

# Guide

## Environmental Impact Assessment Procedure for Mining Projects in Finland



TYÖ- JA ELINKEINOMINISTERIÖ  
ARBETS- OCH NÄRINGSMINISTERIET  
MINISTRY OF EMPLOYMENT AND THE ECONOMY

Environmental Impact Assessment Procedure for mining projects in Finland  
Cover picture: Suurikuusikko gold mine in Kittilä. Photo: Agnico Eagle Finland Oy.

# Contents

<b>Foreword</b> .....	5
<b>1 Introduction</b> .....	8
<b>2 The framework for the EIA procedure</b> .....	10
2.1 Objectives and key principles.....	10
2.2 Applicability of the EIA procedure to mining projects.....	13
2.3 Linkages with planning and decision-making processes for mining projects.....	14
<b>3 Main phases of the eia procedure</b> .....	19
3.1 EIA procedure in general.....	19
3.2 EIA programmes .....	22
3.3 EIA reports .....	23
3.4 Participation .....	25
<b>4 The EIA procedure</b> .....	28
4.1 Project description.....	28
4.2 Defining alternatives.....	31
4.3 Describing the present state of the environment .....	34
4.4 Assessing impacts .....	36
4.4.1 Methods for identifying and assessing impacts .....	36
4.4.2 The extent, scope and significance of impacts and cumulative impacts .....	37
4.4.3 Deficiencies and uncertainty factors.....	41
4.5 Assessing environmental impacts .....	42
4.5.1 Emissions generated by mining projects .....	42
4.5.2 Impacts on the natural environment .....	43
4.5.3 Impacts on people.....	46
4.5.4 Impacts on land use, traffic, landscape and cultural heritage .....	47
4.5.5 Other impacts.....	50
4.6 Comparing alternatives .....	51
4.7 Arranging participation in the EIA procedure.....	52
Principles.....	52
Plans for how public participation will be arranged .....	54
Cooperation with municipalities and other authorities.....	54

4.8	Other requirements.....	56
4.8.1	Preventing and limiting adverse environmental impacts.....	56
4.8.2	Organising monitoring.....	57
4.8.3	How official statements on EIA programmes should be considered .....	57
4.8.4.	Mining projects that do not require the EIA procedure .....	57
<b>Appendices</b>	.....	<b>58</b>

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<p><b>Title</b>          Guide: Environmental Impact Assessment Procedure for mining projects in Finland</p>	
<p><b>Summary</b></p> <p>The purpose of the Environmental Impact Assessment (EIA) procedure is to generate information on the environmental impacts of a project, facilitate the consideration of environmental issues in planning and decision-making processes, and give the public and other stakeholders opportunities to participate in and affect these processes. An EIA must be conducted for all mining projects that may have significant adverse environmental impacts. The developer is responsible for investigating and assessing the environmental impacts of the project. The EIA procedure has two main phases, resulting in the publication of an EIA programme and an EIA report. The EIA procedure is defined by law. The most essential steps in the EIA procedure include: a description of the project; the defining and comparison of project alternatives; a description of the environment in the area concerned; an assessment of the impacts of the project; and the arranging of public participation. Impact assessments should cover the entire life cycle of the project from the opening of the mine to its closure. They must assess impacts on nature, human beings and the built environment. They should also cover exceptional situations, environmental accidents, and means to mitigate adverse impacts.</p> <p>The comparison of the project alternatives is an essential part of the EIA procedure. One alternative should be the “no-action” alternative. The other alternatives may differ with regard to mining techniques, the quantities of rock mined, energy usage and emission levels, for instance. The assessment should also define the cumulative impacts of the project together with those of other relevant existing or planned projects. The actual approval of the project and the conditions for operation are defined through separate permit procedures in accordance with the related legislation and land use planning procedures. Already at an early stage the developer should consider what information will be necessary for the project’s permit procedures. The EIA procedure takes place during the early phase of the life cycle of the mining project.</p> <p>Contact person: Director for Mining and Metallurgical Industry in the Ministry of Employment and the Economy, Finland. Prof. Kirsti Loukola-Ruskeeniemi, e-mail <a href="mailto:kirsti.loukola-ruskeeniemi(at)tem.fi">kirsti.loukola-ruskeeniemi(at)tem.fi</a>.</p>	
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## Foreword

The previous guide to the environmental impact assessment (EIA) procedure for mining projects in Finland was published in 1999. Since then the related legislation has changed, and a lot has been learnt from experience through studies of environmental impacts and their assessment. The environmental impacts of mining activity in Finland have made the headlines in recent years, and conflicts with other local livelihoods have also been highlighted. We hope that this new guide will clarify and improve the situation. The guide is primarily intended for mining project developers, but it will hopefully also be of use to other parties involved in EIAs. EIAs work best when they are closely linked to the planning processes for mining developments. A well-produced EIA can mitigate or prevent adverse impacts. Early assessment of the impacts of project alternatives can also reduce the total costs of a mining project.

In accordance with Finland's EIA Act, overall responsibility for the implementation, monitoring and development of the Act is held by the Ministry of the Environment. Other ministries guide and monitor the implementation of the Act and take responsibility for the development of the assessment in their respective spheres, and they may, if necessary, issue guidelines on the application of the assessment procedure. The Ministry of Employment and the Economy assigned a widely-based steering group to produce this guide on the EIA procedure for mining projects in Finland. The steering group was chaired by Kirsti Loukola-Ruskeeniemi, director for the mining and metallurgical industry at the Ministry of Employment and the Economy. Seija Rantakallio, ministerial adviser from the Ministry of the Environment served as vice-chair. Chief Scientist Tommi Kauppila from the Geological Survey of Finland (GTK) served as the group's secretary.

Other participants in the steering group's meetings included: Division Manager Raimo Nevalainen from GTK; Head of Unit Sari Myllyoja and Senior Adviser Unto Ritvanen from the Kainuu ELY Centre; Head of Unit Anders Jansson from the Finnish Transport Agency; Transport and Infrastructure Director Jaakko Ylinampa from the Lapland ELY Centre; Leading Expert Jorma Jantunen from the Finnish Environment Institute; Lawyer Johanna Korpi and Land Use Rights Expert Pekka Pamppunen from Metsähallitus; Talvivaara Oy's Director for Sustainable Development Eeva Ruokonen and Yara Finland's HSEQ Manager Jouni Torssonen, as representatives of the Finnish mining association Finnmin; lawyers Leena Penttinen and Amanda Nikkilä from the Central Union of Agricultural Producers and Forest Owners (MTK); Expert Pertti Sundqvist and Senior Adviser Tapani Veistola from the Finnish Association for Nature Conservation; reindeer husbandry advisors Marja Anttonen and Sanna Hast and Executive Director Anne Olila from the Finnish Reindeer Herders' Association; and Veikko Virtanen from the municipality of Sodankylä. The steering group was also assisted by three experts from the Lapland ELY Centre: Head of the Environmental Protection Unit Tiina Kämäräinen, senior advisers Juhani Itkonen and Eira Järviluoma; and by Senior Expert Auri Koivuhuhta of the Kainuu ELY Centre. Many experts from the Ministry of the Environment have also contributed their comments, including Counsellor Lasse Tallskog and Environment Counsellor Saara Bäck.

The project group responsible for the practical production of the guide was led by Tommi Kauppila from GTK and Jorma Jantunen from the Finnish Environment Institute. Other project group members included senior scientists Päivi Kauppila and Marja Liisa Räisänen, Geologist Anna Tornivaara, Chief Scientist Antti Pasanen and Chief Geologist Hannu Makkonen from GTK; Research Professor Hannu Komulainen and Development Manager Tapani Kauppinen from the National Institute for Health and Welfare and Professor Hannu Törmä from Helsinki University's Ruralia Institute. The Finnish Environment Institute's representatives in the project group included senior research scientists Matti Leppänen, Jyri Mustajoki and Petri Ekholm, Researcher Sari Kauppi, Biologist Eija Kempainen, Head of Unit Anne Raunio, Research Manager Timo Huttula, and Leading Expert Mika Marttunen. The working group also produced a publication for GTK's research report series covering good practices and methods that can be used in environmental impact assessments of mining projects.

The material in this guide was circulated for comment within organisations represented in the steering group and also to the Finnish Safety and Chemicals Agency (TUKES), the Sámi Council of Finland, and consultants from Ahma Environment, Golder Associates, Agnico Eagle Finland and Ramboll Finland. Diskurssi Oy helped to organize the report. Thanks are also due to Eeva-Liisa Hallanaro for editing and language checking, Fran Weaver for English translations, Elvi Turtiainen for layout and graphic design, and Riitta Elo of the Ministry of Employment and the Economy for overseeing the publication's graphic design.

This guide is also available in Finnish.





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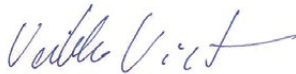
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# 1 Introduction

The environmental impact assessment (EIA) procedure for mining projects in Finland is based on national legislation set out in the EIA Act (468/1994) (Appendix 2) and the EIA Decree (713/2006) (Appendix 3). This guide aims to facilitate and harmonise the preparation of EIA programmes and EIA reports, and the quality of EIAs. It is particularly intended for mining project developers, project managers and experts, but it should also be of use to the authorities and other parties involved in an EIA procedure.

This guide outlines how the environmental impacts of proposed mining projects should be examined and assessed in line with the EIA procedure set out in the relevant Finnish legislation. It is divided into two main parts:

- A) **The framework for the EIA procedure and the main phases** (described in sections 2 and 3):
- \_ Section 2 examines the objectives and main principles of the EIA procedure, and defines the kinds of mining projects to which they apply. This section also covers the linkages between the EIA procedure and wider planning and decision-making processes relevant to mining projects.
  - \_ Section 3 describes the drafting of an EIA programme, the preparation of an EIA report, and arrangements for participation.
- B) **Key elements of the EIA procedure for mining projects** (described in section 4):  
Descriptions of projects and their various alternatives; assessments of the present state of the environment; assessments of the impacts of projects with comparisons between their various alternatives; and arrangements for the assessment process and related participation. This section also explains how each element of the EIA procedure should be incorporated into the preparation of the consequent EIA programme and EIA report.

Brief descriptions of other Finnish legislation relevant to mining projects are presented in Appendix 1. Definitions for key terms and abbreviations used in the guide are given in Appendix 6.

The guide also highlights the special features of EIAs conducted for mining projects. The information produced during EIAs is intended to facilitate the planning of mining projects and the related decision-making. As this guide emphasises, the EIA procedure is just one phase of the life cycle of a mining project. Many additional reports and evaluations assessing the impacts of a project will need to be made both before and after the EIA procedure.

A number of other guides and reports have previously been published covering ore prospecting and mining projects in Finland and their environmental impacts. Examples include a guide to ore prospecting in protected areas and in the homeland region of the indigenous Sámi People, a guide explaining how reindeer herding should be considered

in land use projects, and a guide on best environmental practices for metal ore mines. In parallel with the preparation of this guide, the Geological Survey of Finland is leading the preparation of a report that will examine EIAs for mining projects and the related methods and best practices in greater detail. It is intended that these guides and reports will complement each other to create a comprehensive set of publications focusing on different perspectives on the environmental impacts of mining and how they should be assessed. This guide also refers to certain other guides and reports addressing environmental issues in the context of mining projects.



Hari Töyhönen/Vastavalo.fi

## 2 The framework for the EIA procedure

### 2.1 Objectives and key principles

Extracts from the EIA act:

**Environmental impact refers to:**

*“...the direct and indirect effects inside and outside Finnish territory of a project or operations on:*

- a) human health, living conditions and amenity;*
- b) soil, water, air, climate, flora, organisms and biological diversity;*
- c) the urban structure, buildings, landscape, townscape and cultural heritage;*
- d) the utilization of natural resources; and*
- e) interactions between the factors referred to in subparagraphs a–d.” (EIA Act, Section 2)*

**The environmental impact assessment procedure refers to:**

*“... a procedure in accordance with Chapter 2 in which the environmental impact of certain projects is studied and assessed, and the views of the authorities and those parties whose circumstances or interests may be affected by the project, and corporations and foundations whose field of activity may be affected by the project are heard.” (EIA Act, Section 2)*

**The aim of the EIA Act is to:**

*“...further the assessment of environmental impact and the consistent consideration of this impact in planning and decision-making, and, at the same time, to increase the information available to citizens and their opportunities to participate.” (EIA Act, Section 1)*

The EIA procedure is a statutory procedure that applies to major projects that will have a significant impact on the environment, such as large mining projects. The EIA procedure forms part of project planning, and is conducted before any decisions are made to officially approve a proposed project. EIAs include:

- an assessment of the current state of the environment
- definitions of various project alternatives, assessments of their environmental impacts, and a comprehensive picture of the impacts of the project and its implementation alternatives, presented together with assessments of the scale and significance of such impacts
- plans for the mitigation of detrimental impacts
- the publication of an accurate and coherent EIA report

The purpose of an EIA procedure is to provide information on the environmental impacts of a project and its alternatives to assist the developer in the planning of the project, to create a robust basis for official decision-making, and to promote the participation of municipalities, the public and other stakeholders. The EIA procedure should thus support project planning, enhance the overall consideration of environmental aspects, and provide more information to municipalities, the public and the authorities, thereby

improving their opportunities to participate in project planning. EIAs seek to anticipate major environmental impacts, identify ways to prevent or mitigate such impacts, and facilitate the appropriate targeting of precautionary measures.

Key aspects of the EIA procedure include:

- broad participation
- the public availability of documents prepared during the EIA procedure (EIA programme, EIA report, and the statements and opinions of the competent authority<sup>1</sup> and other parties)
- a review of the various project alternatives
- a broad definition of the environmental impacts of the project (see the definition from the EIA Act above)
- an assessment of the environmental impacts that will occur during the various stages of the project (planning, construction and commissioning, operation, and closure).

It is important to seamlessly integrate the EIA procedure with wider planning and decision-making processes concerning the project. It is also important to note that the EIA procedure is just one phase of impact assessment over the entire life cycle of a mining project. Environmental studies and assessments are usually done before any EIA procedure is initiated, while more detailed reports and assessments are frequently required after the EIA procedure for purposes such as permit processes.

Effective dialogues between the developer of a mining project and other parties can enhance the information available to planners, the quality of the project plan, and the approvability of the project. From the developer's perspective, a well-managed EIA procedure can also be seen as part of the company's environmental management and corporate social responsibility work.

A high-quality EIA procedure can only be carried out if sufficient resources and expertise from various fields are utilised. For large-scale mining projects in particular, sufficient resources must be secured for extensive and demanding assessment processes and the related participation.

Mining projects of different types differ greatly with regard to their environmental impacts, feasible project alternatives, the potential for mitigating detrimental impacts, and the nature of the key interested parties and means to arrange for their participation. It is important to account for such special characteristics of individual mining projects in the related EIA procedure.

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<sup>1</sup> In Finland's EIA Act and Decree the term 'coordinating authority' is used, and is defined in section 2(1)(6) of the Act as "the authority ensuring that the environmental impact assessment procedure is carried out for the project". The term 'competent authority' means the same as coordinating authority in the context of the EIA procedure.

## DIFFERENT ORES AND MINING PROJECTS HAVE VERY DIFFERENT ENVIRONMENTAL IMPACTS

Because ore deposits differ in terms of their geological features and other characteristics, the impacts of mining projects can vary considerably. Metal mines, principally involving the extraction of ores rich in sulphides, i.e. compounds of sulphur and metal, can easily cause acidification in their surroundings. Limestone mines, such as those in Lohja and Lappeenranta, contrastingly reduce acidification in the soil due to the lime-rich dust they generate. It is vital that the EIA procedure identifies the most important environmental impacts associated with each ore type and each locality where an ore deposit is found.

## Responsibilities

**The developer** is responsible for assessing the environmental impacts of a mining project and drawing up the required reports. Developers usually employ one or more consultants to help in this work.

**The competent authority** responsible for the EIA procedure for mining projects – which in Finland is usually the relevant regional centre for economic development, transport and the environment (ELY centre) – must duly arrange official hearings with other public authorities and other stakeholders. The competent authority must also issue official statements on the EIA programme and on the EIA report and its acceptability.

The competent authority also takes responsibility for the public announcements required as part of the EIA procedure, and for obtaining any required statements and opinions. The competent authority is an impartial authority with regard to the interests of the developer, local residents and other stakeholders. The competent authority's role does not involve promoting or opposing the project.

The scheduling of the EIA procedure and other practical arrangements must be agreed between the developer and the competent authority.

## YOUR RESPONSIBILITIES AS A MINING PROJECT DEVELOPER

- You are responsible for the environmental impact assessment of the project and the associated costs.
- You should establish contact with the authorities, municipalities and local residents in good time, since the EIA procedure is an extensive public process much wider than the drafting of a report.
- It is also important to ensure in good time that your company has access to sufficient environmental expertise. In this context it is worth using the services of a professional consultancy agency with suitable expertise.
- You should also ensure that you reserve sufficient time and resources for the whole EIA procedure.
- You should coordinate and harmonise the EIA procedure with the planning of the mining project.

## 2.2 Applicability of the EIA procedure to mining projects

The need to conduct an EIA for any proposed project in Finland is evaluated on the basis of the list of project types in the EIA Decree, or decisions made by regional ELY centres on a case-by-case basis (EIA Act 4.2.§). An EIA must invariably be conducted for all new projects of types listed in the EIA Decree. The EIA procedure must be applied to all expansions and changes in mining projects that exceed the limits stipulated in the list of project types in the EIA Decree. For the extraction and processing of metal ores and other mined minerals the threshold above which the EIA procedure must be applied is 550,000 tonnes of material mined annually. For open-cast mines the threshold is a surface area of 25 hectares. In EIAs for expansions and changes to existing projects, assessments should focus on the environmental impacts of the proposed changes in relation to the impacts of present activities. Though the additional burden on the environment induced by the changes to the project may in itself be limited, assessments should particularly examine such impacts in combination with the impacts of existing activities.

In individual cases the need for an EIA may also arise when a proposed activity or proposed changes in an ongoing activity are likely either alone or in combination with other projects to result in significant adverse environmental impacts. Decisions to apply the EIA procedure to individual mining projects are mainly made by the ELY centre in whose region the project is located.

**PROJECT TYPES FOR WHICH THE EIA PROCEDURE SHOULD BE APPLIED, AS LISTED IN THE EIA DECREE (SECTION 6):**

Finland's EIA Decree stipulates that EIAs should be conducted for the following kinds of mining projects:

- the extraction, dressing and processing of metal ores and other mined minerals if the total amounts of material extracted exceed 550,000 tonnes per year, or if quarries are larger than 25 hectares
- asbestos extraction and installations for the processing and transformation of asbestos or products containing asbestos
- the mining, enrichment and processing of uranium, with the exception of test extraction, test enrichment and other similar processing
- projects associated with mining developments, such as landfill sites of a scale stipulated in the list of project types, may also in themselves necessitate the EIA procedure

## 2.3 Linkages with planning and decision-making processes for mining projects

### Timing of the assessment (EIA Act, Section 7)

“The environmental impact of a project must be investigated in an assessment procedure in accordance with this Act before any action relevant in terms of environmental impact is taken to implement the project. The assessment must, however, at the latest be carried out before the decision-making referred to in Section 13.”

### Consideration of the assessment (EIA Act, Section 13)

“An authority may not grant a permit for the implementation of a project or take any other comparable decision before it has obtained an assessment report and the coordinating authority's statement on it. A permit or comparable decision on a project shall state in what way the assessment report and the coordinating authority's statement on it have been taken into account.”

### Mining Act (Sections 34 and 56)

If necessary, an environmental impact assessment report prepared in accordance with the EIA Act must be attached to a permit application.

If the EIA Act is applicable to the project, the permit decision must indicate how the assessment was considered during the permit process.



The life cycle of a mining project consists of many phases. Four main phases may be identified: ore prospecting, the commissioning of the mine, the production phase, and finally the closure and rehabilitation of the mine (see Fig. 1). EIAs facilitate the planning and decision-making processes related to mining projects. Information on environmental factors becomes more accurate as projects proceed through the permit processes and on to practical implementation. Environmental monitoring can be conducted to help determine actual environmental impacts and plan any necessary remedial measures. EIAs should be seen as processes that continue throughout the life cycle of a mining project, with results that become ever more accurate, even though the EIA procedure itself is necessarily scheduled for a limited time window during the planning of a mining project.

