the assessment. For example, recommendations for using the CENTURY model are elaborated in Information Box 2.

Information box 2

CENTURY Ecosystem Model Recommendations

Definition: This model is widely used worldwide to determine pasture management and carbon capacity, and it models plant growth, water circulation, and soil organic matter.

Basic equation: $AB_c = AB_{max} * f_t(T) * f_m(M) * S_{sh}$

Here: AB_{max} is the maximum value of the above-ground biomass, $f_t(T)$ is an air temperature-dependent function, $f_m(M)$ is a water capacity-dependent function, S_{sh} is a parameter indicating the effects of plant shade and growth.

Input data: The following information is used to run this model.

- Maximum and minimum monthly and daily air temperatures
- Monthly and daily precipitation
- Mechanical structure of soil in the study area

Outcome: This model can be used to study the current and future state of pastureland in the region, basin or territory, and to ensure proper pastureland management.

Processing: The model works on Windows and UNIX OS.

Design source:

1. http://www.nrel.colostate.edu/projects/century/
2. http://www.geoenv.tsukuba.ac.jp/~sugita/archive/Byambakhuu-PhD.pdf

1.6.3 Identifying and assessing potential risks, adverse effects, their consequences and potential cumulative adverse effects on the environment, society and human health from the implementation of development policy, programme or plan

The most important part of strategic environmental assessment conducted when drafting or developing development policy, programme or plan which is to identify and assess the potential risks and potential adverse impacts on the environment, society and human health, identify low-risk options, and to identify and assess the direct and indirect impacts of specific projects and measures to ensure the policy implementation is carried out in this phase.

If the objectives and measures outlined in the policy document are rather multi-faceted and complex, it will be difficult to predict their risks and adverse impacts. So they should be classified and the most risky options are identified, and finally their potential cumulative impacts should be addressed. In doing so:

- Spatial and temporal risks to the environment, society and human health from the implementation of the policy, programme or plan should be identified and ranked;
- All potential adverse and cumulative spatial and temporal impacts to the environment, society and human health from the implementation of the policy, programme or plan should be identified;

- Based on an assessment of the scope and intensity of adverse and cumulative impacts on the environmental and social system, how the sustainable and green development goals and criteria are met should be determined; and
- Based on the identification of the above potential risks, adverse and cumulative impacts, development options with the least risk and the least negative and cumulative impacts are identified.

In identifying and assessing the above impacts, it is important to select and use the most appropriate traditional methods of impact assessment, which suits the nature of the issue. For example, the most suitable one should be selected from the traditional methods such as the comparative risk assessment on the coherence of economic and social policies and their environmental impacts, the economic assessment of environmental degradation, or the research-based participation assessment.

Other examples include expert assessment, BAT-BEP, temporal and spatial overlapped mapping method of geographic information system, risk assessment methods, multi-functional interaction matrix method, human health monitoring and evaluation method, cost-effectiveness analysis, future development comparison method, socio-environmental system vulnerability modeling, sustainability assessment, multivariate analysis, network-analysis method, and cumulative impact assessment methods.

In addition, risk assessment method should be used to identify all potential risks, including risks from natural disasters to the environment and human health, future development comparison method should be used to identify and compare multifaceted development options, and matrix method should be used to analyse the characteristics and differences between key parameters of development options in order to select the option with the least risk.

1.6.4 Identifying environmental and social changes

The factors which will influence the environment and the social system during the implementation of the development policy, programme or plan shall be identified and evaluated on the basis of accurate identification of the relationship between goal, objectives and scope of strategic environmental assessment and all the phases of the assessment. In other words, the pros and cons, the intensity of the impact, and the potential cumulative impact of the combined and overlapped effects on the environmental and social system of the region as a result of the implementation of the development policy under consideration and any other development policies will be identified in this phase.

When identifying and assessing the socio-environmental impact of the policy, programme or plan, changes in environmental and social system should be identified, on the basis of environmental, social and economic assessment, by system vulnerability modeling, ecosystem vulnerability and adaptation assessment, and sustainable development modeling methods.

For example, the T21 model of sustainable development should be used in determining the macro level future trends of sustainable development, green development, and green economy of the country, environmental and social system vulnerability estimation modeling should be used in determining the resilience and threshold values of vulnerability due to impact on society and environment from the development policy implementation, and ecosystem vulnerability and adaptation assessment method should be used to identify the development options adaptable to climate change. Recommendations for using the T21 model of sustainable development are elaborated in Information Box 3.

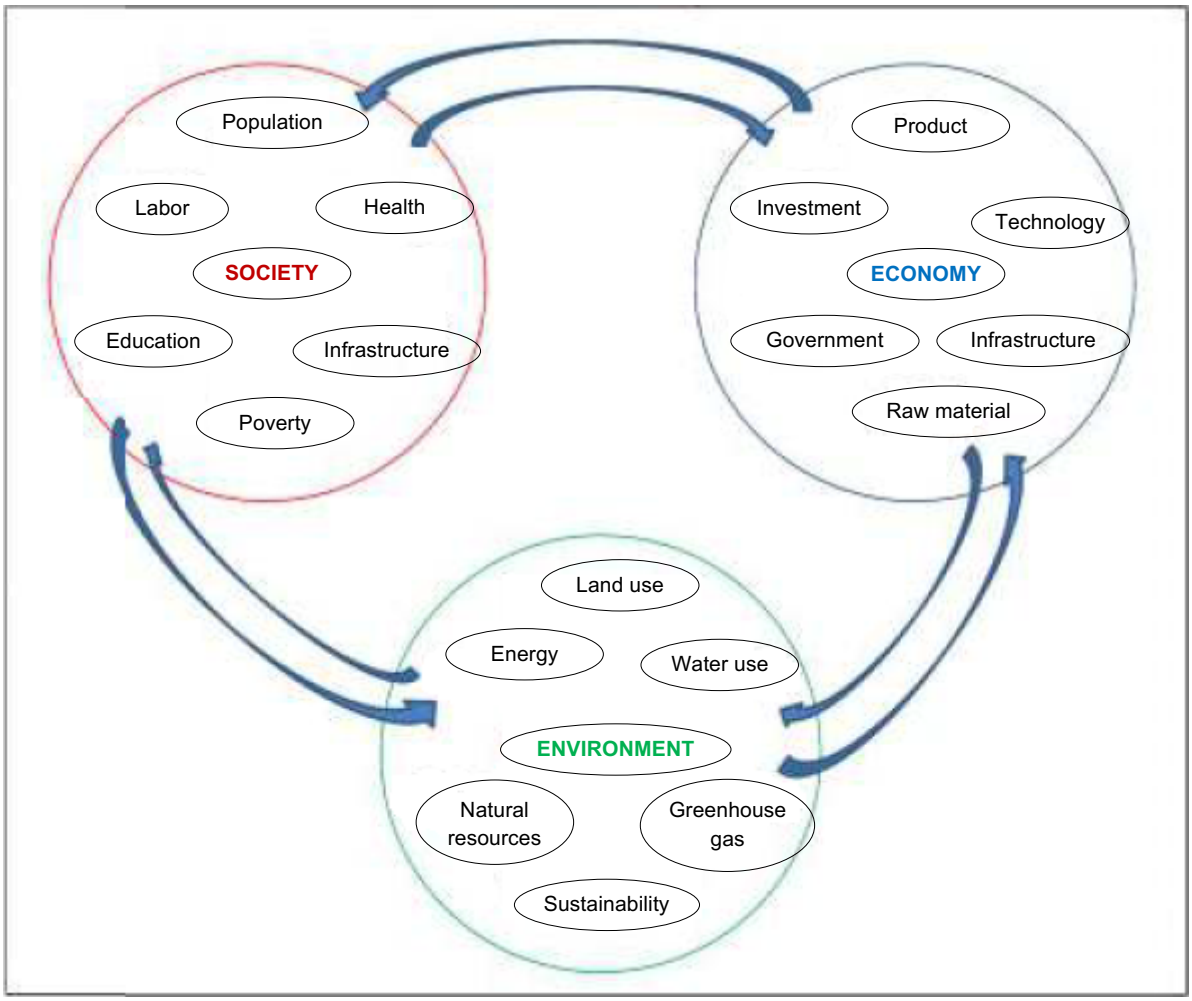
Information box 3

T21 model recommendations

Description: This model can be used to develop short, medium and long term plans for sustainable development of the country.

Basic Equation: The modules in the T21 model should be selected and used depending on the purpose of the study.

Input data: Historical data from social, economic and environmental statistics.



Outcome: It can be used to plan development policies.

Processing: The model works on Windows OS.

Model source:

1. www.millennium-institute.org

2. Towards a GREEN ECONOMY. UNEP, 2012

1.6.5 Selecting the options that prevent (avoid) from adverse impacts, and identifying the mitigation measures

The main objective in this phase is to select an option with the lease adverse impact from the assessment conducted in the previous phase on potential adverse impacts and risks on the environment, society and human health, and to identify appropriate measures to mitigate the potential adverse impacts and risks.

In other words, it is important to create a win-win situation for all the parties when implementing the development policy, programme or plan, which further ensures an optimal economic development option that is supportive of environmental protection and social benefits.

Potential adverse impacts, potential risks, and their consequences should be analysed, relatively low-intensity adverse impacts and risks should be identified, standardised measures to mitigate them should be identified, and measures to keep them at a reasonable level should be identified.

Adverse impact prevention and mitigation measures shall be defined in the order in which they are first avoided or prevented, then mitigated, and finally rehabilitated and compensated. These include:

- Identification of options to avoid, prevent from or reduce potential risks to the environment, society and human health;
- Comparison and ranking of options by their potential risks and adverse impacts on the environment, society and human health;
- Selection of the option with the least adverse impacts and risks; and
- Identification of measures to prevent or mitigate adverse impacts.

Development options comparison method, multi-criteria analysis method, BAT-BEP, sustainable development method and multi-faceted assessment method can be used in avoiding adverse environmental and social impacts of the policy, programme or plan, selecting prevention options, and identifying mitigation measures.

For example, system trend analysis or similar methods can be used to determine the intensity and frequency trends of potential adverse impacts on the natural resources and ecosystem status of the region, and human health over the period of the development policy implementation.

1.6.6 Presenting the process, results, conclusions and recommendations of strategic environmental assessment to stakeholders and the public and reflect their comments.

The main goal in this phase is to identify how to ensure participation of the public and the stakeholders, to identify ways to provide information, to define the methods of communication, and to select the most appropriate method for the situation because keeping the progress reports and results of the phases of the strategic environmental assessment transparent to the public and the stakeholders and taking their comments into consideration are crucial for identifying the options with less adverse impact and risk, and implementing the conclusions and recommendations of the strategic assessment.

In order to provide information and increase stakeholder participation in the strategic environmental assessment, the areas and population most affected by the policy measures will be covered first, objective information will be provided to them, and social impact surveys, discussions and meetings should be organised. At this point, the focus should be on explaining the political and economic objectives and significance of the development policy, how the

decision-making system and public opinion will be considered in the decision-making process, and how to increase its effectiveness.

Co-implementers, stakeholders and interested parties affected by the policy and interventions which are identified in the first phase of the strategic assessment should be provided with access to the progress report and final report of the assessment. In addition, preparing a summary of the strategic assessment report and recommendations on key issues and solutions, and delivering it to the key decision-makers will ensure that the results of the strategic assessment are reflected in any decision-making process and that public and stakeholder comments are reflected in certain decisions. Therefore, the main goal of this phase is to present the progress and the final results of the strategic environmental assessment to the stakeholders and interested parties in accordance with relevant laws and regulations, to reflect their views, and to ensure public participation to help decision makers choose the least risky option.

The process of ensuring public participation can be done in parallel with the development of policy, programme or plan and their strategic assessment. In this case, the decision-makers shall make the strategic assessment recommendations accessible to the public for information such as what options were being considered at the time, what options were selected taking into account what risks to the environment, society and health, and what consequences would follow if wrong decisions were made.

The State Central Administrative Body in charge of environmental matters shall post the draft report and draft conclusions of the strategic environmental assessment on the sector's policy document along with the draft policy document reflecting the draft results on its website within 14 days and organise activities to collect comments of the public, the stakeholders, and the parties interested. Information produced prior to this, such as progress reports of strategic environmental assessment conducted in the development phase of the policy, programme or plan, options considered, their comparison and options selected shall be posted on the website of the line ministry that initiated the policy document development, as well as on social media accounts of the strategic assessment team members to collect and reflect public comments.

An annex with an explanation of how the comments from the stakeholders, interested parties, and affected parties were reflected during the public discussion process may be attached to the strategic environmental assessment report.

1.6.7 Evaluating the implementation of strategic environmental assessment conclusions and recommendations during the implementation of development policy, programme or plan

The results of the strategic environmental assessment, information on the options considered and selected, and monitoring of its implementation are key indicators of how the implementation of the development policy avoids risks to the environment, society and human health and meets the criteria for sustainable and green development. Monitoring should be carried out regularly during the implementation of development policy, programme or plan, and monitoring their implementation is an important tool for predicting potential cumulative impacts and preventing environmental degradation in a particular region. Therefore, the main task in this phase is to identify the monitoring indicators for the implementation of strategic assessment conclusions and recommendations together with the monitoring methods.

The indicators to monitor the implementation of the strategic environmental assessment recommendations should be determined on the basis of the development policy objectives and measures, and should include the following indicators:

- Percentage of implementation of development options selected by strategic environmental assessment;

- The number of options proposed again from the rejected options considered in the strategic assessment;
- The number of projects implemented to ensure the implementation of development policy, programme or plan, and measures to reduce environmental and social impacts;
- Direction and the number of strategic assessment recommendations included in the general environmental impact assessment;
- The extent to which strategic assessment recommendations and conclusions are reflected in general and detailed environmental impact assessment decisions;
- Name, direction, capacity, and other indicators of the project or activity rejected due to its similarity with the options with potential negative and cumulative impacts that were rejected;
- Name, direction and number of projects and activities aimed at introducing green development and environmentally friendly technologies;
- Name, direction, capacity, and other indicators of projects and activities that introduce use of advanced technologies to reduce natural resources utilisation, and energy and water consumption; and
- Comments from stakeholders affected by the policy implementation, and their key points.

1.7 Structure and content of strategic environmental assessment report

The team that conducted the strategic environmental assessment on the sector's policy, programme or plan documents will issue a report and conclusion/recommendation, and the report will have the following structure:

Overview, and

1. Goals and objectives of the development policy, programme or plan, and main measures to be implemented in relation thereto;
2. Compliance of policy objectives and measures with environmental protection, green/sustainable development goals and other government policies and programmes;
3. Current state and perspectives of natural resources and ecosystems affected by policy implementation;
4. Potential risks, adverse impacts, its consequences and cumulative adverse impacts on the environment, society and human health from the policy implementation;
5. Options for prevention, mitigation and avoidance of adverse impacts, their comparison and selection;
6. Conclusions and recommendations of the strategic environmental assessment;
7. Methods for monitoring the implementation of the Strategic Environmental Assessment conclusions/recommendations during the implementation of the development policy, programme or plan; and criteria for evaluating thereof;
8. References of information used; and
9. Information annexes.

The main outcome of the strategic assessment is a conclusion/recommendation, which should include the following:

- A summary of how the principal goal of the sector's policy, programme or plan as well as strategic objectives are in line with the current environmental legislations;

- Policies, strategies, and key interventions selected to ensure environmental protection and sustainable/green development with minimal potential adverse impacts and risks; and a brief summary of the options considered and rejected;
- Potential cumulative adverse impacts in the region and recommendations for prevention thereof; and
- Methods for monitoring the implementation of the Strategic Environmental Assessment recommendations during the implementation of the policy, reporting methods, timelines, and so on.

END OF SECTION

SECTION 2.
METHODOLOGY FOR CUMULATIVE IMPACT ASSESSMENT

Contents

2.1 Overview

Cumulative impact assessment is a process of which main goal is to identify the sources of direct and indirect combined adverse impacts from the implementation of a development policy, programme or plan, or from past, current and future activities of a project inflicted or could inflict on the environment, society, and human health of a particular region, basin or territory, to assess their spatial distribution and spread pattern, and to determine the measures to mitigate or eliminate their consequences.

Although traditional impact assessment methods and techniques are widely used in cumulative impact assessment, there are many challenges, such as defining the spatial and temporal coverage, evaluating the operational interactions and combined impact, detailed identification of sources of adverse impacts and their spatial distribution, and assessing harmful consequences, which necessitates the use of some methods and techniques that are not often used in environmental impact assessment. The assessment method is selected depending on the nature of the region, water basin, and territory selected for the cumulative impact assessment, and the adverse impacts from the implementation of projects inflicted, currently inflicting or could inflict on the environment, society, and human health, as well as their consequences and risks, but the following peculiarities need to be considered.

For example:

- The combined adverse impacts of the projects affect a number of administrative units and large areas and have various consequences (for example, the spread of pollution over particular regions and water basins etc.);
- The combined adverse impacts of the projects can last for a long time, past and future;
- During the activities of the projects, the adverse effects from each of them coalesce to create a combined adverse impact, directly or indirectly affecting important components of the ecosystem and social and human health through the environmental components of the region, watershed and territory; and
- In addition to identifying the sources of direct and indirect impacts of a regional nature on the environment, society and human health, there is a need for identifying the sources of other impacts as well as their spread pattern and harmful consequences.

Therefore, the following issues that need to be considered in conducting the cumulative impact assessment are addressed in this methodology and are clearly explained.

These include: how to avoid separate impact assessments, how to identify the cases that have more adverse impacts, in what spatial zone the scope of cumulative impact assessment activities should be considered, impacts from what other activities to consider together, how to scale the impact period, and how to identify cumulative and future cumulative impacts, and what needs to be done to assess them, etc.

In order to meet the main objectives of the cumulative impact assessment, methodological guidelines on how to address the above-mentioned peculiarities and issues to be considered have been included in this document and developed for the experts, reviewing experts and decision makers.

2.2 Main objectives of cumulative impact assessment

Article 3.1.5 of the Law on Environmental Impact Assessment states that **Cumulative Impact Assessment** shall be conducted for the purpose of identifying both combined and overlapped adverse impacts from projects implemented in a particular region or water basin by citizens, economic entities and organizations on the health of population, and of determining the measures to mitigate or eliminate those impacts.

The law also stipulates that the State Central Administrative Body in charge of environmental matters shall conduct an impact assessment on projects implemented by citizens, economic entities and organizations in particular regions and water basins with the participation of authorised professional organizations and submit the assessment report to the professional council in charge of evaluation under the State Central Administrative Body in charge of environmental matters for review.

Therefore, the cumulative impact assessment is conducted by the relevant authorised professional organization or team appointed by the order of the Member of Parliament in charge of environmental matters. On the basis of identifying the environmental condition of the region or water basin and main adverse impacts inflicted or currently inflicting on its environment, society and human health, and determining the intensity, extent and distribution of the consequences of those impacts, and the sources and spread pattern of the impacts, and their share in the combined impact, the measures to reduce or eliminate the adverse impacts on the environment, society and human health, cost overviews and options will be identified, conclusions and recommendations will be developed, and the report will be written.

The following tasks need to be done as part of the cumulative impact assessment:

- Collecting regional baseline information required for cumulative impact assessments;
- Identifying the state of the environment;
- Identifying regional impacts and challenges;
- Identifying the source, proportion, and spread pattern of adverse effects;
- Identifying the boundaries of the impact (space, time);
- Identifying regional combined and overlapped adverse impacts;
- Assessing and ranking the consequences, intensity and risks of combined and overlapped adverse impacts;
- Identifying the components of the environment that are affected by the activity and all other activities;
- In determining the environmental component, important components of the ecosystem affected by the project activities will be selected and identified in detail;
- Assessing the impact of project activities on human health in the region;
- Assessing the changes in the regional environmental and social system as a result of project activities by using environmental and social vulnerability assessment;
- Developing recommendations, plans and monitoring programmes to mitigate the combined and overlapped impacts in the region; and
- Assessing the harmful consequences.

2.3 Basic principles to be followed by when conducting cumulative impact assessment

The following principles shall be adhered to when conducting cumulative impact assessment and making decisions based thereon:

- Cumulative impact assessment shall be conducted in accordance with the requirements of relevant environmental legislations;
- The cumulative impact on the region shall be studied and analyzed in relation to the social and economic issues of the area;

- The source of the impact and its spread pattern shall be accurately identified in order to accurately and objectively identify the adverse impacts from the project implementation;
- Whether the combined and overlapped adverse impacts are related to natural evolution shall be identified;
- The proportion of sources of combined adverse impacts and their consequences shall be accurately identified;
- The results of the impact assessment, the methodology used to assess it and the cumulative impact assessment should be based on evidence;
- The methodology used in the impact assessment and the results and conclusions of the cumulative impact assessment shall be supported by the results and evidence of research conducted by appropriate scientific methodology; and
- Management measures to mitigate the adverse impacts identified by the cumulative impact assessment shall be feasible.

