



MinLand: Mineral resources in sustainable land-use planning

A H2020 Project

Topic: SC5-15d - Linking land use planning policies to national mineral policies

Deliverable: D.5.1 The Logical Framework Approach for integration of mineral resources into land-use planning

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Abbreviations and acronyms

AUTMINPLAN	Austrian Mineral Resources Plan
CCDR	corresponding regional land-use authority (Portugal)
CIM	Canadian Institute of Mining, Metallurgy and Petroleum.
CRIRSCO	Committee for Mineral Reserves International Reporting Standards
DGEG	Directorate General for Energy and Geology (Portugal)
EC	European Commission
EIA	Environmental Impact Assessment
ELC	European Landscape Convention
EU	European Union
GHG	Greenhouse gas (emissions)
GIS	Geographical Information System
HMF	Harmonised Mapping Framework
JORC	Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves
LCA	Life Cycle Assessment
LFA	Logical Framework Approach
LUP	Land use planning
MDoPI	Mineral Deposits of Public Importance
MPA	Mineral Potential Area
MSA	Mineral Safeguarding Area
NUTS	Nomenclature of territorial units for statistics
PDM	Municipal Director Plans (Portugal)
PERC	Pan-European Reserves and Resources Reporting Committee
SEA	Strategic Environmental Assessment
SLO	Social License to Operate
UNFC	United Nations Framework Classification for Fossil Energy and Mineral Reserves and Resources
USAID	US Agency of International Development
WP	Work Package

Terminology¹ (based on definitions in MinLand's D3.1 and from other projects)

LAND MANAGEMENT²: Land management can be defined as the process of managing the use and development of land in a sustainable way. As land is used for a variety of purposes which interact and may compete with one another, all land uses should be planned and managed in an integrated manner. Land management is closely related to land-use planning.

LAND USE PLANNING (LUP): Land-use planning is the systematic assessment of land and water potential, alternatives for land use and economic and social conditions in order to select and adopt the best land-use options. Its purpose is to select and put into practice those land uses that will best meet the needs of the people while safeguarding resources for the future.³

The land use planning is occurring at different administrative levels. Most commonly at regional and local level. Besides the scientific and policy dimension, it should be taken into account that making decisions about the "best" or "optimal" way of combining land uses raises fundamental and complex moral and ethical issues (see e.g. Beatley 1991, doi: 10.1016/0264-8377(91)90048-N).

MINERAL POTENTIAL AREA (MPA): In the context of this deliverable, we refer to mineral potential areas to any area on the surface delineated by the vertical projection of the geological body or its part or areas with known mineralization in the subsurface which could contain valuable minerals. The value of minerals could be expressed usually in economic matters as an amount of mineral resources (inferred, indicated, measured) or mineral reserves (probable, proved) according to codes from the CRIRSCO family (JORC, PERC, CIM, etc.) using the CRIRSCO International Reporting Template (CRIRSCO, 2013) or their equivalents according to other reporting standards (UNFC, national reporting standards, etc.). Such reports publish results of prospecting and exploration projects.

Areas with hypothetical mineral resources (areas where no deposits have been discovered yet but may be reasonably expected to exist in a known mining district (U.S. Bureau of Mines and U.S. Geological Survey, 1976) could be also considered mineral potential areas.

MINERALS SAFEGUARDING: The act, process or procedure of ensuring that places (areas) where mineral resources occur are not occupied by other uses that may prevent their future extraction. Therefore, it includes places (areas) that may be needed for mining/quarrying facilities and areas for prospecting and exploration (where geology indicates mineral potential).

MINERALS SAFEGUARDING AREA (MSA): MSAs are policy and legal instruments to safeguard areas with mineral potential (MPA) or known mineral deposits and avoid their unnecessary sterilisation by non-mineral developments.

MINERAL STERILISATION: The loss of access to mineral resources due to the use of land for the development of activities that prevent their exploration or exploitation. In other words, it is the term used when development or land-use changes take place which permanently prevent the implementation of exploration activities or extraction of minerals from the ground.

MINERAL DEPOSITS OF PUBLIC IMPORTANCE (MDOPI): From the MINATURA2020 project definition: A mineral deposit is of public importance where information demonstrates that it could provide sustainable economic, social or other benefits to the EU (or the member states or a specific region/municipality).

¹ For more information and definitions see also: the spatial/regional planning (CEMAT Glossary, <http://www.ectp-ceu.eu/images/stories/Glossary-CEMAT/Glossary-English.pdf>), spatial data (INSPIRE glossary: <http://inspire-regadmin.jrc.ec.europa.eu/glossary>), mineral data (MINVENTORY glossary <https://ec.europa.eu/jrc/en/scientific-tool/mininventory>)

² Adapted from the definition in European Conference of Ministers responsible for Spatial/Regional Planning (CEMAT), 2007

³ <http://www.fao.org/docrep/t0715e/t0715e02.htm#what%20is%20land%20use%20planning>

MULTI-FUNCTIONAL LANDSCAPES: Landscapes which serve different functions and combine a variety of qualities (i.e., different material, physical, biological and social processes in nature and society occur simultaneously in any given landscape and interact accordingly); ecological, economic, cultural, historical, recreational, and aesthetic functions co-exist in a multi-functional landscape.

NON-MINERALS DEVELOPMENT: Development that is not associated with the winning (extraction) and working (processing) of minerals.

PRIOR EXTRACTION: The extraction of minerals prior to development (development of any activity other than extraction) taking place.

PROXIMAL STERILIZATION: The sterilisation of a mineral resource by the influence of a development adjacent to the resource. The potential for impacts on the development, through noise or dust, makes it impractical to work the mineral resource adjacent to the development.

SPATIAL PLANNING: Spatial planning refers to the methods used by the public sector to influence the distribution of people and activities in spaces at various scales as well as the location of the various infrastructures, recreation and nature areas. Spatial planning is considered a comprehensive term⁴ which is not only about traditional regulatory and zoning practices of land use but means also understanding the dynamics of development, including where and when it occurs.

PUBLIC CONSULTATION: It involves actively seeking the opinions of interested and affected groups. It is a two-way flow of communication, which may occur at any stage of regulatory or policy development, from problem identification to evaluation of existing regulation, policy or decision. Public consultation is one of the forms of civic engagement in decision making within the public sector.

CIVIC ENGAGEMENT: The definition of civic engagement⁵ could vary according to the context, from participation on election and decision-making or various forms of political initiatives to a very broad definition referring to any social activities as volunteering, donating money to the charity, etc. In this report it is mentioned in the sense of an active involvement of the public in decision making with respect to land use. The term civic engagement is in the text alternatively exchanged with the terms public engagement/public participation.

⁴ More about the differences between spatial and land use planning can be found at: <https://www.mfe.govt.nz/publications/rma/building-competitive-cities-technical-working-paper/page6.html#footnote-79>

⁵ the dispute about definitions of civic engagement is presented e.g. in an article of Ekman & Amnå (2012)

1 Introduction

Europe is one of the most intensively used continents on the globe and competition for land is increasing as demand for multiple land uses and ecosystem services rises. Smart, sustainable and inclusive economic growth, a transition to low carbon economies, renewable energy, the maintenance of ecosystem services, a halt of biodiversity loss and combating land degradation and desertification are all important policy commitments signed by the EU, e.g. under the 2030 Agenda for Sustainable Development or the EU Growth Strategy 2020. Progress towards such commitments requires balanced and optimized use of land to account for a growing demand for urbanization and amenities, infrastructure, mining and quarrying, food, wood and energy production, water and biodiversity conservation, among other uses. Managing the increasing competition and accounting for different stakeholders' interests (e.g. via trade-offs) requires innovative, smart and efficient allocation of land.

Land use planning (LUP) is necessary when there are competing land uses and for ensuring a sustainable land management. Thus, LUP is a tool for preventing future conflicts, i.e. balancing benefits, risks and costs of all alternatives, and maintaining or enhancing the ecological support functions of land, for the current and future generations. For instance, concerning agricultural resources, a sustainable use of land entails the protection of land of agricultural significance from urban and peri-urban encroachment, from desertification, as well as from other drivers of degradation.

A sustainable land management also requires the adequate protection of natural ecosystems or rare species of flora and fauna, water, forest, and other different natural and non-renewable resources. While some of them are important for the adequate functioning of the natural environment, some others, like mineral deposits (containing metals, industrial and construction minerals), are an essential input for modern industrial societies. Moreover, mineral deposits need to be protected not only for the current, but also for future generations; for instance, it may be the case that in the future new extraction technologies are developed which allow a more efficient and low-impact extraction of minerals nowadays considered not viable by the society or that the value of minerals changes drastically, making non-economical deposits more attractive from an economic perspective.

Securing the availability of mineral resources for the European Community was one of the drivers behind the formulation of the Raw Materials Initiative COM 2008(699). The second of the three pillars of such Initiative is to "Foster sustainable supply of raw materials from European sources". This could be achieved only if the framework conditions for access to mineral deposits are facilitating the mineral development. Evidence from past research projects in Europe (e.g. MINLEX, MINATURA2020) has shown that the access to mineral potential areas, including areas with hypothetical mineral resources and to areas with well-known mineral deposits, has encountered difficulties, e.g. due to competition with other land uses, permitting problems or social opposition against prospects of a potential extractive project. As determined by results of the MINATURA2020 project, the situation is heterogeneous across EU Member States, but a common problem is the substantial risk of minerals being sterilized, if not adequately protected against other land uses.

Minerals are not just at risk of being sterilised by non-minerals development happening immediately on top of them but sensitive developments such as housing, schools or nature conservation areas, will have an impact some distance beyond its boundary, i.e. creating a situation of 'proximal sterilization' of the mineral resource (see the example of sterilization by an urban development below in Figure 1)**Chyba! Nenalezen zdroj odkazů.** Minerals may be sterilized by the lack of knowledge about them, but also because a decision has been made by authorities or the community that land uses other than mineral extraction take precedence in a given area.

The MinLand project aims to map and evaluate existing policies and practices among the MinLand consortium partners and stakeholders and related cases (WP2, MS2: Carvalho et. al. 2018a) in relation to mineral resources and LUP (WP2 and WP4), to learn from case studies (WP3) and stakeholders' involvement (WP7) in order to support LUP practitioners, policy and decision makers in including mineral resources into LUP processes (WP6 – peer learning process and good practice guidance and WP5 Common framework for integration of mineral

resources in natural resources planning). This Deliverables presents a proposal to integrate mineral resources into LUP processes by means of a logical framework approach and some general guiding principles.

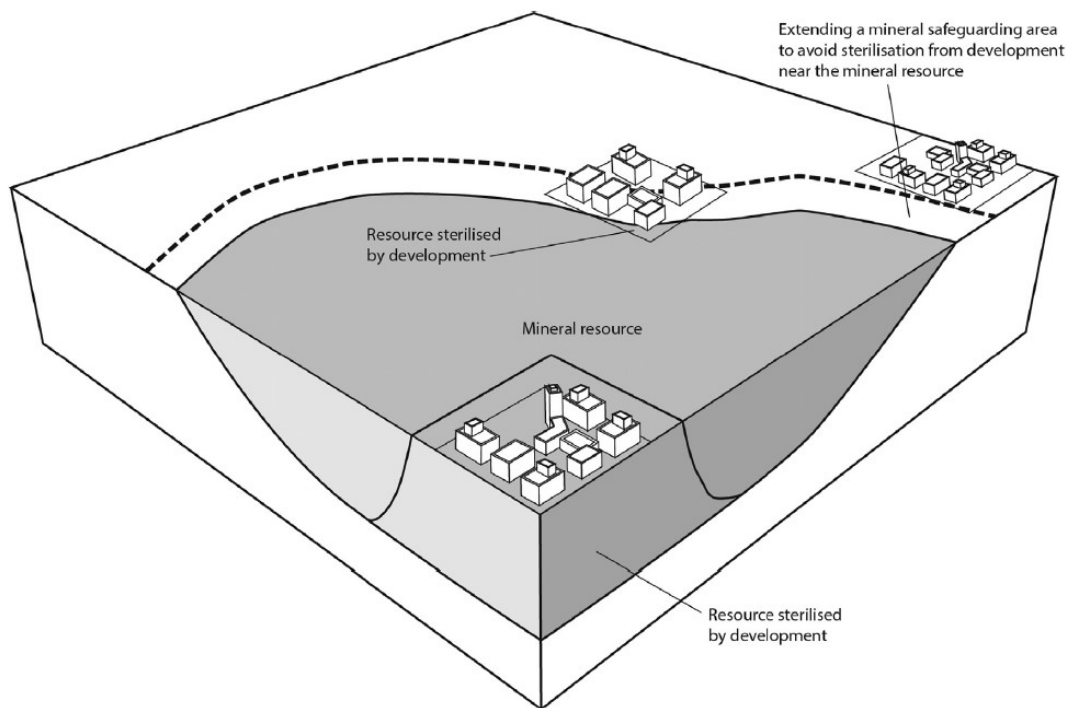


Figure 1: Visual representation of mineral sterilisation of near surface mineral resource by housing development
(Source: Wrighton, Bee, & Mankelow, 2014)

The integration of mineral resources into LUP is a complicated and challenging process which requires a detailed analysis of specific conditions (policy, legal, economic, environmental, social, cultural, etc.) in the designated jurisdiction. Moreover, the process needs to be properly planned and organized with clearly defined expectations and steps towards a solution.