EIAs facilitate planning and decision-making processes from the mining project developer's perspective, as well as for the authorities, in relation to permit decisions, land use planning processes and other planning and decision-making processes. Mining projects

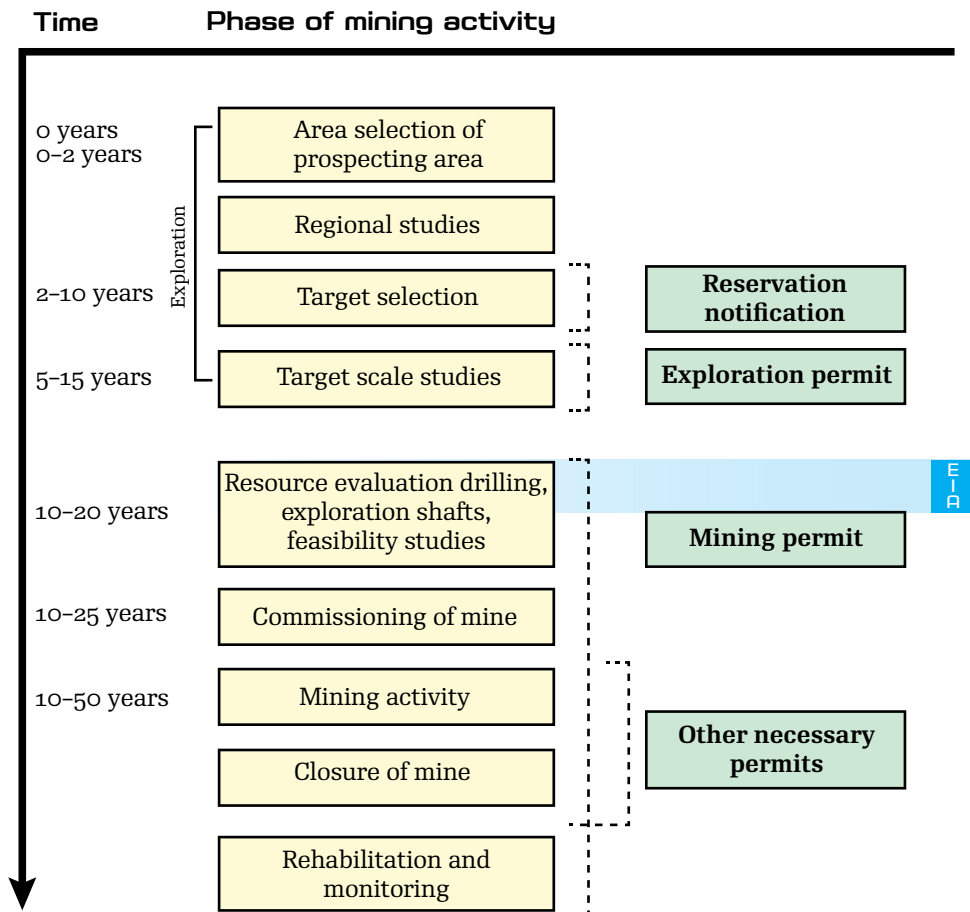


Figure 1. EIA procedure in relation to the life cycle of a mine.

in Finland require a wide range of different permits, most notably permits issued in accordance with the Mining Act, the Water Act, and the Environmental Protection Act. Mining projects often also require planning permission with regard to regional land use plans, Local Master Plans and Local Detailed Plans. Mining projects must also be considered in many other planning and decision-making processes. The Natura regulations contained in the Nature Conservation Act, for instance, are important when a proposed project is located in the vicinity of a Natura site. Appendix 1 lists and summarises the main elements of Finnish legislation that are relevant to mining projects.

## LAND USE PLANNING AND MINING PROJECTS

Mining operations are considered when land use plans are drawn up. Mines and their impacts on infrastructure and communities are usually so large that their locations need to be marked in regional land use plans. These plans indicate localities with potential for mining activity, as well as functioning mines. Plans may also steer and harmonise other land uses necessary in connection with mining activity. To implement a mining project spatial planning on a more detailed scale is also required. The need to renew local master plans and local detailed plans depends on the state of existing regional land use plans, the location of the mining project, local conditions, and the scale and impacts of the project including associated buildings. New master plans or detailed local plans may also be needed where it is important to harmonise mining activity with other local activities.

Planning permission for ore processing facilities and other significant buildings can be based on detailed local plans. Detailed local plans may also define permanent mining industrial areas that serve more than one mine site. Whenever a mining project requires new plans, these plans must be drafted in accordance with the Land Use and Building Act.



The Mining Act (Section 47, 2011) stipulates that: “The relationship of the mining area and any auxiliary area to other usage of land shall be explained. Mining activity shall be based on a legally binding plan in accordance with the Land Use and Building Act, or, in view of the impacts of mining activity, the matter shall be otherwise sufficiently explored in co-operation with the local authority, Regional Council, and Centre for Economic Development, Transport and the Environment.”

The EIA procedure for a mining project should be carefully scheduled with regard to both the planning of the project itself, and administrative processes related to permits, spatial planning and other planning and decision-making. It is also important to understand how the timing of the EIA procedure will affect their outcomes, especially with regard to the accuracy of their findings. Developers should initiate discussions concerning the scheduling of the EIA procedure with the competent authority in good time.

Preliminary pre-feasibility studies often provide a useful basis for conducting an EIA, since they typically focus on the geology of the locality, the presence of ore deposits, resource estimates, mining and ore processing methods, the management of mining wastes, the need for infrastructure, water and energy consumption, and labour and transportation costs, although at this stage estimates for these factors cannot be expected to be very accurate (margins of error may be 20-30%). Since information about a project is, at this stage, still fairly imprecise, any form of EIA conducted on this basis will also be imprecise. To produce an acceptable EIA in accordance with the EIA Act the planning of a project should be so advanced that its impacts can be assessed sufficiently accurately and reliably. For example, it is important to have an accurate understanding of the technical solutions that will be used in the project, to enable accurate quantitative and qualitative estimates of emissions.

The EIA procedure may not, however, be left too late, since they must be completed before a mining project can receive the necessary permits. It is good practice to initiate the permit processes for a project only after the necessary EIA procedure has been completed. The EIA report and the competent authority's statement on the report can then be attached to the permit applications for the project.

If a mining project necessitating land use planning includes various project alternatives, it could be worth initiating the EIA procedure at a fairly early stage, since the procedure could then also facilitate the planning and selection of alternatives, while also providing the environmental information required for spatial planning processes. The studies conducted for the EIA procedure might need often to be supplemented and re-evaluated for the purposes of permit applications. The environmental impacts of the selected alternative for implementing the mining project often have to be studied in greater detail during permit processes than they were examined during the EIA procedure, when the chosen alternative was one of many ways to implement the project.

To avoid duplicating work it is worth checking during the planning of the EIA procedure how many overlaps there are between the information required for the EIA and for other necessary processes. In some cases permit and planning processes require more detailed information than the EIA procedure; while for other factors the EIA procedure may need more comprehensive studies. It is worth considering these differences when compiling data for various purposes.

The EIA procedure for mining projects necessitates field surveys, which may need to be conducted at various times of the year. It is worth initiating the EIA procedure early enough in the year to ensure that the competent authority can give its official statement during the winter. This will ensure that sufficient time is available for the planning of field surveys to be conducted when the ground is snow-free. Field surveys (e.g. of habitats, vegetation and wildlife) should be initiated already during the ore prospecting stage, to ensure that any ecologically valuable features such as sensitive habitats with regard to biodiversity can be identified in good time. Similar considerations apply to the taking of samples in connection with assessments of the present state of the environment. Such samples should be taken before any activities with environmental impacts commence, and in good time to enable findings to be used in the early phases of the EIA procedure.

# 3 Main phases of the EIA procedure

## 3.1 EIA procedure in general

### The two main phases of the EIA procedure

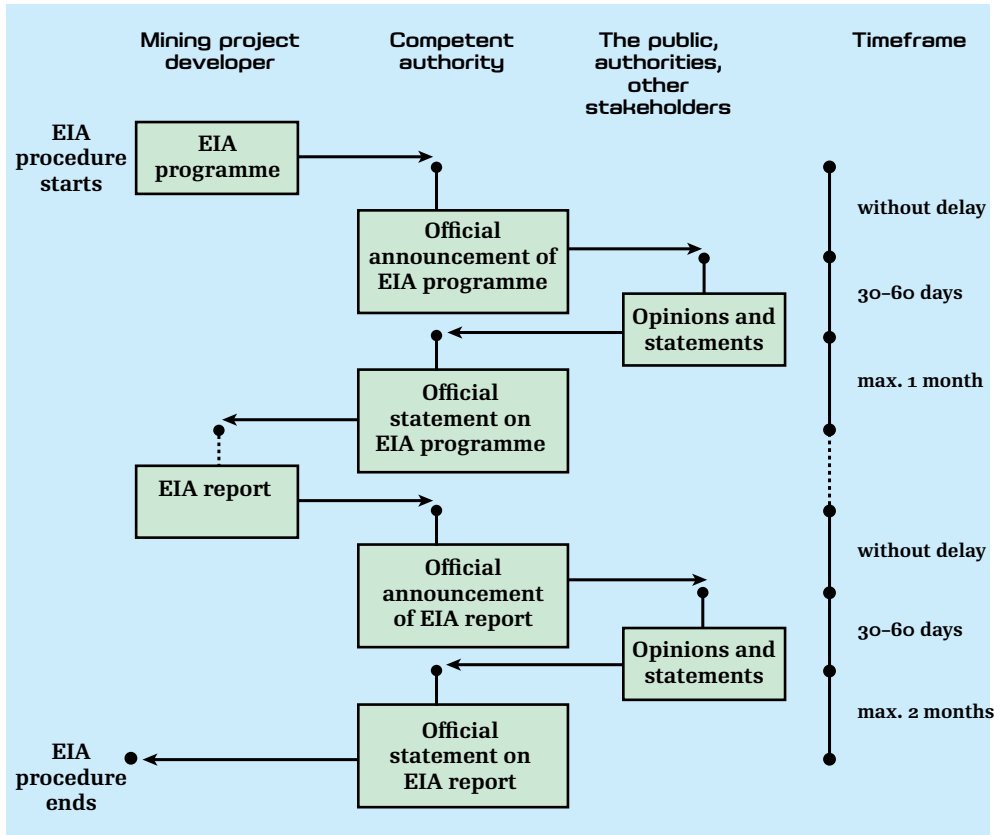
The main phases of the EIA procedure involve the drafting of an EIA programme and the preparation of an EIA report. Arrangements for participation play an important role in both phases (see Fig. 2).

The **EIA programme** is a plan made by the mining project developer to define how the EIA procedure will be organised. The **EIA report** of a project contains details of the project and the various project alternatives, as well as assessments of the expected environmental impacts of each alternative. **Participation** involves communication between the developer, the competent authority, other authorities, municipalities, the public and other stakeholders at various stages of the EIA procedure.

The EIA procedure officially begins when a developer submits an EIA programme to the competent authority. But a lot of work of importance to the whole process has invariably been done before this, since the project has probably progressed at least as far as the feasibility study phase. Environmental limitations and profitability have typically been studied; discussions have been held with the authorities; contact has possibly been made with the public and other organisations; the EIA programme has been drafted; and preliminary studies may also have been made. The EIA procedure is so extensive and varied that, in practice, the skills of an experienced consultant will be required to follow them. Although an EIA programme may be based on existing environmental data, it is worth being prepared from an early stage to conduct various additional studies as necessary. It is also worth initiating discussions with the authorities before the EIA programme is drafted, to discuss the content of the EIA procedure and how impacts will be assessed.

The competent authority must make official announcements whenever an EIA programme or report is published, arrange the necessary public participation together with the developer, compile opinions and statements received from stakeholders, and on the basis of these opinions and statements and its own expertise issue official statements on both the EIA programme and the EIA report.

When drafting an EIA report, the developer must give due consideration to the statement previously issued by the competent authority on the related EIA programme. The EIA procedure ends when the competent authority submits its official statement on the EIA report to the developer, together with any other statements and opinions. In this official statement the competent authority states its position on the adequacy of the EIA report, and also specifies any issues on which more information or action is required with regard to forthcoming planning and permit processes.



**Figure 2.** Schematic illustration of the EIA procedure (By Jorma Jantunen, Finnish Environment Institute).

### Assessing environmental impacts across national boundaries

Assessments of international environmental impacts are regulated by the Espoo Convention on Environmental Impact Assessment in a Transboundary Context (1997) and the EU Parliament and Council directive on the assessment of the effects of certain public and private projects on the environment (EIA Directive; 2011/92/EU). According to the Espoo Convention, signatory states must offer other states an opportunity to hold international negotiations on the potential transboundary impacts of projects in their territory, and on possible measures to reduce or prevent such impacts.

Other signatory states to the convention have the right to participate in any EIA procedure conducted in Finland for projects that can be expected to have significant environmental impacts in their territory. The Ministry of the Environment looks after the notifications and negotiations required for a transboundary EIA procedure. International hearings must also be suitably scheduled within the timeframe of the national EIA procedure.

The public in other states where a project is likely to have environmental impacts must be given the same opportunities to participate in the EIA procedure as the public in the state where the project is located. Related EIA programmes and reports must be adequately translated into the languages of neighbouring countries to ensure that stakeholders have a chance to submit their opinions or statements. In such cases the competent authority must submit the EIA to the Ministry of the Environment, enabling the ministry to make the required official international notification. If the neighbouring state chooses not to participate in the EIA procedure, there is no need for any further international processes. If the neighbouring state does wish to participate, the procedure continues with hearings conducted in relation to the EIA report and its documentation. Permit processes conducted for projects with likely transboundary impacts must duly consider statements issued by other countries and the outcomes of international negotiations. Any states participating in such procedures will receive a copy of the decision made on the project.

Transboundary impacts may need to be considered in relation to mining projects when a mine or ore processing facilities are to be located near an international boundary, or, for instance, when impacts on river basins extend into the territory of a neighbouring country. The costs of the translations needed for a transboundary EIA procedure must be met by the developer (EIA Act 22 §).



Mika Huolman/Vastavalo.fi

## 3.2 EIA programmes

- An EIA programme is “the plan prepared by the developer for the necessary studies, and arrangements for the EIA procedure” (EIA Act, Section 2).

An EIA programme is thus in effect a working plan drawn up by the developer for assessing the environmental impacts of a project. As a body of information on the project it will be of assistance to all parties – including the developer, the authorities, municipalities, the public, and other stakeholders. An effective EIA programme can contribute greatly towards the success of the whole EIA procedure.

### **The EIA Decree (Section 9) stipulates that EIA programmes must contain on a sufficient scale:**

- 1) Information on the project, its purpose, planning stage, site, land use needs, and connections with other projects, as well as information about the developer (see section 4.1).
- 2) Details of alternatives for implementing the project, one of which is usually the no-action alternative (see section 4.2).
- 3) Information about the plans, permits and comparable decisions required for the implementation of the project (see section 4.1).
- 4) A description of the environment, information about investigations into environmental impacts already carried out and planned, and details of the methods and assumptions to be applied in acquiring and assessing the necessary material (see sections 4.3 and 4.4).
  - Existing reports may be utilised when describing the present state of the environment, together with newly arranged supplementary studies where necessary.
  - At this stage it is already important to try to identify any possibly significant impacts of the proposed mining project, which can then be examined subsequently in the EIA procedure.
- 5) A proposal for the delimitation of the impacted area to be studied (see section 4.4).
  - The spatial directions and extents of impacts should be investigated from an early stage, even though the impacted areas for each emission or impact will be defined more accurately on the basis of subsequent assessment work.
- 6) A plan for arranging the assessment procedure and related participation (see section 4.7).
- 7) An estimate of the project planning and implementation schedule and estimates of the dates when investigations and the assessment report will be completed (see section 4.7).

When identifying alternatives to be assessed, significant impacts and other factors for evaluation, it is worth taking advantage of experiences gained in previous mining projects. When identifying the most important impacts, a good starting point is to consider the characteristics of the ore deposits, the ore to be mined, the waste rock, and the tailings that will be generated during ore processing. The next step is to investigate the



proposed processes and their emissions, together with the physical changes the project will cause in the environment. The findings from studies of these environmental changes will then facilitate assessments of the impacts on ecosystems and people. Ways to identify the most important impacts are described in more detail in section 4.4.1.

The EIA programme is an important phase of the whole procedure. It must be based on a sufficient description of the present state of the environment, with all alternatives duly considered together with a good overview of the whole project. The EIA programme will form the basis for all future assessments and dialogues.

The contents of an EIA programme may vary considerably depending on the nature of the project. Important factors include: whether a new mine is to be built or an existing mine expanded; the ore type; the characteristics of the environment around the project site; and the present planning status of the area.

### 3.3 EIA reports

An EIA report is “the document in which information about the project and its various alternatives is presented, together with a comprehensive assessment of their environmental impact” (EIA Act, Section 2).

An EIA report should be drafted on the basis of the related EIA programme and the competent authority’s official statement on the programme. The report should enable comparisons of the various project alternatives, improve the availability of information to the public and other stakeholders, and facilitate decision-making related to the project.

#### **The EIA Decree (Section 10) stipulates that EIA reports must contain on a sufficient scale:**

- 1) The information referred to in Section 9 (on the EIA programme) duly revised.
- 2) An explanation of how the project and its alternatives relate to land use plans and any plans and programmes relating to the use of natural resources and environmental protection which are relevant with regard to the project (see section 4.1).
- 3) The main characteristics and technical solutions of the project, a description of operations, such as products, outputs, raw materials, transport, other materials, and an estimate of the types and amounts of waste, discharges and emissions taking into account the planning, construction and operational stages of the project, including possible dismantling (see sections 4.1 and 4.5 – emissions).
- 4) The main information used in the assessment (see section 4.4).
- 5) An account of the present state of the environment, and an assessment of the environmental impacts of the project and its alternatives, any deficiencies in the data used, and the main uncertainty factors, including assessments of possible environmental accidents and their consequences (see sections 4.3, 4.4 and 4.5).
  - All of the environmental impacts of the project considered to be significant must be clearly specified.

- 6) An account of the feasibility of the project and its alternatives (see section 4.6).
- 7) A proposal for action to prevent and mitigate adverse environmental impacts (see section 4.8).
- 8) A comparison of the project alternatives (see section 4.6).
- 9) A proposal for a monitoring programme (see section 4.8).
- 10) A description of the various stages of the assessment procedure, including the participation procedure (see section 4.7).
- 11) An account of how the competent authority's statement on the assessment programme has been taken into account (see section 4.8).
- 12) A non-technical, clearly presented summary of the information in paragraphs 1-11 above.
  - This summary must also be clearly and transparently derived from the findings of the assessment. The summary should highlight the significant impacts of all the investigated alternatives.
  - This summary should be kept to a reasonable length, though it must contain a comprehensive overview focusing on the significant impacts of the various project alternatives.

The quality of the EIA report is an essential aspect of the whole EIA procedure. In Finland the competent authority plays a key role in assuring the quality of EIA reports, by ensuring that each EIA report contains all of the information needed for decision-making as specified in the EIA Decree. The competent authority must issue an official statement on the EIA report and its sufficiency, but in the EIA procedure the final responsibility for the reliability of the assessments carried out and information compiled for the EIA report lies with the mining project developer.



One of the key objectives of the EIA procedure is to make information more available to the public and other stakeholders. For this reason reports should be clearly written and easy to understand and interpret. EIA reports for mining projects are often very lengthy and difficult for people from outside the industry to understand. It is therefore important to try to compile reports that can also be read and understood by ordinary people. It is particularly important that the conclusions of the assessment should be clearly and transparently derived from the facts and findings generated for the report, and presented accessibly. Detailed measurements and technical specifications should be set out in appendixes to the main report. The recommended length for the main body of an EIA report is about 100–150 pages. If a report is very lengthy, its summary may extend to 20–30 pages.

The contents of an EIA report may vary considerably depending on the nature of the project. Important factors include: whether a new mine is to be built or an existing mine expanded; the ore type; the characteristics of the environment around the project site; and the present planning status of the area. Appendix 5 lists the contents of an example of an EIA report for a mining project in Finland.

### 3.4 Participation

In the context of the IEA Act participation means “...*interaction in environmental impact assessment between the developer and the coordinating authority, other authorities and those parties whose circumstances or interests may be affected by the project, and corporations and foundations whose field of activity may be affected by the project*” (EIA Act, Section 2).

The term participation, as used in the EIA Act, covers interactions between developers, the authorities, municipalities and the public. In addition to the hearings required by the EIA Act, it includes many kinds of communications between different stakeholders.

Public announcements must be made when EIA programmes and reports are issued, the necessary statements on the assessment programme and report must be requested, and opportunities for stakeholders to present their opinions may be organised. The opinions of the municipal authorities and other authorities in the area impacted by the project must always be heard in relation to EIA programmes and reports, while other stakeholders may present their opinions on the basis of public announcements. The official hearings process and its scheduling are illustrated in Figure 2.

In addition to the hearings described in the EIA Act, the developer may organise other complementary kinds of interactions involving different stakeholders, for instance, by setting up joint working groups or organising public events such as presentations, workshops, interviews and field visits. The EIA Decree stipulates that EIA programmes should contain plans describing how participation processes will be arranged, and that EIA reports should include an explanation of the procedures and outcomes of the participation process (see section 4.7).