Cumulative impact assessment shall be carried out through the following phases, and Figure 2.1 summarises the process for each phase.

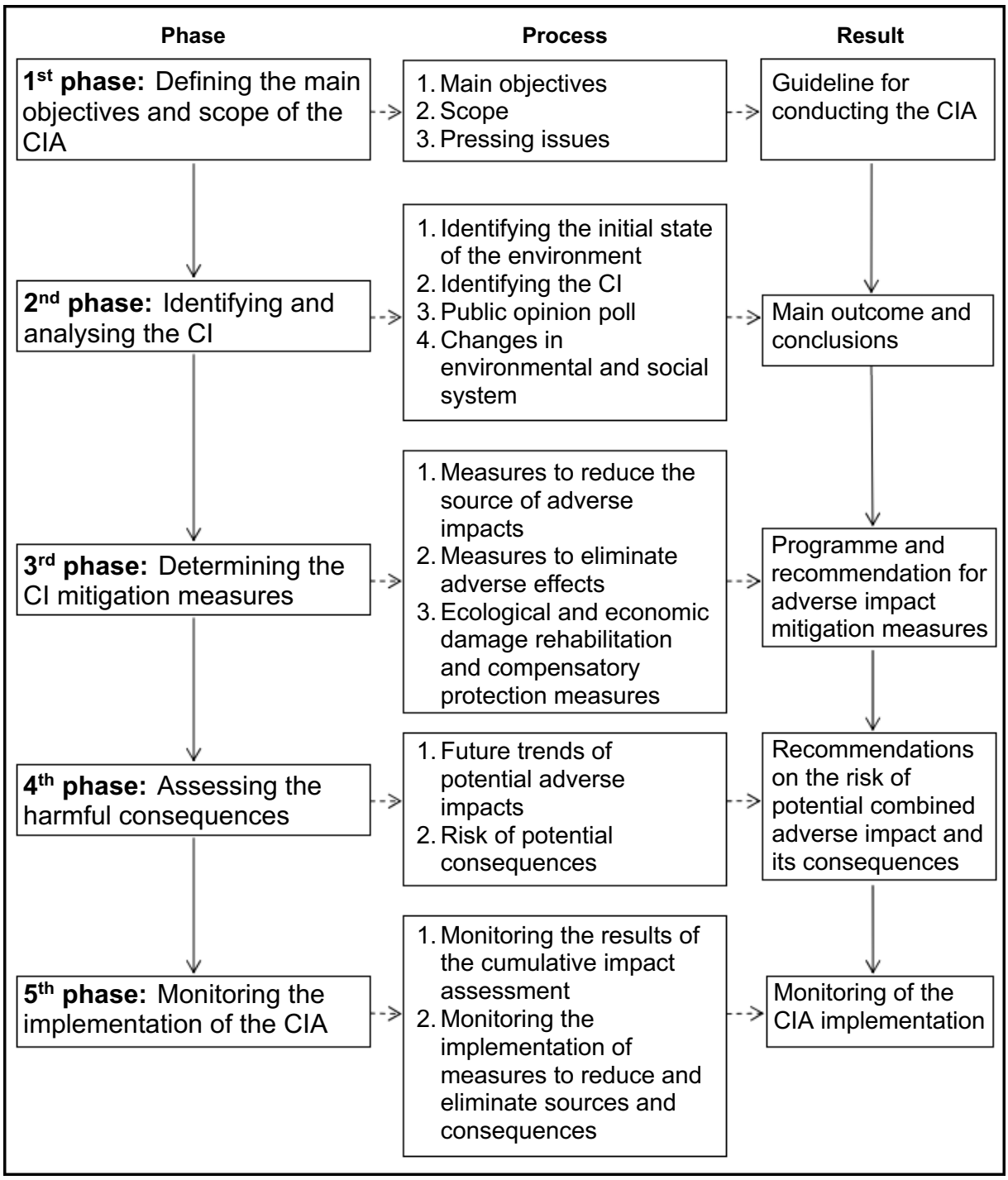


Figure 2.1. Phases and implementation sequence of cumulative impact assessment and their coherence

2.4 Phases of cumulative impact assessment

The main purpose of cumulative impact assessment is to assess the direct and indirect combined adverse impacts on the environment, society and human health of a particular region, water basin and territory, and to determine the measures to mitigate them. Work needs to be done to identify the sources of the combined adverse impacts, their spread pattern, and the share of the sources in the total impact and consequences.

The cumulative impact assessment that meets the above objectives and requirements shall be meticulously conducted according to the following phase and the results shall be reported:

1. Phase of determining the main objectives, requirements and scope of the cumulative impact assessment – The main focus in this phase is to properly direct the assessment.

The main objectives, scope and boundaries of the cumulative impact assessment, and the pressing issues arising from the consequences of combined adverse impacts on the environment, society and human health of the region, water basin and territory are identified in this phase, and subsequently, a guideline for cumulative impact assessment is developed. The guideline shall include such works as identifying the combined adverse impacts from policy implementation and project activities, ranking them according to the nature of the impact, identifying important components of the affected ecosystem through field research, identifying the consequences of the combined impact, planning mitigation measures, and determining the key monitoring objectives.

2. Phase of identifying and analysing the cumulative impact – In this phase, all the data needed to assess the cumulative impact of the region are collated, the initial environmental status of the region and water basin is identified, the sources and spread pattern of adverse impacts from ongoing projects as well as their share in the total impacts are identified in details, combined adverse impacts resulting thereof are assessed, adverse consequences on the environment, society and human health, risks and important components of the affected ecosystem are identified in details, overall ecological and economic damage to the environment as well as the rehabilitation costs are determined.
3. Phase of determining the cumulative impact mitigation measures – In this phase, measures to mitigate the adverse impacts inflicted or could inflict on the environment, society and human health identified in the previous phase as well as measures to eliminate the adverse consequences created thereby are determined, and a recommendation for rehabilitation and compensation measures is developed.
4. Phase of assessing the harmful consequences – In this phase, the harmful consequences of not implementing or incompletely implementing the combined adverse impact mitigation measures, and rehabilitation and compensatory protection measures to be implemented in the region, water basin and territory are identified and a conclusion is made.
5. Phase of monitoring the implementation of the cumulative impact assessment – In this phase, the performance of the cumulative impact assessment is reviewed against the guidelines issued to assess the accuracy and quality of the assessment. In addition, the implementation of measures to mitigate and eliminate the adverse impacts identified by the cumulative impact assessment and the quality of its implementation can be evaluated taking into consideration the positive changes in the environment, society and human health in the affected area.

2.5 Determining the main objectives, requirements and scope of cumulative impact assessment

2.5.1 Determining the objectives and scope of cumulative impact assessment

- The main objective of the cumulative impact assessment is to identify the of direct and indirect combined adverse impacts from the implementation of a development policy, programme or plan, or from past, current and future activities of a project inflicted or could inflict on the environment, society, and human health of a particular region, basin or territory, to determine their sources and spread pattern, and measures to mitigate or eliminate them.
- The scope of the cumulative impact assessment includes the extent of combined adverse impacts on the environment, society and human health in the particular region, and their consequences, the number of people affected, issues faced by the locality, direct and indirect impacts from projects implemented in the region and water basin,

and the spatial and temporal boundaries of the combined and overlapped adverse impacts on the important components of ecosystems.

- When identifying the environmental, social and human health issues in the region, the opinion of citizens whose interests are affected by the impact of project activities, interested parties and government agencies shall be taken into account.
- When identifying the spatial and temporal boundaries of the scope, the size of the area affected by the adverse impact that accumulates in space and time should be identified. In addition, environmental components that will be further affected, and spatial and temporal impacts of the direct and indirect combined and overlapped cumulative impacts should be determined. Furthermore, the past, present, and future scope and risks of the combined adverse impacts should be determined.
- When determining the scope of project activities, if there are cross-border (wildlife migration etc.) and global impacts (climate change and global warming etc.), they should also be clarified.

The State Central Administrative Body shall summarise the results of the above activities draft a guideline for the cumulative impact assessment of the region and water basin, present to the Minister in charge of environmental matters, and appropriate decisions shall be made.

The draft guidelines shall define the main tasks, goals and objectives of the cumulative impact assessment, the body that will be in charge of this work, its co-implementers and stakeholders, the methods of their cooperation, the schedule for conducting the assessment, compliance documents, the sources of funding, the schedule for providing information to the stakeholders and organizing key discussions, and quality control criteria for the assessment.

2.6 Identifying the cumulative impact, its source and spread pattern

2.6.1 Identifying the initial state of regional environment

The following shall be considered when identifying the initial state of regional environmental:

- Physical geography, terrain and landscape;
- Basic climatic parameters and initial level of air quality;
- Surface and groundwater resources, its features, water shortage, depletion, pollution, and quality;
- Soil coverage, soil erosion, degradation and pollution levels;
- Flora, plant species and level of degradation;
- Fauna species composition, number and distribution;
- Historical and cultural memorabilia, their preservation and protection;
- Land use, mineral and natural resource use status;
- Level of local economic development; and
- Indigenous population, health and living standards.

2.6.2 Identifying the cumulative impact

The following should be considered in determining the cumulative impact:

- Identification of the source, nature and intensity of adverse impacts accumulated during the implementation of projects in the regions, water basins and territories selected for the cumulative impact assessment;
- Clarification of spatial distribution and spread pattern of adverse impacts from project implementation in the region, water basin and territory;
- Identification of spatial overlap of the adverse impacts from project implementations and determination of how the combined adverse impacts and their characteristics persisted over a period of time;
- Identification of the consequences and risks to the region's environment, society and human health from the direct and indirect combined adverse impacts of project activities;
- Identification of the social groups and communities affected by the impact of project activities;
- Identification of environmental components affected by the cumulative impact and in-detail consideration of the important components of the ecosystem in relation to the impacts inflicted thereon; and
- Estimation of ecological and economic damage and rehabilitation costs on the basis of identification of the adverse impacts, and their total percentage and coverage area.

2.6.3 Organising public opinion poll and discussions

- Public opinion poll and discussions among the people affected by the project activities shall be aimed at identifying the issues in the region, important components of the affected ecosystem, and changes in the environmental and social system.

2.6.4 Identifying the changes in environment, society and human health, and their consequences

- On the basis of an in-depth understanding of the objectives, requirements, scope, boundaries, adverse impacts, source, spatial distribution, spread pattern and consequences of cumulative impact assessment, and affected social groups, local people and the economic development of the region, the factors affecting the environmental and social system of the region are accurately identified, pros and cons of the combined adverse impacts are assessed, and the vulnerability is assessed (Information Box 1).

Information Box 1

Environmental and social vulnerability assessment recommendations

Definition: Impacts and vulnerability from any project activities inflicted on the environment and ecosystems are indexed and assessed.

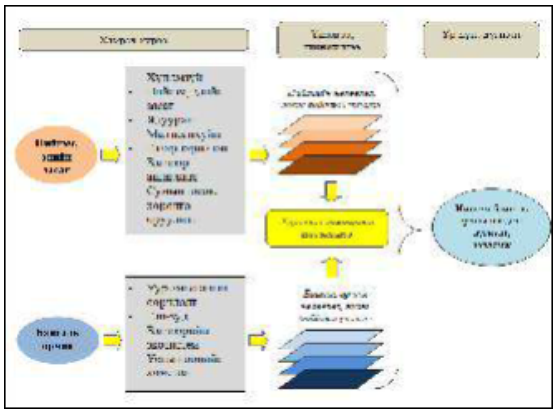
Basic Equation: Methods are selected from the methods of comparison, statistical analysis, and geographic information systems. The Unified Socio-Economic Vulnerability Index can be defined as follows:

$$USEVI = \frac{A + G + R + L + I + P}{6}$$

Here: A – Share of agriculture in GDP, G – GDP per capita [in thousand tugriks], R – Remoteness from the market, [distance from the capital city], L – Disaster vulnerability, [percentage of livestock died in dzud], I – Human development index, P – Poverty rate [in percentage].

Input data: Historical data on social, economic and environmental statistics.

Outcome: This model can be used to spatially map the environmental and social vulnerabilities of a region, basin, or territory.



Processing: The model uses statistical analysis methods and conducts spatial overlap in the geographic information system.

Design source:

1. http://www.esri.com
2. "Methods and methodologies for assessing socio-ecological system vulnerability under climate changes", Altanbagana.M, Chuluun.T, 2012

Although the phase of identifying the cumulative impact is important in conducting the cumulative impact assessment, it is not feasible to use a single comprehensive method for cumulative impact assessment due to the types and peculiarities of project activities. Therefore, depending on the goal and objectives of the cumulative impact assessment and the specific nature of the adverse impact, it is necessary to select and use the best available and most appropriate methods in the assessment.

In assessing the cumulative impact on the region, water basin, and territory, and in explaining the relationship between the project activities, the issues need to be considered in a comprehensive way, as shown in Figure 2. In other words, the initial state of environment, types of project activities, and sources, consequences and interrelations of combined and overlapped adverse impacts need to be identified.

In the cumulative impact assessment, network analysis methods can be used for determining the pros and cons of the activities in consideration of the interactions between activities, and the interaction matrix can be used to determine whether they affect certain components of the environment, and to prioritise the strength of impact (continuity, intensity, etc.) on important components of the ecosystem. In order to understand the nature of interactions, spatial and temporal overlap mapping methods of geographic information systems can be used to determine the extent, degree, and adjacent zones of the mutual overlapping of impacts that make up the cumulative impacts. In identifying the impacts on important components of the ecosystem, indicators (determination of biochemically useful oxygen in the case of water pollution, and indicators depending on human activities, such as road traffic, degraded land size, and lichen growth, etc.) that can indicate the adverse impacts from human activities on the environment can be used. In order to predict the environmental components and ecosystem characteristics, environmental mathematical models can be used to determine the scope, boundaries, intensity, frequency, and duration of adverse and cumulative impacts on ecosystem conditions, and their interrelationships.

/The figure was missing from the original document/

Figure 2.2. Scheme of environmental and social interrelations of development policy

For example, modern modeling methods such as LANDSAT, SPOT, and MODIS that use satellite data to determine changes in space and time and study the effects of surface and groundwater can be used to determine the amount of land degradation caused by human activities. Laboratory analysis methods can be used to determine the level of water and soil pollution (hydrogen index, biochemically useful oxygen, dissolved oxygen content, heavy metal pollution, etc.). ISC3 model can be used to determine air quality. Potential Habitat Model can be used to model the habitats of biological species inseparable from the particular ecosystem, and Threats, Disturbance / Condition Index spatial analysis methods can be used to determine the impacts inflicting on the species. VELMA and Century Ecological Models can be used to determine the impact of changes in pasture carrying capacity. HBV and TOPLAST models can be used to estimate the impact of changes in current and future water runoff. MODFLOW model can be used to calculate the impacts from groundwater. Regional climate change models can be used in analysing the impacts from regional climate change, and Sobek and RIBASIM models can be used to estimate the impact from water use on river runoff. Ecosystem service cost method can be used to estimate the current and future value of ecosystems. The assessment of ecological and economic damage caused by adverse impacts on the ecosystem due to the particular activity and other activities taking place in the region shall be conducted using the environmental damage assessment and compensation calculation methodology, and further measures shall be included in the environmental management plan.

Recommendations for using some of the above models are given in the following Information Boxes.

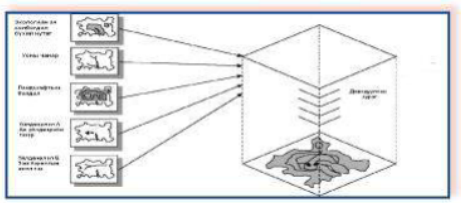
Information Box 2

Geographic Information System Recommendations

Definition: Geographic Information System can be used to qualitatively assess changes due to human activities and other impacts over large areas.

Basic Equation: Methodologies should be selected from the geographic information system depending on the purpose of the study (for example, supervised / unsupervised classification method to study changes in land use, Spatial Analysis method for spatial analysis, etc.).

Input data: Depends on what analysis is to be performed. For example, the following databases can be used to identify spatial overlaps of impacts.



Result: This model can be used to make spatial mapping of regions, basins and territories.

Processing: This model works on Windows and UNIX OS.

Design source:

1. http://www.esri.com

Information Box 3

VELMA Eco-Hydrology Model Recommendations

Definition: This model examines the effects of climate change and land use on water circulation and plant-soil carbon cycle.

Basic Equation: The water balance is calculated along the vertical section of the soil.

$$\frac{ds_1}{dt} = P - D_1 - ET_1 - Q_1 - Q_2 + Q_{1\_in} + Q_{s\_in} \quad (1)$$

$$\frac{ds_2}{dt} = D_1 - D_2 - ET_2 - Q_2 + Q_{2\_in} \quad (2)$$

$$\frac{ds_3}{dt} = D_2 - D_3 - ET_3 - Q_3 + Q_{3\_in} \quad (3)$$

$$\frac{ds_4}{dt} = D_3 - Q_4 + Q_{4\_in} \quad (4)$$

Here: P – Precipitation, ET – Evaporation, D – Drainage, Q – Runoff

Biomass is calculated using the following equation:

$$\frac{dB}{dt} = \left[\left(\sum_{i=1}^{4} \frac{r_i \times \mu_i \times \delta_{NH_i} \times NH_{i_j}}{NH_{i_j} + kn}\right) + \left(\sum_{i=1}^{4} \frac{r_i \times \mu_i \times \delta_{NO_i} \times NO_{i_j}}{NO_{i_j} - kn}\right)\right] \times WS(s_j / s_{in}) \times B - m(B) \times B$$

Here: B – Biomass, m(B) – Degradation rate of plants, WS – Effect of water on plant biomass.

Input data: The following information is used to run this model:

- Daytime air temperature;
- Daily precipitation;
- Mechanical structure of soil in the study area;
- Soil thickness of the study area; and
- Numeric data on elevation.

Result: This model can be used to study the current and future state of pastureland in the region, basin, and territory, and to ensure proper pastureland management.

Processing: This model works on Windows and UNIX OS.

Design source:

1. http://latest-codes.tumblr.com/post/246358173/velma-eco-hydrology-model
2. http://www.processing.org
3. http://gdem.ersdac.jspacesystems.or.jp/
4. http://www.geos.ed.ac.uk/homes/mattal/ASTER12.pdf

Information box 4

CENTURY Ecosystem Model Recommendations

Definition: This model is widely used worldwide to determine pasture management and carbon capacity, and it models plant growth, water circulation, and soil organic matter.

Basic equation: $AB_c = AB_{max} * f_t(T) * f_m(M) * S_{sh}$

Here: AB_{max} *– the maximum value of the above-ground biomass,* $f_t(T)$ *is an air temperature-dependent function,* $f_m(M)$ *is a water capacity-dependent function,* S_{sh} *is a parameter indicating the effects of plant shade and growth.*

Input data: The following information is used to run this model.

- Maximum and minimum monthly and daily air temperatures;
- Monthly and daily precipitation; and
- Mechanical structure of soil in the study area.

Outcome: This model can be used to study the current and future state of pastureland in the region, basin or territory, and to ensure proper pastureland management.

Processing: The model works on Windows and UNIX OS.

Design source:

1. http://www.nrel.colostate.edu/projects/century/
2. http://www.geoenv.tsukuba.ac.jp/~sugita/archive/Byambakhuu-PhD.pdf

Information Box 5

HBV Hydrology Model Recommendations

Definition: This model calculates the water balance and flow/runoff.

Basic Equation:

Water balance:

$$P - E - Q = \frac{d}{dt}[SP + SM + UZ + LZ + lakes]$$

Here: P – Precipitation, E – Evaporation, Q – Runoff, SP – Snow water, SM – Soil Moisture.

River flow:

$$Q_f = k_f * UZ^{(1+ALFA)}$$

Here: Q_f – surface direct runoff [mm], k_f – direct runoff reduction coefficient, UZ – water volume in the water accumulation area [mm], ALFA – direct runoff non-linear coefficient.

$$Q_s = k_s * LZ$$

Here: Q_s – the amount of flow from underground water that feeds into rivers [mm], LZ – riverbed groundwater resource, level [m], k_s – direct correlation coefficient.

Input data: The following information is needed to run this model:

- Daytime air temperature;
- Daily precipitation;
- Daily evaporation; and
- Soil-water parameters of the study area.

Result: This model can be used to estimate the water balance and river flow of a region, basin, or territory, and to ensure an effective integrated water management.

Processing: This model works on Windows OS.

Design source:

1. http://www.smhi.se/sgn0106/if/hydrologi/hbv.htm
2. http://www.geo.uzh.ch/en/units/h2k/services/hbv-model
3. Manual for running the HBV flow model and Sobek water distribution model, World Wide Fund for Nature, 2012, 30 pages

Information Box 6

ISC3 Air Quality Model Recommendations

Definition: The ISC3 (Industrial Source Complex) model can be used to calculate the distribution of gases (SO_2, NO_2, CO, dust, etc.) from point, field, and linear sources in space in relation to weather conditions. This model has two variations: short-term-ISCST and long-term-ISCLT; and are calculated separately.