Therefore, the Logical Framework Approach (LFA) was suggested to be applied (Task 5.1) for the development of a common framework (WP5). This methodology was originally developed to assist the US Agency of International Development (USAID) to improve the project planning and evaluation system. The EC has required the use of the LFA as part of its Project Cycle Management since 1993 (European Commission, 2004).

LFA is an analytical process. Its 'product', the Logframe Matrix, provides a framework for structured reasoning why a 'project'⁶ should be undertaken, what its goals are and what means for implementation, monitoring or verification are needed. It can help planners and managers to:

- Establish a logical hierarchy of means by which objectives will be reached (definition of a goal, purpose, activities and outputs);
- Identify key external factors critical to the project's success;
- Establish how outputs and outcomes might best be monitored and evaluated

The logical hierarchy is applied as a vertical succession of components and their respective sources and means of verification. Components are provided following a top-down chain of logical thinking and structured reasoning: it starts defining the overall objective (the goal we would like to achieve) and continues to justification

⁶ A project is understood as a series of activities aimed at achieving specified objectives within a defined time-period and budget (European Commission, 2004). In the context of the MinLand project it would be the development of a framework for the application of a safeguarding principle on mineral resources in land use planning.

of purpose (why the exercise should be undertaken), planning of necessary activities to be performed (how the objective would be achieved) and what logical outputs would result from performing the previously mentioned activities. To all components the respective sources and means of verifications are provided.

Drawing up a Logframe approach has two main stages:

Analysis Stage which has four main elements:

- Problem Analysis (profile of the main problems);
- Stakeholder Analysis (identification of the main 'players');
- Analysis of Objectives (image of an improved situation in the future); and
- Analysis of Strategies (how to address a given situation).

The Planning Stage is the result of translating the outcomes of the analysis into a practical, operational plan. In a conventional LFA this stage consists of:

- The Logframe matrix requiring further analysis and refinement of ideas;
- Definition and schedule of activities and resource requirements; and
- Preparation of a budget

In this deliverable we have used some of the elements of the LFA to provide a guide for LUP policy makers and practitioners when planning an integration of mineral resources into land use planning in their jurisdiction. How and which elements have been applied are described below in the Methodology section.

It needs to be highlighted that the aim of this deliverable is not to provide strict rules on how to treat mineral resources in land use planning. Instead, this deliverable seeks to offer options how the framework for integrating mineral resources into LUP could be planned, processed and implemented. We, therefore provide a set of suggestions, recommendations and guiding principles which are encouraging MSs to act in this matter. Should authorities and/or practitioners decide to follow our suggestions, we recommend also to look on the literature we are providing linkages for e.g. on MINATURA 2020 project results, MINLEX's Final Report, EC's Project Cycle Management Guidelines (European Commission, 2004) and other literature to complement information presented here.

2 Objectives and methodology

2.1 Objectives

The **overall objective** of this Deliverable is to outline a framework for the integration of mineral resources into land use planning. Such framework could provide a guideline for LUP policy makers and practitioners and support them in their activities ensuring that a balanced and transparent assessment of land uses is conducted, especially with regards to the treatment of mineral resources in LUP decision-making processes. It is important that decision-makers arrive at decisions with adequate geological information and mineral potential data, so as to avoid unintended sterilization. In other words, the objective is to support practitioners in making sure that mineral resources are adequately considered, treated in parity with other potential land uses during LUP processes and are protected against unintended sterilization by other non-mineral development. In this sense, we believe that such attitude would contribute to a sustainable management of land. The stakeholders' engagement (including the public) during the whole process would raise awareness and would help to manage possibly competing and/or conflicting land uses.

Specific objectives include:

- Provide Member States with options for developing and testing their own common framework for assessing land-use alternatives

- Provide MSs a guidance to develop and apply a logical framework for integration of mineral resources into land use planning
- Develop guiding principles (criteria) for the integration of mineral resources into LUP, inclusive of the rationale for not automatically excluding raw-material extraction activities in and around potentially sensitive areas;
- Support practitioners in verifying that such guiding principles were taken into account.

This deliverable is, thus, addressed especially to LUP policy-makers and practitioners. However, it could be useful also for all stakeholders that are involved in decision-making with respect to mineral policy, mineral planning, land use, spatial, environmental and strategic planning, regional development, exploration and extraction permitting, civic engagement in policy-making, or related processes and topics.

2.2 Methodology and report structure

The main methodological axis of this deliverable is the Logical Framework Approach (European Commission, 2004) from which we took some of the elements applied to the development of the framework for the integration of mineral resources into LUP. Even though land use planning is an activity taking place much before any mineral development project comes to an advanced phase, the logic of the LFA can be applied in LUP as it provides a framework for logical analysis and structured thinking.

The LFA aims to aid in the development of a common framework for assessing different land-uses, especially related to mineral resources and for planning their integration into land-use planning processes. Furthermore, the LFA is also expected to provide the rationale for policy objectives, to inform permitting procedures and to provide a rationale for not automatically excluding raw-material extraction activities in and around potentially sensitive areas.

The structure of this report follows the logic of the LFA. In the introduction part we have indicated that an LFA consists of two stages: analysis and planning stage. The first one is represented by Chapter 3 which provides a background analysis (overview) of the main issues related to the integration of mineral resources into LUP. It consists in the introduction of the legal and policy basis of interactions between mineral resources and LUP and highlights the importance of stakeholders' involvement. The analysis continues with drawing up visions and options for the common framework including the need for accurate and relevant data (geological, economic, spatial, land use, etc.) to support any future decisions. The chapter includes numerous linkages to existing research and policy papers, most often referencing to the MINATURA 2020 project (the precursor of the MinLand project) and EU regulations, but also to the MINLEX project (Minpol, 2017a), and other international conventions and research papers in the related topics, which is always properly indicated.

The planning stage of the LFA is, however, for the purposes of this deliverable reduced only to the development of the LFA matrix. This is because our aim is only to support/guide LUP policy makers and practitioners on how to develop their own LFA matrix for integration of mineral resources into LUP in their jurisdiction. The LFA matrix consists in defining goal, purpose and the activities which would lead to specific outputs of how the process of the integration of mineral resources into LUP would look like in different administrative levels (national/regional/local level).

Another important element from the LFA matrix which was applied is an evaluation plan represented by the definition of sources and means of verification. It needs to be highlighted that the LFA matrix presented in Chapter 4 provides only the general framework, how the matrix in the practice could look like and what is recommended to be considered. As mentioned in the Introduction, the competent authorities, which are responsible for leading the process of integrating mineral resources into LUP in their jurisdiction can decide to what extent they will take it into account. Therefore, Chapter 4 provides linkages to previous research in MINATURA 2020 or tasks within the MinLand project which could be used as sources for more information. Also, in real-life application, the remaining elements of the planning stage of the LFA (scheduling of activities and budget preparation) are recommended to be applied. For such detailed planning (not part of this deliverable), the responsible authorities could use other type of guidelines (e.g. European Commission, 2004).

For a further support of LUP practitioners in specific LUP cases related to mineral resources, a list of guiding principles is provided in addition to the Logframe matrix (Chapter 4). Such principles could be applied in LUP exercises directly by LUP authorities as well as integrated in the development of the common framework. The first group of principles is about general principles that could be applied for a successful, transparent and complete land-use planning. The second are principles to ensure the possibility of co-using the land, and the third on the benefits, costs, risks and conditions of acceptability for different land uses. The fourth addresses principles for minerals safeguarding. The principles were created predominantly based on previous experiences from MINATURA 2020 project and literature review. They are complemented by good practice examples. It should be highlighted that these principles are of a preliminary nature and will be further investigated and developed within the Consortium during the remaining time of the project.

Chapter 5 offers reflections of main concluding ideas and further recommendations towards MINLAND project and users of the guidelines provided in this deliverable.

3 Background analysis for the integration of mineral resources into land-use planning

Minerals are non-renewable resources. Their occurrence is depending on the geological conditions on certain place. What is giving the actual value to the minerals is their potential use, i.e. “mineral resources are not, they become”⁷ which means that their importance and use by society is linked to the available technology for extraction and processing and their demand downstream the value chain. If the need for minerals is defined as demand for mineral raw materials in the market, mineral resources could be (under certain conditions) considered as mineral deposits. For any assessment of mineral deposits, it is essential the quality and quantity of geological information as well as economic data. With growing importance of environmental issues and rising urban sprawl, the knowledge about land use constraints has become as important as the knowledge on geology and economic feasibility. The accessibility of land for mineral exploration and extraction is nowadays facing challenges like environmental permitting, social acceptance, and other politically and legally-binding constraints. The continuous interdisciplinary dialogue between different stakeholders could be one of the ways to prevent such conflicts at early stages of a project development.

The idea of integrating mineral resources into land use planning is coming from the need to ensure the access to minerals, thus, secure a supply of primary raw materials, indispensable for modern society’s development. The sustainable supply of raw materials is as important as the supply of energy, water or food, air pollution, climate change, etc. Its importance for the EU’s economy was introduced into the agenda in 2008 by the European Commission which adopted the *Raw Materials Initiative: meeting our critical needs for growth and jobs in Europe COM (2008) 699*. The Initiative accelerated research activities, among others in the area of mineral policy support actions, under the HORIZON 2020 funding programme of the European Commission, in order to improve framework conditions for the access to primary raw materials. One of such projects has been MINATURA 2020 whose objective was to “develop a concept and a methodology (a harmonized European mapping framework) for the definition and subsequent protection of “Mineral Deposits of Public Importance” (MDoPI) in order to protect them for their best use in the future”.

The MinLand project aims to continue in the effort of safeguarding the access to minerals through their early identification in land use planning as a useful tool for enhancing the minerals supply from domestic resources – the 2nd pillar of the Raw Materials Initiative and also the European Innovation Partnership Strategic Implementation Plan⁸, where access to land is formulated as a specific challenge. In this regard the MinLand proposal specifically addresses the challenges and supporting actions outlined in the Strategic Implementation Plan action areas “II.1 Minerals Policy Framework” and “II.2 Access to Mineral Potential in the EU” as given in the Horizon 2020 call under topic SC5-15d-2016-2017 where the MinLand proposal was successful.

⁷ Zimmerman, E.W. (1951) World Resources and Industries.

⁸ <https://ec.europa.eu/growth/tools-databases/eip-raw-materials/en/content/strategic-implementation-plan-sip-0>

This chapter is, thus, combining lessons learnt, outcomes, conclusions and recommendations from the MINATURA 2020 project with MinLand's project objectives, tasks and future activities. The text is introduced by the legal and policy basis of interactions between mineral resources and LUP and includes analysis of stakeholders and especially public participation in decision-making. The section 3.3 offers visions of the common framework supporting consideration of mineral resources in land management and importance of sufficient relevant data before any decision is made. These topics were partly developed already in MINATURA 2020 which is represented by European "Joint Vision" for Mineral Deposits of Public Importance (Deliverable D3.3: Horváth et al., 2018b) and development of a Harmonised Mapping Framework for MDoPI (Deliverables D2.1, D2.2 and D2.3). The section is also discussing options how to integrate mineral resources into LUP from the legal perspective. There exist three options (or its combinations): integration by creating a legal framework; using some of the policy instruments or application of series of guidelines which could be voluntarily used by LUP practitioners.

3.1 Legal and policy basis of interactions between mineral resources and land use

The access to minerals is closely interlinked with land use and spatial planning issues. It is starting with collecting the knowledge about existing resources (mineral inventories), including spatial data and its recording into geographical or other specialized maps which could be used as background materials for planning. And it continues with the discovery of new resources via prospecting and exploration (exploration permit) and the exploitation of the minerals including remediation after finishing extraction (extraction permit) when the impact on the land is most visible. Such stages were already recognized in MinLand's Deliverable D3.1 (Carvalho et. al., 2018) as the main cornerstones in analysing mineral policy and land use policy linkages:

- Planning phase and available infrastructure: The phase in which adequate geological and land use information is being produced and made available e.g., through geological surveys, guidelines prepared to support industry and development and implementation of supporting mineral resource and land use planning policies.
- During the permitting for prospecting and actual mineral exploration.
- During permitting for exploitation and mining (Concession, Licensing, or other legal procedures).
- During and after the remediation.

The situation is illustrated in **Figure 2**. The key stages for the conflict resolution are permitting procedures and the process of integration of mineral resources in land use plans (yellow highlights). They are also important because the active participation of different stakeholders in decision-making (including the public) is crucial at these points. This topic will be further developed in MinLand's Tasks 5.2 and 5.3.