EIAs may be planned so that they also facilitate planning and permit processes. When the impact assessments conducted for the EIA Act and for compliance with other legislation are harmonised, it is important to ensure that the procedures and resulting published reports fully comply with all the requirements of the different legislative statutes.

Though the EIA procedure only officially begins when the developer submits an EIA programme to the competent authority, in practice participative processes for mining projects are invariably organised while the EIA programme is still being drafted. At this stage, the developer should initiate contacts with stakeholders, including the competent authority, other authorities and the public.

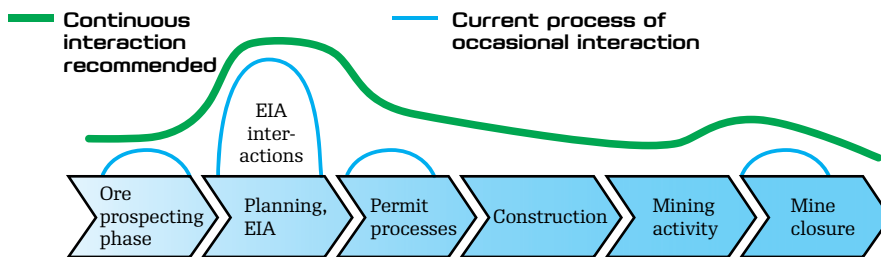
When planning and organising participation for the EIA procedure it is important to remember that cooperation with the authorities, municipalities, the public and other stakeholders must continue for the whole life cycle of any mining project. The public participation arranged for an EIA forms just one part of this broader interaction. It has become established practice in Finland that developers and the competent authorities collaborate on the organisation of public events held when EIA programmes and EIA reports become available.



Pia Rämö/Infra ry:n arkisto

### HEARINGS AND COORDINATING AUTHORITY STATEMENTS ON EIA PROGRAMMES (EIA ACT, SECTIONS 8a AND 9)

- The coordinating authority must provide information about the assessment programme without delay by posting a public notice on the notice boards of municipalities in the probable area of impact of the project for a period of at least 14 days. A public notice should also be published in electronic format and in at least one widely read newspaper in the area of impact of the project.
- Opinions and statements should be submitted to the coordinating authority during a period beginning on the date of publication of the public notice and lasting at least 30 and at most 60 days.
- The coordinating authority must submit an official statement on the EIA programme to the developer within one month of the end of the period allowed for providing statements and expressing opinions.
- The period for processing the EIA programme lasts at the most three months from the date of the public notice.



**Figure 3.** Stakeholder interactions through the life cycle of a mining project (adapted from Vehmas, 2014)

### HEARINGS AND COORDINATING AUTHORITY STATEMENTS ON EIA REPORTS (EIA ACT, SECTIONS 11 AND 12)

- The coordinating authority must provide information about the EIA report through a public notice issued for a period of at least 14 days.
- Opinions and statements should be submitted to the coordinating authority during a period beginning on the date of publication of the public notice and lasting at least 30 and at most 60 days. The coordinating authority must ensure that the necessary statements on the assessment report are requested.
- The coordinating authority must submit an official statement on the EIA report to the developer within two months of the end of the period allowed for providing statements and expressing opinions.
- The period for processing the EIA report lasts at the most four months from the date of the public notice.

## 4 The EIA procedure

### 4.1 Project description

Section 9 of the EIA Decree stipulates that EIA programmes must contain on a sufficient scale:

- Information on the project, its purpose, planning stage, site, land use needs and connections with other projects, and on the developer.
- Details of alternatives for implementing the project, one of which is usually the no-action alternative.
- Information about the plans, permits and comparable decisions required for the implementation of the project.

Section 10 of the EIA Decree stipulates that EIA reports must contain on a sufficient scale:

- The information referred to in Section 9 (on the EIA programme) as revised.
- An explanation of how the project and its alternatives relate to land use plans and any plans and programmes relating to the use of natural resources and environmental protection which are relevant with regard to the project.
- The main characteristics and technical solutions of the project, a description of operations, such as products, outputs, raw materials, transport, other materials, and an estimate of the types and amounts of waste, discharges and emissions taking into account the planning, construction and operational stages of the project, including possible dismantling.

The project description is an important part of the whole EIA procedure, since it forms the basis for assessments of expected environmental impacts. A well-prepared project description provides:

- an accurately outlined overview of the whole project
- a basis for identifying and assessing emissions, discharges and other environmental impacts that can be expected to result from the project
- a basis for targeting and defining the scope of assessment work

The project descriptions included in both the EIA programme and the EIA report should clearly and concisely define the project and its various elements, covering the whole life cycle of the project. It is important to describe the main features of the proposed mining activity and identify the operations that will be significant when environmental impacts are assessed. When describing the project it is worth ensuring that its wording will be easily understandable and accessible to a wide readership. The project description will become more comprehensive as the procedure moves on from the EIA programme phase to the EIA report.



The key information to be included in the project description includes:

- Information on the project as a whole  
To ensure that a comprehensive picture of the environmental impacts of a mining project can be obtained, it is important to ensure that the project description covers all the essential elements of the project. In addition to the mine itself, this will include energy transmission and transportation links.
- Information on the purpose of the project, its planning stage, its location, land use needs and connections with other projects, as well as information on the developer. Where necessary this should also include:
  - a description of the mining company, where it is based, its objectives and operations in Finland and other countries
  - details of any consultants or other experts involved in the project
  - a description of the ore deposits to be mined, including their location, their geological features, and their mineral content
  - a schedule for the implementation of the mining project
- Information on the key characteristics of the project and the technical solutions to be used.
- Information on the plans, permits and other decisions that will be required for the project, as well as links to any other planned developments.

A list of the key project characteristics and technical solutions that should be included in the project description in different circumstances is presented below (on page 30). A more detailed list of these factors is set out in Appendix 4. The main features of the life cycle of a mining project are described in Appendix 5.

Most mining projects are based on plans to exploit more than one ore deposit at different stages of the life cycle of the mine. If future ore prospecting or surveying work and the related test mining are likely to result in significant impacts – when added to those of the main project – this should be specified within the EIA for the main project. Any such ore deposits likely to be mined at a later date should be described in relation to the project, even if their exploitation is not among the alternatives presently under consideration for the project.

#### **KEY MINING PROJECT CHARACTERISTICS AND TECHNICAL PROCESSES TO BE COVERED IN PROJECT DESCRIPTIONS**

- main products and possible by-products
- expected production (in tonnes)
- commissioning and construction phase of the mine
- mining methods (by open-cast quarrying or underground mining) and transport of material
- temporary storage and preliminary processing of ore
- ore processing and possible further refining (hydrometallurgical and pyrometallurgical processing)
- tailings and their processing
- overburden, waste rock and marginal ore
- other wastes and their processing
- fuels, explosives, chemicals and their storage
- water management, water supply and water balance
- wastewater treatment
- energy consumption and production, fuel supplies
- transport links, traffic, transport routes (e.g. roads, railways, harbours and pipelines outside the mine itself)
- other activities and structures
- closure of the mine and related rehabilitation work

Defining the project alternatives of a mining project is a significant part of the EIA procedure. The various alternatives to be considered may be examined as part of the description of the whole project or separately, depending on the circumstances and the nature of the alternatives.

EIA programmes and reports should provide information on the plans, permits and other comparable decisions required for the project to proceed. This encompasses spatial plans and permits required under Finnish legislation, including the Mining Act, the Water Act and the Environmental Protection Act, for instance. EIA reports should also describe how the project complies and is harmonised with any other plans and programmes related to resource use or environmental protection that are of significance for the project. These may include conservation programmes, environmental programmes and various local, regional or national development programmes and strategies.





## 4.2 Defining alternatives

EIA programmes and reports should present project alternatives of a mining project, one of which should be the no-action alternative (o alternative) of the project, unless for specific reasons this alternative is not necessary. The alternatives should be defined by the developer.

### O alternative

The project is not implemented. This “zero alternative” should usually be included among the defined alternatives, separately planned and described. It may thus constitute a description of how the area would develop in the absence of any mining project. The zero alternative also serves as a point of comparison for other alternatives.

### O+ alternative

One possible alternative for a project is a “zero plus alternative”, where further development may, for instance, be limited to further studies of local ore deposits with no actual mine commissioned.

### Project alternatives

Economic viability should form the basis for all the various project alternatives and the scheduling of activities. Within this economic framework it is often possible to define several viable alternatives that differ with regard to their technical solutions, land use, emissions and other environmental impacts, which can be usefully compared. EIA reports must also describe the feasibility of the project and its alternatives.

**THE EIA PROCEDURE MAY EXAMINE VARIOUS PROJECT ALTERNATIVES WITH REGARD TO THE FOLLOWING FACTORS, FOR INSTANCE:**

- the mining of different ore deposits in different orders
- the mining methods applied (open-cast or underground mining, and various alternative excavation techniques)
- annual production levels; duration of mining activity
- the location of ore processing facilities
- ore processing methods and annual production levels
- any further processing carried out within the project site
- different ranges of minerals and valuable materials extracted
- channelling of water discharges into different water courses
- different methods for managing and treating water from mine drainage and other processes throughout the life cycle of the mine
- measures to reduce water discharges, e.g. by improving the effectiveness of treatment processes or increasing water recycling
- the locations of different operations within the project site (with regard to environmental risks during the life cycle of the mine)
- transport routing options
- quantities of mining waste and waste fractions; recovery of usable material and the identification of useful by-products (considering environmental risks throughout life cycles)
- options for the siting of power lines, roads and pipelines
- transport of products (by road, rail or water)
- the transportation or manufacture of chemicals within the mine site (e.g. refining of chemicals)
- changes in land use and land ownership
- post-decommissioning land use and spatial planning options

### Exceptional situations and possible environmental accidents

EIAs for mining projects largely focus on the environmental impacts of normal operations. But it is also necessary to assess the impacts of possible exceptional situations. Such situations may include leaks, accidental releases of chemicals, damage to dams, interruptions in operations, and exceptional releases of water. These situations may result from natural phenomena (e.g. exceptional weather conditions or the impacts of living organisms), or from vandalism, power cuts, other disruptions to supplies, equipment failures, damage to structures or human error. In some extreme cases impacts may be so extensive that an incident can be described as an environmental accident.

Exceptional situations can typically result in higher levels of emissions than normal operations, so they represent new or at least greater threats to the environment. But the environmental impacts of such situations can often be assessed by applying the same principles used for normal operations. When assessing the impacts of exceptional situations the focus is most often on the consequent emissions and their impacts.

Extreme weather conditions such as heavy rains and the consequent floods may result in one important kind of exceptional situation. The likelihood of such extreme weather events is expected to increase due to climate change. Such exceptional weather conditions must be duly considered when planning related aspects of mining projects such as the scaling of dams and reservoirs. This factor must also be considered when evaluating the reliability of EIA results.

The possible curtailing or temporary interruption of mining production is a type of exceptional situation characteristic of the mining industry, whose operations are sensitive to market conditions. Even if plans for the closure of a mine are drafted giving consideration to the unforeseen interruption of mining activity or to a shift to a maintenance phase rather than production, it is still useful to assess the changes that such situations could entail: in terms of how this would affect disturbances and the likelihood of their occurrence, as well as impacts on the normal operations of the mine.



M. L. Räisänen/GTK

## 4.3 Describing the present state of the environment

EIA programmes should include a description of the present state of the environment in the location of the mining project, and EIA reports should also include a report on the environment. The description in the EIA programme is largely based on existing information, but the related section of the EIA report should be based on revised and updated information. In most cases this requires new field work to be conducted. The compilation of information on the state of the environment is a vital aspect of the whole EIA process. This information will facilitate the identification of environmental impacts and alternatives. It will also provide a basis for comparisons between the various project alternatives. The present state of the environment will also be the benchmark for the monitoring of environmental changes.

Such information must be compiled as early as possible in a mining project, preferably already during the ore prospecting phase. This initial information can then be supplemented as the planning of the project progresses.

In particular, descriptive data must be collected on the present state of the environment regarding environmental parameters that can be expected to be significantly affected by the project, such as water quality and biodiversity. In the same context it is also worth investigating any existing polluting activities in the area that may already affect water bodies or the environment, to determine the loads caused by these factors. Since aspects of the environment such as water quality and air quality may be characterised by seasonal and longer-term variability, it is recommended that such data should be compiled over a period longer than one year, with measurements conducted during different seasons.



**ASSESSMENTS OF THE PRESENT STATE OF THE ENVIRONMENT AT MINING PROJECT SITES TYPICALLY EXAMINE:**

- bedrock, soils and landforms
- surface water bodies and groundwater bodies, e.g. lakes and watercourses, flow rates and directions in water courses, water levels, water quality, soil and bedrock hydrogeology, and particularly any important reserves of groundwater used for the local water supply
- any protected areas
- natural habitats and any plant and animal species of conservation interest
- local climate and air quality
- land use, e.g. regional and local land use patterns and structures
- current regional land use plans, local master plans and local detailed plans
- landscapes and landforms
- cultural heritage and the built environment (including any nationally significant built cultural environments and archaeological sites)
- the usage of local natural resources
- settlements, demographic structure

## 4.4 Assessing impacts

### 4.4.1 Methods for identifying and assessing impacts

EIA procedures must identify the environmental impacts that will be caused by different project alternatives, evaluate their significance, and compare the alternatives with regard to their impacts.

#### Identifying the impacts of project alternatives

Several methods may be used to help identify and scope the possible impacts of various alternatives, including:

- checklists and tabulations
- flow charts and impact chains
- expert analyses
- experiences from previous mining projects
- inspections of maps and GIS data analyses

Checklists and tables enable the activities within a project and their impacts to be assessed comparatively, while also enabling local residents in the impacted area and other stakeholder groups to get involved in the identification of possible adverse impacts and vulnerable locations. When using checklists and tables, however, it is important to ensure that all possible environmental impacts are duly considered, including indirect impacts and cumulative impacts. The factors included in tables may include the various parts of the mining project, different phases of the project, the locations affected by the impacts, and the probability and magnitude.

When identifying impacts it is always useful to examine entire impact chains, starting with the mining activities, and continuing on to predicted environmental changes and to the consequent positive or adverse impacts on human beings, animals and plants, and the magnitude of these impacts. This can help to ensure that no impacts are ignored.

#### Information sources and methods

Different methods may be used to assess impacts, depending on the nature of the impacts. When assessing impacts it is often necessary to make assumptions and use models that may only be quite approximate. Some environmental changes may be evaluated quantitatively, but others are best assessed qualitatively.

When assessing the various project alternatives and their consequent impacts, any information previously compiled on the characteristics of various alternatives, which was generated during the planning of the project, and related feasibility studies may be useful. This information may concern mineral reserves, mining methods, the quantities of material to be mined, mineralogy, metallurgical methods, structures to be built, transport options, annual production rates, the planning of ore processing facilities, process charts, material flows, wastewater treatment methods, and the need for labour. Information about emissions may be obtained directly from material produced during the planning phase, including the outcomes of ore processing trials. Other emissions may

be assessed with the help of process-specific or equipment-specific emission factors or specific emission figures, for instance. Assessments should duly consider any planned emission reduction measures and their predicted effectiveness. Such measures may include water treatment processes or measures to limit dust emissions, for instance.

Various dispersal, diffusion and dilution models are useful for estimating the dispersal pathways of emissions and the resulting concentrations in different components of the environment. In addition to data on emissions, such analyses use other information such as meteorological data, topographical data and hydrological data on the surface water bodies and groundwater reserves likely to be affected. During the EIA such studies are often quite general, and there is no need to devise detailed numerical models for this purpose, for instance. Estimates of the concentrations of substances likely to occur in different components of the environment due to emissions from the mining project should be based on the findings of studies of the present state of the environment.

#### 4.4.2 The extent, scope and significance of impacts and cumulative impacts

The nature of impacts may be affected by many factors, including: location, the phase of the mining activity, the ore type, the size of the ore deposit, and the characteristics of the environment.

##### Different dimensions of impacts

Impacts are assessed by examining their different dimensions, i.e. their:

- direction (positive or negative) and magnitude
- extent (see below: Area of impact)
- probability
- duration and reversibility
- directness or indirectness
- effects with regard to the sensitivity of impacted sites
- effects on different groups of people

If the different aspects and phases of a mining project result in the same impacts, the resulting total impact must also be assessed. Noise and dust, for instance, may be generated by many different activities within a mining project.

##### Area of impact

EIA programmes define the area estimated or assumed to be impacted by the project, which will then be revised as necessary as the EIA procedure progresses.

The environmental report included in the EIA report should cover an area at least as large as the predicted impact area of the project. Different areas of impact may be defined for different types of impacts. In the environmental report the areas delimited for each impact factor should each be at least as large as the whole of the area expected

to be impacted. For the impacts of the project on traffic, for instance, it is important to study an area extending as far as these impacts can be clearly differentiated from other traffic flows. For impacts on vegetation, the area examined should extend far enough to cover all areas where plants may be expected to be affected by dust or changes in water conditions.

### The significance of impacts

EIAs are conducted for projects that may result in significant adverse environmental impacts. EIA programmes should seek to define limits for the impacts to be assessed. This is important, since it is prudent to ensure that assessments focus on the most significant impacts. It is not advisable or even possible to assess every conceivable impact. However, the scope of assessments should not be limited too much right from the start. The significance of many impacts may only become evident during the assessment process, for instance during field surveys. Communications with other stakeholders involved in the EIA may also result in additional information relevant with regard to the significance of impacts. During the early stage of an assessment it is important to consider how adverse impacts may be preventable. This will affect evaluations of the viability of a project and its alternatives.

EIA reports should clearly specify each of the most important environmental impacts of any project, even though the assessment process may have examined a wider range of impacts rather than focusing on environmental impacts. EIA reports must particularly focus on those environmental impacts identified as being significant. This will keep reports concise, and help planners, decision-makers, local residents and communities to get an accurate picture of the impacts of a project. If an impact of a kind that the EIA Act specifies must be assessed is considered to be insignificant in the context of a specific project, the decision to not examine this impact in detail should be justified.

The significance of impacts can be assessed by examining the different dimensions of impacts as described above. Each impact should be assessed from these different perspectives to form an estimate of its significance.

Although systematic models and widely used principles, criteria and scales may be devised and applied to assess the significance of impacts, assessments ultimately consist of an expert's personal professional evaluation. It is important to recognise that different people value different things, and perceive impacts in different ways. The impacts of a project may seem much more significant to a community in a location impacted by a project than to a non-resident expert. EIA reports should describe such differences between the perceptions of experts and stakeholder groups, and explain the reasons behind them. Preliminary assessments of the significance of impacts should be conducted as systematically and openly as possible already during the drafting of the EIA programme. Making this process more open and systematic than it is today will help to promote discussions that can reveal which of the impacts of a project should be considered more thoroughly in the EIA procedure, and which impacts may be addressed more briefly. Tools for assessing the significance of impacts have been devised.



## IMPACTS: MAGNITUDE AND DIRECTION, EXTENT AND DURATION, AND THE SENSITIVITY OF IMPACTED SITES

**Magnitude and direction** describe the physical dimensions of the changes caused by a project. The direction of a change may be positive or negative. Various physical parameters and guideline values may be used to measure the magnitude of an impact, depending on the nature of the impact. Noise impacts, for instance, may be measured in terms of sound pressure levels (in decibels). For some types of impacts, such as landscape impacts, assessments of the magnitude of impact may be based on an expert's professional analysis of the magnitude of the harm or benefit caused by the project.

**The extent** of an impact relates to the spatial dimension of a change, describing the geographical scale over which the changes induced by a project are observable (e.g. local, regional or national). This extent may in principle be described in terms of distance from a project site, but local landforms and variations in vegetation may mean that impacts do not extend the same distance from the site in all directions. Different impacts often have different impact areas.

**The duration** of the impact of a project relates to the time dimension, describing for how long the changes induced will be observable. Assessments of the duration of impacts should consider the timing and periodic spacing of impacts. For instance, a long-lasting impact may be nevertheless classed as a relatively minor impact if it does not occur continually and is timed or periodically spaced to result in only limited disturbance.

**The sensitivity of an impacted site** is related to the characteristics of the site. It involves three factors which should be considered when assessing the present state of the site, with no consideration yet of the magnitude of the changes that may be caused by the project:

- **Legislative controls** affecting impacts include various forms of protection or other limitations that may apply to a site (e.g. prohibition of groundwater contamination, Natura sites). Certain recommendations or programmes may also add to the conservation value of a site (e.g. designation as a nationally valuable landscape).
- The **social significance** of a site may relate to economic factors, social values (areas important for their recreational values) or ecological importance (e.g. areas of valuable habitat). When assessing social significance the importance of issues must be considered from a wider social perspective rather than from the viewpoints of individuals suffering from adverse impacts. When addressing impacts on humans the numbers of people experiencing harm or benefit should be considered.
- The **vulnerability of a site to change** describes how sensitively it may react to emissions or other changes.