Basic Equation: Written in a semi-empirical form based on the Gaussian distribution formula:

$$X = \frac{Q\ K\ V\ D}{2\pi u_s \sigma_y \sigma_z} exp\left[-0.5\left(\frac{y}{\sigma_y}\right)^2\right]$$

Here:

X – Air pollution content

Q – Amount of waste from point source per unit time [g/sec]

K – Unit conversion coefficient

V – Vertical dimensions

D – Dimensions of weakening

u_s – Wind speed at source height

σ_z – standard variation of the contaminant along the vertical axis

Input data: The following information is used to run this model:

- Hourly air temperature; and
- Wind speed and direction.

The following information is required to model the distribution of pollutants from a point source. These are: Pollutant spread ratio [g/sec], flue height [m], flue gas temperature [K^0], velocity [m/s], flue diameter [m].

Additional information is required to calculate the dust drop, such as dust density, specific gravity, and dust particle diameter.

Results: In this model, the spatial distribution of air pollution can be calculated as an average of 1 hour and 24 hours, and the 10 maximum values can be obtained. The long-term model calculates the distribution of the average value and the maximum value for each month and season.

Processing: The model works on DOS and Windows OS. Distribution maps can be plotted using GIS and SURFER software.

Design source:

1. User's guide for the industrial source complex (ISC3) dispersion models, Volume I – User instructions, U.S. ENVIRONMENTAL PROTECTION AGENCY, Office of Air Quality Planning and Standards, Emissions, Monitoring, and Analysis Division, Research Triangle Park, North Carolina 27711, September 1995
2. User's guide for the industrial source complex (ISC3) dispersion models, Volume II - description of model algorithms, U.S. ENVIRONMENTAL PROTECTION AGENCY, Office of Air Quality Planning and Standards, Emissions, Monitoring, and Analysis Division, Research Triangle Park, North Carolina 27711, September 1995
3. http://www. Atmospheric Dispersion Modeling

Information Box 7

TOPLATS Hydrology Model Recommendations

Definition: This model calculates water and energy balance.

Basic Equation:

$$Z = \bar{Z} - \frac{1}{f}(\bar{\lambda} - \lambda)$$

Here, Z is the groundwater level in all the grids that divide the basin, $\bar{Z}$ is the average groundwater level in the basin, and $\bar{\lambda}$ is the average topo-index of the basin

Direct runoff (Saturated excess runoff (R_{sat})) occurs when the soil is completely saturated with water, and this phenomenon is determined by the amount of total precipitation (P_{net}) coming to the soil in this model.

$$R_{sat} = P_{net}$$

Slow runoff (Baseflow (Q_b)) is calculated by the following equation:

$$Q_b = Q_0 \exp(-f\bar{z})$$

$$Q_0 = AT_e \exp(\bar{\lambda})$$

Here: A is the size of the basin, and T_e is the average groundwater feed rate of the basin and is expressed by the following equation: $T_e = \frac{K_s}{f}$, here: K_s is the capacity of saturated water conductivity (saturated hydraulic conductivity), and f is the exponential decay of K_s along the vertical section of the soil (exponential decay of K_s).

The basic equation for calculating the energy balance of a region, basin, or territory is:

$$R_n = \rho_w LE + H + G$$

Here: R_n is total radiation, $\rho_w LE$ is latent heat, H is heat radiation, and G is soil heat.

Input data: The following information is used to run this model:

- Precipitation;
- Air temperature;
- Wind speed;
- Air pressure;
- Relative humidity;
- Soil-water parameters;
- Soil-water parameters of the study area; and
- Numeric data of elevation.

Result: This model can be used to calculate the water cycle and energy balance of a region, basin, or territory, and to ensure proper integrated water management and pasture management.

Processing: This model works on UNIX OS.

Design source:

1. http://hydrology.princeton.edu/models.php
2. http://www.geoenv.tsukuba.ac.jp/~sugita/archive/Byambakhuu-PhD.pdf
3. http://gdem.ersdac.jspacesystems.or.jp/
4. http://www.geos.ed.ac.uk/homes/mattal/ASTER12.pdf

2.7 Determining the cumulative impact mitigation measures

In cumulative impact assessments, mitigation and environmental monitoring measures shall be based on the same principles as environmental impact assessments.

These include:

- Developing recommendations and programmes of measures to mitigate the sources of direct and indirect combined adverse impacts on the environment, society and human health identified during the phase of identifying the cumulative impact;
- Developing recommendations and programmes of measures to eliminate the consequences of adverse impacts;
- Estimating the ecological and economic damage, rehabilitation and compensation costs in accordance with the environmental damage assessment and compensation calculation methodology; and
- Developing an environmental protection plan and an environmental monitoring programme of the Integrated Environmental Management Plan.

2.8 Assessing the harmful consequences

Harmful consequences assessment helps to take measures to mitigate the adverse impacts and their consequences by identifying the harmful consequences of not implementing or incompletely implementing the combined adverse impact mitigation measures, and rehabilitation and compensatory protection measures to be implemented in the region, water basin and territory.

The following steps need to be done as part of assessing the harmful consequences of cumulative impact:

- Identifying the future trends of adverse impacts, their scope, boundaries, intensity, frequency, and potential consequences;
- Identifying the trends and probability of further increase in the direct and indirect, combined and overlapped adverse impacts of the activity and other activities;
- Determining whether future damage to the environment, society and human health is within an acceptable limit; and
- Determining whether the extent of the adverse impacts on the environmental component exceeds the environmental sustainability.

The above factors shall be identified in the cumulative impact assessment in relation to the scope of the cumulative impact of the activity, the adverse impacts, and the specific nature of the potential risks.

2.9 Preparing and reporting cumulative impact assessments

The cumulative impact assessment methodology, mitigation and compensation measures, the environmental management plan, its implementation programmes, and the main results of the assessment shall be clearly written.

The results of the cumulative impact assessment shall fully identify the multiple management options, summaries of choices, and their consequences, as well as the possibility to make realistic and credible decisions based on social and economic benefits and costs, and must meet the legal requirements for cumulative impact assessment.

The process of conducting the cumulative impact assessment and its results, conclusions and recommendations shall include the following issues:

1. Adequate information should be collated on the current and future development policies, environmental policies, and the environment, society, and human health in order to identify environmental components that may be affected by the current and future activities in the region;

2. As the impact on the environmental component covers different areas, the scope of the impact from activities should not be limited to the project area, but should cover an area where the reality of the impact can be assessed;
3. The combined impact of the particular activity and all other activities in the project area on the environmental component should be assessed, the possibility of the impact to increase in the future should be determined, and conclusions should be made on whether these impacts need to be studied;
4. Results, conclusions and recommendation should be developed on the basis of in-detail identification of the sources of potential adverse impacts using accurate data and information with the participation of professional experts, and identification of main adverse impacts by analysing the numeric data on overall impacts and comparing them with the indicators specified in the relevant rules, regulations and standards, and of in-detail identification of their consequences.
5. The results, conclusions and recommendations of the cumulative impact should ensure the participation of the affected public and reflect their views; and
6. Measures to reduce the potential adverse impacts on the environment, society and human health, and different options of measures, cost overview and monitoring arrangement should be identified, and conclusions and recommendations should be developed, reported and included in the environmental management plan.

2.10 Monitoring the implementation of cumulative impact assessment

The cumulative impact assessment report prepared in accordance with the approved guidelines shall be submitted to the professional assessment council under the state central administrative body in charge of environmental matters for review.

Relevant professionals of the state central administrative body in charge of environmental matters shall evaluate the implementation and performance of measures to be taken to mitigate the adverse impacts identified by the cumulative impact assessment, and to eliminate its harmful consequences, and shall draw and issue a conclusion.

2.11 Key indicators of cumulative impact assessment

- The area to be covered by the assessment should be large enough to allow the assessment of important ecosystem components that may be affected by the project being assessed;
- The impacts of other projects that are currently being implemented, or have not yet begun, that may affect important components of the ecosystem similar to those identified in the assessment area should be identified;
- The future impact of the proposed activities on important components of the ecosystem should be assessed;
- Science-backed assessment methods should be used in the impact analysis; and
- Impact mitigation measures and environmental management plans and recommendations should be developed.

2.12 Structure, conclusions and content of cumulative impact assessment report

The cumulative impact assessment report should be prepared in accordance with the following sample content, with some chapters and sections to be added depending on the regional and major adverse impacts and the nature of their consequences, and annexed by the original copies of necessary information:

- Brief introduction (overview);

- A description of the environmental state of the area;
- A description of the main adverse impacts on the environment, society and human health of the region and basin, and their consequences;
- Intensity, scope (time, space) and spatial distribution of the cumulative impact;
- Sources of cumulative impact, entities responsible and their share in impact;
- Adverse impact mitigation measures, cost overviews and different options of measures;
- Assessment of environmental, social and human health damage caused by cumulative adverse impacts;
- Plans for future actions and criteria for monitoring its implementation;
- Outcomes and recommendations of public discussions in the affected areas; and
- References of information used.

END OF SECTION

Appendix number 2 of the order number ……
from the minister of environment and green development in December……..., 2013.

ENVIRONMENTAL IMPACT ASSESSMENT METHODOLOGY

PART 1
ENVIRONMENTAL BASELINE ASSESSMENT METHODOLOGY

TABLE OF CONTENTS

1.1 The main purpose of the environmental baseline assessment

The main purpose of the environmental baseline assessment is to determine the first stage of development of any project, development policy, program, or plan, including the geographical condition, geological formation, climate, air quality, surface and groundwater, soil cover, vegetation cover, fauna, as well as local people, their level of social and economic development, health, the current state of historical and cultural heritage with the participation of experts, researchers and professional organizations in those fields, using scientific research methodologies.

Thereby, by determining the condition of the environment, society and the health of the residents before initiating the project or activity has great importance in the procedures of planning the project and policy measures with a minimal negative impact on the environment, society and human health, authentically identifying environmental changes and pollution degradation due to major and potential negative impacts of the implementation process, taking required measures in a timely manner, delivering authentic information for victims affected by project and stakeholders. Therefore, the environmental baseline assessment will be the first step of the assessment process, and this methodology is designed to meet the above objectives.

1.2. Requirements for the environmental baseline assessment

It is especially crucial to conduct the environmental baseline assessments at a high level of professionalism and quality, based on the results of scientifically based research, and to enforce legal requirements and ensure its implementation. Therefore, the project implementer and policy document developers shall prepare it with the participation of authorized professional organizations and research organizations and if necessary, shall approach the state central administrative body in charge of nature and environment to get directions on the issue. Meaning baseline assessment shall be made on a professional basis, on the other hand, the state central administrative body shall review how it was done from early stages, reflecting the issues to be considered when developing policy documents and projects; consider the results of the baseline assessment when conducting a general environmental impact assessment; discuss the strategic and cumulative impact assessments; take into account the detailed environmental impact assessment report results when approving the environmental management plan. Therefore, the following requirements must be met when performing a baseline assessment and reporting its results.

These include:

- Completely cover the areas that are likely to be affected in accordance with the scope and specifics of the planned project during the development of environmental policy assessments, policy documents specified in-laws and regulations, and initial project documents;
- Complete the environmental baseline assessments based on the latest scientific research methodologies and accurate information in that field;
- During the assessment, measurements and samplings shall be done according to the suitable methodologies and standards, therefore be certified;
- The methodologies and sources used to process the relevant information must be clearly stated in the reported news;
- General requirements of international banks and financial institutions (World Bank, International Finance Corporation the European Bank for Reconstruction and Development, Asian Development Bank, etc.) must be satisfied.

Besides, the organization which conducted the environmental baseline assessment shall submit its processed assessment report to the professional council in charge of assessment next to the state central administrative organization in charge of environmental problems for a review and the project implementer shall attach a baseline assessment report to the state central administrative organization in charge of environmental problems or the environmental department when requesting a general assessment in accordance with the classification specified in the appendix to the law.

Field and desk assessments of the environmental baseline assessment shall be conducted in accordance with the relevant laws, standards, methodologies, and requirements, at a professional level, and the organization that prepared the report shall be responsible for the accuracy and authentication of the information in that report. The issues regarding the quality and performance of the assessment shall be regulated by contract responsibility.

1.2 Stages of the environmental baseline assessment.

Environmental baseline research will be conducted in the early stages of these projects, in other words, in the development stage of the project processing techniques for justification, preliminary economic study conduct, processing of the diagrams, for instance, exploration of the fields, mines, factories, roads, bridges, and infrastructure construction. The information base of the environment where the project will take place shall be included in the project documents and diagrams.
The environmental baseline assessment procedure will be done through the following steps.

These include:

- Identify the main objectives, requirements, and scope of the environmental assessment;
- Collect and process data news from previous research and conduct additional research that is required to determine the condition of the environment;
- Compile the research data and prepare an environmental baseline assessment report.

1.3.1 Define the main purpose, requirement, and scope of the environmental baseline assessment.

The following problems shall be considered when determining the main purpose, requirement, and scope of the environmental baseline assessment:

These include:

- The boundaries of the area where the policy action, project activity will take place and area that is likely to be affected by it shall be determined in detail and mapped with appropriate summary - (using the latest measuring instruments, such as high accuracy GPS, differential GPS, electronic tachometer, etc. and using software such as GIS, MapInfo, Erdas, Surfer).
- Identify the main purpose, requirement, and scope of the environmental baseline assessment;
- Determine the environmental and social information base required for planning and processing of the diagram, considering the specifics of the development policy, program and project activities that are being developed;
- Clarify key indicators that reflect the current state of the environment and society likely to be affected through the environmental baseline assessment;

- The time to complete the assessment, the methodologies to be followed, and the issues to pay special attention to.

1.3.1 Collect and process data information from previous research and conduct additional research that is required for determining the environmental baseline.

The following methods shall be used to collect and process information after the scope of the environmental baseline assessment, the boundaries of the areas that are likely to be affected, environmental, and social indicators have become clear.

These include:

- The geographical conditions, geological formations, climate, air quality, surface and groundwater, soil cover, vegetation cover, fauna, society, economy, local people, residents and their health, nature, historical and cultural heritage research information that were made in this region and territory before shall be collected from relevant organizations, local people, researchers and other sources of information to identify information residue.
- Henceforth, shall develop a detailed research work plan to complete the residue of the environmental information base in and around the project implementation area, and shall collect its additional information;

A topographic map is the main source of information for determining the project location, pre-project landforms, and geomorphological elements, thus the map needs to have as large as possible abbreviation of the area under environmental assessment. On the other hand, aerial and cosmic picture taken over a certain period has great importance in determining key objects of the research, including the size of quarries, ditches, dams, artificial lakes, and changes in geomorphological elements. Most of Mongolia's territory is covered by black-and-white aerial photographs with 1: 32000, 1: 45000, and 1: 63000 scale, which can be used to identify and validate pre-project condition by processing and interpreting various satellite images on the Internet.

Location of the project implementation area, geographical conditions, geological formation, climate, air quality, surface and groundwater, soil cover, flora, fauna, also local people, residents, their social and economic development level, health, nature, historical and cultural heritage shall be determined with the participation of specialists, researchers and professional organizations specializing in those fields, and using internationally recognized research methodologies of science. The state of the environment shall be identified and documented for each of the above components in accordance with a specially prepared template (professional evaluation organizations should be specially designed to reflect their research methods and features). During the assessment, measurements of air, soil, water, and vegetation cover, and necessary sampling, which will fully determine the state of the environment, shall be made in accordance with appropriate standards and requirements. Specimens and samples shall be labeled; the process of the research, measurements, and samplings shall be confirmed by photographs and videos then delivered to the relevant laboratories.

Common standards, requirements, and scientific research methods applicable to each environmental component shall be used to determine the state of the environment, out of those following are some of the present status determining issues that are necessary to be addressed:

Physical Geography and Landscape: The first step of the environmental baseline assessment is to determine the location and physical geography of the project area; identify the types of the landscape; compose a map and interpret.

Geological formations: The area covered by the project, its surrounding geological formations, stratigraphy, rock structure, historical development, age, tectonic structure, minerals shall be determined; geological maps, sections, and schemes shall be prepared.

Geomorphology: Main features, development, species, process, evolution, positive and negative forms, morphological structures of the hollows, and bumps around the project area shall be clearly mapped. While doing so, geomorphological observations, relative altitude measurements, topography, and aerial satellite imagery shall be used to classify landforms and geomorphological elements, including sediments, terraces, slopes, and peaks. Relief observations and analyzes shall be conducted during the process of the field research of the environmental baseline assessment using the route method to determine the origin, structure, system, and dynamics.

Hydrogeological conditions, groundwater resources, quality, and regime: Which district belongs to the project implementation area in terms of regional hydrogeological patterns, features of the basin, region, and massif of that area, which area of the project belongs to the groundwater recharge zone, watershed or the source of the water flow, water accumulation zone, walking zone, the geological age sequence of the aquifers distributed in that environment, location patterns and their collector characteristics, hydraulic properties of water containing, groundwater movement and resource indicators, chemical composition, quality, and reserve regime shall all be researched and defined, therefore they shall develop hydrogeological maps, sections, and schemes of the project implementation environment. If necessary hydroiso gypsum drawing and pollution distribution drawings shall be made.
If permafrost has been spread in the project implementation area for many years than the map of that permafrost can be included by studying its thickness and structure, determining its physical properties and thermal regime.

Hydrogeological field observations and surveys of the environmental baseline assessment will be conducted in the form recording of route lines and observation points, covering the entire area. The area of the hydrogeological route shall be determined in the direction of cross-section and following the survey objects, and the distance of observation points shall be determined depending on the location of groundwater findings, springs, wells, and boreholes. The study shall focus on distinguishing groundwater nutrition, accumulation, and walking zone, determining which zone belongs to the location of the project area, and the impact situation of the project activities. Hydrogeological route research records shall be precisely maintained and observations shall be continuous. During the field research, the spring yield shall be determined by the most suitable method out of pumping, flotation, rotary, and overflowing, and the results shall be recorded, if necessary, samplings shall be made. During the hydrogeological field research, water point records, water sampling, water point testing, and hydrological measurements shall follow the methodology described in N. Batsukh's book “Field Hydrogeology” and standards approved by the MASM (Mongolian Agency for Standardization and Metrology).

Surface water resources, regimes, and quality: Main indicators of rivers, lakes, ponds, springs, rainwater resources, quantity, and flow regime in the project implementation area shall be measured with the appropriate methodology and its distribution, composition, quality, scarcity, pollution state, further trends shall be identified and written. Samples from water objects shall be taken and addressed to domestic and foreign testing laboratories with a certificate of conformity for standardization to determine the following parameters.

These include:

- Mineral composition parameters (Ca2+, Mg2+, Na++K+, HCO3/, SO4//, Cl/);
- Nutrient pollution indicators
  (NH4, NO2, NO3, PO4);

- Oxygen regime parameters dissolved oxygen, biochemically necessary oxygen-BH5, oxidation of permanganate-PIC, oxidation of dichromate, etc.
- Heavy metals: copper (Cu^{2+}), manganese (Mn^{2+}), 3 trivalent chromium (Cr^{3+}), 6-valent chromium (Cr^{6+}), arsenic (As^{3+}), cadmium и (Cd^{2+}), lead (Pb^{2+}), nickel (Ni^{2+}), mercury (Hg^{2+}) etc.
- Specific parameters: petroleum, petroleum products, fats, surfactants, etc.

In addition, groundwater interaction impact shall be identified and surface water map shall be processed.

Climate: The main climatic features of the project implementation area, monthly, seasonal, annual average temperature, maximum and minimum average temperature, solar radiation, absolute and relative humidity, precipitation, snow cover, its annual and seasonal distribution, wind intensity, predominance, and speed basic indicators shall be determined based on long-term observation material(data of the last 10 years at least), as well as how weather and climatic conditions will affect human well-being and production activities shall also be determined.

Air quality: To determine air quality in that area air samples shall be taken and laboratory analysis shall be performed. From the following parameters, the required ones will be selected. These include: nitrogen oxides (NOx); sulfur dioxide (SO2); carbon monoxide or carbon protoxide (CO); small particulate matter (PM2.5, PM10); lead (Pb); other heavy metals; greenhouse gases if necessary.

Soil cover: Type of soil in the project implementation area and its surrounding area shall be identified, its distribution, morphology, water-physicochemical quality, fertility, and humification content shall be studied, and the soil cover shall be mapped. During the field study, the main (up to 1.0-1.5 m deep) and half (50-80 cm) cut shall be made in the area that can fully represent the common type of the soil in order to determine the morphological characteristics of that area and to take soil samples. After soil morphological recordings have been made, samples will be taken from every layer and verified by photographing and recording. The sample size will be approximately 0.5 kg and should be labeled with the name, location, cutting number, depth of sampling, etc. and delivered to the relevant laboratory.

In addition, during the field research, monitoring points shall be selected based on the studies of specific characteristics of that area, soil fertility, soil formation process, land use patterns, and type of tenure, therefore initial state records measurements and samples shall be made. To determine soil fertility and contamination, the following parameters shall be delivered to the laboratory for analysis.