It is important to point out that the only actual use of the land with the largest impact on the environment (during the exploration the impact is usually low⁹) and that may reduce/preclude temporal possibility of 'co-use' of land is during the extraction activities (in the red box) which could only happen after successfully passing through (approval of) EIA (or other kinds of studies to obtain the environmental approval) procedure. Moreover, this is subject to presenting the plan for restoration of the area after finishing the extraction (which could enable future land use). Only if all legal conditions are met, conflicts of interest are solved and all other requirements (e.g. compensation of land-owners) and these are not undermining the rentability of the project, the extraction could be present.

⁹ In some cases, the regulatory framework could require EIA even for some of the exploration activities

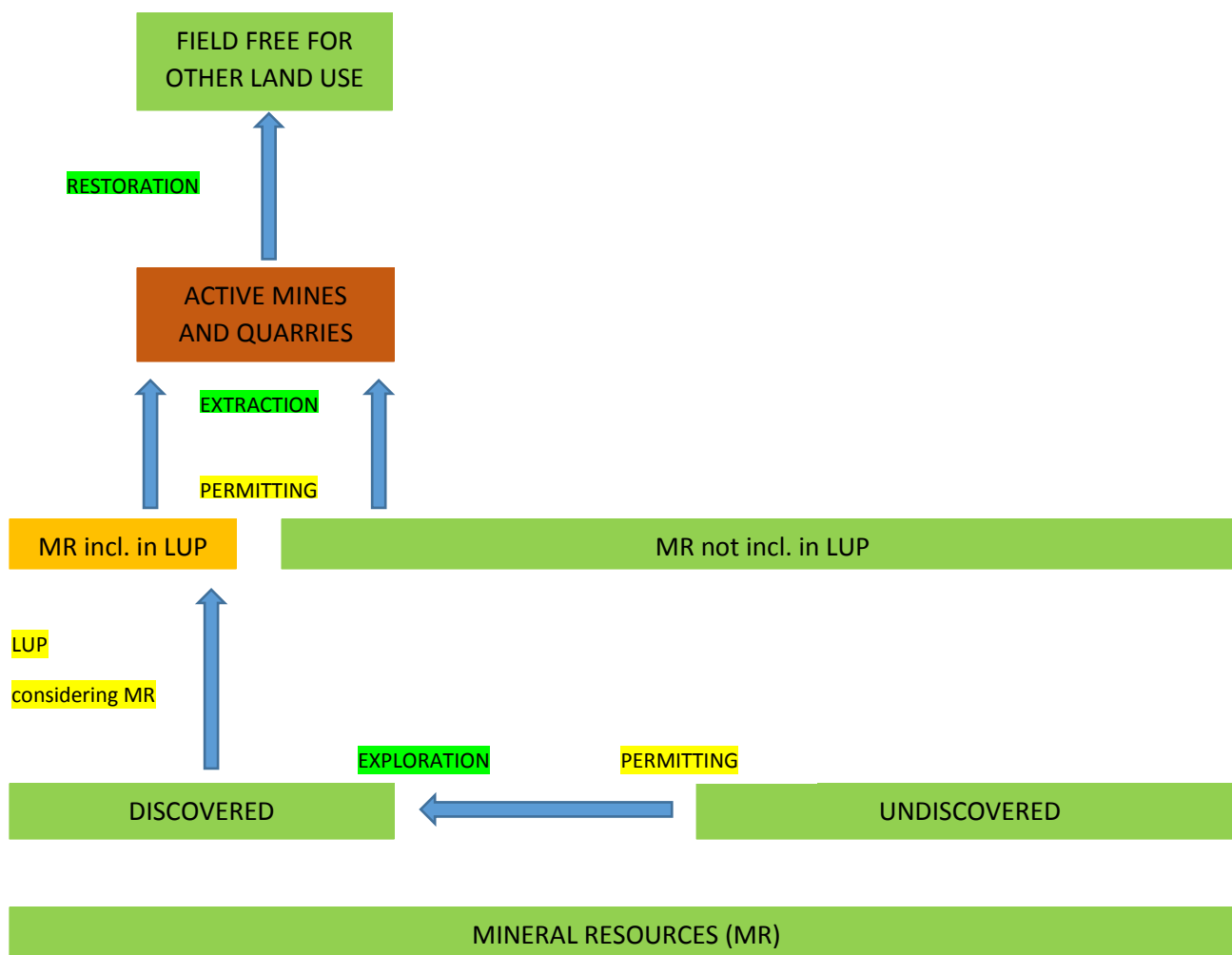


Figure 2: Illustration of interactions between mineral resources and land use.

Note: The yellow highlights - the real contact between LUP authorities and mining industry. The green highlight – actual use of land. The green boxes – no (or very low) impact on other land uses/environment. The orange box – potential conflicts with other land uses need to be solved at this stage. The red box – the highest impact on the environment/other land uses

The heterogeneity among EU Member States on how the interaction between mineral resources and land use management works will be analysed in detail within WP2 and WP4. From previous studies (MINATURA 2020 and MINLEX) is known that different countries may consider mineral potential areas in land use planning at different stages (from early prospection to active mining sites). Other differences may exist in the type of hierarchy between the mining and exploration companies and LUP authorities when it comes to permitting procedures. Such relation could be explained for example of existing practices in some European countries at the stage of extraction permitting (the Figure 3), as it was provided by one of the MINATURA 2020 deliverables (Horváth et. al., 2018a) :

- **Authority driven (top-down – LUP includes area for raw material exploitation):** The land-use authority defines an area where it is possible to open a quarry/mine. Enterprises will request the relevant authority (or authorities, it depends on the country's legislation) to open a pit inside the area already defined by the plan (e.g. Austria, UK, Poland).
- **Industry initiated (bottom up – LUP does not include area for raw material exploitation):** The area where a new extraction activity would like to take place is proposed to the relevant authority (or authorities) by the industry (e.g. Romania, Slovakia, Slovenia, Czech Republic, Finland).

- **mixed (bottom-up and top-down approaches are combined):** (e.g. Hungary, Sweden, Belgium)

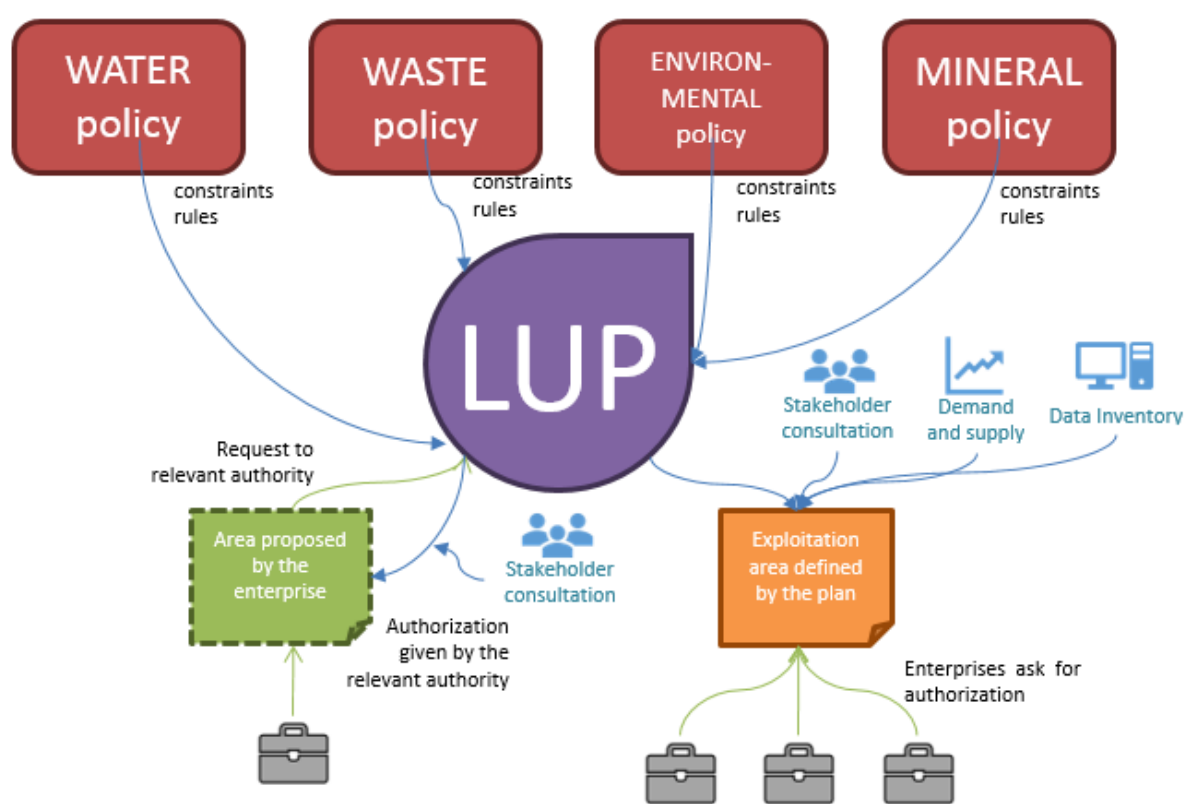


Figure 3: General scheme showing the role of land-use planning in the designation of mining sites with the two different approaches: authority driven/top-down (orange), industry initiated/bottom-up (green) (MINATURA 2020: Deliverable D3.2; Horváth et. al, 2018a)

A brief overview of the situation in some European countries is provided in the Table 1. In most of the countries mineral deposits are included in land use plans excluding Bulgaria, France, the Netherlands and Spain. In some countries/regions there are protected areas (Sweden and the United Kingdom), areas designated for mining by mining concession or land use plans (the Emilia-Romagna Region (IT), Flanders (BE), the Federation of Bosnia and Herzegovina and Montenegro) or several types of areas with different level of geological knowledge are registered in land use plans (prospective, explored and mining areas depending on the country; in the Czech Republic, Poland and Slovakia). While in other countries (Croatia, Finland, Hungary, Ireland, Portugal, Romania, Slovenia and Serbia) mineral deposits (i.e. mining sites) are included in land use plans through the permitting process; in other words, only areas where licensed exploration or exploitation is or have been carried out are included in land use plans.

Table 1: Land use practices with respect to mineral resources across Europe

PARTNERS	APPROACH TYPE	MINING POLICY LEVEL	APPROACH NOTES
Austria	Top down (national > regional > local	national	The Austrian Mineral Resources Plan identifies areas to be declared as 'Mineral Protection Zones' (Bmnt.gv.at., 2018) for land use planning purposes. These zones were derived through two phases: (1) the systematic identification and evaluation of mineral deposits with regard to their 'protection-worthiness'; and (2) the identification of conflict-free areas between the mineral zones

			with other factors protected by law (e.g. residential areas, national parks, etc.). During the identification of areas worth safeguarding there exist 2 possibilities: 1) areas proposed as worth for safeguarding and 2) areas as provisory worth of safeguarding. The AUTMINPLAN itself has no legally binding character because according to the federal constitution, regional planning is the responsibility of the provinces. They are now in the process of implementing the results of the Austrian Mineral Resources Plan (Weber, 2012, p.246). For further details of the process to identify areas worthy of being safeguarded see MINATURA2020 D3.1, Annex 3.
Hungary	both	national	<p>Non-energy minerals: “mineral resource areas” are designated, but a mining activity can be started in areas with a different land-use planning status, too. In this case the status will be modified.</p> <p>Energy resources and ores: concession areas.</p>
Montenegro	top-down (municipality)	no	Within the Spatial Planning, exploitation areas are defined at municipality level.
Romania	bottom-up	no	A special mineral planning policy does not exist in Romania, but there are some plans and strategies at national level. There are separate strategies on mineral resources and territorial development, which are not correlated. All mineral resources are public property of the state. The local authorities are not empowered to issue regulations on mining activities. Mining (exploitation) is conducted on the basis of an exclusive license, after the exploration. The list of exploitation perimeters to be conceded is established by Order of the National Agency for Mineral Resources, which is published in the Official Gazette of Romania, part. I.
Serbia	bottom-up	national	Serbia has no standard concession system for exploration and/or exploitation of mineral resources. The Government launches a tender or auction for some specific projects or areas. Otherwise the system first-to-come-first-to-get is applied, which means that any interested investor may apply for the permit, if the location is free. Exploration is conducted on the basis of exclusive licenses.
Slovakia	bottom-up	national	Safeguarded deposit areas have to be included into the land-use plans. Mineral Safeguarding Areas are determined during the geological surveys. Resolution on assignment of Mining area represents also a resolution on the land-

			use and is included into the land-use plan and relevant documentation.
Slovenia	bottom-up	national	Extraction: Application for granting mining exploitation rights is Submitted to ministry responsible for mining; Ministry obtains nature protection guidelines, opinion of Municipalities (compliance with the proposed spatial planning documents) and asks for compliance with state mining strategy. Concession for exploitation can be granted based on previously issued mining concession act and on its public tender Implemented
Sweden	bottom-up/top-down for area of national interests	national	bottom-up: the authorisation process of opening a new mine; it is the enterprises/companies that applies for the permits to explore and exploit minerals. There are also elements of a top-down approach related to the system of national interests: Geographical areas that are of national significance for a variety of societal interests: within these identified areas, no measures may be taken that may be prejudicial to the specified values or the intended exploitation of the land.
United Kingdom	top-down (municipality)	national	Land-use planning in the UK is a 'local' function undertaken by local authorities but within a framework of national legislation and policy. National legislation and policy provide guidance within which local policy and decisions on land-use change are made. Mineral Planning is merely a specialist sector of land-use planning in the UK: it is not a separate process. 'discretion' (the desirability of making decisions based on each case rather than a common set of rules) is a feature of land-use planning in the UK.
Portugal	both (?)	national	Municipal Director Plans (PDM) are the main instrument of spatial planning at the local level. The elaboration or revision process of each PDM is led by the municipality with the support of the corresponding regional land-use authority (CCDR). The participation of DGEG in PDM's revision is done considering the geological resources and the need to overcome any constraints of land-use planning.
Spain	bottom-up (?)	national	Mineral deposits are not considered by the land-use plans. There are no designated / protected areas for mineral exploitation.