### Cumulative impacts

The European Union Court of Justice has also ruled that assessments of cumulative impacts are also required under the EIA directive. Addressing cumulative impacts may sometimes be challenging, since in some cases these cumulative impacts may make it significantly more difficult for local residents or other stakeholders to adapt to the changes resulting from a single project. The European Commission's EIA guidelines describe cumulative impacts as impacts that arise when the planned project and other past, present or reasonably foreseeable projects together result in incremental changes that combine to generate various kinds of cumulative impacts. Like any other environmental impacts, impacts are always linked to the environment around the project and its specific features.

The assessment should strive to identify the cumulative impacts of the project at stake together with those of other existing or planned projects, including indirect impacts. These cumulative impacts may relate to such factors as traffic flows, water quality in rivers and lakes, demographic structures and the fragmentation of habitats.

The extent of the assessment of cumulative impacts will depend on specific circumstances. EIA should examine cumulative impacts encompassing the impacts of other projects that are already operating in the same impact area, or have permits to do so. According to this principle, any other developers seeking to initiate a new project in the area at a later date must duly consider the impacts of earlier developments.

It is advisable for developers to discuss cumulative impacts and how they should be assessed and considered together with the competent authority.

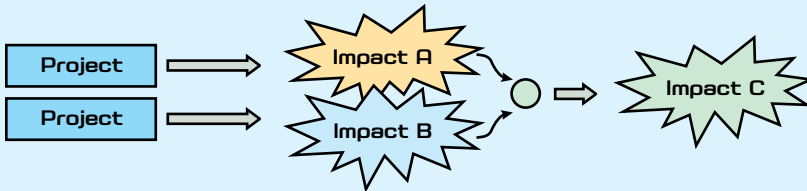
*Indirect impacts:* Impacts on the environment which are not a direct result of the project, often produced as a result of a complex pathway. Sometimes referred to as second or third level impacts or secondary impacts.



*Cumulative impacts:* Impacts that result from incremental changes caused by other past, present or reasonably foreseeable actions together with the project.



*Impact interactions:* The reactions between impacts, whether between the impacts of a single project or taken together with the impacts of other projects in the area.



**Figure 4.** Cumulative impacts as illustrated in the European Commission's EIA guidelines (2001). Modified by Jorma Jantunen, Finnish Environment Institute.

### 4.4.3 Deficiencies and uncertainty factors

The EIA Decree stipulates that EIA reports should include descriptions of possible deficiencies and most significant uncertainty factors in the information used to compile them. These descriptions should include assessments of the nature and consequences of possible environmental accidents. (Exceptional situations are described in section 4.2.)

EIAs are inevitably associated with a degree of uncertainty due to their predictive nature. But it is still worth specifying the nature of uncertainty factors and any deficiencies in existing information, and examining their significance. A sensitivity analysis may be incorporated into forecasts of future changes to help highlight how the assumptions made as a basis for planning and the EIA procedure may affect their results.

## 4.5 Assessing environmental impacts

Finland's EIA Act takes a wide view of the concept of environmental impacts. On this basis the EIA procedure should assess impacts on all of the following:

- a) human health, living conditions and amenity
- b) soil, water, air, climate, flora, organisms and biological diversity
- c) the urban structure, buildings, landscape, townscape and cultural heritage
- d) the utilisation of natural resources
- e) the interaction between the factors listed in points a-d above

EIA reports should additionally contain reporting on “the types and amounts of waste, discharges and emissions, taking into account the planning, construction and operational stages of the project, including possible dismantling.”

The EIA procedure must therefore examine various different kinds of emissions and impacts of very many other different types. Various impact chains should also be assessed, including the effects of impacts on the quality of the environment or the impacts of one environmental change on other aspects of the environment.

EIA procedures for mining projects should examine different kinds of emissions and other environmental changes, and assess how they will affect nature, people and the built environment. It is important in this context to assess various impact chains, cumulative impacts and indirect impacts, in addition to direct impacts.

### 4.5.1 Emissions generated by mining projects

The emissions generated by a project form one important basis for assessments, particularly of impacts on the natural environment and human health and amenity. The emissions that may be released during the various phases of the life cycle of a mining project include:

- dust
- exhaust gases
- other gases
- odorous substances
- wastewater, drainage water
- solid wastes
- vibrations
- noise

The emissions of a project are affected by many factors, including the extent of the mining activity and the mining and ore processing methods utilised. Mines excavating sulphide ores, for instance, may generate runoff water that is acidic and has high concentrations of metals, in cases where mining wastes are stored and the sulphide minerals that they contain become acidified. For mines extracting industrial minerals or lime-

stone, contrastingly, the environmental impacts of the storage of mining waste can more often primarily be related to emissions of dust.

When assessing emissions it is important to identify the characteristics of the emissions generated, particularly any potentially harmful emissions, and to estimate the quantities of emissions that will be released, and their subsequent pathways in the environment. These assessments will form the basis for evaluations of the consequent impacts on the natural environment and human health and amenity, for instance.

The list above specifies various kinds of emissions with impacts on the natural environment which may be generated during the various phases of a mining project. Appendix 4 describes different kinds of emissions and how they should be examined in EIA programmes and reports in connection with the technical descriptions of projects.

## 4.5.2 Impacts on the natural environment

Factors that should be assessed in the EIA procedure include impacts on soil, water, air, climate, organisms and biological diversity, and on the wider utilisation of natural resources. Assessments of impacts on water typically feature most prominently in the EIAs for mining projects.

Projects likely to have impacts in Natura 2000 sites should be assessed in accordance with procedures set out in the Nature Conservation Act, either as part of the EIA procedure or separately, depending on the circumstances. In Finland there have been positive experiences of Natura assessments conducted in connection with EIA procedures.

Surveys of the occurrences of species may be conducted as necessary to facilitate assessments of impacts on organisms and habitats, and to provide material for comparative purposes.

## IMPACTS ON THE NATURAL ENVIRONMENT DURING THE DIFFERENT PHASES OF A MINING PROJECT

### **Ore prospecting**

The impacts of ore prospecting on the natural environment are usually minimal, but it is worth initiating surveys of the present state of the environment before commencing any activities that will affect the environment. These reports can be utilised during the subsequent EIA procedure for the mining project. Prospecting may continue in the area of the mining concession and its surroundings during the mining activity. An EIA is not legally required for ore prospecting activity.

### **Mine construction**

A mine site is an industrial area where the landscape, topography, biodiversity and water balance change due to the removal of vegetation, earthwork, construction and other preparations for excavation. Construction work and the greater volume of traffic generate noise and dust. The drainage of mining facilities by pumping lowers the water table in the mine site and its surroundings. Changes to the land surface raise the risk of soil erosion and surface runoff, and the consequent increased waterborne loads of solid particles increase the turbidity of water bodies. Drainage water and runoff from a mine site may also increase loads of metals and nitrogen in water bodies downstream, if this water is not appropriately managed. Changes in vegetation and water bodies may affect the conditions for organisms and lead to changes in species biodiversity.

### **Mining activity**

Mining activity results in emissions into air and discharges to water. The most significant impacts often relate to dust and changes in water bodies. Soils may also become contaminated by emissions. Other changes include the landscape impacts of mining waste disposal sites and other structures related to mining operations.

Changes in air quality result from blasting, ore processing, the drying of mineral concentrates, heat production, transport, machinery, and the disposal of mining wastes. These changes involve either dust or gaseous emissions. Mineral dust may include metals, metalloids or sulphide minerals that are harmful to the environment, and cause an increase in metal concentrations or acidity in soils, which may in turn reduce water quality in water bodies. Significant gaseous emissions are generated in blasting (CO<sub>2</sub>, N<sub>2</sub>, CO, NO<sub>x</sub>), exhaust gases (CO<sub>2</sub>, CO, hydrocarbons, NO<sub>x</sub>, SO<sub>2</sub>, fine particles) and ore processing (e.g. biosolutions, the processing of biosolutions and the pressure oxidation of enriched minerals: H<sub>2</sub>S, C<sub>2</sub>S, SO<sub>2</sub>, CO<sub>2</sub>, SO and from drainage SO<sub>2</sub>). Gas emissions also contribute to climate change and may result in the acidification of soil or water, damage to flora, or harm to organisms. Nitrogen oxides increase nutrient loads in water bodies.

Quantitative and qualitative changes in water bodies may be induced by the excavation of ore, the drainage of mines, ore processing, the storage of mining wastes and water

management systems. The extraction of water, the drainage of excavations with pumps and any structures built on the surface may all affect the water balance of the area and change water flow pathways and groundwater levels. Blasting can change the hydraulic characteristics of the rock. Outflows of water from the mine site may result in changes such as increased turbidity, acidification or salinisation in water bodies downstream, as well as increased concentrations of metals and nutrients.

Other significant factors affecting the impacts of mine sites include the storage of mining wastes such as waste rock, tailings, overburden, and the sediments resulting from ore processing and water treatment. The quantities of mining wastes may be very large. Wastes containing sulphide minerals may generate acidic or neutral runoff with high concentrations of metals and sulphates as the sulphide minerals are acidified. If this water is not appropriately managed, this may reduce water quality in surface water and groundwater bodies. Water flowing from areas where tailings have been deposited may also contain traces of the chemicals used in ore processing. Runoff from mining wastes may additionally increase salinity and nutrient levels in water bodies downstream. The traces of explosive materials that may remain in waste rock may particularly increase nitrogen loads.

### **Mine closure**

Excavated quarries and piles of mining waste left on the surface change landscapes greatly. Piles of mining waste may emit dust, and release harmful substances into surface water and groundwater bodies. Loads caused by the acidification of sulphide minerals may continue to be released long after mining activity ends.

Sulphide minerals in the walls of quarries are also exposed to acidification. When quarries fill with water after mining activity ends, the products of this acidification leach into the water. The water that accumulates in disused quarries may then percolate through fractures in the rock into the groundwater in the bedrock.

### 4.5.3 Impacts on people

Impacts on human health, living conditions and amenity must be assessed as part of the EIA procedure.

Possible impacts of mining projects that may affect people's health and amenity include impurities released into the air, surface water and groundwater bodies and the soil, as well as odours, noise, radiation and vibrations.



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Impacts on people's living conditions may include effects on homes, recreational amenities, employment, services and mobility. It is also worth assessing impacts on demographics (e.g. migration, total population), workplaces and local services.

Social impacts are often also mentioned in the context of environmental impact assessment, referring to impacts affecting individual people or communities that cause changes in their well-being or the distribution of well-being. The term "social licence to operate" is often used in relation to mining projects, meaning the general approval and support of local communities for developments in their area.

Impacts on people are characterised by their dependence on people's subjective individual experiences and knowledge. These factors can be influenced through interactions between developers and the public.

An assessment of health impacts should provide a quantitative description of changes and how these compare to exposure or emission levels considered to be harmful. EIAs should strive to make quantitative estimates of the health impacts of emissions for any emissions for which this is possible. This is particularly important when adverse impacts are considered to be likely or expected. If existing information is not sufficient for quantitative estimates to be made, some of the issues to be assessed may be evaluated descriptively or using yes/no values.

#### 4.5.4 Impacts on land use, traffic, landscape and cultural heritage

EIAs should additionally examine impacts on the spatial structure of communities, buildings, landscapes, townscape and cultural heritage.

##### Land use

Mining projects often have extensive impacts on land use. Though mines tend to be located in peripheral regions, other forms of land use are invariably practised in these areas. Impacts on these other land uses must be considered for the entire duration of the mining activity.

Even after a mine closes the mine site will not revert to its original condition with regard to land use opportunities. Temporary and permanent impacts on different land uses will depend on how the area was used before mining activity commenced, and on the state of the area after the activity ends and the mine closes.

Assessments must also account for impacts in relation to regional and national land use guidelines and the objectives and activities associated with regional land use plans and local master plans and detailed plans. Any other relevant land use programmes, inventories and reports should also be duly addressed. Investigations should cover the whole



of the area impacted by the project. The methods most commonly used for such assessments are map-based studies and expert evaluations.

The Land Use and Building Act stipulates that areas with mining activity should be considered whenever spatial plans are drafted. In addition to the siting of the mining activity itself, plans may also direct the spatial location of other land uses related to mining operations, such as transport routes. They should also harmonise the land use needs of mining operations and other land uses.

### Traffic

The traffic generated by a mine is an integral part of any mining project. Mining projects generate both heavy goods traffic and passenger traffic. The goods traffic involves the outward transportation of mined ores and their processed minerals to markets, as well as inward deliveries of chemicals and other raw materials needed for mining operations. Passenger traffic is generated due to the commuting journeys of employees. In practice, mining projects always involve the transportation of large consignments of material by road, rail or water. The most significant impacts of this traffic relate to the building of the necessary transport infrastructure, increased traffic densities, traffic safety, noise, dust, air quality and amenity levels. These impacts are most pronounced in the vicinity of the mine. Transportation also results in greenhouse gas emissions.

The impacts of the construction and use of new transport routes must be considered in an EIA. If the new transport routes required for a mining project are sufficiently significant to require separate EIA procedures of their own, the developers responsible for the construction projects are also responsible for the related EIA procedures.

The impacts of a mining project on traffic levels on nearby roads and related road safety, noise, dust and amenity issues may be assessed with the help of expert evaluations or traffic modelling. Although responsibility for the road network lies with the road authority or a private road owner, EIAs should investigate possible means to mitigate the adverse effects of increased traffic. Assessments should consider ways for the road authority or road-owner to prevent adverse impacts. Proposals may be made for the purposes of negotiations held with the road authority or road-owner.

The heavy goods traffic generated by mining projects significantly increases traffic flows. The impacts of a project on road traffic should be studied over an area extending as far as these impacts can be clearly differentiated from the impacts of other traffic flows. Guidelines for assessing the impacts of road traffic have been provided in publications produced by the former Finnish National Road Administration, for instance (Tiehallinto, 1999 and 2009).

Some mining projects may entail transportation by rail or water. In such cases the related assessment should be conducted in accordance with the relevant guidelines (Finnish Transport Agency guidelines 22/2013: Environmental guidelines for rail track maintenance).

## Landscape

Assessments of impacts on landscapes involve conducting landscape analyses and envisaging the future appearance of impacted areas. Such methods may also be used when assessing impacts on cultural environments. Developers must find out whether a site



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lies within a designated valuable landscape or valuable geological area. The visibility of the project in the landscape should be assessed on both a local scale and a wider scale. Landscape impact factors can be envisaged with the help of maps, aerial photographs and technical illustrations by applying modern modelling techniques.

### Cultural and heritage environments

Although mining projects tend to be located in remote areas, they may have impacts on cultural built environments or heritage environments. These impacts may be positive or adverse. In some cases, mining projects may help to maintain settlement in a cultural environment. However, they may also result in the construction of new buildings which could degrade cultural landscapes. Information about valuable cultural environments in Finland can be obtained from the National Board of Antiquities and regional and local museums. Planning processes play an important role in situations where new buildings need to be designed to fit in with existing valuable cultural environments.

One relevant piece of Finnish legislation in this context is the Government Decision of 22 December 2009 on the protection of nationally significant built cultural environments.

### Archaeological sites

All fixed archaeological sites, such as ancient burial sites and the sites of ancient settlements or fortifications are protected under Finland's Antiquities Act (295/1963). Permits are required for any activities that will lead to interference with such sites, including their excavation, burial, alteration, damaging or removal.

Assessments should investigate whether any archaeological sites are present in the area where mining will occur. A national register of Finland's archaeological sites is kept by the National Board of Antiquities, the authority responsible for their protection.

No legal right to compensation exists in cases where any activity is prevented by the Antiquities Act. If previously undiscovered archaeological sites are discovered during mining activities the developer is obliged to interrupt excavation and inform the National Board of Antiquities about the finds. The Antiquities Act empowers regional ELY centres to process applications and issue the permits required for any activities that will interfere with archaeological sites.

## 4.5.5 Other impacts

Other issues not specified in the EIA Act are also often assessed in connection with the EIA procedure, for various reasons. In some cases it is desirable to get a more comprehensive picture of the impacts of a project, including various economic and social impacts in addition to environmental effects. If the EIA is intended to form part of the "social licence to operate" of a project, factors such as human well-being and the distribution of well-being may also be examined, for instance.



If the EIA procedure is being conducted in close connection with planning or permit processes, it may be worth identifying and assessing the factors that will need to be addressed in these processes in connection with the EIA procedure.

Some international investors may have their own additional requirements with regard to assessments of the environmental impacts of mining projects they may finance.

## 4.6 Comparing alternatives

EIA reports must present “comparisons of the various project alternatives”. These comparisons, made to facilitate decision-making, should summarise, outline and interpret all of the information that has been obtained through the EIA procedure on the different project alternatives and their impacts. The differences between the impacts of the various alternatives should be duly described, so that it can be determined how preferable the different alternatives are according to differing perspectives. One alternative should always be the “no-action alternative” of the project, unless for specific reasons this is not necessary.

When comparing alternatives it is not necessary to draw specific conclusions by ranking the alternatives according to how preferable they are. Since the impacts of the various alternatives will differ considerably by nature, and thus not be directly comparable, it is not necessarily desirable to unambiguously define a “best alternative”. Alternatives usually have both favourable and adverse impacts. The overall favourability of alternatives can be assessed from various standpoints. Comparative analytic methods are widely utilised in the EIA procedure. Different impacts can be described with the help

of the most suitable parameters in each case, without trying to combine them in a single figure. It is advisable to present the comparative methods and the principles behind them in the EIA report.

### The feasibility of a project and its alternatives

EIA reports must also present findings on the “*feasibility of a project and its alternatives*”. An assessment of the feasibility of the various project alternatives may be included in the EIA report, for instance, together with the wider comparison of the alternatives.

## 4.7 Arranging participation in the EIA procedure

EIA programmes must include “*a plan for the EIA procedure and arrangements for the related participation, an estimated schedule for the planning and implementation of the project, and estimates for the dates when the EIA report and other reports will be completed*”. The EIA report must contain the same information in updated form, as well as “*a report on the phases of the EIA procedure together with the participation methods used in each phase*”.

### Principles

An EIA programme should contain a plan for the EIA procedure and the arrangements for the related participation. This plan should clearly inform the public and other stakeholders about when and how they will be able to participate in the procedure. It is advisable to also specify details of opportunities for participation associated with other administrative procedures, including their timing. It is also worth including in the EIA programme details of progress on planning and other procedures necessitated by the Mining Act, the Environmental Protection Act and possibly also the Water Act, together with explanations of how these processes are connected with the EIA procedure itself.

The EIA procedure is just one phase of the life cycle of a mining project. Ore prospecting companies and mining companies generally strive to consider the needs of various stakeholders from the ore prospecting phase onwards. The planning of the actual mining project – from ore prospecting to the opening of the mine – also typically takes a long time. It is worth initiating active publicity work and dialogue already in advance of the EIA procedure and then continuing this work on through the detailed planning phase of the mine, the official planning and permit processes, and the actual operations of the mine. The nature of the interaction channels and the selection of identified stakeholder groups will affect the scheduling of interactions and the associated need for resources. Initiating dialogue at an early stage often gives developers useful background information about local conditions and issues. It can also facilitate future assessments of environmental impacts and the planning of measures to prevent or mitigate adverse impacts. Establishing effective channels for communication also promotes information flows and reduces levels of ignorance or uncertainty related to projects.

Plans for the eventual closure of a mine should be widely discussed with regard to objectives for the decommissioning process and how the area will be used after the mine is closed. Applications for mining permits also oblige developers to report on alternatives for the period after mine closure.

In officially bilingual municipalities in coastal regions of Finland, where both Finnish and Swedish are widely spoken, developers should ensure that information is available and sufficiently publicised in both languages. In the Sámi Homeland Region, in northern Finnish Lapland, possible obligations to provide material in one or more of the Sámi languages must also be considered.

Other special considerations apply in the homeland region of Finland's indigenous Sámi peoples, as specified in national legislation and international agreements, notably the voluntary Akwé: Kon Guidelines associated with the UN Convention on Biological Diversity. These guidelines are intended for application by governments and other parties to the convention within the framework of national legislation, and to help them shape and implement their respective impact assessment procedures. The Akwé: Kon Guidelines should always be duly considered whenever development is planned for or will affect a location that is sacred to indigenous or local communities, or lands and waters traditionally occupied or used by indigenous and local communities.