These include: pH, humus; Ammonium (NH_4); Nitrite (NO_2); Nitrate (NO_3); Phosphates (PO_4^{3-}); Potassium (K^{+}); Petroleum and petroleum products; Heavy metals including As, Hg, Cd, Pb, Ni, Cr, Se; etc.

Vegetation cover: Shall determine and list plant species in the project implementation area, also key communities, its patterns, and biomass, and develop explanations. Shall Identify rare, endangered, and endemic plant species, their distribution, and protection status. Also, vegetation covering the research area shall be mapped.

During the environmental baseline assessment field research, vegetation records shall be made of the species in the project area, covering the species composition, size, and yield, and the size of the vegetation cover shall be determined by using most suited of visual, paving design and quantitative methods.

Fauna: The species composition, range of distribution, location, and migration of the fauna in that area shall be determined, population and future status of the animals that have become extinct or run away because of certain activities, also shall be determined. During the field research of the fauna, in order to provide a basic assessment of the fauna of that area, the species composition of invertebrates and vertebrates, their density and population shall be determined by special methods; list of rare, scarce, endangered species shall be made; the current state of population and habitat conditions shall be assessed. During the field research in selected areas small mammals shall be captured using live catch traps; linear transect traps shall be used to place a live catch-mark-repeat method; shall be made estimates of the animal population by observing and enumerating animal life patterns and activities, for active animals at night using lightning, following their footsteps if the snow cover is formulated, in the warm season with their feces, bedding, food residues, habitat addresses, etc., and during mating and breeding shall observe them around water sources; fish shall be counted by placing a sampler in a specific part of the stream; for insects using best suitable of catching methods, such as trapping by selecting a specific area.

Mongolia's vertebrate species' distribution, eating habits, habitat, global and regional scarcity shall be assessed using criteria published by the International Union for Conservation of Nature, and conservation status can be determined using Mongolian bird, mammal red list and animal protection plan information sources.
Natural, historical and cultural monuments: Natural, historical and cultural monuments including rocks, mountains, streams, lakes, ponds, monuments, special protection areas, and natural beauties, etc., their unique features and significance protection status shall be included.

1.3.3 Producing an environmental baseline assessment report by compiling research data

Compiling a summary of the baseline environmental information and writing a comprehensive report of the current environmental, social, economic, human health status, and prospects of the project implementation area will be significantly important not only for the client but also for local citizens, researchers, decision-makers, local authorities, and stakeholders. Therefore, when preparing a summary report of the environmental baseline assessment results, the following requirements shall be provided.

These include:

- The report shall be prepared in accordance with the content specified in the methodology, including information collected during field and desk research and its processing results;
- Original report shall be written in Mongolian, with clear composition, without grammatical and semantic errors, and if necessary, shall be translated into English and other languages according to the customer request;
- The report shall mention the research methodology and sources of information, shall confirm the results of the research with specific pictures, diagrams, graphs, photos and shall be reflected with clear explanation;
- Shall process appendix images with a specific summary that reflect the current environmental and socio-economic situation in the research area;
- The image information included in the appendix and report must be available for commonly used image software;

- A summary of the report shall be prepared in the form of an executive summary, including important issues covered by the report, specific research results, and conclusions.

If new software or method is used to process the survey results, a detailed description of its main features, significance, technical specifications, configuration, selection reasoning, guarantees, and how results will be explained can be attached.

A report on the environmental and socio-economic assessment of the project implementation environment will be prepared to summarize the results of the field and desk research of the environmental baseline, therefore, it should have the following structure and content.

These include:

1.Brief introduction: Shall clearly state the main purpose of the baseline assessment, the work was done within the framework of the assessment, the main results of the research work and future issues to be considered by the project implementer, locality, and decision-making levels.

2. Location and physical geography condition of the project implementation area: The project area and its location shall be identified by natural zones and administrative divisions, and the remoteness, road features shall be determined. Shall make a basic description of the physical geography of that area and shall identify the features of the geographical and natural zones, landscapes, land cover, and surface formations. The current state of land surface erosion and change in the project area shall be identified and assessed. Location and field maps shall be made and attached using an appropriate scale.

3.Climate: Basic climatic conditions, sunlight, radiation, air and soil surface temperature, air humidity, precipitation, wind, and air pressure of the regional and the project environment parameters and each of its measured station's information that is covered for the longest time possible shall be included. Potentially catastrophic climate indicators that must be considered shall be identified and reflected in the project planning.

4. Air quality: Air pollution sources, general air quality status, gaseous air pollutants, particle contents, and methodologies used to determine them, also the environmental pollution monitoring stations, and their measurements shall be included. The current state of air pollution in and around the project area shall be identified and assessed. The original results of field measurements, sampling, and laboratory tests, and relevant photographs and recordings shall be attached.

5. Physical pollution: Sources of physical pollution, such as noise, vibration, sources of radioactive substances in and around the project area, their current level, methods used to determine them, used instruments, monitoring stations in that area, and their measurement information shall be included. The current level of sources of physical pollution, such as noise, vibration, and radioactive sources shall be assessed. The original results of the field measurements and analysis, along with relevant photographs and recordings shall be attached.

6. Geological formations and geomorphology: Geological formations, geotectonic conditions, earthquakes, and geomorphological conditions of the region and the project implementation area shall be clarified and relevant images and diagrams shall be attached. The current level of subsoil damage, degradation, and pollution in and around the project area shall be identified and assessed.

7.Surface water: Surface water network, surface water flow, resources, regime, quality, detailed information about the project implementation area and its surrounding large rivers, surface water guard stations, their location, long-term measurement information supply,

hydrological field research methodology shall be included and precisely written. The current level of surface water use, pollution, and scarcity in and around the project area shall be identified and assessed. The original results of the field measurements and analysis, along with relevant photographs and recordings shall be attached.

8. Groundwater: Hydrogeological conditions of the project implementation environment and project area, groundwater resources, regime, quality, information about boreholes, wells and springs in the project area, groundwater monitoring, location of monitoring points, long-term measurement information, hydrogeological field research methodology shall be included and written concisely. The current level of groundwater use, pollution, and scarcity in and around the project area shall be identified and assessed. The original results of field measurements, sampling, and analysis, along with relevant photos and recordings shall be attached.

9. Soil cover: The type, thickness, distribution, morphology, particle structure, humus, hydro-physical, and chemical basic indicators of the soil cover in the project implementation environment and the project area shall be included along with its information identified during field and desk research. The current level of soil erosion, pollution, and desertification in the project area shall be identified and assessed. The original results of field measurements, sampling, and analysis, along with relevant photos and recordings shall be attached.

10. Vegetation cover: Vegetation cover type, species composition, classification, very rare and endangered plant species, normal species, its distribution, protection status, vegetation cover degradation, pasture degradation, plant biomass and main indicators in and around the project and their information identified during field and desk research shall be included. The current level of vegetation degradation and regression in the project area shall be identified and assessed. The original results of field measurements, samplings, and analysis, along, with relevant attachment images, photos, and videos shall be attached.

11.Fauna: Composition, habitats, food associations, classifications, protection status of mammals, birds, amphibians, reptiles, fish, insect species that live in, inhabit in and pass through the project implementation environment and project area shall be researched conducting field and desk surveys of their habitats and the results shall be included. A detailed list of species, their probability of occurrence, and conditions for their escape and extinction shall be precisely included. The current level of animal mortality, death, poaching, and migration in and around the project implementation area shall be identified and assessed. Relevant photos and videos shall be attached.

12. Special protection area: Information about the state and local special protection areas, their protection procedures, significance, boundaries, location and area occupation, territory occupation and boundaries' clarified explanation shall be included. The current state and main violations of the special protection areas shall be identified and assessed. Using the appropriate scale, a map of the protection area shall be attached.

13. Historical and cultural heritage: Information about the historical and cultural heritage, their definition, location, scientific and cultural and historical significance, its research status, protection status, and whether they are registered in the state and local cultural heritage, information about other archeological finds in and around the project area shall be included. The protection and maintenance of the historical and cultural heritage in the project area and its benefits to the public shall be identified and assessed.

14. Society and economy: Households living in and around the project area that can directly or indirectly be affected by the project impact, registration of its members, their current livelihood, employment, income level, ownership of land, real estate, personal property, water supply, pasture and agriculture, information, level of supply of general services (education, hospitals, utilities, electricity, etc.) shall be all researched and their results

shall be reflected. Aside from that, shall provide information on the proposed project and reflect their suggestions.

The current level of health, morbidity, life expectancy, susceptibility to endemic and communicable diseases, sanitation, and environmental hygiene indicators of the above citizens also shall be researched and reflected.

Project implementation area's administrative unit team, soum, district, province's population, age, sex, and labor resources, budget revenue, expenditure, employment, average income, industry, agriculture and infrastructure, trade turnover and other indicators of the social and economic current level of development shall be determined and assessed.

Brief information about other ongoing projects in that environment also shall be included here.

15. Potential Environmental Impacts of the Project: Preliminary assessments shall be made of the types, characteristics, and scope of the potential impacts of the proposed project activities on the project implementation area.

Also, it shall identify the natural and social factors to pay attention to in project planning and the direction of measures to be taken to prevent environmental and social impacts. In addition, it shall reflect issues to be considered and some recommendations for further general and detailed environmental impact assessments.

16. Information and sources used: All data, materials, internet, and social media information collected and used during the field and desk research of the environmental baseline assessment, along with their original sources shall be listed. Shall make a note about which part of the baseline assessment report it was used.

SECTION 2
GENERAL ENVIRONMENTAL ASSESSMENT METHODOLOGY

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2.1 Main purpose and requirements of the general assessment

The main purpose of the general assessment is to conduct a general environmental impact assessment of any project document based on the state central administrative and local organization in charge of nature and environment issues, legislation on environmental protection and environmental impact assessment of Mongolia, relevant government policy decisions, recommendation, standard and requirement for environmental strategic assessment, environmental assessment report or description of the project implementation area, other relevant information; to predetermine the potential adverse effects of the project on the environment; to make an appropriate decision on whether to implement the project.

This section reflects the guidance on how relevant government agencies and experts in charge of the issue will conduct a general assessment, and methodologies to ensure the participation of project implementers, community members, the public, and other stakeholders.

Since the general environmental impact assessment is the first and most important decision on whether to implement the project that is made by the state central administrative body in charge of nature and environment and local organization, thus at this stage decision-makers and stakeholders are required to adhere to the relevant legislation and to be responsible and open.

2.2 Request for General Assessment

Before any individuals and business entities apply for a license for the use of natural resources, extraction of petroleum and minerals, and possession and use of land for business purposes, engagement in production and services, and implementation of that project, they shall request for the general environmental impact assessment conducted by the state central administrative body in charge of nature and the environment or the province or capital city environmental department, according to the project classification.

The project implementer that is requesting the general assessment must submit the following documents to the relevant government agency.

These include:

- Request for a general assessment of the project implementer / official letter/;
- Feasibility validation and diagram certified by the relevant authorities;
- Soum and district governor's proposal on how the project can correspond with the local development program that is to be implemented.
- The environmental baseline assessment report is needed for the project that will take place in special protection areas that store, process and dispose of oil, minerals, radioactive minerals, natural gas, hazardous waste, and their surrounding buffer zones, protected areas with forests and water reservoirs;
- A description of the current state of the environment is required for the projects other than those mentioned above;
- Certificate of the business entities or organizations implementing the project, decision or license of the competent authority for land use, possession, mineral exploration, findings use and copy about its right transaction document;
- A description of the status reflected in the plan of general land management of the project area.

- In the case of mining projects, geology and exploration report; feasibility study for the development of a mineral deposit; the decision of the competent authority that discussed the geological resources are required in the project for general environmental impact assessment, according to the “Minerals Law” specified in the Article 25.1.7
- Oil, gas, mineral, and radioactive mineral exploration projects shall include an approved exploration work plan and a proposal from the soum or district Citizens' Representative Assembly, etc.

Within the framework of the General Environmental Impact Assessment, the assessment expert shall fill out the acceptance control sample form (listed in Annex 1), by checking if the set of documents submitted by the project implementer and the information contained in them is sufficient for the general assessment, and shall be confirmed if signed by both parties (project implementer, state central administrative body in charge of nature and environment or representative of the province and capital city environmental department). In the case of in accordance or inadequacy of the documents, the responsible expert/specialist shall refuse to accept the request for general assessment and return it by writing the reasoning. Documents received from the project implementer during the general assessment shall be categorized, labeled, and archived in accordance with appropriate procedures.

2.3 Conducting a general environmental impact assessment

Central and local assessment experts and specialists who have received a request for a general assessment from the project implementer shall research the submitted documents and conduct a general assessment in accordance with the following steps.

These include:

- Shall determine how purpose, scope, technique, technology, and activity of the project developed for implementation comply with the legislation on environmental protection and environmental impact assessment in force in Mongolia;
- Shall determine how purpose, scope, technique, technology, and activity of the project developed for implementation comply with the government policy in that direction, its conclusion, and recommendation of the strategic environmental assessment.
- Shall draw a conclusion about whether the choice of the project location is in accordance with the law and whether it will have a cumulative impact in a certain region;
- Shall draw a conclusion by conducting an initial (preliminary) assessment of potential adverse impacts from key technology and the activities of the project.
- Shall draw tentative conclusions about a preliminary assessment of the social impact of the project activities in the local community and its potential risks to human health.

Shall use the “General assessment performance sheet” provided in Annex 2 of this methodology while doing the above steps, and shall reflect the result of the work done at each step in the column “rationale and explanation”.

For example, the first two steps shall use a simple legal comparison and analysis method in the project document, review whether the location, operational feature, and technology of the project violate the current environmental protection laws and regulations; review whether it is in accordance with the purpose and measures set out in the government's policy documents, therefore inaccordant sections shall be identified and reflected in the rationale, explanation column of the “General Assessment Performance Sheet”.

If the conclusions and recommendations of the laws, regulations, policies, and strategic environmental assessments within the framework of the detailed impact assessment are considered necessary to study in detail, that section shall be marked.

In drawing a conclusion regarding the location of the project, it is necessary to monitor whether the prohibited and restricted zones of the relevant legislation, such as the source of river runoffs, water reservoir protection zones, forest reserves, boundaries of special protection areas and border protection zones, regimes are violated. In addition, based on information on other projects and policy measures planned in that region, an initial assessment of whether there will be a potential cumulative impact shall be reflected in the column rationale and explanation of the "General Assessment Performance Sheet".

Shall Identify the main negative environmental and social impacts of the project at the general assessment stage, using simple test methods, questionnaire methods, and analytical methods when conducting and concluding an initial (preliminary) assessment of potential adverse impacts from key technology and activities of the project, conducting a preliminary assessment of the social impact of the project activities on the local community and drawing preliminary conclusions on potential risks to human health.

The simple test method: The process of assessing and drawing general conclusions of the project by developing simple and few criteria to assess the main potential adverse effects on the environment and human health of the area in accordance with the specifics of the project and the project implementation area, including the project type, scope, duration, implementation area, technology, and activities.

The questionnaire method: A method of assessing the impact of the project by questioning the project implementers, relevant officials of citizens, business entities and organizations, residents of the project implementation area, and researchers in that field with its developed questionnaire to identify the main environmental and social impacts of that project

The analysis method: A method of identifying and drawing a conclusion by comparing the main negative impacts of the proposed project on the environment and society by researching the detailed environmental impact assessment report, research information, policy and recommendation documents previously conducted in that field.

In addition, specialist expertise that is conducting a general assessment of that project shall pay attention to whether the geological and exploring stages and the actual and available geological mineral resources have been fully determined; whether the technology selected for the project is the latest environmentally friendly advanced technology; in terms of infrastructure projects, how accordant it is with the general urban development planning of the road, energy, communications; for agricultural, industrial and service projects, whether environmentally friendly technologies are used; reflection on the efficiency and reuse of natural resources; whether requirements for sustainable services of the natural scenery and ecosystem are fulfilled and above all should be considered when conducting the general environmental impact assessment of the mining project.

The expert in charge of the general assessment shall summarize the results of the assessment in the section summary of the "General assessment performance sheet" including, the main validity for the conclusion on whether to withdraw or not to implement the project, the main requirements of the conditions and the issues to be considered at the stage of detailed impact assessment shall be identified and included in the section things to pay special attention to at the bottom of that page.

2.4 General assessment decision project and its approval

The expert who conducted the general assessment of the project shall check whether the "General assessment performance sheet" has been filled in accurately, summarize the notes, clarified validity and explanations made in accordance with the question, make one of the following project decisions and reflect it in the summary section.

These include:

1. If the laws, policies, and decisions of the general criteria of "General assessment performance sheet" are marked as inconsistent, or the location criteria are marked as "have negative impacts" and its rationale is complete, more than 90 percent of the initial or preliminary environmental and social impact assessment criteria are marked as "have negative impacts" than it shall be concluded and written in the summary section that the project cannot be implemented. In this case, the provisions of the laws, regulations, policies, and decisions that are being violated, and the relevant provisions of the strategic environmental assessment conclusion shall be indicated in the section on things to pay special attention to.
2. If the laws, policies, and decisions of the general criteria of "General assessment performance sheet" are not marked as inaccordant with the location criteria, more than 90 percent of the initial or preliminary environmental and social impact assessment criteria are marked as "don't have negative impacts", have potentially "negative impacts" but no detailed assessment is required than it shall be concluded and written in the summary section that the project can be implemented with project conditions. For the project that has been identified as having potentially "negative impacts" or to prevent negative impacts the work required by the project implementer, its performance indicators, and the form and timing of reporting on implementation shall be reflected in the section things to pay special attention and the project implementer shall prepare a report on the implementation of the work specified in the terms and conditions of the general assessment within a given period and submit it to the organization that conducted the general assessment.
3. If the laws, policies, and decisions of the general criteria of "General assessment performance sheet" are not marked as accordant with the location criteria or marked but clarified to identify within the framework of a detailed assessment, more than 40 percent of the initial or preliminary environmental and social impact assessment criteria are marked as "have negative impacts", have potentially "negative impacts", and that a detailed assessment is required than it shall be concluded and written in the summary section that the detailed environmental impact assessment is required for the project. In this case, the areas marked as to have negative impacts, and a detailed assessment is required will be an additional area of further detailed assessment. In addition to the sections noted above in the things to pay attention section details to be clarified as part of the detailed assessment shall also be included. These scopes and direction provide guidelines for the detailed assessment of the authorized entity.

The expert who conducted the general assessment shall sign and date the filled "General Assessment Performance Sheet" which reflects the results of the general environmental assessment made in the project document and shall present it to the authorized official of the project implementer.

Subsequently, the project decision shall be delivered to the project implementer after presenting it to the Chief Expert of the project, reflecting its main requirements, developing in the form of an official letter, and formalizing by the signature of the Chief Expert.

2.5 Ensuring public participation at the general assessment level

Prior to conducting a general environmental impact assessment, the project implementer shall compile information on the socio-economic and environmental conditions of the project implementation area and attach it to the project documents and shall organize meetings and discussions with local authorities, citizens and the public to provide them with project information as openly as possible.

In the case of a project that requires an environmental baseline assessment, the authorized professional organization and research organization shall summarize and reflect results based on the responsibility for ensuring public participation issues during the environmental status assessment in the environmental baseline assessment report. Identifying the strengths and weaknesses of the project in the first stage of the ESIA allows the public to have clear information about any issues that may arise, to draw conclusions, and to formulate their own opinions. If the public is provided with detailed information about the project, they will be able to identify its benefits and drawbacks, can assist in identifying potential impacts from project activities, and communicate with the project implementer based on greater trust and confidence.

In the project documentation that is collected for general assessment, the project implementer shall include relevant information about the number of people that are likely to be affected by the project, their age and gender differences, characteristics of the settlement area, customs, social development, and public opinions on whether to implement the project.

Shall emphasize the importance of ensuring public participation in the general assessment and decision-making process; conclusions and decisions made at the general assessment level on the implementation of any project or program shall be open to the public, providing them with accurate information in order to allow expressing their views on the potential impact on the environment, human health, and society that may be caused by the project to be implemented in their area of residence.

The expert shall relay the conclusions and decisions to the public via the website of the organization that conducted the general assessment within 5 working days after the decision is made, regardless of whether the ESIA needs to be conducted in accordance with conclusions and decisions of the general assessment, meanwhile, the project implementer shall present the conclusions and decisions of the general assessment to the local government and the environmental department.

Annex 1. General assessment request and document receipt form

Name of the project implementer, address:

Contact number, E-mail address:

Name of the project:

Project implementation area and location:

Name of the document	Required or not	The requirement has been met or not	Explanation
Request for the general assessment of the project implementer / official letter /			
Feasibility study and diagram approved by the authorized organization			
Whether it is reflected in the land management plan and program of that year/land permit, proposal of the Protection administration if it will be located in the PA (Protected Area) /			
Description of the environmental baseline of the project implementation area			
Environmental baseline assessment report of the project implementation area			
Review map of the project implementation environment (topo, space)			
Reference from the soum or district governor			
Copy of business entity's certificate / notarized /			
For mining projects: a. All the documents mentioned above			
b. Copy of license / notarized /			
c. If XV license is owned approved reports of the exploration work and reserve approved decision			
d. If MV license is owned, the feasibility study approved by the authorized entity, resources approved decision			

e. Amendments to the ESIA resource movement for the project report			
f. Project related diagrams			
Information about suppliers of raw materials to be used in the project, etc.			
Special note:			

The number of pages of material received.....