Ireland	bottom-up (?)	Government policy is to support the development of Ireland's mineral resources in an environmentally and socially responsible way. Recognising the economic contribution that mineral extraction can make, through the provision of well-paid secure jobs in rural areas that often have relatively limited employment opportunities.	There is no concept on country/region levels for mineral protection based on land-use planning. There is no overarching Land-use Planning Policy but have a suite of GIS layers with aggregate potential (APM). Some local authorities sometimes take information into account in local planning decisions. Potential assessment for aggregates has been done. Concerning data on minerals Minerals4EU website and Central statistics office are http://www.cso.ie/en/index.html .
Bosnia	both	no	Land-use Planning Policy does not cover mineral deposits
Croatia	no information	national	Land-use Planning Policy does not cover mineral deposits
Netherlands	no information	No. The Ministry of Economic Affairs recently published a white paper on energy (Ministry of Economic Affairs, 2016. Energierapport (Energy Report, in Dutch), 148 pp. Other minerals are not covered by specific policies.	Land-use planning encourages sensible land-use, weighing all interests amongst which that of surface mineral resources. It does however not protect (superficial) mineral deposits. The Netherlands does not have a separate sustainable development policy. It is part of the land-use policy and in addition several sectoral policies address this issue.
Poland	top-down(?)	national	According to the Act on Land-use Planning and Space Management (2003), borders of mineral deposits should be included in local and provincial spatial management plans.
Belgium	both	regional	"There is connection between mining and land-use planning legislations. In the seventies, maps of Flanders were created on which all areas were given a specific destination. These maps are legally binding. Mining is a type of (temporary) land-use that is included. There are procedures available to change the destination of a specific area. For mining, the Flemish Parliament Act on Surface Mineral Resources foresees the possibility for both the government and companies to start a procedure to change the destination of an area to 'mining'.
Bulgaria	no info	national	There is no connection between mining and land-use planning legislations
Czech Republic	both (?)	national	If the mineral deposit is recognized (estimation of reserves/resources), than a Protected Mineral Deposit area enters the land-use plans. It means some restrictions to the land-use, as well as warning for the people to let know that this place might be extracted

			in the future. Land-use plans are always on the local level. Mineral protection is applied on 3 levels: prospecting areas, protected mineral deposit areas and mining leases.
Finland	bottom-up (?)	national	The final land-use is decided during the mining permitting procedure. Mineral deposits are included in land-use plans on regional and local level. Lapland region is renewing the LUP and decided to show potential mineralization on the LUP but are indicative and not bonding in decisions. Aggregates, sands, natural stones are under the building act and in some regions assessed areas have been already introduced in the LUP and are going to be introduced in the future. It is defined in the mining law the importance of areas characterized by societal values.
France	?	national(?)	Mining and land-use planning are regulated by Mining Act and Environmental Code. Regarding land-use restrictions strong differences exist (e.g. in Brittany), industrial projects can interact with protected areas, and not solely mining activity.

Source: MINATURA 2020, Deliverable 3.2 (Horváth et. al., 2018a), updated by T5.1 partners (Austria, Finland)

Note: In the cases, where no validity of information of the type of approach or mining policy level was confirmed it is assigned with (?)

In addition to the systematic approach (authority driven, industry initiated) national policy and legal frameworks differ by covering different types of minerals, the rules of implementation, coexistence with other land uses, etc. This heterogenic situation in Europe is creating the space for discussions about harmonisation and demand for development of a common framework (cf. European Commission, 2010 report – exchange of good practices). However, before setting any recommendations or developing any common (European or national) vision towards better integration of mineral resources in land use planning it is crucial to understand such peculiarities and conditions in each country.

For the development of this deliverable, the information was used mainly from existing knowledge from MINATURA 2020 and MINLEX projects. Along the MinLand project duration even better understanding of the policy and legislative framework relevant for mineral resources in LUP (WP2) and evaluation of different approaches in Europe (WP4) will be exercised. The information will be completed by analysis of country-specific mineral land use cases (WP3). All results will be compiled into the Good Practice Guidance (WP6). All these outputs could serve then to relevant authorities as a background data for assessment of the situation in their jurisdiction.

3.2 Importance of stakeholders' engagement

As indicated in the previous section, the interactions between mineral resources and land use are framed by the permitting procedures, its regulations and legal system in the country¹⁰. These are in each country unique, but

¹⁰ The complete analysis of permitting procedures for exploration and exploitation in all EU countries (including list or relevant legal pieces and authorities) is compiled in the publication: Legal framework for mineral extraction and permitting procedures for exploration and exploitation in the EU (MINLEX). (MinPol, 2017a).

usually have some common elements. Among others, involvement of different stakeholders in the process (by consultation or other kind of engagement) and environmental permitting (EIA).

There are many types of stakeholders relevant for the raw materials sector that could be grouped according to their main activities. For instance, within the MICA project (Erdmann et al., 2016) different stakeholders groups were identified from the area of knowledge and research (R&D institutions, education organizations, knowledge infrastructure, etc.), economic sector (industry, industry associations, commercial organizations, investors, etc) public sector (government, policy-makers, judiciary, parliaments, public authorities, etc.), civil society (NGO's, public initiatives, communities, individuals, etc.) and hidden actors (informal actors, illegal operators, etc.). Especially, interdisciplinary dialogue and civil society engagement are becoming an essential element for achieving sustainable development (Leal & Brandli, 2016). The importance of interdisciplinary work is acknowledged by authorities, e.g. by the formation of multidisciplinary commissions. For instance, in Portugal, according to a MinLand case study around the Neves Corvo mine (Cf. WP3), land use authorities (municipalities) usually do not have expertise on mineral resources neither on how to integrate them in land use planning. However, the land use planning procedure is supported by a multidisciplinary Commission, which incorporates the mining authority.

The civil society in decision-making is followed not only as a good practice, but as an internationally recognized standard. Most visible it is in environmental matters: one of the most significant documents for EU and EU countries in this area is the *Aarhus convention*, signed in 1998, which has 47 signatories in EU and central Asia. It is based on three pillars:

- a. Any citizen should have the right to get a wide and easy access to environmental information;
- b. the public must be informed over all the relevant projects and it has to have the chance to participate during the decision-making and legislative process;
- c. the public has the right to judicial or administrative recourse procedures in case a Party violates or fails to adhere to environmental law and the convention's principles.

The transposition of Aarhus convention into EU legislative is represented by *Directive 2003/35/EC* Other Directives, focusing on different natural resources followed the spirit of Aarhus convention, most importantly the Water Framework Directive 2000/60/EC and the Habitats Directive 92/43/EEC. UN convention from Espoo (1991) is dealing with environmental impact assessment on transboundary context. As other EU Directives or UN conventions, these has been transposed or implemented by Member States resp. signatories to their legislative frameworks. As the environmental permit for exploration or mining activity could in some cases touch issues covered by above mentioned regulations, the public engagement is legal part of the process.

The stakeholder dialogue is increasing on importance also in the area of mining itself. If successfully managed, it culminates in public acceptance of the mining operation on certain place, the so-called *Social Licence to Operate (SLO)*. Some incentives for more public-engaged policy development are coming also from the private sector and international organisations: e.g. *OECD Due Diligence Guidance for Meaningful Stakeholder Engagement in the Extractive Sector* (Horváth et al., 2018a). This initiative is part policy part industry based, focusing on three main recommendations:

- Integrating stakeholder engagement into project planning and regular business operations through sharing of decision-making power with interested and affected parties;
- Practising stakeholder engagement that is driven by stakeholders through ongoing consultation and follow-through;
- Developing a stakeholder engagement strategy which prioritises engagement with most severely affected rather than most influential stakeholders.

In the case of spatial planning the public participation is anchored in the European Landscape Convention (ELC) which is the first international treaty dedicated to the protection, management and planning of all landscapes in Europe signed by the Council of Europe in Florence in 2000. In the Convention, each Party undertakes “to establish procedures for the participation of the general public, local and regional authorities, and other parties”.

Other international documents related to urban development such as the Bristol accord (2005), the Leipzig charter (2007) or the European Union 2020 Strategy for smart sustainable and inclusive growth from 2010, call for the active participation of citizens in procedures of spatial planning and simultaneously warn about the necessity of improving the dialogue between authorities, inhabitants and the economic sector more marginally (Berčič, 2013).

The participation of the public could have various forms and levels. One is a traditional *public consultation* – where typically a small group of people decide what should happen and then inform those affected. A lot of time is spent for explaining and justifying the decision. Some of the stakeholders have limited opportunity to influence what is planned and are usually only consulted when most of the decisions have been made and written down. However, many voices and initiatives are now claiming moving towards a *stakeholder dialogue/engagement* - engaging the stakeholders at an early stage when options are open, and they can influence the outcome. Everyone shares knowledge and insights. Possible actions and ideas are explored before decisions are finalised and written. Moreover, the active participation of the public in decision-making has, according to Creighton (2005), several benefits like: improved quality of decisions, minimizing costs and delays, contribution to a consensus building, increased ease of implementation, avoiding worst-case confrontations, maintaining credibility and legitimacy, and others. In conclusion, it is leading to better acceptance of an agreed outcome (Creighton, 2005). Such early applied stakeholder engagement was recommended also by the European Commission in the Guidance document for Non-energy Extractive Industry and Natura 2000 areas (European Commission, 2011) and by the MINLEX study (Minpol, 2017a).

The active involvement of different types of stakeholders is an important tool also in the MinLand project. Several local workshops will be held within the WP7 Land use planning network and clustering, in order to stimulate peer learning and good practice exchange. Thus, the MinLand observations about land use planning in the mineral resources context are tested and its validity examined by numbers of stakeholders. The analysis of stakeholders is also included in other WPs, especially WP4 and WP5.

3.3 Visioning of the common framework for mineral safeguarding

The question how to approach the position of mineral resources in land use planning knowing its complexity and diversity of existing practices across Europe is leading to the need for harmonisation. One of the discussed visions for improvement in the future is seen in the common framework for the protection of mineral resources. This should include: a) in one hand protection of mineral resources for present and future generations similar to e.g. natural resources, biodiversity, or cultural values protection; and b) transparent, comprehensive and effective management of land able to meet the demand for mineral raw materials and other needs of the society on the other hand.

The minimum and the first step, is considering the presence of known mineral resources in a certain area in land use planning process (what some of the countries are already doing to a certain extent). It means acknowledging their value for the future generations i.e. other land uses which do not sterilize the mineral resource should be considered as more preferable than non-mineral development (e.g. extensions of urban area) which could significantly diminish the future access to the deposit.

The second step is related to permitting procedures and to not automatically reject mineral development activity (exploration/extraction and processing), especially in environmentally and culturally sensitive areas. This is, of course, a delicate and complex task and should be developed very carefully. It does not mean that mineral development should be something automatically preferred. The aim of the Minland is an optimized and balanced land use where mineral resources and mineral development activities are having similar importance as other land uses. What is desired to be done before any official decision is made is a qualified assessment of all benefits, costs and risk which the activity could affect the environment, community, or other stakeholders and also to evaluate possibilities of co-use of land. Depending on the type of jurisdiction the decision-making process would require in different forms an intensive dialogue with stakeholders and experts, negotiations, and compromises. The final decision, even not satisfying all participants, would be the common and informed decision with a clearly defined conditions and consequences. Even though this process may be a time and energy consuming activity, it

is bringing a new perspective to the life of the community and to decision-making where everybody is invited to participate in the dialogue¹¹ and searching for a solution.

The first two steps are forming the strong background and pillar for improving the access to minerals with respect to the land use management. They generally do not require amendment of a legal framework. The most important requirement is the willingness of authorities, industry and stakeholders to conduct the dialogue and search for compromises. The useful tool for the application of these steps could be a kind of guidelines which however must be adopted to local conditions.