**THE PUBLIC SHOULD BE ENCOURAGED TO PARTICIPATE IN THE EIA PROCEDURE TO ENABLE THEM TO:**

1. obtain information about a project and its impacts
2. participate in planning procedures and contribute their local knowledge
3. affect the way the EIA procedure is carried out:
  - during the EIA programme phase, by giving their opinion on the various project alternatives and the kinds of reports that will be necessary
  - during the EIA report phase by giving their opinion on the adequacy of the EIA report
4. comment on the conclusions of the EIA procedure from the perspective of a local resident

It is important to remember, however, that the EIA procedure is not a decision-making process in itself, and that a decision on the approval or refusal of any project will be taken in accordance with other specific legislation. Permit procedures have their own opportunities for hearings involving certain stakeholders, as defined in the related legislation. EIA procedures have particularly extensive opportunities for public participation.

## Plans for how public participation will be arranged

Careful advance planning is essential for successful public participation. Preparations should ensure that all significant stakeholders are duly considered and that suitable means for public participation are arranged to deal with all key issues at appropriate stages. The participation plan for a mining project drawn up in advance of or for the EIA programme must support and guide interactions throughout the planning and project phases. It can also provide a basis for continuing interactions during the operational phase of the mine. The participation plan should be updated and revised as necessary as the planning process proceeds. It should also take due advantage of opportunities for participation through digital channels.

A well-drafted participation plan should cover at least the following issues:

- objectives for participation
- identification of municipalities and communities which may be affected by the project
- comprehensive identification of stakeholders:
  - individuals, groups and communities who may be impacted directly or indirectly
  - other stakeholders (e.g. authorities, organisations)
  - parties who may be particularly vulnerable to the impacts of the project or who may find it exceptionally difficult to participate in the procedure (i.e. groups who need to be targeted with interactions of a special nature)
- definition of key stakeholders
- the chosen participation methods and how they will be applied
- a schedule for participation as part of the EIA procedure
- responses to any questions or concerns that may have arisen
- documentation of all communications and interactions
- the provision of resources for stakeholder engagement work

When planning arrangements for participation, developers must consider the related legal obligations defined in the EIA Act and Decree.

Stakeholder groups need to be identified as comprehensively as possible. It is not, however, necessary to interact as closely with every single stakeholder group, and various suitable means of interaction should be defined for different groups. One good way to engage with local residents is through locally held workshops, for instance; whereas national organisations are best kept up to date with developments largely through bulletins and other general communications on the project.

## Cooperation with municipalities and other authorities

Developers are obliged to agree the EIA procedure and the related practical arrangements with the competent authority, who will organise the related official announcements and collect the necessary statements and opinions.

The EIA Act stipulates that developers must collaborate sufficiently closely with the competent authority and the planning authorities (municipalities and the regional





council) to ensure that the EIA procedure can be duly harmonised with the related planning processes. For mining projects, the municipality where the mine site is located plays a key role as the local authority drafting and approving local municipal plans. Regional councils make decisions on municipal-level plans and more general regional land use plans. Developers should strive to initiate cooperation with municipalities and the regional council in good time to determine how planning requirements should be addressed.

The forms of collaboration between the developer, the competent authority, other authorities and other stakeholders do not follow any predefined guidelines, and are not specified in the EIA Act. Developers often set up specific steering groups or wider monitoring groups, or both, composed of representatives from different stakeholder organisations, to help direct the whole EIA procedure and ensure the flow of information. The exact composition of such working groups can be decided on a case-by-case basis. If the developer does not see a need to set up any such working group, this should be discussed with the competent authority well before the EIA procedure begins.

A representative of the competent authority should be appointed to any steering or monitoring group, since the meetings of these groups are sure to discuss many issues

related to the principles and practices of the EIA procedure, of which the competent authority will have valuable expertise and practical experience. The competent authority's role in the group is to act as a neutral party with expertise in EIA procedure.

It is also recommended that before starting to draft the EIA programme and any related environmental reports developers should hold discussions with representatives from the competent authority and other authorities and expert institutes (including the Finnish Safety and Chemicals Agency (TUKES), the Geological Survey of Finland, the national Radiation and Nuclear Authority (STUK), and the National Institute for Health and Welfare) about issues related to the project and the assessment of its impacts.

## 4.8 Other requirements

### 4.8.1 Preventing and limiting adverse environmental impacts

EIA reports must propose actions that will prevent or limit the adverse environmental impacts of a project. This is an important part of the assessment of the project and its alternatives. The need to prevent and limit such impacts may also affect the definitions, feasibility, and costs of project alternatives. Some of the actions proposed to prevent or limit adverse impacts typically relate to technical solutions. Certain specific measures may be defined as ways to prevent or limit adverse impacts, though they may not directly be carried out as part of the existing plan, and may be incorporated in future plans. Useful information about the need for such actions and possible means to implement them may be obtained through participation processes.



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## 4.8.2 Organising monitoring

EIA reports must also include “proposals for a monitoring programme”. Legally binding obligations to conduct monitoring are also imposed in the conditions of the official permits granted for mining activities. The main objective of such monitoring is to provide information that can be used to prevent and reduce harmful impacts. Developers’ own monitoring may be more extensive than the obligatory monitoring stipulated in the environmental permit for the project, and cover a wider range of significant impacts identified during the EIA procedure.

## 4.8.3 How official statements on EIA programmes should be considered

The EIA Act stipulates that EIA reports should be drafted on the basis of the EIA programme and the competent authority’s official statement on the programme. The EIA report should specify exactly how the competent authority’s statement on the EIA programme has been acted upon. If the statement contained many specific demands, it may be advisable to list them separately in a table together with the related responses. If the competent authority’s statement is unclear in any way, it has proven to be good practice to hold discussions where the developer, any consultant working with the developer and the competent authority can together go through the statement.

## 4.8.4. Mining projects that do not require the EIA procedure

Many of the reports described in this guide will need to be produced for planning and permit procedures, even if the EIA procedure as such is not required for a project under the EIA Act.

Even if the EIA procedure is not necessary under the EIA Act, the developer should be sufficiently aware of the environmental impacts of a project “on the scale that can be reasonably required” (as stipulated in the EIA Act, section 25). The Finnish Government Decree on Mining Activities (391/2012; section 16, subparagraph 12) requires developers to include in their mining permit applications a report on the environmental impacts of the planned mining activity on the scale required in section 25 of the EIA Act, whenever the EIA procedure as defined in the EIA Act does not apply to the project. Environmental impacts should additionally be examined in the applications for permits required under the Environmental Protection Act and the Water Act, and as part of spatial planning procedures to the extent required in any applicable legislation.

If the impacts of a mining project extend into a site within the Natura 2000 network, and these impacts are likely to significantly reduce the natural values of the site, a separate Natura assessment will have to be conducted in accordance with the Nature Conservation Act. The developer should evaluate the need for such an assessment wherever the possibility of such impacts is an issue.

# Appendices



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## Appendix 1. Other Finnish legislation relevant to mining projects

### MINING ACT

The Mining Act (*Kaivoslaki 621/2011*) regulates rights to extract minerals from the bedrock in Finland. It applies to the mining of metals, minerals, soapstone and marble. The quarrying of sand, gravel and stone is regulated by the Land Extraction Act (*Maa-ainoslaki 555/1981*).

The Mining Act aims to ensure favourable conditions for socially, economically and ecologically sustainable ore prospecting and mining activities. It allows for the development of ore prospecting and mining operations while also duly considering environmental issues, the rights of landowners and other citizens, and the need for local authorities to be able to influence decision-making. Key rights in this context include the protection of private property, freedom of trade, the public's right to participate in and influence decision-making, environmental rights and other basic legal rights. The Mining Act also accounts for special issues related to the rights of the indigenous Sámi peoples of Lapland and other constitutional rights and elements of current legislation. Permission may not be given for any mining activity that will endanger public safety, cause significant adverse environmental impacts, or significantly degrade conditions for local residents and businesses, when such adverse impacts may not be effectively prevented through permit conditions.

Permits for mining in Finland may be sought by developers currently in possession of an exploration permit for the area in question. The proposed project should also fulfil requirements defined in other legislation. The permits required under the Mining Act are granted by the Finnish Safety and Chemicals Agency (TUKES), who are also responsible for monitoring compliance with permit conditions.

### ENVIRONMENTAL PROTECTION ACT

Activities that lead or may lead to environmental pollution such as mining projects need to obtain permits under the Environmental Protection Act (*Ympäristönsuojelulaki 527/2014*). New regulations have recently been enacted particularly to implement the EU Industrial Emissions Directive (*Directive 2010/75/EU on industrial emissions (integrated pollution prevention and control)*). Mining activities and the establishment of storage facilities for mining wastes must be covered by environmental permits issued by the Regional State Administrative Agencies (AVI agencies). Such facilities are not considered to be directly covered by the directive, however, so they are not directly bound by EU-approved best available technology (BAT) conclusions, though they are covered by the BAT principle.

Environmental permits include official orders that must be observed to prevent pollution from the mining activity. These conditions may relate to such factors as the extent

of mining activity and actions to be taken after mining activity ends, as well as emissions and wastes, and measures to reduce them. One important condition for the granting of environmental permits is that mining operations should not have adverse impacts on public health or entail the risk of significant pollution of the environment.

The Environmental Protection Act prohibits soil contamination. Wastes or other substances may not be released or dumped in locations where this would degrade soil conditions to the extent that this would harm public health or pose a risk of environmental pollution, considerably reduce amenity values, or otherwise infringe on the common good or individuals' rights. A similar prohibition applies to the contamination of groundwater.

Applications for environmental permits are processed by the Regional State Administrative Agencies (AVI agencies) within whose area the mining project is located.

### WATER ACT

The Water Act (*Vesilaki 587/2011*) includes provisions on projects that affect the water supply. Such projects include the construction of dams and the extraction of water from water bodies. Projects that will affect the volume and productivity of groundwater resources also require permits in accordance with the Water Act. The related permit application for mining activities are processed together with the project's environmental permit application, and resolved through the same decision. Provisions on the pollution of water bodies are included in the Environmental Protection Act. These issues and other issues related to mining activity are processed in connection with environmental permit applications and resolved through the same decision.

Applications for the necessary permits are processed by the Regional State Administrative Agencies (AVI agencies) within whose area the mining project is located.

### MINING WASTE DECREE

Developers applying for environmental permits must draft waste management plans defining how they will deal with mining wastes. Detailed regulations on how these plans should be drafted are included in a government decree on extractive waste (*Valtioneuvooston asetus kaivannaisjätteistä 190/2013*). The areas where mining waste will be disposed of must be planned and realised so as to ensure that there is no risk of contaminating the environment, soil or groundwater in the short or long term. Mining waste management plans must be assessed and revised as necessary every five years. The decree also controls measures that may be implemented to prevent harm and risks that could result from mining waste storage areas where there is a risk of a potential major accident.

### DAM SAFETY ACT

The Dam Safety Act (*Patoturvallisuuslaki 494/2009*) and the related Government Decree on dam safety (*Valtioneuvooston asetus patoturvallisuudesta 319/2010*) apply to dams and related structures and equipment, including dams built above ground in connection

with mining operations. The act obliges developers to plan and construct dams so that their use will not result in any safety risks. Dams may only be used in ways that do not endanger public health and safety. Developers are obliged to evaluate the related risks and include in the permit applications required under other legislation a reasonably detailed report on the risks of damage associated with the dam and how these risks have been considered when deciding on the scale of the dam. The authorities responsible for dam safety issues are the three regional ELY centres of Häme, Kainuu and Lapland. Finland is divided into three larger regions for this administrative purpose.

## LEGISLATION ON ENVIRONMENTAL DAMAGE

Obligations to take remedial measures and provide compensation for certain kinds of damage to the environment are set out in the Act on the Remediation of Certain Environmental Damages (*Laki eräiden ympäristölle aiheutuneiden vahinkojen korjaamisesta* 383/2009). Other environmental legislation may also apply, depending on what has been damaged and the kind of activity causing the accident. Different authorities and legislative statutes may be involved in such processes depending on which specific act is in question, but a common feature of all these regulations is the principle that the polluter causing any damage to the environment is legally responsible for the damage.

The Act on the Remediation of Certain Environmental Damages only applies to incidents that meet the legal definition of significant environmental damage by resulting in significant adverse impacts on protected species and natural habitats, water bodies or soil.

The Act on Compensation for Environmental Damage (*Laki ympäristövahinkojen korvaamisesta* 737/1994) also applies to damage caused by mining activities as defined in the Mining Act. Compensation issues may be resolved at the request of the mining project developer or the claimant of compensation through separate proceedings initiated within one year of the damage becoming evident.

## NATURE CONSERVATION ACT

The Nature Conservation Act (*Luonnonsuojelulaki* 1096/1996) contains provisions on nature conservation and landscape conservation and management. Under the Act, nature reserves may be established on state-owned lands, limiting the future use of these areas. Provisions in the Act relating to the protection of habitats and species also apply in areas that are commercially utilised. Legislation on environmental damage also covers damage to protected species and natural habitats.

The European Union legislation most relevant to nature conservation includes the Birds Directive (*Council Directive 79/409/EEC on the conservation of wild birds*) and the Habitats Directive. Environmental impact assessments for mining projects must particularly consider the reasons why any local Natura 2000 sites were established, and assess possible impacts on these factors. If a mining project may have any impacts on any species or natural habitats protected under the Natura programme, these impacts should be assessed as specified in section 65 of the act.

## LAND USE AND BUILDING ACT

General guidelines controlling land use planning are defined in Finland's Land Use and Building Act (*Maankäyttö- ja rakennuslaki 1999/132*). Spatial planning at regional and municipal level is guided by a set of national land use objectives. In addition to these objectives, the land use planning system includes plans drafted at three levels: regional land use plans, local master plans and local detailed plans.

Finland's spatial planning system, as defined in the Land Use and Building Act, is thus based on different increasingly detailed layers of planning. National land use guidelines are observed in plans and planning decisions made at regional and local authority levels. The more general regional land use plans and local master plans provide a framework for more detailed local planning.

### National land use guidelines

Finland's national land use guidelines form part of the land use planning system covered by the Land Use and Building Act. They are officially approved by the Government. As specified in the Land Use and Building Act, they must be duly taken into consideration in regional and local planning and the work of state administrative authorities so that their objectives are promoted.

### Regional land use plans

Regional land use plans are generalised plans drawn up to guide land use in a specific region or sub-region. They set out principles for land use and the spatial community structure, and also define areas where development is needed to promote overall regional development. Their function is to resolve national, regional and sub-regional land use issues. They guide the spatial planning work done at the local level, as well as other official planning related to land use. They are presented in map form marked with planning designations and controls, and are published together with a written report that presents the objectives of the plan, expected impacts and other information necessary to facilitate their interpretation and implementation.

Regional land use plans are drawn up by regional councils and approved by the regional council's assembly for ratification by the Ministry of the Environment, after which they are legally enforceable.

### Local master plans

Local master plans are general land use plans drawn up by municipalities. Their purpose is to generally guide and harmonise different land uses at the local level, including the locations of housing, services, workplaces and recreational amenities. They set out principles related to local development goals, and provide a framework for the drafting of more detailed local plans.

Local master plans may cover an entire municipality or certain districts within a municipality, in which case they are known as **partial local master plans**. Municipalities may also work together to produce a **joint local master plan**. Local master plans are



published in map form marked with planning designations and controls, together with explanatory texts.

Local master plans must be drafted by the municipality and approved by the city council or municipal council. Joint local master plans must be approved by the body that organises cooperation between the respective municipalities, and then ratified by the Ministry of the Environment.

### Local detailed plans

Local detailed plans define permissible land uses for each area, stating what features must be preserved, and organising land use, building and development according to the local conditions. They show the locations and sizes of individual buildings and define building rights and the permissible functions of the buildings.

Local detailed plans may be drawn up for entire residential districts including associated housing, workplaces and recreational amenities; or they may sometimes even be drawn up for a single plot of land. They are drafted by the municipal authority. Development along shores may also be guided by a detailed shore plan drafted on the basis of a land-owner's initiative.

Local detailed plans consist of maps marked with planning designations and controls, published together with explanatory texts describing their most important aspects and the related planning process.

As part of the local detailed planning process, mining companies and the local municipality may enter into land use agreements.

### Permits issued under the Land Use and Building Act

The Land Use and Building Act defines conditions for the granting of the following permits:

- building permits
- building demolition permits
- action permits
- landscape work permits

These permits must be based on the related spatial plans. If no local detailed plan has yet been drafted, the granting of a building permit may necessitate a new planning solution. Building permits required for any buildings with significant environmental impacts must in all cases be based on the related local detailed plan.

New roads and power lines must also be planned giving due consideration to existing spatial plans.

## OTHER LEGISLATION

Many other laws and regulations also apply to mining projects. The **Reindeer Husbandry Act** (*Poronhoitolaki* 848/1990) safeguards favourable conditions and rights for reindeer herding in the regions of Northern Finland where reindeer husbandry is practised. This involves an obligation to discuss land use issues in state-owned lands with the relevant reindeer husbandry district officials, for instance. The **Off-road Traffic Act** (*Maastoliikennelaki* 1710/1995) regulates the use of motor vehicles away from roads. The **Radiation Act** (*Säteilylaki* 592/1991) and the **Nuclear Energy Act** (*Ydinenergi laki* 990/1987) regulate mining and processing activities whose purpose is to produce uranium or thorium. The **EU REACH Regulation** (*Regulation (EC) No 1907/2006*) controls the use of chemicals within the European Union. The **Chemicals Act** (*Kemikaalilaki* 599/2013) contains provisions designed to protect health and the environment from the hazards and harm caused by chemicals, including risks related to fires and explosions. The **Act on the Safe Handling and Storage of Dangerous Chemicals and Explosives** (*Laki vaarallisten kemikaalien ja räjähteiden käsittelyn turvallisuudesta* 390/2005) contains regulations on permits and notification procedures for the use of certain chemicals. The **Electricity Market Act** (*Sähkömarkkinalaki* 588/2013) defines the legal framework for the transmission of electricity in Finland.

These different legislative statutes tend to impose ever more detailed requirements as mining projects progress through the planning and implementation stages.



Jari Väätäinen/GTK

# Appendix 2.

## Act on Environmental Impact Assessment Procedure

Unofficial translation, legally binding texts are those in Finnish and Swedish Ministry of the Environment, Finland

### Act on Environmental Impact Assessment Procedure (468/1994; amendments up to 1812/2009 included)

#### Chapter 1 – Aim of the Act and Definitions

##### Section 1 – Aim

The aim of this Act is to further the assessment of environmental impact and consistent consideration of this impact in planning and decision-making, and, at the same time, to increase the information available to citizens and their opportunities to participate.

##### Section 2 – Definitions

In this Act:

- 1) *environmental impact* means the direct and indirect effects inside and outside Finnish territory of a project or operations on
  - a) human health, living conditions and amenity;
  - b) soil, water, air, climate, flora, organisms and biological diversity;
  - c) the urban structure, buildings, landscape, townscape and cultural heritage;
  - d) the utilization of natural resources; and
  - e) the interaction between the factors referred to in subparagraphs a–d.  
(267/1999)
- 2) *environmental impact assessment procedure* means a procedure in accordance with Chapter 2 in which the environmental impact of certain projects is studied and assessed, and the views of authorities and those parties whose circumstances or interests may be affected by the project, and corporations and foundations whose field of activity may be affected by the project are heard;  
(458/2006)
- 3) *environmental impact assessment programme* means the plan prepared by the developer for the necessary studies, and arrangements for the assessment procedure;
- 4) *environmental impact assessment report* means the document in which information about the project and its various alternatives is presented, together with a comprehensive assessment of their environmental impact;
- 5) *developer* means the applicant who is otherwise responsible for the preparation and implementation of a project referred to in this Act; (267/1999)

- 6) *coordinating authority* means the authority ensuring that the environmental impact assessment procedure is carried out for the project; (458/2006) and
- 7) *participation* means interaction in environmental impact assessment between the developer and the coordinating authority, other authorities and those parties whose circumstances or interests may be affected by the project, and corporations and foundations whose field of activity may be affected by the project. (458/2006)

### **Section 3 – Relationship to other legislation (267/1999)**

In applying this Act, other studies concerning the project and its environmental impact carried out in other connections are to be taken into account, and studies called for by this Act and other legislation are to be coordinated as far as possible. Provisions on the use of the assessment report referred to in this Act as a report referred to in another act shall be issued separately.

## **Chapter 2 – Assessment Procedure**

### **Section 4 – Scope of application (458/2006)**

- (1) The environmental impact assessment procedure is applied to such projects and alterations to them for which an assessment is required to enforce an international agreement binding on Finland or which may have significant adverse environmental impact due to the special features of Finland's nature and environment. Further provisions on projects and alterations to them for which an assessment is to be carried out shall be issued by government decree.
- (2) The assessment procedure is also applied in individual cases to a project or a material alteration to a completed project, other than that referred to in subsection 1, that will probably have significant adverse environmental impact comparable in type and extent to that of the projects referred to in subsection 1, also taking into account the cumulative impacts of different projects.
- (3) In addition to what is provided in subsection 2, the characteristics and location of the project and the nature of its impact are to be taken into account when considering the significance of the impact in individual cases. Further provisions on selection criteria shall be issued by government decree.