Received: **Submitted:**

Full name: **Full name:**

Position: **Position**

Signature: **Signature:**

Date:

Annex 2. General assessment performance sheet

Name and address of the project implementer:

Project name:

Project implementation area and location:

Contact phone:

E-mail address:

	Key assessment criteria	Accordant	Inaccordant	A detailed assessment is required	Rationale and explanation
Accordance with environmental protection legislation	Legislation on environmental protection and environmental impact assessment in force in Mongolia				
Accordance with government policies and decisions	Relevant provisions of the state policy document, strategic assessment conclusion, and recommendations				
Project location and its related criteria	Whether it is in the areas protected by law (source of river runoffs, water reservoir protection zones, forest reserves, boundaries of special protection areas and border protection zones, etc.)				
	Whether the project implementation area is vulnerable, sensitive to human impact and climate change				
	Whether there are areas in and around project implementation areas that are planned to be used for national and local development, which can be negatively affected.				
	Whether potential accumulation effects will be created.				

Preliminary environmental impact assessment of the project	Air quality				
	Whether there will be emissions of pollutants and hazardous substances into the atmosphere				
	Whether noise, vibration, light and heat effects, electromagnetic radiation will be formed				
	Aquatic environment				
	Whether there will be a shortage of surface and groundwater resources				
	Whether freshwater resources will be used				
	Whether contamination will be created in surface and groundwater				
	Soil cover				
	Whether the soil cover will be damaged				
	Whether soil will be contaminated				
	Whether there will be soil degradation or desertification				
	Vegetation cover				
	Whether vegetation cover and forest cover will be affected				
	Whether rare or very rare plant species will be affected				
	Fauna				
	Whether there will be a degradation of wildlife habitat				
	Whether rare or very rare animals will be affected				
Preliminary assessment of the social impact	Residents				
	whether the right to possess or use land will be violated				
	Whether it will have a negative impact on the social situation of local residents				

	Whether there are any centers or settlements that are likely to be affected				
	Whether there will be a resettlement issue				
	Historical and cultural heritage				
	Whether any historical or cultural values will be negatively affected				
	Impacts on human health				
	Whether it will negatively affect the health of local people and residents				
	Whether there will be a risk to human health and life during the entire stages of the project				
Summary:					
Things to pay special attention:					
The general assessment conducted by Surname, name: Position: Signature: Date:			The results of the general assessment approved by Surname, name: Position: Signature: Date:		

Annex 3. Form of general assessment conclusion

Date_____ Number___

Submission of the general assessment report

Based on Article 7.3 of the Law on environmental impact assessment and Article 2.1 of the procedure for implementing the environmental impact assessment in the ..... project document, that was developed and submitted by your side in ..... province's ..... soum territory, ... land, a general environmental impact assessment was conducted in accordance with the approved methodology for environmental impact assessment. It was considered that the project cannot be implemented (the project can be implemented with conditions or the project needs a detailed environmental impact assessment).

We would like to inform you that the detailed environmental impact assessment shall be conducted, considering the issues to be clarified during the detailed assessment and the things to pay special attention to indicated on the general assessment performance sheet, alongside with the developed environmental management plan of the project and submitted to the Ministry of Environment and Green Development within the .... season of the year...

Note: The general assessment performance sheet has been attached.

Chief Expert of *Ministry* of Environment and *Green Development* (MEGD)

_____

(At local: ..... Province environmental protection specialist…….)

SECTION 3
METHODOLOGY FOR DETAILED ENVIRONMENTAL IMPACT ASSESSMENT

TABLE OF CONTENTS

3.1 The main purpose and basic requirements of the detailed environmental impact assessment

The main purpose of the detailed environmental impact assessment is to identify and assess the potential adverse impacts on the environment, society and health of the residents during the implementation of certain projects by individuals, business entities and organizations and to identify measures to prevent, avoid, mitigate and eliminate, its negative consequences.

Prior to the implementation of any project determining the potential adverse effects on the environment, society and health of residents during its implementation, determining measures to prevent, mitigate and eliminate, its consequences will be the main information required by the government to decide whether to implement the project, from banks and financial institutions to decide whether to finance it and from the local government and the project implementer about the project victims.

Besides, it is important for stakeholders to be provided with authentic information.

When implementing this requirement of the law, the project implementer shall select professional organizations authorized by the state central administrative body in charge of nature and environment to conduct detailed environmental baseline and impact assessments at a high level of professionalism and quality, and based on the results of scientifically based research, as it is especially important for improving the quality and effectiveness of environmental impact and complying with common international standards.

Therefore, licenses and rights to conduct a detailed environmental impact assessment shall be granted to business entities and organizations after considering their professional skills, knowledge, database, research and analysis experience, professional team composition, capacity, financial stability, and capacity to take responsibility of the organization, also it is important to have a transparent selection process.

The project implementer shall ensure that the selection will happen on a competitive basis, considering the specifics of the project and the capacity of the professional assessment organization. Professional organizations need to constantly improve their professional skills and capacity and shall conduct impact assessments that meet Mongolian, and international general and specific criteria in this area.

Decisions of any state or local administrative body, banking, and a financial institution or other relevant body, which will consider the results of a detailed environmental and social impact assessment, shall be transparent, open, responsible, providing multi-stakeholder participation and meeting the legitimate interests of the parties.

These guidelines shall be followed when performing a detailed environmental impact assessment in a highly professional manner, complying with the obligations under the laws of Mongolia.

3.2 Stages of the detailed environmental impact assessment.

A detailed environmental impact assessment of the project shall be performed through the following steps.

These include:

- Developing guidelines for detailed impact assessment;
- Identifying potential and main adverse impacts of the project;
- Assessing potential and main adverse impacts;
- Choosing a version with the least adverse impacts of the project;
- Identifying measures to prevent, mitigate and eliminate the consequences;
- Establishing rehabilitation and compensatory conservation measures;
- Conducting a potential risk assessment on the environment and denizens that may be affected by the project activities;
- The main purpose, scope, and criteria of the environmental management plan;
- The development of a detailed impact assessment report and its non-technical summary, etc.

3.3 Performance of the detailed environmental impact assessment

3.3.1 Developing guidelines for detailed impact assessment

Project implementer shall develop clear work guidelines based on the conducted results of the general environmental impact assessment, the overall conclusion, the main purpose of the detailed assessment based on the relevant legislation, the scope of work to be performed, issues to pay special attention to, its requirements, and execution schedule. In addition, the guideline shall include standards, norms, and rules to be followed, if necessary, conditions may be set to meet the criteria set by the common international requirements in this regard, and bank and financial institutions.

The timing and stages of a detailed impact assessment, its description of the monitoring, and additional conditions and requirements of the project implementer may be included.

Thereby, the entity authorized to conduct a detailed impact assessment shall be selected based on work guidelines that meet the requirements for the implementation of the legislation and the conclusion of the general assessment.

3.3.2 Identifying potential and main adverse impacts of the project

The authorized entity and its specialist that was selected to perform the detailed environmental impact assessment of the project shall thoroughly review the project documents, description, Feasibility Study Report, and Design Parameters and Layouts, and shall determine the potential and main adverse effects of the project by researching conclusions of the general assessment, detailed assessment work guidelines and using the following steps.

These include:

- Preparing topographic maps, aerial and satellite maps in and around the project area, and marking the location of the project, area where its activities will take place and its objects;
- After identifying the main purpose, technical, technological, economic capacity, scope and features of the main and auxiliary activities reflected in the project document, conduct an environmental analysis and identify its main and potential adverse effects;
- Identifying areas and biodiversity that are particularly important, through the interactions of environmental components and communities that will be affected by the adverse impacts of the project, their social status, historical and cultural heritage, and ecosystem components.

The main purpose of the project, technical, technological, economic capacity, and environmental analysis of the main and auxiliary activities shall be considered in detail in the following issues.

These include: Whether there will be physical changes (landscape, land use, soil and aquifer changes, etc.) for the local area during the construction of project facilities, implementation and closure phases of the project, whether water resources will be used for project implementation, whether there will be a shortage of surface and groundwater resources, whether non-renewable and rare natural resources will be used, whether the usage, storage, transportation, destruction and production of chemicals and materials harmful to human health and the environment will be carried out within the framework of the project implementation, whether solid waste will be generated during the construction of project facilities, implementation and closure phases of the project, whether liquid waste (wastewater) will be generated during the construction, implementation and closure phases of the project, whether any pollutants or hazardous and toxic substances will be released into the atmosphere in connection with the implementation of the project, whether noise, vibration, light and heat, and electromagnetic radiation will be produced during the project implementation, whether water pollution will be caused by the introduction of contaminants into surface and groundwater, whether there will be accidents and risks affecting human health, life, and the environment during the construction, implementation and closure phases of the project, whether there will be any changes in the society related to the implementation of the project (for example, changes in living standards, favorable business environment, increased local budget revenues, new job creations, support for local development, or changes in traditional lifestyles, changes in employment, adverse effects on rituals, religions, and adapted lives of the local population, etc.), whether there are perspective development plan, potential adverse effects, or other factors related to the activities that will be implemented during the project implementation or planned to be implemented at the local level, whether roads and transportation activities that may cause environmental pollution and degradation will take place in and around the project area, etc.

The following issues shall be considered in detail when identifying the components of the environment and locals, their social status, historical and cultural heritage, and areas and biodiversity of particular importance for ecosystem services, that may be adversely affected by the project activities. Including whether there are any historical, cultural values, monuments, and areas under state and local special protection that may be adversely affected in the project area and its surroundings; whether there are any ecologically sensitive areas such as wetlands, mountains with special formation and forests that may be adversely affected in the project area and its surroundings; whether there are rare and very rare species of animals and plants in the project area and its surroundings; whether there will be any adverse effects on the animals' reproduction, mating, nesting, foraging, drinking water, wintering, migration and movement; whether there are beautiful places of nature that may be adversely

affected in and around the project area; whether public buildings and facilities for recreation and other purposes and the route to them will be affected by the project; whether it will be implemented in a sacred deserted place where no project has been implemented before; whether there are land that are being used in any way(apartment, park, private land, factory, trade market, resort, tourist land, free public land, local land, forest area, agricultural and mining land, etc.) and may be adversely affected, whether there are any areas that are planned to be used for national and local development that may be adversely affected in the project area and its surroundings that may be affected by the project, whether there are any areas in and around the project area that may be difficult to relocate, such as hospitals, schools, places of worship, and local public facilities that may be adversely affected prior to the implementation of the project; whether there are areas in the project area and its surroundings which was polluted or degraded due to human activities, in other words, the pollution and degradation exceeded the environmental standards prior to the implementation, and which may be affected by the project, whether there are project areas vulnerable to natural and climatic changes such as earthquakes, landslides, land shrinkages, erosion, disruption, floods, rapid changes in temperature, fog, and strong wind storms, etc.

3.3.3 Assessing potential and main adverse impacts of the project

The potential and main adverse impacts of the project shall be assessed based on the potential and main adverse impacts identified in the previous phase, the environment, local people, historical and cultural heritage, its intensity, extent, direct and indirect impacts, and potentially cumulative impacts shall be assessed using Mongolian legislation and common international methods. This assessment shall be performed in the following steps.

These include:

- Determining the scope, intensity, duration, and characteristics of the main and potential environmental and social impacts of the project identified in the previous phase and conducting a quantitative and qualitative analysis;
- Analyzing potential and major adverse impacts in the environmental assessment data of the project area (conducted according to the appropriate methodology) and assessing the distribution and consequences of adverse impacts;
- Covering additional studies, necessary experiments, observations and monitoring on the detailed impact assessment to determine the current environmental and social conditions and the level of pollution and degradation in the project implementation area and area that will be affected by the project.

A method that is most relevant to the nature of the problem shall be chosen from one of the most widely used methods in the world today or a combination of two or more methods to compensate for the advantages and disadvantages and shall be used when assessing the potential and major adverse effects of the project, therefore the results shall be analyzed and reflected in the report. These methods include expert assessment, time and spatial overlap mapping of geographic information systems, risk assessment methods, network analysis methods, interaction matrices, multifunctional interaction matrix methods, mathematical-statistical methods, health surveillance and assessment methods, and social-environmental system dominance modeling and cumulative impact assessment methods, etc.

The main definitions, purposes, and significance of these methods are highlighted in the inlays below.

Inlay 1

Dedicate method (Ad hoc)

Definition: A method that is based on the informal process of making a joint conclusion and exchanging ideas based on the results of research and analysis by experienced experts involved in environmental impact assessment.

Main development: The main methodology aims to identify potential sources of impact as fully as possible, and to identify objects that may be affected and the whole environment.

Input data: Results of research and analysis work.

Outcome: Drawing an opinion and conclusion by comparing several options in terms of possible indicators and parameters from the experts' conclusions.

Source:

http://www.unep.org

Inlay 2

Description: A method that uses pre-designed guidelines and manuals to assess the impact of the project on human health and the environment.

Main development: Develops environmental impact assessment guidelines and manuals by similar projects or specific sectors (agriculture, water management, agronomy, mining, heavy and light industry, transportation, energy, development projects, public utilities, tourism), production and services, etc.).

Input message: Guidelines and manuals

Outcome: Identifying the impacts of the project on human health and the environment.

Source: http://www.unep.org

Inlay 3

Checklist method

Definition: A method of compiling a comparatively defined table by listing the types of environmental components and comparing them with the project.

Main development: The checklist method is widely used to determine how the activities of any production or service affect the local environmental situation and the social and economic impact, its type, duration, and intensity. This method is implemented by developing expert assessments and conclusions based on probability theory.

Input data: Expert assessment and conclusion

Outcome: Identifying the impacts of the project on human health and the environment.

Source: http://www.unep.org

Inlay 4

Questionnaire method

Definition: A method of assessing the impact of a project by questioning relevant people, such as project implementers and relevant officials of the business entity or organization, as well as residents who will be directly affected by the positive and negative consequences of project activities.

Main development: The impact shall be assessed by questioning relevant people who will be directly affected by the positive and negative consequences of the project.

Input message: Poll

Outcome: Identifying the impacts of the project on human health and the environment.

Source: http://www.unep.org

Inlay 5

Matrices method

Definition: A method with a wide range of possibilities to fully identify the impact by considering both the positive and negative environmental impacts of the project and its implementation.

Main development: Issues directly related to the project activities and environmental components shall be categorized along the vertical and horizontal lines of the matrix and their interactions shall be recorded in the matrix field. A list of project activities, tables, and cards of natural conditions are used to form the Matrix.

Input data: Issues directly related to project activities and issues related to environmental components.

Outcome: The aggregate figures of rows and columns shall be used to determine which project activities or which type of environment to focus on in the future. The aggregate figures are sometimes called the "weight occupancy".

Source: http://www.unep.org

Inlay 6

Networking method

Definition: The network-scheme method is superior to other methods in determining indirect effects. Secondary and tertiary effects can be identified by identifying network branches.

Main development: Direct impacts shall be identified in relation to project activities, and checklists and matrices can be used for this purpose. Indirect impacts shall be identified through the direct impact host network. This method can be successfully implemented on computing devices.

Input data: Direct impact

Outcome: Identifying indirect effects.

Source: http://www.unep.org

Inlay 7

Overlays mapping method

Definition: A method of studying and summarizing changes that will happen in the environment related to the project activities by reflecting and showing them on the image and comparing them with the pre-project image by overlapping the two images.

Main development: Overlap the images and determine which effects are important.

For example, if the direction of noise propagation overlays with the populated area and is high, this can be identified as an important impact to consider in the future.

Input message:

- Agricultural land tenure;
- Important environment for forest and biodiversity;
- Sensitive environments (pond where birds gather, etc.);
- An environment of historical, cultural, archeological and paleontological significance;
- Populated areas of residence;
- Infrastructure/water supply, energy supply, buildings, roads, communications, networks /;
- Beautiful natural places;
- Special Protection areas, etc.

Outcome: A realistic result of a detailed environmental impact assessment can be achieved if a comprehensive assessment is made by overlapping all types of project-related images.

Source: http://www.unep.org

Inlay 8

Battle system

Description: This system was originally developed for a water use project, but it has been used in transportation and other industries.

Main development: When using the system, the impact is determined for each environmental component and each environmental indicator is listed in order of importance.

Input message: Information that shows the relationship between environmental quality and indicators.

Outcome: Identifies environmental impacts.

Source: http://www.unep.org

Inlay 9

Geographic Information System Recommendations (GIS)

Definition: A geographic information system can be used to qualitatively assess changes in human activity and changes caused by other influences over a large area.

Main Equation: Depending on the purpose of the study, it will be used selecting from the methodologies available in the geographic information system (For example, to study changes in land use and supervised/unsupervised classification methods, spatial analysis methods for spatial analysis, etc.).

Input data: Depends on what analysis is going to be done. For example, the following databases can be used to identify spatial overlaps of influences.

Outcome: This model can be used to create spatial maps of regions, basins, and territories.

Development: The model works in Window and UNIX environments.

Source: http://www.esri.com

It is also required to use mathematical-statistical and modeling methods for specific purposes in order to determine in detail the distribution of adverse effects, intensity, change, a continuation of time, the extent, joint and secondary effects of the adverse effects in combination with the above methods. The models used for such purposes may be the models shown in the table below, which are currently used in environmental assessments and impact analysis and other methods based on the latest technology and technical advances that are non-inferior to the accuracy, requirements, and significance of these models.

Table 3.1 Environmental modeling methods that will be used in assessment studies

#	Determining indicators	Modeling and method name
1	To determine the extent of land degradation and disruption associated with any human activity	Determining changes in space and time using satellite data such as LANDSAT, SPOT, MODIS
2	Laboratory analysis methods to determine water and soil pollution levels	Hydrogen index, biochemical oxygen demand, dissolved oxygen content, heavy metal contamination, etc.
3	To determine air quality and pollution distribution	AirMod, ISC3 models
4	Potential Habitat Model for a species that worships an ecosystem	To determine their impact Threats, Disturbance / Condition Index spatial analysis methods shall be used
5	To determine the effect of changes in grazing capacity of the land tenure	VELMA, Century ecological models
6	To estimate the impact of current and future changes in runoff	HBV, TOP LAST models
7	To calculate the impact of groundwater	MODFLOW models
8	To estimate the impact of water, use on river runoff and to use regional climate change models	Sobek, RIBASIM models

Based on the above assessment research and work results, conclusions and calculations shall be made about whether there will be changes of the natural appearance and landscape of the area, depletion of groundwater resources, quality, quality of drinking water, water infiltration, loss, vegetation loss, depletion of plant species, rare and very rare plant resources, grinding of the pastureland, loss of fodder resources, soil erosion, disruption, loss of soil fertility, soil pollution, air pollution, changes in air quality, changes in the location, distribution, migration, and movement of animals, noise pollution, depletion of mineral resources and their by-products, mineral and raw material resources, water resources and forest resources due to the use of natural resources.

In addition, shall clarify and reflect issues about whether there will be a risk to the health of the residents who live in that area, the risk to the public health, the spread of infectious diseases, and occupational diseases, food shortages, increase in local and population incomes, job creation, poverty reduction, population change, labor resources, number, labor protection, social issues, migration, etc., power supply, water supply, road transport, post, telecommunications, industrial facilities, staff accommodation and service area establishment /canteen, bathhouse, laundry place/, destruction and abrasion of historical and cultural monuments, impact, destruction and abrasion on archeological and paleontological finds in the results.

3.3.4 Identifying project options with low adverse effects

The project implementer usually considers several alternatives during project development. In the context of a detailed environmental impact assessment, it is important to compare these alternatives for their impact on the environment, society, and public health, and to identify the option with the least adverse effects on the environment. In other words, shall analyze the main and potential adverse effects, potential risks, the consequences of these alternatives, and determine the alternative with the least adverse effects. The alternative with the least adverse effects of the project shall be determined by the following steps.

These include:

- In addition to the approved version of the project, one or more alternative versions (can be other project implementations under similar conditions) that are considered most feasible during the project development shall be selected, and its relevant information and technology solutions shall be clarified.
- Conducting a comparative analysis of the selected alternatives by location, the extent of main and potential adverse effects, technical and technological solutions, and potential risk consequences;
- This includes identifying the alternative with the least negative environmental and social impact and comparing them with the options selected for implementation, etc.

By determining this way, authentic recommendations can be given to use environmentally friendly, advanced technology with low adverse social impacts during the project implementation can prevent the main and potential adverse impacts of the project, and the project implementer will be able to make optimal choices in their future activities.