A more challenging and complicated issue would be the legalization of integration of mineral resources in land use planning. Safeguarding of mineral resources supported by law would ensure the standardized treatment as well as law enforcement for investors and any other stakeholders. This is in addition to stakeholders' engagement requiring legal and policy analysis and political willingness at highest governmental level.

We believe, that early stage conflict resolution when applying mineral safeguarding principles during land use planning phase could help reduce future conflicts when it comes to mineral development project planning. It could also rise the possibilities of land available for mining at present and for the future which would mean moving towards more secure supply of raw materials for society development.

In any case, at the beginning there is a question which mineral deposits¹²/mineral resources are worthy to be protected? The logical answer could be that all of them should be safeguarded or alternatively be an integral part of all land-use planning, as they represent socio-economic and natural values, which would be very challenging task. The dilemma is based on discussions about: "what should be defined as a mineral deposit?" and "what are the attributes (natural, socio-economic, others) which are giving the value to the deposit that should be appreciated by wider society?". These and some other questions were addressed to the MINATURA 2020 project partners (the precursor of MINLAND), and has led to establishment of the term "Mineral Deposits of Public Importance" and the development of a Harmonised mapping framework and its consequent testing (MINATURA 2020: Work packages 2 and 4). In the next section we are presenting a summary of such disputes and the main conclusions of the project.

The focus of MINATURA 2020 project was, thus, the analysis of possibilities for mapping and assessment of mineral potential areas which is important part of the visioning of the future of the mineral resources in LUP. The MinLand project is complementing these efforts by defining challenges and strengths in the existing practices of the integration of mineral resources (mineral potential areas) and mineral development activities (exploration, extraction, remediation) in land use planning process. Finally, it is in the competency of each country to decide how they will use this knowledge accumulated by these or other projects.

3.3.1 Development and testing of a Harmonised Mapping Framework¹³

An example how to develop a common framework for mineral safeguarding was the Harmonised Mapping Framework (HMF) for Mineral Deposits of Public Importance (MDoPI) in Europe within the MINATURA 2020. In the following section we are presenting in a summarized way how the HMF was developed and tested and what are the project main results and recommendations. Even it was developed specifically for already mentioned concept of MDoPI, the principles and recommendations could be applicable also generally for mineral resources in LUP. For the reader it could provide an idea how complex the development of the common framework could be, what could be the main challenges, and what were the main issues already studied, discussed and developed.

¹¹ See the Chapter 3 .1.1 Importance of stakeholders' involvement" p. 13 ..."

¹² as explained in the introduction part of the Chapter 3: the mineral resources become mineral deposits "under certain conditions". These could be very diverse, country by country and there is no general agreement neither among the experts. Some of the international standards are used in some countries (see the term "mineral potential area" in Terminology section) but usually consider the "economic value" only. Therefore, in the MINLAND project we prefer the term "mineral resources" which is more general. The term mineral deposit is used in connection to the MINATURA 2020 project and term "Mineral Deposits of Public Importance"

¹³ from MINATURA 2020 Final Report: Summary of results achieved in Work package 2, 4 and 5

This could also serve as the transfer of experiences which are representing the background for the development of this deliverable and could be used as a source of information and inspiration for the development of national framework and plan for integration of mineral resources into LUP.

The HMF development consisted first on agreeing on a definition and then setting the criteria for the assessment of Mineral Deposits of Public Importance.

It was agreed within the MINATURA 2020 project that the assessment of mineral resources should be multicriteria. It means considering geological, economic, environmental and social aspects and it should be applicable to different levels (regional, national, EU). This has led to the definition of Mineral Deposits of Public Importance (MDoPI):

A mineral deposit is of public importance where information demonstrates that it could provide sustainable economic, social or other benefits to the EU (or the member states or a specific region/municipality).

At the same time the broad discussion about what should be considered as potential MDoPI was held concluding that in spatial terms it could include:

- Active mines and quarries;
- Areas adjacent to active mines and quarries in mining/quarrying districts;
- Areas of inactive mines (abandoned, in care & maintenance, closed, historic, in retention) including wastes and residues from the extractive activities;
- Greenfield areas with known and recognised mineral resources/reserves;
- Areas with mineral potential (with mineral occurrences, perspective areas subject to prospecting and exploration, areas with exploration results)

Some of the good practices for the identification and safeguarding mechanisms were studied (AUTMINPLAN, Swedish concept of Mineral Deposits of National Interest and Mineral Safeguarding Areas in the UK) and other proposed options for identification of MDoPI (Portuguese and Polish proposal – cf. MINATURA 2020 Deliverable D2.2 Galos et al., 2016). It was recognized that for any common framework it should be respected that in some countries there already exists recognition of mineral deposits within the land use planning or/and its legal protection.

For designation of Mineral Deposits of Public Importance, the project proposed to follow a 6-steps approach:

1. Analysis of mineral policy, mineral demand forecasts and economic context
2. Identification and classification of potential MDoPIs
3. Analysis of competing land uses
4. Proposing and delineating MSAs for each MDoPI
5. Validation of MDoPIs and MSAs and communication to the MDoPI network management body
6. Inclusion of MSAs in local spatial planning documents

However, it was recognised that such six steps could represent significant administrative burden and was offered only as a guidance to Member States. If Member States agreed to participate in a common framework for safeguarding MDoPI, the steps that will be requested to Member States will be only **steps 2 and 4**, i.e. identifying MDoPIs according to basic common criteria and the implementation of safeguarding procedures. This is based on the idea that as long as MDoPI are identified and effectively safeguarded in a transparent and clear way is satisfactory.

It is also highly recommended to cooperate during the identification of MDoPI with all relevant stakeholders and experts. This recommendation is coming from the experience of the national workshops where numerous stakeholders (mining, environmental and land use authorities, mining industry representatives, NGO's, representatives of local authorities, or other relevant groups) participated to the discussion about the MDoPI working definition and the procedures (including qualifying conditions) for the identification and designation of MDoPI.

The development of the HMF was accompanied by **7 case study countries** (offshore minerals - UK, onshore minerals- Italy, Sweden, Portugal, Hungary, Poland and Slovenia) where the pilot test of MDOPI designation methodology was run.

Every case study country had to follow the same general structure of the Testing report:

1. **Case Study Description.** Clearly describe the nature and extent of the case study, what is included, what is excluded. Effectively setting the scene, scope and boundaries. (conceptually, minerals, geographical coverage, temporal limits etc.
2. **Baseline conditions** - Preparation and Enablement: Establish specific preconditions and parameters for the CS testing process. Who will be conducting it, under what circumstances, what assumptions will be made, where the source data have been acquired, description of how all tools and sub-routines were used. Listing and recording effort/resources requirements for all preparatory steps e.g. (data acquisition and processing, validation and verification for inputs).
3. **Testing Process.** Application of the Minatura MDoPI methodology based on original descriptions as per
 - a. MINATURA 2020 D2.2 which presents the set of qualifying conditions for a harmonised mapping framework (HMF) for each type of mineral. (Galós et al., 2016)
 - b. MINATURA 2020 D4.1 List of potential protected areas that suit the selected safeguarding criteria in selected case study countries (Rokavec et al., 2016)
4. **Results/outputs.** Description of results in the form of comprehensive maps at various scales with explanatory texts, data inventories (or traceable links to sources),
5. **Reporting and Recommendations.** Report on outcome of testing of each CS to be made against fixed reporting template. This will capture the lessons learned from doing, and will include:
 - a. a SWOT analysis on workability and appropriateness of MDoPI methodology for each CS,
 - b. giving rise to a set of targeted recommendations describing how from both the testers and stakeholders' perspectives the process can be improved or modified both in general and at specific scales pertinent to the local/regional/national or EU level interest dimensions.
 - c. Selected high quality maps as graphics illustrating key aspects of testing process and outcomes.

The testing has resulted in the following conclusions and recommendations:

1. According to many stakeholders, **geological information** should be complemented (and balanced) by other figures that recognise the multidimensionality (environmental, economic and social) of issues related to the future access/use of those MDoPI and foreseen benefits to the EU, Member States or specific region/municipality. Consequently, factors backing each criteria should be clearly identified, demonstrating their usefulness in the MDoPI appraisal. In addition, the higher significance of some factors should be openly recognised, giving rise to an accountable relative weighing.
2. A low **public awareness** about mineral resources may lead to low social acceptance. Therefore, it is highlighted the importance of ensuring that the procedure of MDoPI identification should be supported by transparent criteria based on a robust body of information complemented by demonstrating WHY the access to some mineral resources should be safeguarded.
3. The **spatial delimitation of MDoPI** in a given region can be approached in two distinct ways.
 - a. The first one considers the maximised area of a known mining/quarrying district or of a potential belt (according to some geological attributes) obtained after elimination of the segments imposed by several layers of land-use restrictions or conflicts. The resulting MDoPI areas reflect a wide perspective of what should be safeguarded for future exploration and exploitation works; these are in fact remaining areas that might, or might not, include the most important deposits.
 - b. The second approach recognises the natural heterogeneities of physical and chemical properties that determine the geological continuity needed to define a mineral deposit; consequently, it considers the spatial distribution of specific tracts hosting mineral deposits and the correspondent accumulated geological information.
4. Perspectives behind the MDoPI concept are quite distinct across EU Member States, conceivably reflecting different perceptions on the meaning of "D" (deposits) and "PI" (public importance). For

instance, the interpretation, the “D” in MDoPI could vary from very *narrow* – considering primarily mineral deposits with proven or probable mineral reserves, while the main criteria of economic nature; to assessing also *uneconomic deposits* – in these cases the interpretation of “public importance” could have different role; and third variation of “D” – represents the cases where also former economic and non-economic deposits could be potential MDoPI. The interpretations differ in the view of mitigating the sterilisation risk (contributing to a long-term availability of mineral resources) and of concurrently addressing two overlapping issues: (1) *safeguarding the future access to mineral resources*; (2) *planning the mineral development in the short-medium term, recognising the need to assign specific areas to mining activities*.

5. Based on the responses of Stakeholders attending the national workshops it can be concluded that a top down (EU level) initiative to implement an MDoPI concept would be welcome by most countries. Moreover, it was concluded that it would help if it was framed as a development topic, e.g. sustainable natural resource management for development and supported with discretion right of different countries, to determine the MDoPI on different levels.

3.3.2 Data availability for multicriteria assessment¹⁴

A decision-making process addressing the issue if any mineral potential area should be safeguarded and included in LUP or not, should be supported by sufficient relevant data and information. The amount and quality of geological information is crucial for the identification of mineral resources. Especially in the case of potential and hypothetical resources where only partial information is available i.e. only outcrops or prospection areas spatial data is available but no subsurface distribution of the geological body, vein mineralisation, etc.

Information sharing mechanisms between LUP authorities/planners and holders of official geological information is not always present. However, this may be overcome by informal mechanisms which ensure a regular flow of information exchange exists. For instance, in Portugal, the MinLand case study around the Neves Corvo mine shows that there are formal governance mechanisms between the mining authority (DGEG) and the LUP authority aimed at the exchange of information during LUP processes. LUP legislations refers DGEG as one of the public entities that should participate and be part of decision making process of land use planning. At the same time there is an informal mechanism for exchange of information between the mining authority and the geological survey (LNEG)

In the case of undiscovered mineral resources, a mapping is very difficult and challenging. There is also lack of harmonisation in quantitative and qualitative data about mineral deposits (different classifications, nomenclature, reporting, etc.) across EU Member States. Therefore, the identification of mineral resources should go in one hand with mineral inventory and geological knowledge of mineral wealth of the country/region/jurisdiction and count on potential discoveries of mineral resources in the future.

Potential land use constraints with identified mineral resources could be mapped using GIS software tools if there is sufficient spatial data available. The availability of specific spatial data about land use and mineral deposits varies by countries and by minerals. In some cases, only analogous spatial data is available (paper maps) or in non-GIS formats (like PDF) only and not all are publicly available. The use of the spatial data is usually limited to just viewing the maps at an online portal using WMS/WFS format (e.g. Sweden, Portugal, Slovakia, EU data).

Another challenge which may rise in terms of spatial assessment of land use constraints is that not all of them are mappable, or some are very difficult to map (e.g. species presence and distribution outside the designated nature conservation sites). The urban sprawl and nature protection areas were identified as main constraints for the mineral development.

One important conclusion from mapping of land use constraints to identified mineral resources was that the focus should be on working along (rather than competing) with other nature conservation instruments, i.e. focus on co-use of land.

¹⁴ from MINATURA 2020 Final Report: Summary of results achieved in Work package 1

3.3.3 Options for integration of mineral resources in LUP

Furthermore, for securing the access to minerals, there exist two overlapping issues (safeguarding for future access vs. planning the mineral development) which are also representing two different (legal) processes. The mineral development part means setting the rules for exploration resp. extraction from the subsurface (usually covered by mining act of the country and legal aspects of permitting processes for exploration and extraction respectively¹⁵). To access the subsurface could be done only through the surface and such mining activity could have certain impact on the landscape, ecosystems, quality of life of the inhabitants in a certain area, etc.