### **Section 4 a – Finland's exclusive economic zone (1059/2004)**

This Act also applies in Finland's exclusive economic zone referred to in section 1 of the Act on the Exclusive Economic Zone of Finland (*Laki Suomen talousvyöhykkeestä* 1058/2004).

### **Section 5 – Relationship to other procedures (267/1999)**

- (1) The coordinating authority, the local authority or regional council drawing up the plan and the developer shall cooperate sufficiently so that the project assessment procedure and land use planning are coordinated.
- (2) Unless otherwise provided in Chapter 3, the assessment procedure shall not be applied to a project or an alteration of a completed project referred to in section 4(2), if its impacts have been reported in accordance with another act as required

under this Act and all parties whose circumstances or interests may be affected by the project, and corporations and foundations whose field of activity may be affected by the project have been heard concerning the studies. The coordinating authority assesses, if necessary, the adequacy of the studies and hearings conducted in accordance with other legislation before the decision on permits concerning the implementation of the project or another similar decision is made. (458/2006)

#### **Section 6 – Decision to apply the assessment procedure (458/2006)**

- (1) The Centre for Economic Development, Transport and the Environment decides on the application of the assessment procedure to the projects referred to in section 4(2). The decision must be made without delay; however, at the latest within one month of the Centre for Economic Development, Transport and the Environment receiving adequate information about the project. Before the decision, the need for assessment must be discussed sufficiently between the appropriate authorities, and the developer shall be given the opportunity to be heard. The developer must be informed of the decision as provided in section 60 of the Administrative Procedure Act (*Hallintolaki 434/2003*). The decision shall be announced by public notice posted for at least 14 days on the notice boards of the municipalities within the likely area of impact of the project, as provided in the Act on Public Announcements (*Laki julkisista kuulutuksista 34/1925*). The decision shall also be published in electronic format and sent to the appropriate authorities for their information.
- (2) If a project concerns the area of operation of more than one Centre for Economic Development, Transport and the Environment or if a Centre for Economic Development, Transport and the Environment is responsible for the planning or implementation of the project, the Ministry of the Environment determines which Centre for Economic Development, Transport and the Environment will decide on the application of the assessment procedure. The Ministry of the Environment's decision on this matter may not be appealed.
- (3) The Ministry of Employment and the Economy is responsible for the functions referred to in subsection 1 as concerns the nuclear power plants referred to in the Nuclear Energy Act (*Ydinenergi laki 990/1987*).

#### **Section 6 a – Coordinating authority (458/2006)**

- (1) The Centre for Economic Development, Transport and the Environment acts as the coordinating authority. In projects concerning the nuclear power plants referred to in the Nuclear Energy Act, however, the coordinating authority is the Ministry of Employment and the Economy. Further provisions on the division of competence between the Centre for Economic Development, Transport and the Environment and the Ministry of Employment and the Economy shall be issued by government decree.
- (2) If a project concerns the area of operation of more than one Centre for Economic Development, Transport and the Environment, the authorities shall agree on which of them will act as the coordinating authority for the project. If there is disagreement concerning the coordinating authority, or if the project is planned or implemented by a Centre for Economic Development, Transport and the Environment, the Ministry of the Environment determines which Centre for Economic Development, Transport and the Environment will act as the coordinating authority. The Ministry of the Environment's decision on this matter may not be appealed.

## **Section 7 - Timing of the assessment**

- (1) The environmental impact of a project must be studied in an assessment procedure in accordance with this Act before any action relevant in terms of environmental impact is taken to implement the project.
- (2) The assessment must, however, at the latest be carried out before the decision-making referred to in section 13.

## **Section 8 - Starting the assessment procedure (458/2006)**

The developer shall submit the assessment programme to the coordinating authority at the earliest possible stage of planning, taking into account other project preparations. Further provisions on the contents and structure of the assessment programme shall be issued by government decree.

### **Section 8 a - Hearings on the assessment procedure (458/2006)**

- (1) The coordinating authority shall announce the assessment programme without delay by posting a public notice thereof for at least 14 days on the notice boards of municipalities within the likely area of impact of the project, as provided in the Act on Public Announcements. The public notice shall also be published in electronic format and in at least one newspaper in general circulation within the area of impact of the project. Further provisions on the contents of the public notice shall be issued by government decree.
- (2) The coordinating authority shall also ensure that the necessary statements are requested on the assessment programme and provide an opportunity for opinions to be expressed. The coordinating authority shall provide the municipalities within the area of impact of the project with an opportunity to express their opinion on the assessment programme. Opinions and statements shall be submitted to the coordinating authority within the period of time stated in the public notice, which begins on the date of publication of the public notice and lasts at least 30 and at most 60 days.
- (3) Information need not be provided about the assessment programme if it is clearly unnecessary, because information about the project has already been provided as laid down in this Act, and those parties whose circumstances or interests may be affected by the project, and corporations and foundations whose field of activity may be affected by the project have already been heard.
- (4) The date of publication of the public notice and its contents shall be determined in such a way that the competitive status of the developer is not jeopardised. The provisions on transboundary environmental impact in Chapter 3 shall also be taken into account.

## **Section 9 - Coordinating authority statement**

- (1) The coordinating authority provides its statement on the assessment programme. The statement on the assessment programme shall be delivered to the developer within two months of the end of the period allowed for providing statements and expressing opinions. If necessary, the coordinating authority shall specify in its statement the ways in which the assessment programme must be revised. The statement shall also explain how the necessary studies called for by this Act will be carried out and how public notification and hearings will be arranged and,

as necessary, coordinated with procedures provided under other acts that affect the project. A summary of other statements and opinions shall be included in the statement. (458/2006)

- (2) The coordinating authority delivers its statement and other statements and opinions to the developer. At the same time, the statement shall be delivered to the appropriate authorities for their information. (267/1999)
- (3) The developer is entitled to obtain all information from the coordinating authority in its possession that the developer needs for assessing the environmental impact of the project.

#### **Section 10 – Assessment report**

- (1) The developer assesses the impacts of the project and its various alternatives on the basis of the assessment programme and the coordinating authority's statement, and prepares an environmental impact assessment report. The assessment report shall be submitted to the coordinating authority and attached to the application documents related to the project, in a way that is provided separately.
- (2) Further provisions on the contents and structure of the assessment report shall be issued by government decree. (458/2006)

#### **Section 11 – Hearings on the assessment report** (458/2006)

- (1) The coordinating authority shall announce the assessment report by posting a public notice thereof for at least 14 days on the notice boards of municipalities within the likely area of impact of the project, as provided in the Act on Public Announcements. The public notice shall also be published in electronic format and in at least one newspaper in general circulation within the area of impact of the project. Further provisions on the contents of the public notice shall be issued by government decree.
- (2) The coordinating authority shall also ensure that the necessary statements are requested on the assessment report and provide an opportunity for opinions to be expressed. The coordinating authority must provide the municipalities within the area of impact of the project with an opportunity to express their opinion on the assessment report. Opinions and statements shall be submitted to the coordinating authority within the period of time stated in the public notice, which begins on the date of publication of the public notice and lasts at least 30 and at most 60 days.
- (3) The public notice and hearings referred to in subsections 1 and 2 may be arranged in connection with public notification and hearings which are provided for elsewhere in legislation and which are applicable to the project.

#### **Section 11 a – Other forms of participation** (458/2006)

In addition to what is provided in sections 8 a and 11 above, the developer and the coordinating authority may agree to arrange the public notification and hearings in another manner.

## **Section 12 – Concluding the assessment procedure (458/2006)**

The coordinating authority gives its own statement on the assessment report and its adequacy. The statement on the assessment report shall be delivered to the developer within two months of the end of the period allowed for providing statements and expressing opinions. A summary of other statements and opinions shall be included in the statement. The assessment procedure is concluded when the coordinating authority delivers its statement and other statements and opinions to the developer. The statement shall likewise be given for information purposes to authorities dealing with the project, to the municipalities within the area of impact of the project and, as necessary, to regional councils and other appropriate authorities.

## **Section 13 – Consideration of the assessment**

- (1) An authority may not grant a permit for implementation of a project or take any other comparable decision before it has obtained an assessment report and the coordinating authority's statement on it.
- (2) A permit or comparable decision on a project shall state in what way the assessment report and the coordinating authority's statement on it have been taken into account.

## **Chapter 3 – Transboundary environmental impact**

### **Section 14 – International obligations**

- (1) The provisions of this Act on the environmental impact assessment procedure also apply if the enforcement of an international agreement binding on Finland requires an environmental impact assessment procedure to be arranged in cooperation with another state in the case of a project being carried out in Finland.
- (2) The Ministry of the Environment sees to the notification and consultation obligations connected with environmental impact assessment in accordance with the agreement referred to in subsection 1.
- (3) If a project is likely to have significant environmental impact in a territory under the jurisdiction of another state, the coordinating authority shall provide the Ministry of the Environment with an assessment programme without delay for notification to the other state, in accordance with the agreement referred to above. The Ministry of the Environment delivers a copy of the notification sent to the other state to the Ministry for Foreign Affairs for its information. (267/1999)
- (4) The notification shall provide, in particular:
  - 1) information on the project;
  - 2) information on any possible transboundary environmental impact;
  - 3) information on the assessment procedure and decisions relevant to the implementation of the project; and
  - 4) a reasonable time period within which any notification by authorities, citizens and corporations concerning participation in the assessment procedure shall be sent to the Ministry of the Environment. (458/2006)



## Section 15 – International hearings

The Ministry of the Environment or an authority designated by it shall provide the state authorities and natural persons and corporations party to the agreement referred to in section 14(1) with an opportunity to participate in an assessment procedure in accordance with this Act, if a project referred to in this Act is likely to have environmental impact in the territory of the other state.

## Chapter 4 – Miscellaneous provisions

### Section 16 – Guidance, supervision and monitoring

- (1) The Ministry of the Environment is responsible for general guidance and the monitoring of the enforcement of the Act, and for the general development of assessment. Other ministries see to the supervision and monitoring of enforcement and the development of assessment within their mandates and can, when necessary, issue instructions on applying the assessment procedure.
- (2) The Centres for Economic Development, Transport and the Environment oversee and supervise enforcement of this Act in their areas of operation. (59/1995)
- (3) State and local authorities shall cooperate in carrying out the assessment procedure provided in this Act and in coordinating it with procedures provided under other acts that affect the project.

### Section 17 – Right of appeal on the grounds of lack or inadequacy of assessment (458/2006)

- (1) In addition to what is provided separately on the right of appeal, a Centre for Economic Development, Transport and the Environment has the right to appeal a ruling on a project referred to in section 4 in a permit case in accordance with another act or any other decisions relevant to the implementation of the project on the grounds that an environmental impact assessment referred to in this Act has not been carried out or it has been carried out in a way that is inadequate in material respects.
- (2) Whoever otherwise has the right to appeal the decision can in the appeal refer to the fact that an assessment has not been carried out or that it has been carried out in a way that is inadequate in material respects.

### Section 18 – Enforcement measures (59/1995)

If the implementation of a project referred to in section 4 does not require a permit or a decision referred to in section 17(1), and the project is implemented before the assessment of environmental impact required in this Act, the Centre for Economic Development, Transport and the Environment can, under notice of a conditional fine, order the implementation of the project to be halted until such time as the assessment procedure has been carried out. The provisions of the Act on Conditional Fines (*Uhkasakkolaki* 1113/1990) shall apply to matters concerning notice of a conditional fine.

### **Section 19 – Appealing a decision concerning application of the assessment procedure (458/2006)**

- (1) The developer may appeal a decision made pursuant to section 6(1) as laid down in the Administrative Judicial Procedure Act (*Hallintolainkäyttölaki* 586/1996). The jurisdiction of the administrative court is determined under section 12 of the Administrative Judicial Procedure Act. However, when the appeal concerns a decision by the Centre for Economic Development, Transport and the Environment, the administrative court is the court in whose jurisdiction the main part of the project or the activity in question is located.
- (2) To ensure consistent administrative and judicial practice, a Centre for Economic Development, Transport and the Environment has the right to appeal an administrative court decision repealing a decision made by the Centre for Economic Development, Transport and the Environment under section 6(1).
- (3) Decisions made under section 6(1) of this Act cannot be otherwise appealed separately. Parties referred to in section 17(2) above may, however, appeal decisions stating that the application of the assessment procedure is not necessary, according to the same procedure and in the same context as in the case of an appeal made against a permit ruling under other legislation concerning a project referred to in section 4 or against some other decision relevant to the implementation of the project.

### **Section 20**

*Repealed by Act 623/1999.*

### **Section 21 – Special provisions for national defence purposes (458/2006)**

- (1) If the information on the project must be kept secret in the interests of national defence, as laid down in the Act on the Openness of Government Activities (*Laki viranomaisten toiminnan julkisuudesta* 621/1999), an exception may be granted when necessary concerning the provisions in this Act on public notification and hearings.
- (2) If the Ministry of Defence so proposes, the Ministry of the Environment may decide that the environmental impact assessment procedure is not to be applied to a defence force project implemented under exceptional circumstances referred to in the Emergency Powers Act (*Valmiuslaki* 1080/1991), if the application of the assessment procedure would have an adverse effect on national defence. Decisions made by the Ministry of the Environment on the matter may not be appealed.

### **Section 22 – Liability for costs**

The developer is responsible for the costs of public notification, hearings and studies of environmental impact, and for the cost of translations needed in the assessment of transboundary impact.

### **Section 23 – Further provisions (458/2006)**

Further provisions on the authorities and their functions in the environmental impact assessment procedure shall be issued by government decree.

## Chapter 5 – General obligation to assess

### Section 24 – Programmes and plans (201/2005)

Provisions concerning the assessment of the environmental impacts of plans, programmes and policies prepared by the authorities are laid down in the Act on the Assessment of the Effects of Certain Plans and Programmes on the Environment (*Laki viranomaisten suunnitelmien ja ohjelmien ympäristövaikutusten arvioinnista 200/2005*).

### Section 25 – Obligation to be aware of impacts

The developer of a project other than that referred to in section 4, in addition to what is provided separately, must have sufficient knowledge of the environmental impact of the project to an extent that can reasonably be required.

## Chapter 6 – Entry into force

### Section 26 – Entry into force

- (1) This Act enters into force on 1 September 1994.
- (2) Measures necessary for the implementation of this Act may be undertaken before the entry into force of the Act.

### Section 27 – Provisions on application

This Act shall not apply to a project for which a permit has been granted or where an authority has taken some other decision comparable to a permit before this Act enters into force, or for which there has been a public announcement or hearing of the interested parties before 14 January 1994 in accordance with the Building Act (*Rakennuslaki 370/1958*), Water Act (*Vesilaki 264/1961*), Environmental Permit Procedures Act (*Ympäristölupamenettelylaki 735/1991*), Air Pollution Control Act (*Ilmansuojelulaki 67/1982*), Waste Act (*Jätelaki 1072/1993*), Public Health Act (*Terveydenhoitolaki 469/1965*), Adjoining Properties Act (*Laki eräistä naapurussuhteista 26/1920*), Chemicals Act (*Kemikaalilaki 744/1989*), Land Extraction Act (*Maa-aineslaki 555/1981*), Mining Act (*Kaivoslaki 503/1965*), Electricity Act (*Sähkölaki 319/1979*), Public Roads Act (*Laki yleisistä teistä 243/1954*), Aviation Act (*Ilmailulaki 595/1964*), Act on the Redemption of Immoveable Property and Special Rights (*Laki kiinteän omaisuuden ja erityisten oikeuksien lunastuksesta 603/1977*), Private Forests Act (*Yksityismetsälaki 412/1967*), Forest Improvement Act (*Metsänparannuslaki 140/1987*), or Nuclear Energy Act (*Ydinenergi laki 990/1987*).

### Entry into force and application of 458/2006:

- (1) This Act enters into force on 1 September 2006.
- (2) Measures necessary for the implementation of this Act may be undertaken before the entry into force of the Act.
- (3) Matters referred to in section 4(2) that are pending in the Ministry of the Environment at the time of the entry into force of this Act are transferred under this Act to the competent Centre for Economic Development, Transport and the

Environment. The Act in force at the time of the entry into force of this Act will, however, continue to apply to decisions by the Ministry of the Environment or the Ministry of Trade and Industry<sup>1</sup> concerning the application of section 4(2), or to statements by the Ministry of the Environment, the Ministry of Trade and Industry or the Centre for Economic Development, Transport and the Environment that have been done or given before the entry into force of this Act.

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<sup>1</sup> Now, Ministry of Employment and the Economy.



Jari Väätäinen/GTK

# Appendix 3. Decree on Environmental Impact Assessment Procedure

Unofficial translation, legally binding texts are those in Finnish  
and Swedish Ministry of the Environment, Finland

## Decree on Environmental Impact Assessment Procedure (713/2006) (amendments up to 359/2011 included)

### Chapter 1 – Functions of Authorities

#### Section 1 – Functions of the Ministry of the Environment

The Ministry of the Environment provides guidance on, monitors and develops the environmental impact assessment procedure generally and performs the functions laid down in section 6(2), section 6 a(2), Chapter 3 and section 21(2) of the Act on Environmental Impact Assessment Procedure (*Laki ympäristövaikutusten arviointimenettelystä* 468/1994).

#### Section 2 – Functions of the Ministry of Trade and Industry

The Ministry of Trade and Industry decides on the application of the assessment procedure to individual cases and acts as the coordinating authority in projects involving nuclear power plants referred to in the Nuclear Energy Act (*Ydinenergilaki* 990/1987).

#### Section 3 – Functions of the Finnish Environment Institute<sup>1</sup>

The Finnish Environment Institute:

- 1) is responsible for general training, information and research connected with environmental impact assessment in cooperation with other authorities, research institutes and universities;
- 2) assists in obtaining the expertise needed in the assessment procedure;
- 3) stores and keeps available the assessment programmes and assessment reports that have been prepared and the coordinating authority's statements on them;
- 4) monitors and gathers experiences on the application of the Act on Environmental Impact Assessment Procedure and this Decree;
- 5) performs other expert tasks connected with the environmental impact assessment procedure that are assigned to it by the Ministry of the Environment.

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<sup>1</sup> Now, Ministry of Employment and the Economy

## **Section 4 – Functions of the Centre for Economic Development, Transport and the Environment**

The Centre for Economic Development, Transport and the Environment:

- 1) oversees and supervises enforcement of the assessment procedure in its area of operation;
- 2) decides on the application of the assessment procedure in individual cases;
- 3) acts as the coordinating authority as provided in Chapter 2;
- 4) is responsible for any other tasks laid down for it in the Act and this Decree.