3.3.5 Identifying measures to prevent, mitigate and eliminate adverse effects

After identifying and assessing the main and potential adverse impacts of the project on the environment, society and public health, and identifying the optimal project alternative,

developing recommendations for mitigation and rehabilitation measures based on the extent, intensity, duration and nature of these impacts is a key outcome and an important part of a detailed environmental impact assessment. Measures to prevent, mitigate, and eliminate the main and potential adverse effects of the project shall be identified in the following steps.

These include:

- Identifying versions and options that can be implemented in consultation with the project implementer from the versions with the most minimal adverse effects considered in the previous stage;
- Considering each of the main and potential adverse impacts of the project and determining measures to minimize and mitigate potential adverse effects in accordance with its scope, intensity, and components of the natural environment that will be impacted;
- Identifying the most important, necessary, and priority measures to be implemented and developing their definitions by analyzing and prioritizing measures to prevent, mitigate, and eliminate adverse effects, etc.

In identifying measures to prevent, mitigate and eliminate the main and potential adverse effects of the project, following criteria shall be met: to consider all options for environmentally friendly operations and the use of advanced technology, to create conditions for its activities not to exceed the normative established by laws, regulations, standards, and norms, not to endanger the health of employees and the population of the project area, to use natural resources wisely and sparingly, be feasible, etc.

In addition, it shall develop environmentally friendly and feasible recommendations for the use of all types of solid, liquid, and gaseous wastes and emissions that may cause environmental pollution from project activities.

Measures to identify, reduce and eliminate adverse environmental impacts during the implementation of mining, infrastructure, agriculture, factory service, and tourism projects and use, storage, transportation, cleaning and disposal of toxic chemicals and radioactive substances, as well as in the collection, storage, treatment and disposal of solid and liquid wastes shall reflect the specifics of the project and the environmental and social conditions of the area to be implemented.

3.3.6 Establishing rehabilitation and compensatory conservation measures

Compensatory conservation measure is a set of conservation management measures that aim to protect and enhance the biodiversity in selected areas designated for compensatory conservation. The ultimate goal of compensatory conservation is to ensure that the biodiversity of the area is better than normal as a result of the implementation of compensatory measures.

Biodiversity compensatory conservation measures consist of the following parts.

These include:

- Setting goals to improve biodiversity;
- Identifying biodiversity management measures;
- Creating implementation monitoring;
- Developing an operating budget and financing plan, etc.

Biodiversity compensatory conservation measures are of the following types.

These include:

- Direct protection measures;
- Rehabilitation and improvement;
- Threat reduction;
- Improving connectivity, etc.

Each of the types, fauna, and flora of the compensatory conservatory ecosystems shall be determined after assessing the underlying conditions of biodiversity when determining compensatory conservation measures. These goals shall be based on biodiversity viability assessments and shall determine objectives aimed to improve the viability of each biodiversity receiving compensatory conservation.

The principles of compensatory conservation shall be based on the principles of nearness to the affected area, ecological compatibility, determining the period of compensatory conservation in comparison with the duration of the impact, provision of long-term conservation and complementarity (principle of complementarity is the results of additional conservation created as a result of compensatory conservation).

In addition, compensatory conservation measures are required to establish new conservations or to have a more positive impact on the normal condition of biodiversity. The following steps shall be followed in determining compensatory conservation.

These include:

1. Determining the size of the area that will be affected by the project: Basic information on the size of the area that will be affected by the project can be found in the ESIA report. If the ESIA report does not provide sufficient information on the spatial impact on biodiversity, additional research is required.

A relatively realistic assessment of the impact on biodiversity will be the basis for determining important issues, such as the size of the area, the type of compensatory conservation, and the timing. The extent of the impact on the habitat can be determined using the impact index in case it is impossible to determine in detail the effects and reactions to each of the species of animals and plants that are likely to be affected.

For example, the size of the area that will be affected can be determined using the GIS-based “Impact spatial decrease function” to calculate the project impact index for the habitat. This method is an easy way to measure direct and indirect effects in space. This is especially important in determining the size of the compensatory conservation area relative to the affected habitat.

Impact reduction function:

Function= (1/(1+Exp(((Distance/100)-a *b)))*Weight

These include:

Distance- Impact reduction distance,

Weight - Impact intensity

a, b - Slope factors

The distance and intensity of the impact will be different depending on the type of impact and the terrain, therefore the impact reduction function shall be determined by selecting the slope factors in relation to the degree of impact reduction as shown in the following table. (Table 3.2, Figure 3.1).

Table 3.2: Impact reduction function combined with a degree of impact reduction

	Impact reduction function
High	(1 / (1 + Exp(((Distance / 100) - 1) * 5))) * Weight
Medium-sharp	(1 / (1 + Exp(((Distance / 100) - 2.5) * 2))) * Weight
Medium	(1 / (1 + Exp((Distance / 100) - 5))) * Weight
Low	(1 / (1 + Exp(((Distance / 100) - 10) * 0.5))) * Weight

When using the function of mitigation, see reduction distance, impact reduction degree, impact intensity from values calculated differently by natural zones in Mongolia in Appendix 1[1].

[1]These values were used in accordance with the values set by the World Wealth Fund's program research in Mongolia.

Using the mitigation function, the geographic information system (GIS) is determined by the size of the affected area (in ha), and the intensity of the impact is divided into three classes: high, medium and low impact (see Figure 3.1).

The amount of habitat that requires compensatory conservation shall be determined based on this impact intensity classification.

The following impact coefficients shall be used to differentiate the impact intensity classification in the compensatory conservation calculations (Table 3.3).

Figure 3.1. Determines the impact coefficient (high, medium, low) using the impact reduction function.

Table 3.3. Impact intensity and impact coefficient

Impact intensity	Impact coefficient	Explanation
High impact (ha) –I_1	1.00	Because the impact of biodiversity will be great, the whole area shall be calculated as 1: 1 in the calculation and the coefficient shall be 1.
Medium impact (ha)– I_2	0.66	If the impact is medium 1/3*2=0.66
Medium impact (ha)– I_2	0.33	Low impact (ha)– I_3

Using the mitigation function and the adjustment coefficient, the size of the project area shall be calculated as follows.

These include:

$S_i = I_1+I_2*0.66+I_3*0.33$

S_i -The size of the area that will be affected (ha)

I_1- High impact,

I_2- Medium impact,

I_3– Low impact.

2. Determining the amount of land that requires compensatory conservation:

The size of the area that requires compensatory conservation shall be determined after the size of the area that may be affected by the project is determined. The following factors shall be considered when determining the amount of land that requires compensatory conservation.

These include:

· Habitat type

· Ecosystem rarity

· Ecological health

· Landscape location

· Impact duration

For each of these factors, the compensatory conservation coefficient shown in the following table shall be used to determine the amount of land that requires compensatory conservation.

Table 3.4 Compensation protection coefficient

Category	Description	Compensatory conservation coefficient
Habitat classification[2]		
Important	-Areas identified as ecologically important by ecological regional assessment. -Including the original version identified in the Marxan program and the reworked version due to overlapping.	3
Normal	-Except for areas identified as significant or changed.	1.5
Changed	-Areas with a human performance impact index values set at GIS 95% <	0.20
Ecosystem rarity[3]		
Very rare	-By continental ecosystem classification, the distribution is <5% within the ecological region and bio-geographical zoning	3
Rare	By continental ecosystem classification, the distribution is 5% <-<10% within the ecological region and bio-geographical zoning,	1.5
Normal	-By continental ecosystem classification, the distribution is 10% < within the ecological region and bio-geographical zoning,	0.20
Ecological health[4]		

[2]Spatial information on habitat status can be obtained from the Ecological regional assessment.

[3]Ecosystem rarity classification can be obtained from the Ecological regional assessment.

Good	-Areas with low human activity impact index values set at GIS 0% - 50%	3
Medium	-Areas with human activity impact index values set at GIS 51% -94%	1.5
Bad	-Areas with human activity impact index values set at GIS <95%.	0.20
Landscape location[5]		
Important	- If it is less than 20 km from the boundaries of ecologically important areas, - If there will be a serious disturbance to the movement of nomadic animals,	3
Medium	-If the distance between ecologically important areas is 20 km-50 km from the boundaries, -if there will be a disturbance in the movement of nomadic animals in some ways,	1.5
Not important	-If it is more than 50 km from the boundaries of ecologically important areas, -If it will not disturb the movement of nomadic animals,	0.20
Duration of the impact		
>20 year	-Shall be calculated including time until rehabilitation is complete.	3
5-20 year		1.5
<5 year		0.20

[4]Ecological health information can be obtained from the Ecological regional assessment.

[5]Factors such as distance, size and relevance that depend on the important habitat shall be considered.

Considering the above coefficients, the size of the area that requires compensatory conservation is calculated by the following formula.

$$S_O = f_n * S_I$$

$$S_O = (I_1 * f_1) + (0.66 * I_2 * f_n) + (0.33 * I_2 * f_n) = > \{ (I_1 + 0.66 * I_2 + 0.33 * I_3) \}$$

These include:

S_O -The size of the area that requires compensatory conservation (ha),

f_n- One of the corresponding values of the compensation coefficient

3. Determining the cost of compensatory conservation.

A funding plan for biodiversity compensatory conservation must be developed. The parties implementing the compensatory conservation shall base the calculation and financing of the annual compensatory conservation budget on the basis of this 5-year financial plan. The budget for biodiversity conservation measures includes the following expenditures.

These include:

1. The expenditures of additional compensatory conservation research (Er) will consist of the cost of determining the intensity and extent of the project impact, and the cost of consulting services to determine the area that must be compensated and its size. The cost of consulting services shall be determined by agreement between the customer and the contractor.
2. The expenditures of planning a compensatory conservation measure (Ep) include the cost of basic biodiversity research and the cost of planning a compensatory conservation measure with the participation of the parties and having the plan approved by the relevant authority. The cost shall be determined by agreement between the customer and the contractor.
3. The expenditures of compensatory conservation operation measures (Eo) consist of the costs of financing the management measures that must be implemented which was reflected in the biodiversity compensatory action plan that will be implemented in that area.

$E_O=S_O*\{(C*R)*(1+r)\}^t$

These include:

Eo– The expenditure of one year of compensatory conservation measures

S_O-The size of directly and indirectly affected area that requires compensatory conservation (ha)

C– Compensation costs per hectare $C=(2_{т.н})^6$,

R- The value of the coefficient of compensatory conservation. $R=10^7$,

$(1+r)^t$–inflation.

4. The contractor's management expenditures (Em) consist of the costs of additional compensatory conservation research, professional consulting services to develop and implement the compensatory conservation plan. This shall not exceed 20% of the expenditures of implementing compensatory conservation measures.

Therefore, the total amount of compensatory conservation expenditure is calculated as follows.

$E_{total}=E_r+E_b+E_o+E_m$

These include:

E_{total} - total annual expenditures of compensatory conservation measures

Based on this estimate of compensatory conservation measures and the costs required for them, the measures in this area together with the monitoring criteria shall be identified in the environmental management plan and be included in the detailed assessment report.

3.3.7 Assessing potential risks to the environment and local residents from project activities

An important part of the environmental impact assessment is to assess the potential risks of natural hazards and incidents, major industrial accidents and its leaks of chemical toxic during the project implementation and radioactive substances, and potential risks due to hazardous waste.

The above law states that the risk assessment shall include the identification and prevention of the toxic and hazardous chemicals, hazardous properties and potential risks, and waste detoxification and disposal.

Risk assessment is a flexible method of managing toxic and hazardous chemicals and analyzing the process of a systematic approach based on scientifically sound information about potentially hazardous substances.

[6]Cost per hectare required for proper management of biodiversity.

[7]Coefficients used to generate additional positive changes through compensatory conservation for affected biodiversity. There is an international practice of compensating for the impact of biodiversity on a conservation basis of 1:10.

Handling, storing, accumulating, eliminating and disposing of toxic and hazardous chemicals and materials and hazardous waste in areas where natural disasters and accidents may occur, for example, in areas with high seismic intensity and in areas prone to other natural disasters, also the risk assessment for large construction projects shall be assessed as part of a detailed environmental impact assessment.

The risk assessment shall be conducted in accordance with approved (joint order of the Minister of Environment and Green Development, the Minister of Health and the Director of the National Emergency Management Agency, approved by Order No. A \ 50 \ 378 \ 565 of December 25, 2012) procedures and methodologies, and the results shall be included here as a separate section.

In addition, in this section natural disasters, their probability of occurrence, and disaster prevention measures shall be identified and reflected. Disaster risk management shall be carried out in accordance with the procedures and methodologies approved by the competent authority (approved by Government Resolution No. 178 of 2006) and the results shall be reflected in the report.

3.3.8 Determining the main purpose, scope, and criteria of the environmental management plan

After assessing the potential adverse effects and risks to the environment, society and human health identified in the previous step, the conditions to reduce the potential negative impact, to prevent potential risks and to ensure the implementation of mitigation measures shall be determined during the implementation of the selected alternative with the least negative impact, therefore the main purpose at this stage will be to determine the most effective implementation objectives, ensuring the sequence and coherence of the above measures.

At this stage, mitigation and elimination measures for the project shall be categorized as follows.

These include:

1. Preventive measures (Including ceasing potential adverse impacts before its occurrence, changing directions, widely promoting the project to local residents and the general public, and comparing with other environmentally friendly alternatives, etc.)
2. Measures to mitigate and eliminate negative impacts (Including environmental pollution control, installation of pollution control devices and instruments, provision of measuring instruments, construction of buildings and structures in accordance with the approved design and high quality, technical, technological and organizational measures to reduce pollution, regular monitoring and reporting of results to relevant authorities, etc.);
3. Rehabilitation and compensatory conservation measures (Including measures to rehabilitate, renovate, and fix the land that has been damaged during the operation, and to provide compensatory conservation for its unavoidable changes and consequences, etc.);
4. Resettlement and compensation measures (Including measures such as compensation for direct damage, rehabilitation of the affected environment, compensation for victims, non-monetary compensation for losses, allocation of new land, provision of financial assistance, etc.).

Classify these measures and conduct targeted analysis to improve coherence and effectiveness, and the main purpose, scope, and criteria of the project's environmental management plan shall be identified according to the above classification. This will be the basis for developing an environmental management plan. If necessary, the main rationale, brief description, main requirements, and recommendations for implementation shall be included in this section.

3.4 Considering social impact issues in the detailed environmental impact assessment

3.4.1 Guidelines for social impact assessment

In the context of a detailed environmental impact assessment of the project, social impact issues must be considered and included in the work guideline, and in determining social impact, the principle of meeting the common international requirements and criteria set by banks and financial institutions shall be followed.

3.4.2 Determining the socio-economic impact of the project

The following issues must be considered in determining the socio-economic impact of the project under the ESIA.

These include:

- Identifying changes in the regional infrastructure, such as road transport, telecommunications, energy, and water supply, and their impacts after implementation of the project start;
- Identifying potential changes in employment, demographic structure, cultural and educational levels, and benefits for local residents from the project, as a result of the project implementation.
- Identifying what will be changed in the situation where land has been used for economic purpose before the project implementation and how it will affect the livelihoods of local people.

Considering the social impact of the project in terms of the main purpose, technical, technological, economic capacity, main and ancillary activities, the potential adverse effects shall be considered such as, whether the land needs to be vacated in order to implement the project, whether the project facilities can be used for civilian purposes later, whether the project implementation will create a settlement.

3.4.3 Assessing the negative social impacts of the project

Project social impact assessment shall ensure public participation and organize stakeholder consultations and discussions, and its research data shall be processed and assessed based on local feedback by using the matrix, verification, analysis methods, common methods specified in Mongolian legislation and international methods. This assessment shall be performed in the following steps.

These include:

- Analyzing the citizens' and community's suggestions and identifying the quantitative and qualitative analysis of the socio-economic situation in the previous stage;
- Researching the economic and social changes that will occur as a result of the project implementation and assessing the causes and consequences of the adverse effects;
- Determining the requirements of the program to mitigate the negative social impacts, adapt to the new environment where the project is implemented and assess the possible alternatives.

Many other assessment methods can be used for detailed environmental assessments in social impact assessments, but they must be similar in the principle of application to those described earlier.

3.4.4 Identifying alternatives with low social impact

In the context of social impact assessment, it is necessary to conduct a comparative analysis of society and population health effects and determine the alternative that will not worsen the current living conditions of the residents. The following steps shall be used to determine the alternative with the least social impact.

These include:

- When developing the project, planning in advance measures to mitigate the adverse social impacts when the implementation of the project starts and recommending several alternatives for implementation (can be other projects under similar circumstances);
- Identifying the social groups that will be involved in the implementation of the selected alternatives and explain the reasons and justifications for exposures to the adverse impacts;
- Determining whether the land acquisition is required to implement the project if it is required shall develop resettlement, compensation plans, and adaptation programs.

In this way, the social and economic impact of the project will be realistically determined, the adverse effects of the project will be prevented, and the project implementer will be able to make optimal choices for future activities.

3.5 Discussing the results of a detailed impact assessment at the local level.

Formal consultations shall be held with the administration of the project area and local residents that will be affected by the project after the business entity conducting a detailed environmental impact assessment of the project determines the main results of the assessment, the main purpose of the environmental management plan, and finishes an assessment report.

Depending on the specifics of the project, the discussion shall be conducted in accordance with the relevant procedures to ensure public participation and use the most appropriate methods of disseminating and collecting information.

Opinions of the project victims shall be clarified and reflected in the report through a sample survey, questionnaires, interviews, resource mapping, ranking, grading, H-forums, graphic representations, and role-playing, or through open discussion and targeted group discussions.

The following issues shall be clearly stated in the report when organizing the consultation and conducting the poll

These include:

- Information on when, how and where the project interviews, consultations, questionnaires, and information dissemination were conducted and their attendance information of stakeholders;
- Information on the main topics of the discussion and the issues that were highlighted during the discussion;
- Reasonable proposals for changes in project planning, implementation, and operations.

If the project covers the territory of several administrative subdivisions and soums, the authorized business entity shall present it separately to the soum's Citizens' Representatives' Khural and administrative subdivision's Citizens' Public Khural's for comments.

3.6 Preparing a detailed impact assessment report and its non-technical summary

The main and potential adverse impacts identified as a result of a detailed environmental and social impact assessment of the project, measures to prevent, mitigate and compensate them, the results of the assessment of potential risks to the environment and residents of the area from the project activities and measures to prevent them, complication and reporting on the main purpose, scope and indicators of the environmental management plan shall be the main work at this stage and the main result of the project's detailed environmental and social impact assessment report.

Detailed environmental impact assessment reports are usually developed with multi-page professional and technical terms, depending on the scope of the project, the scope of the assessment research, and the detailed assessment work.

Therefore, the non-technical summary shall be developed in understandable simple language for the public and stakeholders, including all the main results of the detailed impact assessment work, measures to mitigate, prevent and eliminate adverse effects, and the main purpose of the environmental management plan and shall be attached to the report.

The structure and content of the detailed environmental impact assessment report shall be as follows, reflecting general information requirements.

3.7 Content and format of the detailed environmental impact assessment report

1. A non-technical summary of the report: This section shall provide brief information on the current state of the environment in the project area, and develop a summary to provide a comprehensive understanding of the project, its site environment, project impact, and impact mitigation measures. The summary shall highlight uncertain project issues and their potential adverse impacts on the environment. Appropriate permits required for the implementation of the project must be stated and written in a form that is understandable to the public.

Non-technical summaries shall be written concisely, avoiding professional and technical terminology as much as possible, and must have a simple and easy composition.

2. Introduction: The main purpose of the detailed environmental impact assessment of the project, the work was done within the framework of the detailed assessment, the main results of the assessment research and the issues to be considered at the project implementer, local and decision-making levels shall be clearly stated.

3. Scope of the activities: The current environmental protection law related to project activities, legal environment, prohibited and restricted provisions of the law that must be followed during the project implementation, rules, regulations, standards issued by state authorities, the relevant requirements of the conventions to which Mongolia is a party shall be clearly stated.

4. Project Description: Feasibility study report, design parameters, and layouts, other relevant documents including the main purpose, scope, size, project implementation phase, raw material, and natural resource use, energy, water, heat demand, technical and technological selection, production capacity, final and intermediate production, waste, emissions, recycling and disposal methods, etc., shall be clarified.

This section may include the results of an environmental, sustainability, and green development analysis conducted in the project document.

5. Main and potential adverse impacts and assessments of the project: Environment that will be affected by the main and potential adverse impacts of the project, such as subsoil, air, surface and groundwater, soil cover, vegetation cover, fauna, special protection areas, historic and cultural monuments, adverse impact on the social situation and health of the citizens of the project implementation area shall be reflected in each direction. In addition, quantitative and qualitative assessment results by identifying the intensity, distribution, and extent of these main and potential adverse impacts shall be reflected. The results of the assessment research, methods used to identify and assess main and potential impacts, modeling, and calculation shall be reflected and explained in detail on the basis of the selection. Shall clearly describe the data collected during the assessment research and the source of the measurements used during the field survey, also originals shall be attached to the report and certified by photographs and recordings.