On the other hand, other kind of development, for instance, extension of building area or other kind of infrastructure could impede the access to mineral resources. The future access to minerals before the extraction is allowed (or intended) could be secured by other (legal) process. It means by protection at early stage of discovery of the existence of mineral resources.

For any type of safeguarding mechanism, it is important to have in mind:

1. Minerals are non-renewable natural resources indispensable for human development
2. The value of minerals is conditioned by their extraction from the place where they are originated
3. The extraction of minerals could have a significant (both positive and negative) impact on the environment (air, water, land, ecosystems, etc.) and community.

The point 3. is relevant only at the stage of the mining project development resp. at its planning stage when its known when and where the project will take place and how the extraction will be done. The Environmental Impact Assessment (EIA) of specific projects is in the EU regulated by Directive 2014/52/EU potentially cumulative impact of plans and policy programmes on the environment, so called Strategic Environmental Assessment (SEA) is regulated by Directive 2001/42/EC.

However, because of several reasons (high population density, urban sprawl¹⁶, conflicts of interests with other protected areas or land uses, lack of social acceptance, and others) the availability of land for exploration and extraction in Europe is becoming more difficult (Minpol, 2017b) that it even does not come to EIA procedure or the project fails in other stage.

It is clear that mineral safeguarding is only one factor which could help to enhance the sustainable supply of minerals for European society. However, if properly handled, it could provide an elemental background and assumptions for other steps.

Finally, the questions could be formulated as follows: *How can we protect mineral resources against their sterilization by other non-mineral development to ensure the access to them?; How can we enable the mineral development enhancing sustainable supply of minerals from domestic resources and at the same time consider potential impact on other natural and cultural values worthy to be protected¹⁷?; and Thus, how to balance the use of land in the way it will contribute to sustainable development of certain area?*

There are three different options how mineral resources could be implemented in LUP. Some of the countries are already implementing some of the approaches.

a. Legal tool: Legal implementation of safeguarded areas in land use plans

If there is a legal and technical background for the integration prepared, the land use authorities are authorised to include proposed and approved safeguarded areas in the land use plans and count with their protection for future land use activities. This could be only made if the state decides to apply legal

¹⁵ For a detailed information of permitting procedures for exploration and exploitation in the EU see the publication: Legal framework for mineral extraction and permitting procedures for exploration and exploitation in the EU (MINLEX). (MinPol, 2017a).

¹⁶ In most of the EU countries they have observed increases in the share of built-up land between the period 2006 to 2012 and such increase, was higher than those in 2000 to 2006 (European Union, 2016)

¹⁷ "identifying and safeguarding mineral resources to meet minimum demand, taking account of other land uses." was defined as one of the key elements for a comprehensive land use policy (European Commission, 2010)

process for mineral safeguarding. Legal safeguarding of so called “protected mineral deposits areas” is established e.g. in Slovakia and Czech Republic (their mining law is from 1988, the time of former Czechoslovakia).

b. Policy tool: Consideration of mineral resources in strategic planning and support of mineral resource exploration and extraction

The strategic planning is one of the possible tools to include the mineral resources in land use planning as it provides a policy tool which would need to be considered in LUP. This option is administratively less complicated than the legal process. However, the importance of political lobbying is comparable. An example of strategic policy planning document is the Austrian Mineral Resources Plan (AUTMINPLAN), another is Swedens Mineral Strategy¹⁸ which is a supportive instrument for actions necessary for development of mineral resources in the society.

c. Voluntarily applied guidance: Consideration of mineral potential areas which are not legally protected in land use planning activities

The last option represents voluntarily applied principles of mineral safeguarding by LUP practitioners. It could be supported by preparing and using guiding principles and would be dependent on local decision-makers. The voluntarily applied guidance is usually connected with an existing policy (e.g. in Portugal there exist legal, policy and guidance approach in parallel). Also, the UK is combining various tools: a policy and guideline.¹⁹ Voluntarily applied guidance has been used for aggregates in some regions in Finland (Pirkanmaa for example)²⁰. Similarly, the Swedish system of land-use of national interest²¹, whereof minerals is part. It is used as a tool in the decision process but not legally binding.

Other kinds of integration of mineral resources into LUP may also exist. E.g. in Lapland (Finland), the region has asked to experts to define the area affected by a possible mineralization, so a large area is visible on the LUP, where mapping has already been done. The deposit is not defined and there is not a concession. It does not preclude other activities; however, it is known that there is a possible mineralization.

The mapping of relevant existing policy frameworks and evaluation of existing practices in relation to land use planning and mineral resources will be further examined in WP2 resp. of WP4 in the MinLand project.

For the planning of integration of mineral resources in LUP, in addition to decide on the type of the approach, other important elements of the vision of the common framework need to be agreed. It means, setting some basic conditions and measures which will be considered and applied. They could be similar to the basic criteria of so called ‘Joint Vision’ of European Countries for the European Framework of Mineral Deposits of Public Importance (MINATURA 2020: Deliverable D3.3 – Horváth et al., 2018b) that should form a basis for National Frameworks (according to the MINATURA 2020 Final report):

- **Mineral policy will be supported by mineral resources inventories and mineral economics:** A comprehensive minerals policy which considers availability of domestic resources (i.e. mineral resources inventories including mineral potential assessment), the predicted demand for minerals, their import and export and which respect a structure of the industry provides a framework for the MDoPI implementation. The minerals policy should ideally be in line with other policies and takes into account social, economic and environmental factors.
- **Mineral deposits/minerals policies will be integrated into land-use planning policies and an appropriate safeguarding mechanism will be developed:** This step requires good understanding of both (land use and

¹⁸ <https://www.government.se/contentassets/78bb6c6324bf43158d7c153ebf2a4611/swedens-minerals-strategy.-for-sustainable-use-of-swedens-mineral-resources-that-creates-growth-throughout-the-country-complete-version>

¹⁹ <https://www.gov.uk/guidance/minerals> ; <http://nora.nerc.ac.uk/id/eprint/7508/>

²⁰ However, aggregates are under a Building act Usually minerals under the mining act, are not included into LUP until they are deposits to be exploited-generally no safeguarding is performed.

²¹ The responsible authority in Sweden is the Geological Survey of Sweden. The coordinating authority on areas of national interest is Boverket (www.boverket.se).

mineral) policies and its legal framework which must be respected. The integration should go in line with sustainable development principles and highlight the role of minerals in this sense. The implementation of the MDoPI concept in the Land-use plan can help to balance mineral policies with others (environmental, transport, housing, etc.) solving conflicts between policies with more effectiveness.

- **Conflict management should be secured through coordinated stakeholder consultations and involvement of relevant organisations:** A key tool for successful implementation is public and other stakeholders' engagement (such as authorities involved in the process, other types of industry that may be influenced by the decision, and others) and conflict resolution management. Conflicts may appear between MDoPI and other land-uses (e.g. nature conservation sites, cultural heritage sites, groundwater protection, urban areas, etc.) that will need to be resolved. Conflicts also arise out of differing stakeholder interests, reflecting their respective priorities and value systems. The level and the manner of involvement could differ according to the legal framework in each jurisdiction. In any case, local governments, decision makers and local communities needs to be integrated in the designation of MDoPI areas in a coordinated way.

In this chapter we have provided an overview of aspects important for the integration of mineral resources into LUP which are: legal and policy analysis, stakeholders involvement which should lead to drafting the vision of the common framework. The last one consists first, in setting the conditions for mapping and assessing the mineral potential areas supported by sufficient relevant and accurate data and second, in agreement of relevant authorities on the approach (legal, policy, voluntary) and measures which will be applied in the process of integration.

In the next pages, these aspects are structured into succession of activities inside the Logframe matrix. The logical relations within the matrix are helping to the reader better orientation in what is needed to keep in mind when planning any changes in sense of integration of mineral resources into LUP.

4 Logical framework and guiding principles for the integration of mineral resources in land use planning

4.1 Logframe matrix

A log-frame approach normally consists of a 4x4 matrix indicating goals, purposes, activities and outputs against sources and means of verification. Usually it contains also indicators of success, which will be presented in Deliverable D4.4, so it is not exposed in this report. We present below an adapted version of the Logframe matrix for the purposes of LUP and mineral resource integration. The Logframe presents only the 'guide' and inspiration for mineral and land use planning policy-makers and practitioners how to develop their own detailed Logframe matrix and approach.

Every component of the matrix is first introduced by a brief instruction or description of the selected "box" of the matrix followed by the extended content of the general Logframe matrix presented in

Table 2. The LUP policy makers and practitioners can use this as a reference and further develop these ideas when using the Logframe approach for planning the integration of mineral resources in LUP in their jurisdiction.

In addition to the Logframe, guiding principles that should be considered when planning the integration are listed in the next section of this chapter.

Goal (what?)

At the beginning of any land use planning policy exercise it is important to agree on the common target. The goal (overall objective) that the log-frame developer seeks to achieve should be clear. For instance:

Overall Objective: Facilitate (or safeguard) the access to minerals via land use planning

For that land use planning needs to ensure mineral deposits are considered in the land use and spatial planning process and their value (economic, environmental, socio-cultural) are mapped, discussed and considered in the decision-making process and land use conflicts are managed properly.

Purpose (why?)

The purpose should include reasoning why the objective was set, i.e. why this is important from a societal perspective point of view.

Purpose: Enhance the sustainable supply of minerals from domestic resources

Minerals are essential for modern societies and the minerals industry has a strong potential in contributing to the achievement of the Sustainable Development Goals, i.e. contributing to a smart, sustained and decent economic growth, providing well-paid jobs and opportunities in inactive regions, fighting climate change (reducing GHG emissions by fostering local extraction and consumption of minerals, i.e. reducing transportation), etc. The demand for primary minerals is expected to rise as populations and real per capita income increases. Therefore, it is important to foster the domestic production when possible and intensify the diversification of resources for which the territory is not self-sufficient.

Activities (how?)

For achieving the objectives, it is important to define the steps which would lead to achieving them.

For integrating mineral resources in land use planning the following steps are proposed to be scheduled. We have linked these activities to the activities and tasks held in MINATURA 2020 and MinLand project. The Logframe developers can use it as a reference where to find more information about each point.

Activities:

1. Background analysis for integration of mineral resources into LUP

a. *Legal and policy analysis* (including other natural resources safeguarding mechanisms)

The successful legal integration of mineral safeguarding could be done only after detailed legal and policy analysis. First of all, an examination is needed of: at which stages the interactions between mineral resources and LUP is occurring; and what are the risks at which stage. Secondly, analysis of all related topics which could be influenced by the procedure of implementation (mining, land use policy, industrial and fiscal policy, environmental and social policies, demography, economic and regional development, sustainability targets, etc.) should be part of it. Finally, existing (good) practices in other countries with respect to mineral safeguarding could be mapped as well as safeguarding mechanisms for other natural and cultural values).

In MinLand project, the Work Packages 2 and 4 are collecting, storing and analysing existing legal and policy frameworks related to land use planning and mineral resources.

b. *Stakeholders' engagement*

The stakeholders continuous dialogue with relevant stakeholders is a key for a successful development of the common framework. It is important to understand stakeholders' needs²² and the challenges they are facing, seek their motivations and interests, possibilities and capacity, time horizons, perspectives, visions (short-term, mid-term, long term). Stakeholders should be engaged according to the appropriate level of public participation which should provide an answer to the question: how much potential influence on the decision or action are you willing to provide to the public? This requires a careful analysis of the right level of participation, avoiding promising the public for more potential influence than is actually likely or possible. This could help to understand the system and real-life cases and also impact of previous policies and possible consequences of offered solutions. In MINLAND project the stakeholders' involvement is a vital component of all WP's.

2. Analysis of areas with mineral potential and its inclusion in land use planning via different options

a. Multicriteria assessment of mineral potential areas on different levels in cooperation with stakeholders according to an agreed common framework

The common framework for integrating mineral resources into LUP should be set, based on the background analysis and dialogue with relevant stakeholders and experts. When this is agreed, the next step is the assessment of mineral potential areas considered to be safeguarded (designated as mineral safeguarding areas. This should be made in cooperation with competent experts (e.g. geological survey, environmental authority, LUP authorities, etc.) supported by sufficient, updatable data. Several possibilities for the assessment of mineral potential areas including existing methods were already discussed in MINATURA 2020 project²³ as a part of the development of a 'Harmonised mapping framework of Mineral Deposits of Public Importance (MDOPI)'. According to MINATURA 2020 recommendations, the assessment should be multicriteria, it means considering different aspects as geology, economic, environmental and social issues.²⁴ Again stakeholders' active participation during identification of areas to be safeguarded needs to be present as a tool for early-stage conflict resolution which was also one of the conclusions of MINATURA 2020.

b. Selection of the right approach for integrating mineral resources into LUP and implementation

The integration of mineral safeguarding into land use planning could be implemented by different approaches which are using different tools already introduced in Section 3.3.3. In the best case, all of them are applied.