## **Section 5 – Functions of the coordinating authority**

The coordinating authority:

- 1) coordinates the assessment procedure in accordance with other laws, in cooperation with the appropriate authorities;
- 2) sees to public notification and hearings in accordance with sections 8 a and 11 of the Act on Environmental Impact Assessment Procedure, and arranges the necessary public hearings;
- 3) as necessary delivers information to the Ministry of the Environment about the project for notification to another state referred to in section 14(2) of the Act on Environmental Impact Assessment Procedure;
- 4) examines the assessment programme and assessment report and provides its statement on them;
- 5) is responsible for organising the monitoring of the environmental impact of the project when necessary, in cooperation with other authorities and the developer;
- 6) submits the assessment programme and the assessment report and its statement on them together with any translations to the Finnish Environment Institute;
- 7) is responsible for **any other tasks laid down for it in the Act and this Decree.**

## **Chapter 2 – Application of the Assessment Procedure**

### **Section 6 – List of projects**

Projects to which the assessment procedure is applied under section 4(1) of the Act on Environmental Impact Assessment Procedure are:

- 1) animal husbandry:
  - poultry houses and piggeries with more than
    - a) 85,000 chickens or 60,000 hens,

- b) 3,000 pigs (with a weight of over 30 kg/pig) or
  - c) 900 sows;
- 2) the extraction and processing of natural resources:
- a) the extraction, dressing and processing of metal ores and other mined minerals when the total amount of the extracted material is at least 550,000 tonnes per year, or quarries and opencast mines with a surface area larger than 25 hectares;
  - b) the extraction of stone, gravel or sand when the surface area of the extraction or excavation site is larger than 25 hectares, or the amount of the extracted material is at least 200,000 solid cubic metres per year;
  - c) the extraction of asbestos and installations for the processing and transformation of asbestos or products containing asbestos;
  - d) the extraction, enrichment and processing of uranium with the exception of test extraction, test enrichment and other similar processing;
  - e) peat production when the production area that is regarded as connected is more than 150 hectares;
  - f) the permanent alteration of natural forest, peatland or wetland when the area that is regarded as connected is more than 200 hectares, by carrying out new ditching or by draining unditched peatland and wetland areas, by removing the tree stock permanently or by replanting the area with species of tree not indigenous to Finland;
  - g) the commercial production of crude oil and natural gas;
- 3) hydraulic engineering and regulation of water flow:
- a) dams and other structures where the dammed or stored volume of water or the increase in the volume of water is more than 10 million cubic metres; (359/2011)
  - b) reservoirs where the dammed or stored volume of new water or the increase in the volume of water is more than 10 million cubic metres;
  - c) water body regulation projects, if the mean flow in the water body is over 20 cubic metres per second, and the flow and water-level conditions will change materially compared with the initial situation;
  - d) the transfer of water from one river basin to another where the volume of water to be transferred exceeds 3 cubic metres per second;
  - e) flood prevention projects covering an area of at least 1,000 hectares;
- 4) the metal industry:
- a) foundries or smelting plants with an output of at least 5,000 tonnes per year;
  - b) iron and steel works, sintering plants and iron alloy manufacturing plants or calcining plants;

- c) metal works or calcining plants processing metals other than iron;
- 5) the forest industry:
- a) pulp mills;
  - b) paper or board mills with a production capacity of more than 200 tonnes per day;
- 6) the chemical industry and the manufacture of mineral products:
- a) crude oil refineries;
  - b) installations for the gasification and liquefaction of bituminous shale, coal or peat of at least 500 tonnes per day;
  - c) factories manufacturing artificial fibres;
  - d) plants using solvents or substances containing solvents and using at least 1,000 tonnes of solvents per year;
  - e) plants manufacturing on a large scale dangerous chemicals referred to in the Act on the safe handling and storage of dangerous chemicals and explosives (*Laki vaarallisten kemikaalien ja räjähteiden käsittelyn turvallisuudesta* 390/2005);
  - f) factories manufacturing mineral wool and cement;
- 7) energy production:
- a) boilers and power plants with a gross output of at least 300 megawatts;
  - b) nuclear power plants and other nuclear reactors, including the dismantling or decommissioning of these plants and reactors, except for research facilities intended for the production and conversion of fissionable and fertile materials and with a maximum continuous heat output of one kilowatt; nuclear power plants and other nuclear reactors cease to be categorized as such when the nuclear fuel and other radioactively contaminated elements have been permanently removed from the plant site;
  - c) plants in which irradiated nuclear fuel is reprocessed;
  - d) plants designed for
    - the production and isotopic enrichment of nuclear fuel;
    - the processing of irradiated nuclear fuel or high-level waste;
    - the final disposal of irradiated nuclear fuel;
    - the sole purpose of final disposal of radioactive waste; or
    - the sole purpose of storing irradiated nuclear fuels or irradiated waste outside the production site (planned to last for more than 10 years);
  - e) wind farm projects where the number of wind turbines is at least 10 or the total power at least 30 megawatts; (359/2011)



- 8) the transmission, transport and storage of energy and materials:
- a) main pipelines intended for the long-distance transport of oil and liquids other than water or wastewater;
  - b) gas pipelines with a diameter of more than DN 800 millimetres and a length of more than 40 kilometres;
  - c) overhead power lines of at least 220 kilovolts and a length of more than 15 kilometres;
  - d) installations for storage of oil, petrochemical products or chemical products when the total volume of the storage tanks for these substances is at least 50,000 cubic metres;
  - e) installations designed for the recovery of carbon dioxide streams, for the purpose of geological storage, from plants included in the scope of application of this list of projects or other installations where the total volume of recovered carbon dioxide is at least 1.5 megatonnes per year; (359/2011)
  - f) pipelines required for the transport of carbon dioxide from recovery facilities to storage sites, where the diameter is more than DN 800 millimetres and the length is more than 40 kilometres, including any associated pressure boosting stations; (359/2011)
  - g) geological storage of carbon dioxide, with the exception of research, development and testing activities where the total volume of stored carbon dioxide is less than 100,000 tonnes; (359/2011)
- 9) transport:
- a) the construction of motorways and expressways;
  - b) the construction of a new road with four or more lanes of at least 10 kilometres of continuous length;
  - c) the realignment or widening of a road so that the resulting continuous section with four or more lanes is at least 10 kilometres in length;
  - d) the construction of long-distance railway tracks;
  - e) the construction of airports if the main runway is at least 2,100 metres long;
  - f) shipping lanes, ports and loading and unloading facilities primarily intended for merchant ships of over 1,350 tonnes;
  - g) canals and inland shipping lanes and ports for ships of over 1,350 tonnes;
- 10) water supply and sewerage:
- a) groundwater abstraction or groundwater recharge of an annual volume of at least 3 million cubic metres;

- b) large tunnels for raw water or wastewater;
  - c) sewage treatment plants designed for a population equivalent of more than 100,000;
- 11) waste management:
- a) hazardous waste treatment plants that receive hazardous waste for incineration, physio-chemical treatment or disposal in landfills, and biological treatment plants designed for a hazardous waste volume of at least 5,000 tonnes per year;
  - b) incineration plants for other than hazardous waste, or physio-chemical treatment plants designed for a waste volume of more than 100 tonnes per day and biological treatment plants designed for a waste volume of at least 20,000 tonnes per year;
  - c) landfills for municipal waste or sludge designed for a waste volume of at least 20,000 tonnes per year;
  - d) landfills for waste other than that referred to in subparagraphs a and c and designed for a waste volume of at least 50,000 tonnes per year;
- 12) alterations to projects equivalent in size to projects referred to in paragraphs 1-11.

### **Section 7 - Applying the assessment procedure to individual cases**

In considering how to apply the assessment procedure to individual cases of projects referred to in section 4(2) of the Act on Environmental Impact Assessment Procedure, special consideration shall be given to:

- 1) the characteristics of projects, such as
  - a) the size of the project;
  - b) the cumulation with other projects;
  - c) the use of natural resources;
  - d) the production of waste;
  - e) pollution and other nuisances;
  - f) the risk of accidents, with particular regard to substances or technologies used;
- 2) the location of projects, such as
  - a) the existing land use;
  - b) the relative abundance, quality and regenerative capacity of natural resources in the area;

- c) the absorption capacity of the natural environment, with particular regard to
  - wetlands,
  - coastal zones,
  - mountain and forest areas,
  - nature reserves and landscape protection areas,
  - areas classified or protected under law,
  - areas in which the environmental quality standards laid down in Community legislation have already been exceeded,
  - densely populated areas, and
  - landscapes of historical, cultural or archaeological significance;
- 3) characteristics of the potential impact, such as
  - a) the extent of the impact considering the size of the affected population;
  - b) the transboundary impact;
  - c) the magnitude and complexity of the impact;
  - d) the probability of the impact;
  - e) the duration, frequency and reversibility of the impact.

### **Section 8 – Coordinating authority**

The coordinating authority is:

- 1) the relevant Centre for Economic Development, Transport and the Environment for the projects referred to in section 6, paragraphs 1-6, paragraph 7(a) and paragraphs 8-11, and for the projects referred to in section 4(2) of the Act on Environmental Impact Assessment Procedure;
- 2) the Ministry of Trade and Industry for the projects referred to in section 6, paragraph 7(b-d), and for projects involving nuclear power plants referred to in section 4(2) of the Act on Environmental Impact Assessment Procedure.

## **Chapter 3 – Assessment programme and assessment report**

### **Section 9 – Assessment programme**

The assessment programme shall contain, on a sufficient scale:

- 1) information on the project, its purpose, planning stage, location, land use needs and connections with other projects, and information on the developer;
- 2) alternatives to carrying out the project, one of which is the no-action alternative, unless for specific reasons this alternative is unnecessary;
- 3) information about the plans, permits and comparable decisions required for implementation of the project;
- 4) a description of the environment, information on the studies on environmental impact already carried out and planned, and information on the methods to

be used in the acquisition and assessment of the material and on assumptions related to the methods;

- 5) a proposal for determining the area of impact;
- 6) a plan for arranging the assessment procedure and the related participation; and
- 7) an estimate of the project planning and implementation schedule and of the date when the studies **and assessment report will be completed.**

## **Section 10 – Assessment report**

The assessment report shall contain, on a sufficient scale:

- 1) the information in section 9 as revised;
- 2) an account of how the project and its alternatives relate to land use plans and such plans and programmes for the use of natural resources and environmental protection which are relevant in regard to the project;
- 3) the main characteristics and technical solutions of the project, a description of operations, such as products, outputs, raw materials, transport, other materials, and an estimate of the types and amounts of waste, discharges and emissions, taking into account the planning, construction and operational stages of the project, including possible dismantling;
- 4) the main information used in the assessment;
- 5) an account of the environment, and an assessment of the environmental impact of the project and its alternatives, any deficiencies in the data used, and the main uncertainty factors, including an assessment of the possibility of environmental accidents and their consequences;
- 6) an account of the feasibility of the project and the alternatives;
- 7) a proposal for action to prevent and mitigate adverse environmental impact;
- 8) a comparison of the project alternatives;
- 9) a proposal for a monitoring programme;
- 10) a description of the various stages of the assessment procedure, including the participation procedure;
- 11) an account of how the coordinating authority's statement on the assessment programme has been taken into account; and
- 12) a non-technical, clearly presented summary of the information in paragraphs 1-11.

## Section 11 – Public notice

- (1) The public notice concerning the assessment programme shall present sufficiently specified information on the project, the location, the developer and the procedure for expressing opinions and giving statements on the assessment programme. In addition, the public notice shall mention where the assessment programme and the subsequent statement by the coordinating authority are available for viewing during the assessment procedure. If the transboundary assessment procedure applies, this shall be mentioned in the public notice.
- (2) As applicable, the provisions laid down in subsection 1 apply to the public notice on the assessment report.

## Chapter 4 – Entry into force

### Section 12 – Transitional provisions and entry into force

- (1) This Decree enters into force on 1 September 2006.
- (2) This Decree repeals the Decree on Environmental Impact Assessment Procedure (*Asetus ympäristövaikutusten arviointimenettelystä* 268/1999) issued on 5 March 1999.
- (3) Provisions of the Decree in force at the time of the entry into force of this Decree concerning the contents of the assessment programme and assessment report continue to apply, however, to assessment programmes and assessment reports submitted to the coordinating authority before 1 January 2007.
- (4) Section 6, paragraph 2(d), of this Decree and, in the case of flammable or explosive chemicals, section 6, paragraph 6(e), of this Decree shall not apply to a project where the permit application has been publicly announced or where the interested parties have been heard, before the entry into force of this Decree, in accordance with the Environmental Protection Act (*Ympäristönsuojelulaki* 86/2000), the Chemicals Act (*Kemikaalilaki* 744/1989) or the Act on the safe handling and storage of dangerous chemicals and explosives.

### Entry into force and application of 359/2011:

- (1) This Decree enters into force on 1 June 2011.
- (2) Section 6, paragraph 7(e), and section 6, paragraph 8(e), (f) and (g) of this Decree shall not apply to a project where the permit application has been publicly announced or where the interested parties have been heard, before the entry into force of this Decree, in accordance with the Land Use and Building Act (*Maankäyttö- ja rakennuslaki* 132/1999), the Water Act (*Vesilaki* 264/1961) or the Environmental Protection Act (*Ympäristönsuojelulaki* 86/2000), or where a decision has been taken on applying the assessment procedure in individual cases in accordance with section 6 of the Act on Environmental Impact Assessment Procedure.

## Appendix 4. Details to include in descriptions of mining projects

### CONSTRUCTION AND OPENING OF A MINE

Descriptions of the opening of a mine prepared for EIA purposes should define conditions under which the opening of the mine will be probable, and set out a schedule for project implementation.

The construction phase of the mine should be presented in broad detail, specifying what will be built at the mine site, and defining an estimated schedule for the construction of different facilities. The various alternatives of a mining project are often particularly differentiated by the timing of the phases of the project or the locations of processing facilities. The construction phase may include the construction of road links, power lines, pipelines, permanent structures and other structures such as water and wastewater reservoirs, in addition to the actual extraction and transportation of earth and building stone. The construction phase may also include ore extraction trials and ore processing trials.

At the latest by the time the EIA report is prepared, the description should also specify any emissions that may be generated during construction, and describe their characteristics. Dust emissions generated during earthworks including the removal of overburden and the excavation, loading, transportation and sorting of material may be estimated with the help of data on the specific dust emission impacts of different work phases, possible measures to reduce emissions, and the exhaust emissions of vehicles and machinery (e.g. in Kauppila et al. (ed.) 2013; Unit Emissions of Vehicles in Finland: <http://lipasto.vtt.fi/yksikkopaastot/muut/tyokoneet/tyokoneet.htm>). Impacts related to noise, vibrations and possible accidents and damage must also be considered for the construction phase. Arrangements affecting local watercourses also often need to be made during the construction phase.

### TRANSPORT LINKS

EIA programmes and reports should briefly describe which transport links have been planned to be built, expanded or altered, especially away from the mine site, either before the construction of the mine (usually necessary for new mines), or during mining activity. These descriptions should contain illustrations of the alternative versions of planned routes together with schedules for their construction and opening. Information on the contractors responsible for construction should also be given, together with details of where any earth or stone will be excavated for construction purposes, and details of any alterations that will need to be made in watercourses. If material is to be excavated within the mine area, the impacts of activities related to transport projects must be considered together with the other environmental impacts of the mine area. Measures to reduce noise and dust problems should also be described as necessary.

Guides relating to the environmental impacts of road and rail projects in Finland (National Road Administration 2009, Finnish Transport Agency 2013a) may be utilised in assessments of mining projects. If a transport infrastructure project is very significant in itself, its environmental impacts should be assessed separately with a wider scope. In such cases EIA programmes and reports only need to summarise their impacts.

## DESCRIPTIONS OF PROCESSES DURING THE PRODUCTION PHASE OF A MINE

The scope of the descriptions of mining operations during the production phase will depend on the specific characteristics of the mining project under assessment. Details of the kinds of technical descriptions needed for various mining activities are outlined below. In addition to describing the production phase as a whole, EIA programmes and reports must describe in greater detail any elements of the project likely to have significant environmental impacts. Descriptions of mining projects are intended to share information on the various elements of projects. It is also important to describe actions that may be taken to reduce emissions and their impacts. Descriptions of mining activities also serve as a checklist that can be used to ensure that all processes resulting in emissions are duly considered.

## MINING OPERATIONS AND THE TRANSPORTATION OF STONE AND EARTH

Descriptions of the actual excavation activities form an essential part of assessments of mining projects and their environmental impacts. Factors relating to the quantities to be mined, the methods to be used, and the timing of different phases, are often the main factors differentiating the project alternatives. Descriptions of excavation activities typically cover:

- mining methods (open-cast mining or quarrying, underground mining, exact mining methods)
- actions taken to prepare for excavation work
- methods and explosive substances used for blasting
- quantities of ore to be extracted (annual and total)
- estimates of the numbers and (maximum) sizes of quarries or excavations during the phases of the project

The transportation of excavated material (ore and waste rock) may also be described together with excavation activities, if transportation activities in the mine area are not separately described:

- loading and unloading; sorting of material into piles for storage
- transportation quantities, methods and journeys
- transport routes, including their surfacing and any methods used to reduce dust emissions

During the EIA programme phase it is important to specify the kinds of emissions that will result from different activities (noise, vibrations, dust, gases released during blasting, traces of explosive substances, nitrogen emissions, exhaust gases, etc.), together

with measures to reduce emissions, the specific characteristics of significant emissions, and the methods used to assess emissions. EIA reports should present estimates of emission levels and the methods and assumptions used in calculating them (e.g. Kaupila *et al.*, 2013). Detailed figures may be included in appendixes as necessary.

### TEMPORARY STORAGE AND PRE-TREATMENT OF ORE

Descriptions of the project alternatives and emission estimates should also cover the temporary storage of ore, its transportation from temporary storage for pre-treatment, and the methods used for pre-treatment, including:

- the locations, operating and characteristics of temporary storage sites
- crushing and grinding methods and the locations and structures of facilities used in different phases
- methods used to reduce emissions, such as temporary storage in buildings or underground
- the movements of material between different phases, especially where environmental impacts result
- usage of raw water and recycled water

It is important that descriptions highlight all significant factors with regard to the dispersal and control of emissions, and their possible consequent impacts. Descriptions of the emissions expected during different operational phases (noise, vibrations, dust etc.) and their characteristics should also be included. Emissions are typically estimated on the basis of the emission rates of individual machines and vehicles, emission reduction measures, and the amounts of material to be handled or the numbers of hours to be worked. Estimates must also include emissions generated during the movements of material between different stages of excavation, processing and storage.

### ORE PROCESSING

Ore is processed to separate minerals containing valuable substances from the other minerals. Ore processing methods include several stages, which should be described briefly in writing and with the help of explanatory diagrams illustrating the different processing phases and specifying how enriched ore, by-products and waste rock are processed. Descriptions may include details of:

- the quantities of ore to be processed
- the resulting mineral concentrates and their annual production figures; total production of the project
- the quantities of by-product and waste rock fractions to be produced
- usage of raw water (water supply issues should be described together with water management)
- the recycling of water (levels of recycling in different phases, methods, limitations, management of the gradual increase of impurities, exceptional situations, processing)
- the chemicals to be used in ore processing: quantities to be used, their chemical properties, and how they behave and lead to impacts in the environment



- the key properties of enriched ores and by-products, including potential future by-products
- impurities present in enriched ores
- the processing and storage of enriched ores (transfer, storage, loading, transportation and location)
- emissions generated during the processing and storage of enriched ores, and measures to reduce these emissions (dust emissions from processing and storage, siltation, structures, etc.)

Descriptions of ore enrichment processes should include descriptions of the quantities and characteristics of emissions released during different processing activities and stages (e.g. gases, odours, wastewater, different solid wastes, etc.). These emissions may be best described in connection with the respective processing activities leading to their release. Planned controlled releases of emissions into the environment should also be described, assuming that the emission flows from different processes are combined as planned, and that the planned emission reduction means are applied. These factors may also usefully be presented as a process diagram where this is possible.

The need to estimate future emissions should also be considered during ore processing trials and process planning. Information from these processes may be utilised for reference purposes in the EIA procedure. It is important to ensure that ore processing trials and process planning procedures generate enough reference data of sufficient quality to enable evaluations of future emissions.

## FURTHER REFINING

Enriched ores may be further refined in the mine area using hydrometallurgical or other metallurgical methods. This further refining may involve the dissolving of metals using acids, bioprocesses or cyanide, often by subjecting enriched ore to a froth flotation process. One further method applied may be the precipitation of dissolved metal using chemicals (e.g. sulphuric acid) or applications of electrolytic or smelting methods. If bioleaching methods are applied to the enriched ore, the valuable metals leached from the ore may be precipitated during further refining, for example, as metal sulphides precipitated using sulphuric acid.

The processes applied during further refining should each be separately described briefly and clearly, for example, using diagrams complemented with written explanations. The chemicals used in any of these processes must be described in more detail in the EIA sections covering chemicals. Descriptions of further refining processes should specify their main products and any by-products, together with estimates of annual production rates and total production over the whole life cycle of the mine. General descriptions of the properties these products and how they will be stored, loaded and transported should also be included. In descriptions of processes and the processing of products it is essential to specify any issues of significance with regard to the environmental impacts of the whole project. Transport routes should be described in the EIA sections covering traffic.

Descriptions of further refining processes should also include details of the consequent emissions and wastes (in a table or diagrams) presented so as to specify which phases of processes result in which emissions. Emissions may consist of releases to air (gases, dust and odours), wastewater effluent and waste fractions generated during refining. The quantities of emissions should be briefly described, together with any key properties of significance with regard to the environmental impacts of further processing. This section of the text should also specify the amounts of water to be used, and how this water will be managed, recycled and eventually released into natural watercourses. These descriptions should indicate which parts of the process involve the use of water, releases of water or the recycling of water for reuse. If the use of water involves its treatment, this should also be described together with estimates of the effectiveness of treatment. Any linkages between the water balance and water supply management in further refining processes and water issues in relation to other processes should be described in the EIA section on “Water management, water supply and water balance” (see below).

The properties of the waste fractions generated during further refining should be described in the same details as those of actual mining wastes (with regard to their physical and chemical composition, and possibly also their mineralogical composition, acidifying or neutralising properties, concentrations of harmful substances and their potential solubility, and chemical traces). When classifying waste fractions the focus should be on their most significant characteristics with regard to environmental impacts. Another option is to use the names of the compounds involved. Plans for the transfer and storage of waste fractions should also be presented. If waste fractions are located in separate facilities from mining wastes, the hydrogeological properties of these management facilities and their basal structures, dams and water management systems must also be described. If waste fractions are transferred together with tailing fractions into tailings ponds, possible interactions between the different waste fractions must also be assessed. In plans for the siting of waste storage facilities it is important to highlight the significance of storage alternatives with regard to efforts to reduce and control environmental impacts in the short and long term.