The requirements of this methodology shall be addressed systematically, by analyzing the main and potential adverse effects of the identified project, potential indirect and secondary adverse effects shall be identified and a summary shall be provided.

6. Measures to prevent, mitigate, eliminate and provide compensatory protection for adverse impacts: Shall reflect the mitigation measures identified for each of the following, major and potential adverse impacts identified during the project implementation, surface, subsoil, air, surface and groundwater, soil cover, vegetation cover, fauna, special protection area, historical and cultural monuments, the social and health status of the citizens of the project area that will be affected.

Shall analyze main and potential mitigation measures by categorizing them into prevention, mitigation techniques, technologies, management, rehabilitation (closing objectives in case of mining projects), compensatory conservation, and include specific recommendations for improving their results, ensuring coherence and returns.

7. Risk assessment and management: The assessment of natural hazards, disasters, industrial accidents, and risks that may occur during the implementation of the project shall be conducted in accordance with the methodology approved by the relevant authorities, and preventive measures shall be identified and reflected in this section.

8. Main results and conclusion: The main results of the detailed environmental impact assessment or main and potential adverse impacts on the environmental, social, historical and cultural values of the project area during the project implementation, their prevention, and mitigation, the main measures to be taken to eliminate, rehabilitate and compensate for the consequences, the objectives of the project closure, the main subjects of resettlement, compensation, and monitoring, and its indicators shall be compiled and reflected in this section.

In addition, issues that need to be addressed during the project implementation, such as environmental protection and the protection of the interests of local people shall be reflected, and conclusions and recommendations on how to make the project more effective shall be developed.

9. Materials used: All data, materials, internet and social media information collected during the desk and field surveys of the detailed environmental impact assessment, along with their sources shall be listed. A note of which part in the ESIA report it has been used shall be made.

SECTION 4

METHODOLOGY FOR ENVIRONMENTAL MANAGEMENT PLAN DEVELOPMENT

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4.1 The purpose and requirements of the environmental management plan

The environmental management plan is the legal document with the primary purpose of the protection, rational use and rehabilitation of the environment in the project area, implementation of strategic assessment recommendations, mitigation, elimination and prevention of adverse impacts identified in the detailed impact assessment, and monitoring and detection of potential adverse effects in the project implementation environment.

According to the revised version of the law on environmental impact assessment, during the implementation of any project, an environmental management plan (hereinafter referred to as EMP) shall be developed based on the results of the detailed environmental impact assessment performed by a professional organization-authorized business entity, therefore consulting with the project implementer, the project implementer shall be responsible for reviewing the general assessment by the organization that conducted it and ensuring its implementation after approval. The state central administrative body in charge of nature and environment is responsible for regularly monitoring the implementation of the project by approving the project's environmental management plan, issuing permits for project implementation, reviewing the annual implementation report and approving the next year's plan.

In addition, local rangers, state environmental inspectors, governors of all levels, state central administrative bodies, and environmental non-governmental organizations have the right to monitor the implementation of the environmental management plan, also required to disclose relevant information and make it possible to monitor according to a specific schedule.

Shall use the following sequence and steps to develop and discuss EMP that meets the above objectives and requirements, and research the general and special requirements and methodologies used by international banks and financial institutions in this field to use them in accordance with the laws, economy, traditions, customs, and specifics of their own country.

4.2 Structure and content of the environmental management plan

An environmental management plan (EMP) consists of an environmental protection plan and an environmental monitoring program, and the environmental protection plan that reflects measures to mitigate and eliminate the adverse impacts identified by the environmental impact assessment, compensatory conservation, time frame for their implementation, and required capital expenditures, also the environmental monitoring program shall have a content structure that monitors, analyzes and reports on changes in the state of the environment as a result of the project activities, and shall identify the methods, means, costs, and timing required for its implementation.

The process of developing an environmental management plan starts with the impact assessment research and the identification of project prevention, mitigation, and elimination measures, and continues until it is presented to stakeholders for discussion and approval.

Developing management plan is based on a common understanding with the project implementer, decision-maker, supervisor and other stakeholders on the main and potential adverse impact of the project identified by the impact assessment research, its prevention, mitigation, minimization, rehabilitation, and monitoring, thus this will require time, but it is important for avoiding misunderstandings and additional costs during the project implementation.

The environmental management plan shall have the following main components.

These include:

- Mitigation of the direct and indirect adverse impact of the project, resulting in elimination and rehabilitation activities reflected in the environmental protection plan (EPP)
- Environmental monitoring throughout the entire duration of the project in order to take additional measurements when necessary, like whether the measures outlined in the project's conservation plan was effective.

The environmental protection plan includes an action plan to prevent, mitigate and eliminate the adverse impacts of the project identified in the environmental impact assessment, chemical risk management plan, rehabilitation, and landscaping (progress) plan, resettlement, and compensation plan, historical and cultural heritage protection plan, plan to report on the progress and results of the implementation of the environmental management plan to the relevant government agencies and the public, human resources to implement an environmental management plan, environmental management organizational scheme, biodiversity compensatory conservation action plan for petroleum, mining and radioactive minerals projects, closing objectives and rehabilitation action plan for mining projects.

The environmental monitoring program shall define the main and potential environmental components of the project, the quantities and indicators to be measured in the context of the distribution of adverse effects and consequences, and the methods, location, time, frequency of analysis, reporting of results, methods of its implementation, required funds and expenses, and the timing of sampling, measurement, and analysis of the environment.

The results of the environmental monitoring program over a certain amount of time shall be compared with the baseline information on the environment, human health, and social status prior to project implementation, therefore changes due to project implementation shall be reported at regular intervals and a time limit for notifying stakeholders shall be included. It may also include quantitative and qualitative indicators to determine the results of elimination, remediation, detoxification, and mitigation measures of some adverse impacts, and legislation and standards to be followed by the project implementer.

4.3 Developing an environmental management plan

At this stage, mitigation of main and potential project impacts, measures to eliminate the consequences, to prevent the adverse impact, to mitigate and eliminate the negative impact; rehabilitation, compensation, resettlement and compensatory conservation measures; measures to protect historical and cultural heritage; compensatory conservation for biodiversity in the case of oil, mining and radioactive mining projects; in the case of a mining project, the closure objectives, and rehabilitation measures shall be all categorized and developed based on the results of a detailed impact assessment which determined the main purpose and criteria. The main purpose, measures, scope, and criteria of the environmental management plan included in the assessment report shall be rereviewed and refined in accordance with the recommendations made during the local and public consultations. The main technical and economic rationale of measures and the required estimated costs shall be identified, the standards and norms to be followed during the implementation shall be clarified, and a project management plan shall be developed.

An environmental management plan shall be developed in accordance with the following steps.

These include:

- Determined in detail the size and scope of the works including measures to prevent, mitigate and eliminate consequences of the adverse impacts, rehabilitation, compensatory conservation, resettlement compensation measures, protection of historical and cultural heritage, biodiversity compensatory conservation measures for oil, mining and radioactive mining projects identified during the detailed environmental impact assessment phase;
- Determining the cost of the above measures based on the real market price;
- Clarifying the timing and frequency of the measurements.
- Specifying the legal norms and standards to be followed during implementation;
- Determining the supervisory authority and responsible person to be responsible for the implementation, participation, and control of the measurement;
- Identifying the criteria for measuring changes in the environmental conditions that may be affected by the adverse impacts of the project, social and public health indicators, and the form and timing of the reporting.
- Determining the estimated cost of performing environmental monitoring activities.

The above measurements, their unit of measurement, the total amount of work, cost, responsible person, and standards to be followed shall be included in the planning table. In addition, the human resources responsible for the implementation of the project management's environmental management plan, the environmental management structure, the management structure scheme, and the schedule for reporting and disseminating the progress and results to the relevant organizations, parties, and the public shall be developed jointly.

The major components and content of the environmental management plan are outlined below.

These include:

1. Main purpose and scope of the environmental management plan: Shall briefly mention the main and potential adverse impacts identified by the detailed environmental impact assessment and their mitigation measures, the environmental and social status and features, the main purpose, capacity, technology, use of raw materials, type and amount of waste, emissions of the project. Therefore, it shall clearly outline the main focus, main purpose, scope, and principles to be followed in environmental management activities.

It is also important to include the costs of implementing the management plan, the combined expenditures of implementing the environmental and social impact monitoring program, and specify their sources.

3. Adverse impact mitigation plan: Measures identified during a detailed environmental impact assessment to mitigate the main and potential adverse impacts of the project, to prevent and eliminate its consequences, the timeframe for their implementation, the budget to be spent, and the legal documents to be followed shall be defined, consolidated and reflected. The original plan shall have the following format.

Main and potential adverse effects	Preventive, mitigating and remedial measures	The scope and size of the measurement	Unit cost	Total cost (million. MNT)	Implementation time and frequency	Standards and methodologies to be followed

3. Rehabilitation plan: Damages to the subsoil, surface, soil, surface water network and vegetation cover of the project area during the implementation of the project shall be subject to technical and biological rehabilitation measures and the amount of rehabilitation work and related costs shall be calculated and reflected in detail in accordance with the procedures, methodologies and standard requirements approved by the state central administrative body. Relevant standards in force during the development of mineral prospecting and mining project plans, such as "Environment. Rehabilitation of disturbed land. Terms and definitions." MNS 5914-2008; "Classification of land disturbed by mining operations" / MNS 5915-2008 /; "Stripping and storage of fertile soil during earthworks / MNS 5916-2008 /; "Rehabilitation of land disturbed by mining operations, General Technical requirements / MNS 5917-2008 /; "Vegetation of disturbed lands, General technical requirements" / MNS 5918-2008 /; Including environmental protection and rehabilitation standards for oil-related activities, etc. The original plan shall have the following format.

Purpose of the rehabilitation	Rehabilitation measures	The size and scope of the measurement	Unit cost	Total cost (million)	Implementation time and frequency	Standards and methodologies to be followed

4. Biodiversity compensatory conservation plan: Shall identify and implement an action plan to compensate for biodiversity in areas that are ecologically similar to the land, that cannot be rehabilitated because of the residual effects of oil, mining, and radioactive minerals. The original plan shall have the following format.

Compensatory conservation objectives	Conservation measures	The scope and size of the measurement	Unit cost	Total cost (million.MNT)	Implementation time and frequency	Standards and methodologies to be followed

5. Resettlement and compensation plan: A resettlement plan shall be developed if it is necessary to relocate citizens, residents, households, and organizations located in the industrial and intense negative impact zones of the project. In doing so, shall specify and reflect when compensation will be paid to them and when resettlement will take place, considering their suggestions. The original plan shall have the following format.

Citizens that will be affected	Resettlement measures	The scope and size of the measurement	Unit cost	Total cost (million.MNT)	Implementation time and frequency	Standards and methodologies to be followed

6. Historical and cultural heritage protection plan: Shall develop a plan for the protection of historical and cultural heritage based on information about historical and cultural monuments from local people and relevant organizations, archeological research, historical and cultural heritage research conducted in and around the project areas. The plan shall reflect measures for the construction and operation of industrial infrastructure and measures to protect the historical and cultural heritage identified during the operation. The original plan shall have the following format.

Historical and cultural heritages that will be affected	Conservation measures	The scope and size of the measurement	Unit cost	Total cost (million MNT)	Implementation time and frequency	Standards and methodologies to be followed

7. Accident and risk management plan: Natural hazards identified according to the methodology approved in this plan, possible natural disasters identified by the disaster assessment, measures to be taken to prevent them, the amount of work, required expenditures, standards to be followed to prevent the loss of hazardous and toxic chemicals identified as a result of chemical risk assessment shall be reflected here. The original plan shall have the following format.

Potential hazards and adverse effects	Prevention and protection measures	The scope and size of the measurement	Unit cost	Total cost (million.MNT)	Implementation time and frequency	Standards and methodologies to be followed

8. Environmental Monitoring Program (EMP): The environmental components that will be and maybe affected, indicators to determine their condition, the main indicators of the livelihood, social and health status of the people living in the project implementation area, their measurement and sampling methods, and location of control points, timing, and frequency of monitoring shall be determined and included in the environmental monitoring program. Also, the unit of measurement, unit price, total cost, standards, and methodologies to be followed shall be reflected. The original plan shall have the following format

Indicators for monitoring	Unit of measurement	Location	Time and repetition	Scope of monitoring work	Unit cost, thousands/ MNT	Total cost, million MNT/year	Standards and methods to be followed	Top and bottom limit

9. Schedule for reporting and discussion of EMP and its implementation to stakeholders: The project implementer shall submit an annual report on the implementation of the EMP to the state central administrative body in charge of nature and environment and shall submit semi-annual reports on the implementation of the annual environmental management plan to state environmental inspectors, local inspectors, governors of all levels and non-governmental environmental organizations. In addition, to soum and administrative subdivision’s Citizens' Khural of the project area EMP implementation briefings shall be conducted semi-annually. The schedule for reporting and discussing the implementation of the EMP shall be set according to the table below.

Institutions to report and discuss environmental management plan implementation	Original form of reporting and discussion	Information content	Date	The direction of getting feedback through discussion	Place of organization

4.4 Ensuring public participation in the development of environmental management plans

Ensuring as wide as possible public participation within the limits specified in the legislation in the development of the environmental management plan, especially the participation of local people and local organizations that may be adversely affected by the project, and providing them with clear, accurate and authentic information, exploring and reflecting opinions on protection of their rights that may be violated shall be the main purpose of this stage.

The entity conducting the detailed impact assessment in collaboration with the project implementer shall prepare and distribute a series of reports, leaflets, and materials about the information on the environmental, socio-economic and health status of the residents in the potential impact zone, main technical and economic indicators of the planned project, main

and potential adverse impacts of the project, the extent of the impact, measures of its prevention, mitigation and elimination of the adverse consequences, accurate and factual information on the main purpose, scope and implementation measures of the environmental management plan. It also shall provide an opportunity to get acquainted with the original report.

After this the preliminary delivery schedule will be presented to them in person about the information on the measures to mitigate the main and potential adverse impacts of the project, measures to prevent, eliminate, rehabilitate, compensate conservation, relocate and compensate, project programs for the protection of historical and cultural heritage and environmental monitoring, the implementation of the environmental management plan.

In this way, after providing sufficient information on the project and its main and potential adverse impacts, measures to prevent, reduce, mitigate and eliminate the negative consequences, their opinions on the above measures shall be taken in accordance with a specially prepared questionnaire that will be reflected in the environmental management plan.

The results of the research shall be summarized and the issues raised shall be considered in detail in the development of the environmental protection plan. The environmental monitoring program and the necessary measures shall be included and introduced in the environmental management plan.

The completed work to ensure public participation and the research process shall be documented and attached to the impact assessment report.

4.5 Developing an annual environmental management plan (EMP).

The organization which conducted the detailed impact assessment of the project shall be required to develop the project implementer's project annual environmental management plan (PAEMP). It is the process of identifying and planning activities for this year based on the project planning and annual action plan of that year (an annual exploration and mining plan in case of the mining project) with measures identified by a detailed environmental impact assessment to prevent and mitigate main and potential adverse impacts, eliminate negative consequences, rehabilitate, provide compensatory conservation and monitor.

The annual environmental management plan shall be developed in accordance with the steps outlined in Section 4.3 of this methodology and shall reflect the following things in detail.

These include:

4.5.1 Measures to be taken to mitigate and eliminate impacts, additional technical and technological measures, such as filtration, settling, cleaning, neutralization, demineralization, detoxification, refreshment, burial, incineration, emission, distillation, installation of additional equipment, etc.;

4.5.2 Works related to providing knowledge and skills regarding management, organization, and measures to be taken regarding internal procedures, training, advertising, making a report and news, reporting.

4.5.3 Works related to fulfilling the requirements of "Environmental management system-MNS ISO 14001: 2005" standard: shall provide employees with knowledge and information about the environment, shall assess potential risks, and train them in response to potential emergencies, etc.;

4.5.4 Expenditures required for mitigation and elimination activities, for example, expenditures required for process rehabilitation measures, expenditures required for solid and liquid waste types, volumes, sources, collection, storage, transportation, processing, cleaning, reuse, recycle, disposal, destruction and burial techniques, expenditures required for technical and technological measures for hazardous waste, expenditures required for management measures, expenditures required for fire prevention measures, expenditures required for potential hazards, accident prevention measures, capital expenditures required for the prevention of hazardous and toxic chemicals and the provision of first aid in the event of an accident, expenditures required for measures to be taken to protect the health and safety of employees.

4.5.5 Measures to prevent and relocate the population around the project implementation area from the adverse impacts and their required expenditures; measures to protect historical and cultural monuments, and their required expenditures;

4.5.6 Analytical methods to monitor water, soil and air pollution during the project implementation and any potential changes in each environmental component; time duration of monitoring, location of specimens and measurement points; consolidation and reporting of test results; the person responsible for the implementation of the program, and the expenditures of the implementation, etc.

The business entity that operated or project implementer shall submit the annual EMP implementation report together with the next year's EMP project by December 10 of each year in accordance with the planned measurements and submit it to the organization that conducted the general assessment.

The following shall be included in the annual EMP implementation report.

These include:

- Information and a brief introduction about the project implementer, government, administrative jurisdiction of the project area, infrastructure, road conditions, in what year did the operation start, number of years of operation, whether the project implementation is efficient, how many years it will be possible to operate in the future, the machinery and equipment used, and the workforce;
- Information on factory and mine operations, such as diagrams and brief descriptions of factory operations and technological sequences, information on adverse environmental impacts during the reporting year, size of newly mined land, adverse effects on air, soil, vegetation and aquatic environment, information on solid waste, hazardous and toxic wastes, notes on hazards, accidents and risks;
- Brief information on the environmental condition of the project area, for example, brief information on geographical zoning, geological formations, climate, climatic conditions, surface water networks, groundwater, soil, flora and fauna, and changes in them.

In addition, information and reports on environmental research initiated by the project implementer and conducted in and around the project implementation site, also reports and conclusions on the information analysis of environmental monitoring program may be attached.

SECTION 5

METHODOLOGY OF ANALYSIS IN THE DETAILED ENVIRONMENTAL IMPACT ASSESSMENT REPORT

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5.1 The Purpose

Assessment analysis is the most responsible process of making professional judgments and decisions on whether the business entity that conducted the detailed environmental impact assessment performed the assessment in accordance with the relevant laws and regulations, whether the assessment report is reasonable and accurate, and whether the environmental management plan is realistic.

This guideline aims to ensure that project implementer, the business entity that conducted the detailed impact assessment of the project and decision-makers have a common understanding of the assessment analysis, conduct the assessment analysis within the timeframe specified by law, and ensure transparency in the decision-making process on whether to implement the project or not.

5.2 Receiving the materials

The business entity that conducted the detailed assessment shall submit the following documents to the organization that conducted the general assessment with the consent of the project implementer.

These include:

- Request for the assessment analysis;
- General assessment performance report;
- Detailed assessment report;
- Environmental management plan (for 5 years);
- The environmental management plan of that year, etc.

The documents must be in printed or electronic format and both must be exactly the same. The electronic copy must meet the following requirements.

These include:

- The document must be converted to PDF format and the file size shall not exceed 50 MB;
- The accompanying image file must be converted to PDF format;
- The file name shall not exceed 15 characters(letters), etc.

The material receiving expert shall complete the checklist provided in Annex 1, verify whether both electronic and printed copies are the same, and then both parties shall confirm by signing.

5.3 Assessment analysis

A variety of international manuals on how to conduct assessment analysis have been developed, all of which use some form of checklist questionnaire. The purpose of the checklist method is to assist the expert and the Professional Council in drawing conclusions, deciding whether the detailed assessment report and the environmental management plan have been prepared correctly in accordance with the law. In particular, the following three objectives must be met.

These include:

- Whether the main and potential adverse impacts of the project was fully identified and the quantitative and qualitative indicators were accurately assessed;

- Whether the potential project alternative (geographically convenient location, the right technical and technological solution) was chosen correctly;
- Whether the measures to reduce, eliminate, and rehabilitate potential and adverse impacts of the project were planned realistically and whether their results can be monitored, etc.

If the checklist method is unable to provide a scientific or technical understanding of the accuracy of the research work performed during the assessment, and the expert is skeptical about the accuracy of the assessment on a particular issue, then appointing a qualified external expert and seeking assistance is fully open under the Law on Environmental Impact Assessment.

The checklist method consists of a questionnaire in the following components of the assessment report.

These include:

- Project description;
- The choice among alternatives;
- A description of the environment that may be affected by the project;
- A description of the main and potential impacts of the project;
- Description of mitigation measures;
- Non-technical summary, etc.

5.4 Decision of the detailed impact assessment

The expert assigned to conduct the assessment shall review the assessment report and the environmental management plan in detail and complete the checklist questionnaire. If more than 80 percent of the checklist questionnaire is considered satisfactory, the assessment expert shall draw a conclusion and submit it to the regular meeting of the professional council for discussion.