- *Legal tool: Legal implementation of safeguarded areas in land use plans*
- *Policy tool: Consideration of mineral resources in strategic planning*
- *Voluntarily applied guidance: Consideration of mineral potential areas which are not legally protected in land use planning activities*

The options differ by the administrative level of application (national, regional, local). The level of harmonisation depends on which tool on which level will be used. It means to what extent will be ensured that the process will be equally held in each jurisdiction. Logically, the harmonisation is highest if the rules are set by the law at national level and it is decreasing going to lower administrative levels.

On the other hand, the feasibility of implementation is decreasing in opposite direction. Easiest and least time-consuming implementation would be in the case of voluntarily applied guidance principles and most challenging is the legal implementation. It is depending on complexity of implementation process (administrative burden, time requirements) and to what extent the political will is playing a role.

A guidance for implementation resulting from the previous analysis and communication with stakeholders is an important pillar of the common framework. It is practical tool which could be

²² MICA project - Deliverable D2.2 Stakeholder Needs (Erdmann et al. 2017)

²³ MINATURA 2020 – Deliverables D2.2 (Galos et al., 2016) and D2.3 (Tiess et al., 2018)

²⁴ Check the MDOPI definition in the Terminology at the beginning of this document

voluntarily applied and used by LUP authorities. Peer learning exercises (conducted by WP6) will be held by several workshops organized by the WP 7 of MINLAND project. In addition, the Good Practice Guidance will be one of the key outputs of WP6.

Outputs (logical result if activities are performed)

The logical output would depend on the strategy which will be chosen and which tools (activities) would be selected to be applied.

If the above listed activities were applied, they should logically result in the following:

- LUP authorities, practitioners and decision-makers will have a clear picture of the mineral resources worthy of being protected/safeguarded, why they should be protected, the different interest and motivations of stakeholders involved and of the existing mechanisms to do that in the context of LUP processes (at least those three mentioned in this Deliverable: legal, policy or voluntary protection);
- The *safeguarding mechanism for mineral resources* is developed (or upgraded if existing before) to achieve that mineral resources be treated in parity as other natural and cultural values (water, biotopes, air, fertile soil, cultural heritage, etc.) in land use planning process. The developed mechanism is supported by intensive stakeholders' and experts' engagement and deep policy, legislative and relevant data collection and analysis.
- A *complete and comprehensive list of principles* is available and useful for LUP practitioners which could be applied for making sure that all relevant aspects were considered for a balanced assessment of land uses.

Sources and means of verification (Monitoring and evaluation plan)

The sources and means of verification are defined starting from Outputs, continuing in bottom-up logic to Activities, Purpose and finishing with Goals. They are important elements of the Logframe as they are stressing the developer to think about future evaluation process and verification of accuracy of the logical framework created.

In the case of the Logframe for integration of mineral resources in land use planning, the strategy for definition of sources and means of verification is based on:

- identification of responsible authorities for verification process
- development of indicators²⁵
- regular monitoring and evaluation
- stakeholders' engagement (in addition to ones responsible for the monitoring and evaluation)

Outputs verification

If the output would be a framework for safeguarding of mineral resources and guidelines of principles that should be applied in LUP, then their efficiency and impact should be regularly evaluated. The authority responsible for the implementation process (e.g. competent ministry or LUP authority) should decide who will be responsible for monitoring and evaluation. This could be made by development of indicators which also should be assessed if they are really seeking the objective they were developed for. If there would be an observation of gaps and problems, the update of the framework or principles as well as indicators will be provided.

Activities verification

²⁵ The indicators will be developed in Deliverable 5.4 of MinLand project

In the best case, the structure of activities is counting with a wide and close cooperation between relevant experts and stakeholders. The process should be open to a critical and constructive comments and proposals and should be considering variety of perspectives and factors.

Purpose verification

The purpose verification should be checking if the challenge which has led to definition of the Logframe was properly addressed. It is counting with setting the indicators which could describe the trends reflecting the development of the problematic issue which was originally identified. Thus, if the challenge is problematic supply of minerals from domestic resources which we would like to enhance, then the trends in domestic supply of primary mineral raw materials should be monitored. For this reason, relevant indicators for monitoring and evaluating such trends should be developed (e.g. domestic production, imports vs. exports of raw materials, number of successfully opened new mining operations, etc.).

Goal verification

If the goal would be to facilitate the access to minerals through LUP then monitoring some market trends would not be enough. The market trends are to a large extent reflecting the behaviour of investors, moved by investment attractiveness, security perception, etc. This could be also subjective reaction to the specific situations which are hardly defined by general statements. It is important to collect also information that might be of subjective nature, therefore, the feedback from different stakeholders should be collected to complement the information from indicators. Especially, important one is the feedback from exploration and mining companies but also from LUP authorities which could bring the perspective from the other side.

We acknowledge the fact that LUP decisions are not made solely on the basis of technical evaluations, but are also influenced by political decisions, i.e. to a certain degree on subjective influences. In order to account for this factor, we stress that written results of evaluations (where rationale and justifications of why decisions were taken are clearly written) should be made available to the public fulfilling the transparency principle (see principles in Section 4.2).

Even though the structure and content of the Logframe is addressed mainly to LUP policy makers, also other stakeholders in which competence is to influence the position of mineral resources in LUP could be able to apply some of the issues presented in this deliverable. For those directly involved in LUP decision-making we provide the list of general principles which could guide them in the treatment of mineral resources. Except for the principle for 'mineral safeguarding' described in the section 4.2.4, the rest of principles (4.2.1-4.2.3) could be applied ad hoc.

Table 2: The general (guiding) Logframe for integration of mineral resources into LUP

Component	Sources and means of verification
<p>Goal (what?)</p> <p>Facilitate the access to minerals through Land use planning For that land use planning needs to ensure mineral deposits are considered in the land use and spatial planning process and their value (economic, environmental, socio-cultural) is mapped, discussed and considered in the decision-making process and land use conflicts are managed properly.</p>	<p>The feedback from different stakeholders is collected in order to complement the information from monitoring of indicators. Especially, important one is the feedback from LUP authorities and from exploration and mining companies.</p>
<p>Purpose (why?)</p> <p>Enhance the sustainable supply of minerals from domestic resources Minerals are essential for modern societies and the minerals industry has a strong potential in contributing to the achievement of the Sustainable Development Goals. The demand for primary minerals is expected to rise as populations and real per capita income increases. Therefore, it is important to foster the domestic production when possible and intensify the diversification of resources which for which the territory is not self-sufficient.</p>	<p>The trends in domestic supply of primary mineral raw materials is monitored. For this reason, indicators for monitoring and evaluating these trends are developed.</p>
<p>Activities (how?)</p> <ol style="list-style-type: none"> 1. Background analysis for integration of mineral resources in LUP <ol style="list-style-type: none"> a. Legal and policy analysis (including other natural resources safeguarding mechanisms) b. Stakeholders' engagement 2. Analysis of areas with mineral potential and its inclusion in land use planning <ol style="list-style-type: none"> a. <i>Multicriteria assessment on different levels in cooperation with stakeholders according to an agreed common framework</i> b. <i>Implementation of mineral safeguarding in LUP by means of the right option</i> <ul style="list-style-type: none"> • Legal tool • Policy tool • Voluntarily applied guidance 	<p>All activities will be taken in a wide and close cooperation with relevant experts and stakeholders. The process will be open to critical and constructive comments and proposals and will be considering variety of perspectives.</p>
<p>Outputs (logical result if activities are performed)</p> <p>The <u>framework for safeguarding of mineral resources</u> is developed (or upgraded if existing before) to achieve equal treatment of mineral resources with other natural and cultural land uses (water, biotopes, air, fertile soil, cultural heritage, etc.)</p> <p>A <u>complete and comprehensive list of principles</u> is available and useful for LUP practitioners which could be applied for making sure that all relevant aspects were considered for a balanced assessment of land uses.</p>	<p>The regular evaluation of efficiency of the safeguarding mechanism will be planned. The indicators for monitoring of success will be developed and regularly evaluated. If there would be an observation of gaps and problems, the update of the framework will be provided.</p>

4.2 General principles

4.2.1 General principles for LUP decision-making processes

Basic principles which should guide any discussion around LUP are:

- ✓ **Consideration of all relevant policies** – all public policies to which a jurisdiction has made a commitment to (e.g. economic growth, low-carbon economies, mining policies, fisheries policies, agriculture and forestry policies, regional and urban development policies, environmental policies, biodiversity conservation policies, etc.) should be considered during LUP processes. The integration of mineral resources into LUP should be guided by highlighting the importance of the minerals industry in contributing to the achievement of some of those policies and international commitments committed by the jurisdiction that is leading the process.
- ✓ **Tailored participation of communities and all relevant stakeholders**– Directly and indirectly²⁶ affected stakeholders should be identified, informed and consulted on multiple land use options and potential for co-existence of different land uses to promote a greater understanding of mutual benefits and seek ways to avoid conflicts and resolve problems.
- ✓ **Accessible relevant information** – Land use planning is place-based by definition and highly context-specific, thus it requires a high level of information on local conditions. Just like planners, the stakeholders should be invited to participate but they need to do so be based on sufficient, understandable and easy-to-access accurate information regarding land capability, and examples of multiple and sequential land uses to better assess different combinations of options.
- ✓ **Decision making and accountability** – The LUP decision-making always implies ethical decisions (Beatley, 1994) with a clear accountability of planners for the community, the environment and future development. Risk-based approach in the assessment of land use capability, including the benefits and consequences is important to be applied in the process.
- ✓ **Efficient processes** – Streamlined, transparent and consistent approval processes. Those who are responsible for the planning, assessment and approvals processes should be clearly identified as well as the different parts of the decision-making process.
- ✓ **Transparent process**: in a best-case scenario, the whole LUP process should be open to the public and progress/final decisions, including the assessments and technical studies on which decisions are grounded, should be available to the public.

4.2.2 Guiding principles for co-using land

One of the outcomes of the MINATURA2020 project is that the possibility to co-use the land, i.e. to accommodate two or more competing activities, must always be the first alternative (cf. MINATURA2020's D4.2). That means that to emphasise competition of land use is not the most fruitful way for land use planning and a successful integration of mineral resources. Cooperation between different stakeholders, with different interests at hand, should be the guiding star. Therefore, principles governing multiple land use frameworks (MULF) (co-use of land) need to be considered.

A multiple land use frameworks is designed to be used by decision makers (primarily regulators) to achieve multiple and sequential land use outcomes that:

²⁶ directly affected stakeholders are the ones immediately influenced by the decision (e.g. landowners and inhabitants in affected area), indirectly affected stakeholders are the ones which are influenced by the decision because of consequences resulting from these decision (e.g. industries dependent on mineral supply, environmental NGO's, etc.)

- ✓ Utilise land for different purposes simultaneously and sustainably within an area, with a view to maximising the benefits for all stakeholders, and to retain options for current and future uses to maximise net benefits to present and future generations
- ✓ Utilise land sequentially, enabling land to be used later for another purpose once the current land use has ended or been terminated, noting sequential land use may be a reinstatement of the former land use or development of an alternative land use.

The MLUF is designed to be used by decision makers, primarily regulators, to achieve multiple and sequential land use. The following guiding principles should be embodied into the mindset of governments, community and industry in land use planning, policy and development:

- ✓ **Best use of resources** – Optimize the social, economic, environmental and cultural (heritage values) of land use for current and future generations.
- ✓ **Co-existence** – The rights of all land users are recognised, and their intentions acknowledged and respected. Ensure land use decision making does not exclude other potential uses without considering the benefits and consequences for other land users and the wider European community.
- ✓ **Avoid, if possible, single-use zoning:** as highlighted by the OECD, restrictive zoning rules and in particular single-use zoning are among the most important factors contributing to inflexible planning regulations.

For instance, among the MinLand case studies (cf. WP3), the case of the Neves Corvo mine in Portugal shows that land use plans for minerals do not preclude other land uses, i.e. multiple land use frameworks are implemented. According to such case study, land use legislation considers that all the following activities in rural soil may be compatible with each other, as long as they happen in a previous scheduled land use plan (importance of having sectorial plans):

- Agricultural
- Forest
- Geological Resources
- Industrial connected with compatible activities
- Tourism
- Natural and landscape areas (Natura 2000, ...)
- Small villages

Despite the potential benefits of the MLUF concept, some stakeholders may disagree with such concept. For instance, conservationists or environmental NGOs strongly involved in conservation may argue that conservation areas are already catering for a multitude of uses, including ecological, scientific, recreational, aesthetic and spiritual, and that any exploration (or potential future extraction) in such areas would not be compatible with these uses, regardless of whether best available practices or low-impact exploration techniques have been applied. Such positions need to be considered and a reasonable solution needs to be found which satisfies stakeholders. For that, planners need to work on a case-by-case strategy as local conditions are very heterogeneous in Europe.

Despite such potential extreme cases, co-existence of land destined for exploration or extraction of mineral resources with other land-uses is not uncommon in Europe. In the following some examples are presented to inspire planners how to look for creative and innovative solutions (involving trade-offs between different stakeholders).