## TAILINGS AND THEIR PROCESSING

Tailings are formed as waste when valuable minerals are extracted from ores. Particularly where sulphide ores are mined, tailings are a key issue with regard to the environmental impacts of mining projects. The physical and chemical composition of the resulting tailings, their grain size and their water content are greatly affected by the mineralogy of the ore deposits and the selected ore processing methods. Tailings usually consist of fine-grained, silt-like waste materials located in dammed tailings ponds.

The mineralogical and chemical composition of the tailing fractions generated at different stages of ore processing should be duly described. The properties of any aqueous phases used to channel the solid particles within tailings should also be described. It is important to describe all the physical, mineralogical and chemical characteristics of significance with regard to the selection of the disposal location for tailings, disposal

method, dams and underlying structures, and the assessment of their environmental impacts. The main characteristics to be described may include:

- the mineralogical and chemical composition of the tailings
- concentrations of harmful substances and their potential solubility
- the acidifying and neutralising potential of wastes
- the characteristics of the interstitial water in the tailings
- concentrations of ore processing chemicals in wastes
- waste classification

Other useful information for assessments of the long-term load levels includes data on the hydraulic characteristics of tailings and their properties with regard to the diffusion of oxygen (grain-size distributions). The properties that need to be described should particularly be defined on the basis of the nature of the waste fractions generated during ore processing and results from analyses of their interstitial water. It is also essential to define possible margins of error for estimates, as well as any other factors reducing the reliability of these findings, such as the fact that estimates may be based on analyses of ore processing trials conducted only on a small scale.

Another part of the description of ore processing wastes should address factors related to their storage, including:

- transfers of tailings to storage areas in the project alternatives
- tailings storage methods (how the material is deposited, timing of different phases, means to limit acidification and dust emissions)
- alternative locations for storage areas (locations, layering of soil and bedrock, characteristics, suitability for landfilling, recipient water bodies)
- dams and underlying structures to be used for alternative forms of storage of different waste fractions (cross-sections, grounds for their selection)
- direction of water flow in the tailings pond and watercourses in the surroundings, together with the impacts of tailings storage on them
- water management solutions (sedimentation, recycling, processing, collection of leachate)

The activities and characteristics listed above can be described with the help of maps illustrating the differences between alternative options, together with written explanations defining the grounds on which the alternatives have been proposed. It is essential to describe any properties of the underlying ground and the proposed dams and underlying structures that may be significant with regard to the short- and long-term impacts of the landfill areas and efforts to manage these impacts. The structures and water management systems needed for storage and landfill sites are normally selected on the basis of the physical and chemical properties of the mining wastes, and estimates of the kinds of chemical changes that will occur in these wastes in alternative disposal locations.

One goal for the description of ore processing wastes and waste disposal areas is to facilitate assessments of the emissions that will be generated during the processing of tailings (Kauppila *et al. (eds)*, 2013). Such emissions largely consist of dust emissions, gases,

leachate and impurities in effluent water to be recycled or released as wastewater. When examining these factors it is particularly challenging to forecast how the properties of the leachate water filtering out of landfill areas will change in the long term. This is nevertheless a very important factor in the context of EIAs for mining projects.

## OVERBURDEN, WASTE ROCK AND MARGINAL ORE

### Overburden

During the early stages of mining operations, especially when excavating ground to create open quarries and tunnels, large volumes of overburden may need to be removed. This material will then need to be stored and utilised. Such material is typically used to landscape the walls of quarries or to cover and landscape areas where waste rock is landfilled. Overburden may also be used in dams and possibly also to line the beds of tailings ponds or other reservoirs of water, if the geotechnical and chemical properties of the material make this feasible.

Overburden is classified as mining waste. Its properties, quantities, processing and storage solutions should be described in the same way as those of other mining wastes (see above). It is important to consider that the overburden from mine sites may also be chemically variable and have acidifying properties. The resulting emissions can be assessed in the same way as emissions from tailings. Possible environmental impacts are generally considered when deposit sites are chosen for the disposal of overburden – and often simultaneously for the disposal of waste rock. In this context it is worth specifying the proportions of the overburden that can be utilised during the construction of the mine, or later, during the rehabilitation phase of the project, for instance.

### Waste rock

Waste rock is excavated both in open quarries and in underground mines to enable access to metal-bearing ores. It may consist of another rock type bordering on the ore deposit, or beds of a rock type classified as uneconomic located within the ore deposit. In open quarries the amounts of waste rock excavated may be greater than the quantities of ore mined, and the waste rock is often stored in mine areas in designated deposit sites, where underlying structures may have been built. In underground mines the quantities of waste rock are usually lower, and this rock may be used to infill the mine after the ore is extracted, meaning that there is no need to store it above ground except during the construction phase. Some of the waste rock may be utilised in earthworks that need to be constructed for the mine (dams, road embankments, landfill foundations for buildings), if the environmental properties of the rock make it suitable for such purposes.

Waste rock should be described with reference to the proportions of different rock types it contains, the masses of material concerned (annual excavation rates and total quantities excavated during the life cycle of the mine), and its physical and chemical characteristics where these are of importance with regard to its potential utilisation and the environmental impacts of storage areas. Key characteristics include the acidifying and neutralising potential of the material, as well as concentrations of harmful substances

and their potential solubility. It is important to also describe any traces of explosive substances used in blasting that may remain in the waste rock, and to estimate the quantities of nitrogen compounds that may be released into local watercourses during storage. Descriptions of these properties may present an assessment of the waste classification of the waste rock. Plans for the storage of waste rock and the consequent impacts must be assessed in the same way as for tailings.

### Marginal ore

Marginal ore contains concentrations of valuable minerals that are so low that it is not economical to extract them by processing the ore at the time when they are mined. It is often assumed, however, that such ore may be processed during the final phases of mining activity or at some time in future when the prices of the metals present in the ore rise enough to make their extraction economically viable. The characteristics of marginal ore should be described in the same way as those of mining wastes. It is essential to measure any factors that could significantly affect the environmental impacts of the storage area (e.g. acidifying properties, concentrations of harmful substances and their potential solubility). The means chosen for storing marginal ore must also be described, and their impacts must be assessed following the same principles as for tailings and waste rock.

## OTHER WASTES AND THEIR MANAGEMENT

Other wastes typically generated during mining and ore processing operations include scrap metal, waste electrical and electronic equipment, rubber and plastic waste, hazardous wastes and sanitary wastewater. Descriptions of other wastes must briefly and clearly outline their characteristics and explain how they will be processed and possibly stored or transferred away from the mine site for disposal. It is essential to describe the key factors with regard to environmental impacts. The methods and facilities used to treat sanitary wastewater should also be presented, together with details of how the treated water will be released into watercourses if it is treated in the mine area.

## FUELS, EXPLOSIVES, CHEMICALS AND THEIR STORAGE

Sections specifically addressing the handling and storage of the various chemicals and substances to be used at a mine should be included in EIA programmes and reports.

### Fuels

- Fuel types for each vehicle category and figures for annual usage
- Fuels used for local energy production
- Fuel storage and loading locations and transport routes
- Characteristics of fuel storage and loading locations, including protective structures

### Explosives

- Explosive substances with figures for the amounts to be used
- Details of the transportation, storage or manufacture of explosive substances
- The properties of explosive substances or the chemicals used in their manufacture, particularly specifying their impacts and behaviour in the environment
- Descriptions of the facilities where explosive chemicals are to be stored and manufactured

Chemicals used in ore processing, further refining and water treatment

- Their chemical composition (elements and compounds)
- Details of their functions and the quantities to be used for each purpose
- Descriptions of the impacts of each chemical and behaviour in the environment
- Estimates of the residual quantities that will remain in processing and waste fractions; their pathways and decomposition in processing
- Methods used to process and decompose chemicals, with details of their efficiency
- Details of their storage

## WATER MANAGEMENT, WATER SUPPLY AND WATER BALANCE

Mining operations use water for quarrying, during the crushing and processing of ore, and possibly also during further refining. Water is also used, for example, in certain equipment as seal water, in the manufacture of chemicals, to rinse and wash equipment and floors, and in the water supply for drinking water and sanitation facilities. Water management in mine areas can be divided into five main categories relating to: raw water, process water, domestic water supply, water from the drainage of excavations, and runoff in the mine area (built-up areas, mining waste areas, natural water).

It is advisable to describe water management as accurately as possible at the time of writing with the help of explanatory water balance diagrams. Descriptions should include values for the annual usage or generation of water in each specific location, the amounts of water to be recycled together with the recycling methods, and the quantities of untreated or treated water to be released at any location. The locations and characteristics of any water storage reservoirs and other structures related to water management should also be described, together with the geological and geotechnical characteristics of reservoir locations. EIA reports should also include descriptions of possible exceptional hydrological conditions and details of preparations for responses to such situations.

## WASTEWATER TREATMENT AND LOADS

Descriptions should give an overview of the process water and drainage water used and generated in a mining project, alternative methods for treating runoff containing impurities from the mine area with details of their efficiency, the principles applied when channelling water releases, and the characteristics of recipient watercourses. On the basis of this information, the loads contained in water flowing away from the mine area may be calculated, and their impacts on recipient water bodies should be assessed. It is also important to examine how well different water treatment methods can cope in exceptional situations and be applied in the recycling of water. The chemical and physical properties of wastewater released into natural watercourses and any possible diffuse loads in runoff should be defined for the construction phase of the mine, normal mining operations and exceptional situations.

## ENERGY USE, ENERGY PRODUCTION AND FUEL SUPPLY

Descriptions of energy use in mining projects should separately specify the energy use of each facility and the means used to produce energy. If the project necessitates the

construction of a power line of more than 15 km in length with a voltage of at least 220 kV, this must be covered by a separate EIA procedure in which the company responsible for transmitting the energy will be considered as the developer. The EIA procedure for the mining project should nevertheless at least broadly outline and assess the electricity transmission scheme, to enable its feasibility to be assessed in general.

If energy is to be generated in the mine area, the methods to be used and figures for annual generation levels should be specified, also mentioning the facilities where the energy will be used, including the utilisation of any waste energy. Descriptions should also consider any surplus heat energy that may be generated in other activities, and how this energy could be used. Descriptions of local energy production facilities should specify their location and the fuels to be used, together with estimates for their annual usage and details of their storage. Other elements of the fuel supply for the project may also be presented in this context together with the related structures and safety measures. Estimates of the emissions generated during energy production and details of actions to manage these emissions should be presented in EIA reports covering the whole life cycle of the mining activity. This article contains references that may be of use when estimating emissions of particles, greenhouse gases and harmful substances released during energy production.

## OTHER OPERATIONS AND STRUCTURES

Any other facilities constructed in the mine area (e.g. production facilities, offices, storage and maintenance facilities, facilities for workers) should be described, specifying their purposes and any alternative locations. These alternative locations may be marked on the same maps used to illustrate the locations of other key aspects of mining operations (excavations, mining waste storage areas, reservoirs of water or wastewater). The locations of facilities for storing fuels, explosive substances and chemicals used in ore processing and further refining may be specified in this context or in the related written explanations.

## TRAFFIC AND TRANSPORT ROUTES

Descriptions of traffic and transport routes should specify which routes will be used by traffic to and from the mine (roads, railways, harbours), as well as transport routes inside the mine area with their alternatives, including the routing of conveyor belts. Maps may be used to illustrate alternative routes for the different phases of the project, and to delimit the areas along transport routes that will be impacted by different emissions. As the assessment and planning phase proceeds, increasingly detailed descriptions of the factors used to identify and evaluate transport-related emissions should be presented.

Descriptions should cover:

- types of vehicles and rolling stock used for different operations and routes at different stages of the project
- quantities of material transported and vehicle mileages
- road surfacing and measures to limit dust emissions applied on different routes
- conveyor belts and related structures for loading, unloading or transferring material

- descriptions of the commuting journeys of mine personnel (routes, vehicles, traffic levels)
- descriptions of the levels of goods traffic to and from the mine site

### MINE CLOSURE AND REHABILITATION

This section of the description should cover the planning of the decommissioning phase of the mine, including estimated schedules for different stages and the main contents of the closure plan, particularly with regard to environmental impacts and safety issues. Plans for the termination of the different operations of the mine should be presented together with their preliminary main objectives, and a general description of the means and actions envisaged for achieving these objectives. For the rehabilitation stage, a description of the means used to monitor progress towards the objectives of mine closure should also be included. It is worth describing separately the plans and objectives for the rehabilitation of open quarries, underground mines and mining waste storage areas. The actual mine closure plan must be a separate, more detailed document that can be duly updated as the mining project proceeds.



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## Appendix 5. The life cycle of a mining project

The life cycle of a mining project is finite, and consists of four main stages: ore prospecting, opening of the mine, the production stage, and finally the closure and rehabilitation of the mine.

### ORE PROSPECTING

Ore prospecting progresses from regional prospecting to prospect delineation. **Regional ore prospecting** aims to identify the locations of zones with potential ore deposits for further investigation. This work is largely based on the analysis of existing geological, geophysical and geochemical data (e.g. the Geological Survey of Finland's bedrock maps and soil maps, airborne geophysical mapping data, and regional data on the geochemical properties of glacial till).

**Target selection studies** aim to define more limited target areas for more detailed investigations of potential ore deposits. In these areas, data are gathered through geological field surveys, geophysical measurements and geochemical studies. Geological studies include observations and measurements of exposed bedrock, studies of boulders, and the taking of samples from bedrock and glacial till for chemical and mineralogical analysis. Sample pieces of bedrock are taken using a geological hammer, a mini-drill or a diamond saw, or powder samples may be taken using a drill. Boulder surveys examine loose boulders and bedrock outcrops, their grain structure and the minerals they contain, with samples taken for further study if necessary using a geological hammer or a mini-drill. Till samples for geochemical analysis are taken using a hammer drill, and geophysical measurements are taken from airborne or field survey data. Studies of tills searching for heavy metals can be conducted in mechanically dug excavations, examining the structure and composition of the soil, the stratification of layered till deposits, the distances the till has been transported, and the occurrence of boulders containing heavy minerals and ore minerals.

**Prospect delineation studies** assess the potential for the economic exploitation of a targeted zone of ore deposits. Ores are examined by boring into them, through geochemical studies, and through geophysical measurements. Boreholes may produce contiguous sample series tens or hundreds of metres in depth revealing the nature of the rock type successions below ground. Bore samples and borehole measurements can also be used to study structures in the bedrock.

The economic viability of an ore deposit can be assessed on the basis of **test mining and ore processing trials** after the deposit has been designated as potentially exploitable on the basis of bore samples. During test mining, various mining methods can be tested, and samples can be chosen for ore processing trials which will investigate the potential for enriching the ore to be excavated. In addition to accounting for the results of test mining and ore processing, evaluations of the exploitability of ore deposits should also consider factors such as: the location and size of the ore deposit; the quantities of

valuable minerals and substances; the costs of constructing, maintaining and rehabilitating the mine; opportunities for the marketing of mined ore fractions; and environmental issues. When assessing the feasibility and economic viability of exploiting the ore it is necessary to consider the costs resulting from environmental investments that will need to be made during the operation, closure and rehabilitation of the mine.

## OPENING A MINE

When the methods for mining and processing the ore have been selected, its exploitation has been proven to be economically viable, and the necessary permits have been obtained, the construction of the mine can begin. It usually takes about two years to build a mine combined with ore processing facilities. Firstly, road links, power lines and drainage and wastewater removal systems are built, productive excavations are prepared, and storage areas are created for the waste material that will be generated during mining and ore processing. If open-cast mining methods are to be used, the overburden of earth and rock is removed from above the ore deposit. This overburden material may be used for earthworks in the mine area, or stored for later utilisation. The construction of an underground mine begins with the excavation of an inclined tunnel, possibly also a hoisting shaft, and underground processing, maintenance and storage spaces. Waste rock generated during mining can be either utilised for construction work in the area or stored separately in a designated storage area.

## THE OPERATIONAL STAGE OF A MINE

During the operational stage of a mine, ore is excavated from the bedrock using open-cast or underground mining methods. Operations often begin with open-cast mining but later involve underground workings.

Valuable minerals and substances are extracted from the mined ore using ore processing methods. This may happen in the mining concession area itself, or the ore may be transported elsewhere for processing. Before processing, the ore is crushed, sifted and ground. Crushing is often done in stages. In underground mines, ore can be pre-crushed below ground. Grinding ore reduces its grain size sufficiently to enable the valuable minerals it contains to be separated from other minerals during ore processing. The most widely used processing methods are: froth flotation, gravity separation, magnetic separation and leaching methods (tank or heap leaching). Combinations of methods are often used. In many processing methods, chemicals are used to facilitate the separation of the ore containing valuable minerals from other minerals. The end product of processing usually consists of dry, finely ground mineral material containing valuable metals. Some mined materials, such as pre-crushed limestone, may be economically utilised as such without further refining. Refined products and other processed materials are stored in the mine area in heaps or various kinds of containers before being transported to clients for further processing.

Mining generates waste rock, and ore processing results in tailings. These materials may be utilised in construction work in mine areas or piled up in the mine area in their own separate storage heaps or in disused excavations. Ore processing often involves

several phases during which processing wastes are divided into separate fractions for future commercial utilisation or to facilitate their storage. Mineral wastes and process wastes generated during other activities include the earth removed during construction work, and precipitates and sediments formed during ore processing or water treatment.

Large quantities of water are used in mining operations, including drilling and ore enrichment. Some of this water demand can be met by recycling water and using drainage water from the mine, but many processes require the use of freshly obtained pure water. Such water may usually be obtained from nearby lakes or rivers. Where possible, water may be recycled back into processes, for instance, from tailings ponds after sedimentation has occurred, from runoff from mineral waste heaps, or from different stages of processes. Surplus water is then channelled away from the mine site into nearby watercourses, after being treated if necessary.

### MINE CLOSURE AND REHABILITATION

After mining activity ends, the mine area must be made safe with regard to human health and the environment. The area should be integrated into its surroundings and their landscapes, giving due consideration to future land use requirements. Any unnecessary structures should be demolished, and care should be taken to ensure that any remaining structures do not entail risks or harm to the natural environment, human health, or the future use of the area. A plan for mine closure, including related objectives, should be defined as early as possible to help reduce adverse environmental impacts and to enhance the cost-effectiveness of restoration measures. Closure plans should be attached to environmental permit applications, and updated as mining activities proceed. A final closure plan should be submitted to the authorities during the final stage of mining operation.

During the rehabilitation of mine areas, a closure plan addressing all of the operations of the area (excavations, industrial facilities, waste rock and tailings storage areas) should be drafted, defining both the objectives for closure and the actions to be taken to achieve these objectives.



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## Appendix 6. Glossary and abbreviations

### Glossary of terms

- Competent authority (also referred to as “coordinating authority” in Finnish legislation) = The competent authorities responsible for overseeing the EIA procedure for mining projects in Finland are usually the regional ELY centres (centres for economic development, transport and the environment), who guide the EIA procedure and duly organise the legally required public notices, statements and public hearings. The competent authorities must also examine and issue statements on EIA programmes and EIA reports.
- Developer = The party responsible for the mining project, who is usually also responsible for initiating the EIA procedure by contacting the relevant regional ELY centre, and who must also prepare the consequent EIA and EIA report.
- EIA procedure = A procedure in accordance with the EIA Act, through which the environmental impacts of specified projects are investigated and assessed, and the views of the relevant authorities and any parties whose circumstances or interests may be affected by the project are heard.
- EIA programme = A plan prepared by the developer for the EIA procedure and related necessary investigations.
- EIA report = A document containing information about the proposed project and its various alternatives, together with a comprehensive assessment of their environmental impacts.
- Natural state = The ecological state of the proposed mine site before any significant changes resulting from human activity.
- Present state = The present ecological and environmental state of the proposed mine site at the time of assessment.
- Social licence to operate = Approval and support from local communities for a mining project.

### Abbreviations

- AVI agency = Regional State Administrative Agency (6 AVI agencies cover different regions of Finland)
- EIA = environmental impact assessment
- ELY centre = regional Centre for Economic Development, Transport and the Environment (15 ELY centres cover different regions of Finland)
- GTK = Geological Survey of Finland
- PM = particulate matter present in the air, often described in size categories by maximum particle diameter in micrometres ( $\mu\text{m}$ ), e.g.: PM<sub>10</sub> inhalable particles; PM<sub>2.5</sub> fine particles
- SIA = social impact assessment
- STUK = the Finnish Radiation and Nuclear Safety Authority
- SYKE = the Finnish Environment Institute
- TUKES = the Finnish Safety and Chemicals Agency (responsible for the approval of mining projects under the Mining Act)

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