The Professional Council shall get acquainted with the review checklist and conclusion drawn by the expert, and make appropriate conclusions and project decisions. The conclusion and project decision of the Professional Council shall be signed and approved by the Chief Expert.

The decision shall take the following form:

These include:

- Approving the assessment report and allowing the project implementation under certain conditions. This condition will be a legally valid document;
- Returning the project to the project implementer,

  considering that the project needs additional research and information.
- If the Professional Council concludes that the quality of the detailed environmental impact assessment report of the project is poor, then it shall be refused to approve and returned to the business entity that performed the detailed assessment;
- If the Professional council concludes that the cost of implementing the project's environmental management plan is unreasonable or that the project is likely to cause significant or irreparable damage to the environment, then it shall be refused

to approve and returned to the entity that performed the detailed assessment by the project implementer.

5.5 Monitoring the implementation of the environmental impact assessment.

Government, administrations, public organizations, and citizens shall monitor the implementation of the environmental impact assessment in accordance with the certain conditions set forth in the general and detailed assessment decisions about avoiding, mitigating and eliminating adverse environmental impacts, and how the activities reflected in the environmental management plan are being implemented during the project implementation.

Public participation and citizen monitoring in the implementation of the impact assessment shall be carried out in the following ways.

These include:

- The local people and non-governmental organizations of the project implementation area shall voluntarily request to review the implementation of the environmental management plan. The project implementer shall maintain a valid copy of the impact assessment documentation at the branch office of the project area and provide citizens with access to information.
- The project implementer shall organize an open discussion among the local community on the implementation of the annual environmental management plan.
- Adverse impact on the living conditions and environment of the people living in that area during the project implementation, its proposals to reduce or eliminate shall be submitted to the specialized inspection agency of the respective territory for resolution.

Government monitoring shall take the following forms.

These include:

- Information report on the implementation of the environmental management plan of that year;
- External monitoring specified in Article 9.13 of the Law on Environmental Impact Assessment.
- Inspection by the specialized inspection agency of the respective territory based on citizen information;
- Environmental audit specified in Article 10.1 of the Law on Environmental Protection, if the project implementer is engaged in production and services that use natural resources;
- Financial audits and performance audits of the organization from the State Audit Office.

A copy of the inspection results conducted by the government organization shall be submitted to the government organization that conducted the general environmental impact assessment and shall be placed in the unified impact assessment database.

Annex 4. Checklist of the assessment analysis.

Project name:

Project implementation area and location:

Name and address of the project implementer:

Contact number and e-mail address:

Name and address of the company that performed the detailed environmental impact assessment for the project:

Contact number and e-mail address:

	The main criteria	Whether it is important	Whether it is satisfactory	Rationale and explanation
Compliance with assessment laws, regulations, and procedures	Whether details of the project implementer, location, site general planning, infrastructure solutions, techniques, technology, annual use of toxic and hazardous chemicals, purpose, capacity, duration of project phases, key economic indicators, closure, and rehabilitation are clearly reflected.			
	Whether the main and potential adverse impacts on the environmental and social situation of the project area were identified by conducting impact analysis on project documents.			
	Whether the main and potential adverse impacts were assessed using a specific methodology and the extent, intensity, and level of adverse impacts are estimated, and the alternative with the least adverse impacts is identified.			
	Whether measures to prevent, reduce to the minimum, eliminate the consequences of adverse impacts are identified.			
	Whether mitigation measures for residual impacts of biodiversity are identified.			
	Whether potential risks were identified and assessed by conducting a risk assessment			

	Whether an environmental management plan and a risk management plan are developed			
Whether the conclusion of the general assessment was developed within the framework of the assessment methodology	Whether a detailed environmental impact assessment was developed, considering the issues to be clarified, and the things to pay special attention to specified in the general assessment performance sheet during the detailed assessment			
	Whether the environmental baseline assessment fully covered the areas that may be affected in accordance with the scope and specifics of the planned project during the stage of development of policy documents and initial project documents specified in-laws and regulations			
	Whether the environmental baseline assessment was conducted in accordance with the latest scientific research methodologies and based on accurate information.			
	Whether measurements and sample were made according to the appropriate methodologies and standards during the assessment			
	Whether the methodology for processing the relevant information and the source of the information is clearly stated in the report			
	Whether the general requirements of international banks and financial institutions (World Bank, International Finance Corporation, European Bank for Reconstruction and Development, Asian Development Bank, etc.) were met			
Whether the results of the assessment are fully reflected in the report	Whether the results of the measurements and sampling are interpreted			
	Whether air, surface and groundwater modeling was performed and the results were interpreted			

	Whether official comments were taken from the project area administration and local people that will be affected by the project impact and whether those are included in the report.			
Sources of materials used in the assessment	Whether measurements, sampling, research, meetings, and interviews were confirmed by photographs and videos during the field research			

	The main criteria	**Whether it is important**	**Whether it is satisfactory**	**Rationale and explanation**
	Whether making measurement and sampling using internationally accepted field measurement and sampling equipment were confirmed by photographs or video			
	Whether an introduction of the instruments and equipment used for field measurement and sampling, a copy of the instrument required for certification, and a certificate issued by the certification body are attached.			
	Whether official laboratory results are attached			
	Whether the project implementation area administration, local communities that will be affected by the project and residents were formally consulted, whether the results of the discussion were photographed, videotaped, protocolled and recorded, and whether the official written comments were received			
Whether a detailed impact assessment report and its non-technical summary are developed	Whether the non-technical summary, which outlines the main results of the assessment, mitigation, prevention, and elimination measures and the main purpose of the environmental management plan was specially developed in simple language that is understandable to the public and stakeholders and attached to the report			
Mark				
General conclusion				

A detailed impact assessment report was analyzed by:

Name and Surname of Expert / Specialist:

Position:

Signature:

Date:

Reviewed by:

Name of the head /senior specialist of the Environmental Action Plan: Signature:

Date:

Annex 5

Methodology for environmental impact assessment in service sector projects

1.1 Features of the service sector and its consideration in impact assessment

The market is established and organized based on demand for any service since the activities of a service organization have a specific business purpose, aimed at meeting the needs of human society.

Services are evolving as an independent sector of the country, and the concept of "services" includes all activities except industry, agricultural production, and mining. In other words, a service is a set of activities that involve a certain cost that aimed at meeting the needs of consumers.

Services are divided into four categories: consumptive, social, productive, and distributive. Services differ from physical products having intangible, indivisible, mixed, non-dispersible, or nonscorable features.

The state central administrative body in charge of nature and environment issues the right to conduct detailed environmental impact assessments in four areas: mining, infrastructure, agricultural production, and services. Therefore, the ESIA methodology in the service sector was chosen because it must be closely coordinated with the above direction.

Tourism is the type of service that causes the most environmental problems out of all service organizations and differs from the urban service sector in many aspects, such as purpose, services, scope, and location.

Tourism activities are highly seasonal and are based on special protection and scenic areas, which can have certain adverse impacts on the environment. Therefore, it is important to identify in detail the potential adverse impacts within the framework of the ESIA and implement mitigation and elimination measures with optimal planning.

The main issues to consider of a tourism project's ESIA is the project's location, facilities, capacity, site capacity, and travel itinerary, etc. Tourism is also the main source of additional economic benefits for people living in the special protection areas and their surroundings. Therefore, it is crucial to realistically assess the participation of local people, natural resources, and especially the capacity of special protection areas in the development of tourism, based on the results of the ESIA. It is also necessary to assess how the traveling

program and itinerary are coordinated with conservation purposes and guidelines for the protection of natural treasures.

1.2 General Environmental Impact Assessment

The general environmental impact assessment is the process of predicting the adverse environmental impacts of the project, that determines whether further ESIAs are required, and is conducted based on legislation, research materials, technology, standards, norms, normative, initial data and data at the initial stage of project planning.

1.2.1 Contractor in charge of general environmental impact assessment

The state central administrative body in charge of nature and environment and the expert of the Capital City Governor's Office shall be responsible for conducting a general environmental impact assessment in accordance with the classification specified in the Annex to the Law of Mongolia " on Environmental Impact Assessment", depending on the scope of the project.

Experts of the state central administrative body in charge of nature and environment shall conduct a general environmental impact assessment of the project to be implemented within the boundaries of the state special protection area according to the classification specified in the appendix to the Law of Mongolia "on Environmental Impact Assessment". Local experts shall conduct a general environmental impact assessment of the project implementation territories of aimags, the capital city, soums, and districts under the local protection of the Citizens' Representatives Khural.

1.2.2 Requesting a general assessment of the service project

Citizens and business entities shall submit the following documents to the state central administrative body in charge of nature and environment for general assessment. These include:

- Request for a general assessment from the project implementer / official letter /;
- Feasibility study and diagram approved by the relevant authority;
- Whether it is reflected in the land management plan and program of that year/land use permit, proposal of the Security administration if it will be located in the Special Protection Area /;
- Brief description of the project;
- Description of the environmental baseline of the project implementation area / environmental baseline assessment report if it will be located in the Special Protected Area /;
- Reference from the soum or district governor;
- Copy of business entity certificate / must be notarized /;

The general assessment shall be conducted by an expert appointed by the decision of the state central administrative body in charge of nature and environment.

1.2.3 Issues to consider when conducting a general environmental impact assessment

The following issues shall be considered by the expert when conducting a general environmental impact assessment of a project in a special protection area. These include:

1. Whether the project complies with the requirements of the Law of Mongolia "On Special Protected Areas" and "On Buffer Zones Around Special Protected Areas" and other legislation;
2. Whether and to what extent do the documents of Mongolian citizens, business entities and organizations intending to use the special protection area for a specific purpose, terms and conditions meet the current legal requirements;
3. How the project will change the environmental baseline of the special protection area, the adverse impact on biodiversity, and the natural appearance of the special protection area;
4. How the project activities will affect Restricted zones of Nature Reserve and National Parks, and historical and cultural monuments such as unique natural formations, geological sediments, very rare and endangered species of animals and plant species, tombs, petroglyphs, manure of ancient people and traces of stone weapon production, inscriptions, stone statues of deer and man, ruins of ancient cities and towns located in the territory of natural resources and monument areas.

In addition, issues such as determining the itinerary of the trip, selecting a reliable source of water supply, disposing of solid waste and domestic wastewater without harming the environment, determining the correct location of sewers, waste dumps, and latrines, as well as the leveling, repairing and rehabilitating the damaged area during the construction of the buildings, networks, roads, sewers, latrines and parking lots shall be considered.

Most of the tourism projects implemented in our country are located in special protection areas. For example, Bogd Khan Uul nature reserve, Khuvsgul, and Gorkhi-Terelj national parks are home to tourist camps. Therefore, the specific requirements of the special protection area, protection regimes and environmental specificity of the environmental impact assessment of a tourism project shall be considered, as well as whether there is a regional cumulative impact on these areas and, if there is, a cumulative impact assessment is required.

The expert in charge of the general assessment shall summarize the results of the assessment, considering the above issues, in accordance with the "General Assessment Performance Sheet" set out in Annex 2 of the General Environmental Impact Assessment Methodology.

1.3 Detailed environmental impact assessment

A detailed environmental impact assessment is the process of identifying measurements to mitigate and eliminate potential adverse impacts of the project implementation on the environment, society, and human health and determining the optimal project alternative.

1.3.1 Research of the detailed environmental assessment

The following tasks shall be performed during the research phase of the detailed environmental impact assessment. These include:

- To get acquainted with the relevant documents such as feasibility study, design, project location, outline map of the project implementation area, land use permit, description of the environmental baseline of the project implementation area, and proposal of the Security administration if it will be located in the Special Protection Area;
- Research the policies, laws, and regulations related to the project;

- Conduct environmental baseline research in the project implementation area, clarify detailed basic information on social and population health indicators in the course of the research, confirm the information collected by the results of field measurements, census, observations, research, photographs, geographical coordinates, laboratory analysis and based on topographic and geographic information system maps;
- If located in a special protection area, an environmental baseline report shall be prepared based on the results of research and analysis;
- Identify and assess potential and main adverse impacts of the project on the environment, society, and human health;
- To get public feedback from the relevant organizations in the project area, local people, and the public who may be affected by the adverse impacts of the project, etc.

In case of a tourism project, an environmental assessment shall be conducted within the framework of the ESIA and the natural conditions and environmental features to be considered in the future shall be determined based on the basic environmental conditions of the project implementation area, such as geography, geology, climate, soil, water, air quality, surface and groundwater, soil cover, vegetation cover, fauna, as well as local people, residents and the current level of their social and economic development, health, natural, historical and cultural heritage.

The research of a detailed assessment shall be conducted in accordance with the general methodology for environmental impact assessment.

During the environmental baseline assessment meetings and discussions with the administration of the project area and citizens who may be affected by the project shall be organized, a public opinion poll shall be taken, and information about the project shall be provided in the first stage of project planning in a way that is as accessible and open as possible in accordance with the culture and customs of the project area.

In the first phase of the ESIA, public disclosure of the project's strengths and weaknesses will enable the public to discuss, draw conclusions and express their views openly about any issues that may arise during the implementation of the project.

1.3.2 Identifying potential and main adverse impacts of the project

The tourism project incorporates the diversity and variety of the service sector and is based on the special protection area and the natural beauty of the water and vegetation; thus, the rapid development and over-concentration of the tourism sector alters the ecosystem and environmental baseline of the special protection area and disturbs the native land due to overcrowding. Also, a lack of public toilets along intercity and local roads, or a limited number of locked public toilets result in urinating in public, as well as littering due to an insufficient number of bins, etc., causes environmental pollution when organizing a route trip. Therefore, the specialists and experts of the business entity authorized to conduct the detailed environmental impact assessment shall get acquainted in detail with the project documents, description, feasibility study, design, travel itinerary, and work guidelines to determine the potential and main adverse impacts of the project.

When determining the potential and main adverse impacts of the project, whether there are any historical, cultural values, monuments, areas under state and local special protection, and natural beauty that may be adversely affected in and around the project implementation area shall be clarified.

1.3.3 Assessing potential and main adverse impacts of the project

The potential and main adverse impacts of the project shall be assessed using methods common to Mongolian law and international law about adverse impacts on the environment, local residents, historical and cultural heritage, intensity, extent, direct and indirect impacts, and potential cumulative impacts.

These include dedicated or expert assessment methods, guideline-manual methods, checklist methods, matrix methods, timing, and spatial overlap mapping methods of geographic information systems, networking, schema methods, risk assessment methods, cumulative impact assessment methods, cost/efficiency assessment method, mathematical modeling methods, etc. which all have their own advantages and disadvantages, therefore they shall be selected and used according to the situation.

The main definitions, purposes, sources, and results of the above methods are clearly reflected in the General Methodology for Environmental Impact Assessment, as can be seen there.

1.3.4 Identifying measures to mitigate and eliminate the adverse impacts

Environmentally friendly and advanced techniques and technologies shall be used when identifying the mitigation and elimination measures to determine the main and potential adverse impacts of the project, and the measures to eliminate the adverse consequences, project activities shall not exceed the norms established by laws, regulations, standards, and normative and shall not endanger the health of employees and the population of the project implementation area.

Measures to compensate for the damages occurred in the event of devaluation of natural resources, pollution, erosion, damage to the environment shall also be applied to mitigation and elimination measures.

The detailed environmental impact assessment report shall describe in detail the mitigation and elimination measures for each and every environmental component and develop recommendations, as well as realistically calculate the expenditure required for the measurements and reflect it in the environmental protection plan.

1.3.4 Compensatory conservation for biodiversity

In our country, the concept of compensatory conservation is a novelty, Article 3.1.11 and 9.6 of the Law on Environmental Impact Assessment included new provisions on compensatory conservation.

The main purpose of the compensatory conservation method is to preserve biodiversity and diversity and implement compensatory conservation measures by creating their living conditions in places and spaces other than the project area with research, planning, and organizing.

In order to provide compensatory conservation, first of all, it is necessary to determine the adverse impact of the project on the environment and find out where and what rare animals, plants, habitats, rivers, and pastures need to be protected based on scientifically sound research. Whether the animals, plants, and their habitats that need to be protected are being affected in the project implementation area and its impact zone shall be determined by mapping the areas of great importance for conservation, animals and plants and where, and how they can be protected shall be calculated.

The following three environmental protection principles shall be followed in the environmental impact assessment:

1. Avoid permitting the use of the areas of ecological value as much as possible;
2. Implementing mitigation and elimination measures;
3. Providing compensatory conservation for non-recoverable residual impacts (This means providing compensatory conservation for the other areas that are ecologically similar to the affected area)

1.3.5 Public participation in the detailed assessment process

Community-based activities outlined in the ESIA report shall be based on their feedback and criticism and the feasibility of the planned action and whether it will be sufficient to fully address the issues raised shall be determined.

In order to ensure public participation, project-related information shall be distributed in advance and announcements shall be delivered, meetings and discussions shall be held with project victims/stakeholders, information on when, where, and how the survey was conducted and Stakeholder Attendance information shall be attached to the report.

During the development of the environmental management plan, the proposals received from the project administration, citizens that may be affected by the project, and the public shall be compiled and reflected in the plan, and the criteria for those proposals' implementation shall be clarified.

Once the development of the ESIA report is finished, it shall be discussed at a public meeting of the project area, and the proposal of the project local government or Citizen's Representative's Khural shall be taken and attached to the report.

1.3.6 Environmental management plan

An environmental management plan shall be developed by an organization which conducted the ESIA in order to protect, rationally use and rehabilitate the environment in the project implementation area, mitigate, eliminate and prevent adverse impacts identified in the detailed impact assessment, and monitor and detect potential adverse impacts in the project implementation area.

According to the Law of Mongolia on Environmental Impact Assessment, permission to implement the project will be issued by the state central administrative body that has conducted the general assessment after approving the project's environmental management plan.

The environmental management plan shall consist of an environmental protection plan and an environmental monitoring program and shall be developed in accordance with the methodology approved by the state central administrative body in charge of nature and environment.

1.4 Criteria for project implementer

The following table summarizes the criteria that must be met and to be considered in the environmental impact assessment, as business entities engaged in tourism activities must meet certain criteria in order to protect the environment.

Criteria for project implementer during the EIA

Scope	Related items	Indicators
Legal environment	Tourism licensing	Must have obtained a license to conduct tourism activities in accordance with the Law on Business Licensing;

	Type of tourism	A certain type of tourism shall be chosen;
	Site selection for project implementation	Whether the project area is included in the special protection area and its buffer zone;
		Whether the relevant government agencies and other stakeholders believe that the species of the project implementation area needs to be protected as a matter of priority, even though it does not belong to the special protection area at the time
		Whether it complies with the "Law on Special Protected Areas" and the "Law on Buffer Zones Around Special Protected Areas"
		Whether the capacity of the special protection area where the project will be implemented was determined;
	Feasibility study or project and management plan	Must have a feasibility study or project development and management plan prior to commencing tourism activities;
Environment	Appropriateness of land use and land management	Shall operate in an authorized area;
		Shall not change the purpose of land use;
		Adverse impacts of the project on the environmental baseline and biodiversity;
		The density of tourist camps operating in special protection areas;
		Proper management of the land to be used for tourism;
	Vehicle	Type of vehicle to be used;
		Access to major tourist attractions and sites by vehicle;
		Adverse effects due to vehicles;

	Energy consumption and renewable energy	Energy source;
		Renewable energy use;
	Water consumption, water resources, and quality	Water supply sources and water consumption;
		Water resources, and quality
		Sewage drainage and cleaning technology
	Waste management	Whether there is a waste management plan;
		Location of the landfill (shall be placed at least 60 m from the guest house and building, below the prevailing wind);
		Whether the recyclable waste is planned to be sorted and supplied to the secondary raw material receiving warehouse;
	Biodiversity	Lack of biodiversity due to the activities of travelers and tourists;
		Impacts on biodiversity;
		Whether there are very rare and endangered species in the project area and its surroundings;
	Environmental protection management	Whether the construction of apartments, buildings, and tourism activities are planned in an environmentally friendly manner;
		Traffic signs and markings for tourist destinations and major exhibits;
		Whether eco-tourism products (paid travel services for tourists) will be implemented;
		Whether protection of the environment, historical and cultural heritage and traditional customs is planned
		Whether there is a disaster prevention plan;
Economy	Contribution to local development	Contribution to the local economy;
		Contribution to small and medium business development;
		Contribution to employment increase;

		Contribution to the protection and development of protected areas from fees and taxes paid by tourists;
	Project investment and economic potential	Guaranteed funds to finance the costs of environmental protection, pollution reduction, and elimination;
Society and human health	Social security and health	Whether it will be overcrowded;
		Whether it is planned to provide information and publicity about Law on special protected areas, rules and regulations and own activities;
		Whether protections of social security and human health are planned;
History and culture	History, culture, and customs	Whether the use of nomadic culture and traditions as a tourism product is optimally planned;
		Whether historical and cultural artifacts will be relocated;
		Whether preventions of the loss of traditional culture and customs and over-imitation of foreign cultures are planned.

THE END