Nature Conservation – Natura 2000 network

One of the most important overlaps of land uses are mineral resources and nature conservation, especially within the Natura 2000 network. Such network currently covers over 27,000 terrestrial and marine sites across all EU's MSs selected for the long-term conservation of Europe's most valuable and threatened species and habitats.

Even though the mineral resources sector has the potential to cause substantial adverse effects on nature, its activities can be conducted conserving or in some cases even improving (e.g. by the creation of habitats such as new wetlands, new cliffs or rocky/sandy areas through site rehabilitation works during extraction or after extraction ceases) the status of ecosystems, habitats and species and the European biodiversity in general. There is a growing number of examples where an extraction site has, over the course of its entire life cycle, delivered an overall net benefit for biodiversity due to rehabilitation activities (Milieu et al., 2016). Moreover, as argued by the “Life in Quarries” project in Belgium, in highly urbanised landscapes, quarries are an exceptional opportunity to maintain rare and threatened transient habitats that host pioneer species²⁷.

The main European extractive associations (UEPG, CEMBureau, IMA-Europe, Euromines) often highlight good practices²⁸ which indicate the opportunities of co-using land for several purposes:

- **Natura 2000 sites have been designed on former extraction sites:** dozens of case studies are available at the websites of the main European extractive associations²⁹ and in the database of the LIFE programme³⁰.
- **Early cooperation and partnerships between developers and conservation NGOs** provide the basis for flexible approaches, dialogue and win-win practices which ends up in less costly and less conflictive permitting procedures: examples of successful initiatives are the partnership between Heidelberg Cement and BirdLife³¹ or the CEMEX and BirdLife global partnership and Biodiversity Action Plan³².
- **Partnerships between multiple stakeholders** (developers, government, academia and NGOs): an example is the Life in Quarries project which is led by the Fediex (Belgium Federation of Extractive and Processing Industries for Non-Energetic Rocks) and include the Wallonia governmental’s Directorate of Nature for the Department of Nature and Forests (DNF), the University of Liège, Natagora (conservation NGO) and PNPE (a natural park association).
- **Another example is the EU Business & Biodiversity Platform**, an EU level forum for sustained and strategic dialogue about the links between business and biodiversity and for showcasing business best practices at EU level. Some companies and minerals association representing the NEEI sector are members of this initiative, including Heidelberg Cement, IMA-Europe, Euromines, CEMBureau, Eurogypsum, Mineral Products Association³³.

A MinLand case study around the Neves Corvo mine in Portugal (cf. WP3) highlights the fact that, even though the mine is located in a Natura 2000 area within the Special Protected Areas (SPA) of Castro Verde and the Site of Community Interest (SCI) Guadiana, the mining project was subject to EIA and got approved with constraints due to the Nature Conservation Area. All the extensions/activities have been licensed (Cf. WP3 deliverables).

²⁷ <http://www.lifeinquarries.eu/en/project/#> (accessed 10.01.17)

²⁸ It should be noted that such extractive industrial associations make large efforts on the promotion of good practices and on convincing that the extractive industry may even contribute to the extension of the Natura 2000 area, especially through the restoration activities during or at the end of the operation phase

²⁹ UEPG: <http://www.uepg.eu/key-uepg-topics/case-studies/biodiversity>; IMA-Europe: <http://www.ima-europe.eu/publication-type/biodiversity-case-studies>; Euromines: <http://www.euromines.org/publications/biodiversity> CEMBureau: <http://www.cembureau.be/topics/biodiversity/case-studies> (accessed 10.01.17)

³⁰ <http://ec.europa.eu/environment/life/project/Projects/index.cfm> (accessed 30.03.17)

³¹ <http://www.birdlife.org/europe-and-central-asia/project/project-map> (accessed 10.01.17)

³² <http://www.birdlife.org/sites/default/files/attachments/Biodiversity%20Action%20Plan%20guidance%20%28BAP%29%20by%20CEMEX%20and%20BirdLife.pdf> (accessed 10.01.17)

³³ http://ec.europa.eu/environment/biodiversity/business/index_en.htm (accessed 30.12.16)

4.2.3 Principles for evaluation of benefits, costs, risks and conditions of acceptability

As described in the previous section, the co-use of land should be the first choice for land use planners whenever possible. However, not all overlapping land-uses are compatible or only partially compatible under certain conditions. Before any decision is made it is important to evaluate all overlapping alternatives (nature protection area, mineral safeguarding, mining activity, forest, agriculture, urban area, others) in terms of benefits, costs and risks they are representing. The multifunctional perspective should be applied, it means economic, social, environmental, policy, ethical and other points of view should be considered. The coexistence (co-use) with other land uses, however should be still in the focus, thus, the conditions of acceptability and possibilities of compatibility should be discussed as well. Such balanced assessment of benefits, costs, risks and potential for compatibility including active dialogue with stakeholders and experts could support to make informed and responsible decisions.

Benefits and Costs

Planners should be aware and consider all the potential benefits and costs for society at large (including financial, economic, social and cultural benefits) and for nature that each land use in a land portion could entail. Benefits should be measured not only in quantitative but in qualitative terms. This assessment should be the basis for the decision by the authorities of which land use should take precedence (priority) over others, according to the criteria prioritized by the authorities (economic, social, environmental, political, and others). An example of such kind of comprehensive assessment as basis for decision making are the new mineral plans in the Emilia-Romagna Region in Italy (cf. deliverables of WP3). According to the MinLand case study BAISO “Varicolori” clays (cf. WP3), a new minerals plan has to weight and compare the extraction use against others and in particular against the actual one. It’s necessary to analyse benefits and costs for the communities and environment evaluated when designating areas for minerals; in the Emilia-Romagna such analysis it’s called Strategic environmental valuation.

It should be underlined here that sometimes the system of beliefs and values may be very different among stakeholders involved in a LUP process. For example, the mining industry generally believes that the economic benefits they are bringing to the country/region (jobs creation, economic profit from taxes, etc.) available from its activities are of national or regional importance and can be gained whilst protecting environmental and other values. Conservationists or environmental NGOs, however, may argue that the aesthetics, cultural values or recreational uses of an area may be more important than any economic benefits to be gained by mining/quarrying that area. For instance, a case study from the MINLEX project in Austria around the extension of an operating diabase quarry showed that a citizens’ initiative was against the quarry extension and appealed the granted permit arguing that it was not a matter of public interest to extract diabase at that location, that another location would require less effort from the viewpoint of nature conservation and that the interventions in the landscape were negatively impacting tourism in the area (cf. case 1 Quarry extension and public participation in MinPol 2017a).

Risks

Different land uses can pose different risks to society and to the environment, e.g. agriculture, if not properly managed, can pollute the soil or degrade the land. Planners need to have a sound knowledge of the different practices at local levels, and the risks involved for each of the possible land uses in their municipality or region. On the other hand, in the case of areas with mineral potential, the risk could be that if they are not protected, a non-mineral development is built upon the area or close to it, closing off the access and sterilizing the minerals (e.g. by the construction of housing as shown in Figure 1. or by transport or telecommunications infrastructure on top of a mineral deposit).

The objective of MinLand project is to minimize risk of sterilization in the case of mineral resources. This is the reason why the practice of ‘minerals safeguarding’ is recommended to be applied (see next section for details). On the other hand, we cannot avoid the fact that mining activity is also representing considerable risks especially to the environment and community (e.g. quarrying activity is changing the landscape, producing dust and noise, etc.). Before the mining activity is considered (covered by permitting procedures and EIA) the risk of affecting other land-uses is at the stage of minerals safeguarding remarkably lower. Therefore, the risks of different

overlapping land uses should be evaluated together with costs and benefits considering their capacity for co-use in order to find a balanced solution.

Conditions of acceptability – land use compatibility

Possibility of coexistence with other land uses should be always considered. This is an important component of the analysis as it creates a space for negotiations and search for compromise. It is also offering the possibility to present different alternatives of the same land use or development activity (e.g. offering different spatial distribution, treatment of the other components of the environment – as it is in case of Environmental Impact Assessment) and to lead the open dialogue with other stakeholders including public to find an optimal solution. It could contain also proposals for mitigation of risks.

With a focus on mineral resources, the question would stay: Is this land use alternative compatible with other land uses overlapping or bordering the area? For which other land uses the co-use is possible? Under which conditions would it be acceptable (for planners, for society, landowners, environmental authorities, and other relevant stakeholders) that a mineral safeguarding area, or mineral development activity (e.g. exploration, extraction) takes place, e.g. via change of processing technology or with enough compensation? The standpoints resulting from this analysis could be YES/NO the proposed land use is acceptable in this area or the land use alternative is acceptable IF certain conditions are met. For the definition of such conditions, the involvement of multiple stakeholders is essential.

The latter was evidenced in a MINLEX case study in the Krumovgrad exploration area in Bulgaria where prospects of developing the Ada Tepe gold mining project existed. The project was foreseen to take place within a large site of community interest (a category under the Habitats Directive) protected by the Habitats Directive. An Appropriate Assessment was conducted which revealed that the project would indeed have a significant negative effect on a number of protected habitat types and species and could not be allowed to proceed in its present form. The company then changed the project proposal and presented as new one offering an alternative approach to disposing of the waste material and to the processing technology (cyanide leaching would not be used for beneficiation, but flotation instead). The revised project was put out to public consultation and public hearings were held with the local community and NGOs. Compared to the first Investment proposal, the appropriate assessment concluded that, except for the open pit for which there is no alternative, the investor had now adjusted the locations and types of installations sufficiently to reduce the negative effects on the Natura 2000 site and its habitats and species to an insignificant level. The fact that the project area was now more than half the size of the first proposal also played a major role in reducing impacts and cumulative effects. Finally, the project was approved³⁴. On the other hand, the case of Ada Tepe mine could represent the risk of “double standard”. The design of an extraction project may was modified in a favour of a high quality EIA/AA procedure, however, in order to avoid significant environmental effects leading to social refusal due to fears of pollution using cyanidation techniques, is to smelt/refine the concentrate produced on site in a facility offsite: in this case, the concentrate produced onsite will be shipped for smelting/refining to offsite facilities with a bad environmental reputation, i.e. the Tsumeb smelter in Namibia (MinPol, 2017a).

A lesson learnt from such case is that even though high-quality environmental studies extend permitting procedures in time and represent a higher cost for the developer (e.g. due to the need to change the processing technology as a result of an appropriate assessment), they may result in the project being approved by environmental permitting authorities, fewer public concerns during hearings and a good public image of the developer (MinPol 2017a). It should be, however, carefully analysed if the improved situation onsite do not hide the “double standard” situation as it was in the case of Ada Tepe mine near Krumovgrad.

³⁴ http://ec.europa.eu/environment/nature/natura2000/management/docs/AA_case_study_compilation.pdf

4.2.4 Guiding principles for ‘minerals safeguarding’

The draft principles described in this section arise from literature and the MINATURA2020 project; they should be considered only as input for discussions within the MinLand Consortium. They will be further investigated and discussed during the project and may be included in the next deliverables or as final recommendations.

Just like other land uses are protected for current or future uses (e.g. genetic material within biodiversity for yet unknown applications), minerals should be protected and remain available for future uses. In this sense, ‘minerals safeguarding’ is about protecting mineral resources, either in a very early prospecting and exploration stage or an advanced one (though protection modes need to be different).

The ‘minerals safeguarding’ concept intends to acknowledge the importance and current and future need for primary minerals and aims to protect lands hosting mineral deposits. ‘Minerals Safeguarding Areas’ are a policy instrument useful to protect deposits of minerals (or tracts of land with potentially available mineral resources) which are, or may become, of economic value. They help to restrict non-mineral related development which would compromise the extraction of the mineral deposit in the future. The purpose of such areas is to draw the attention of developers and planners to the existence of minerals deposits, or their possibility of existence (geological potential, exploration is needed) which are, or may become of economic importance in the future, and ensure that they are not unnecessarily sterilised by surface development.

We believe that the provisions contained in the UK’s National Planning Policy Framework (2012) represent a good guidance for the minerals safeguarding discussions within the MinLand project. According to such framework, in preparing Local Plans, local planning authorities should define ‘Mineral Safeguarding Areas’ and adopt appropriate policies in order that known locations of specific minerals resources of local and national importance are not needlessly sterilised by non-mineral development. An important feature of the designation of Minerals Safeguarding Areas is that **there exists no presumption** that applications to extract the mineral resources defined in Minerals Safeguarding Areas (MSAs) will be granted permission. Neither does a Minerals Safeguarding Area automatically preclude other forms of development. What MSAs do is draw attention to the presence of important mineral resources and make sure that they are adequately and effectively considered in land-use planning decisions.

In order to achieve a successful safeguarding during the LUP phase, the following principles (or at least some of them) we suggest being observed and applied by planning authorities:

- **Updated geological information should be available**, in a format that is understandable and applicable according to the LUP practices of the competent planning authorities;
- **Identify areas with mineral potential:** Based on such information, planning authorities should be able to identify areas (polygons) with geological potential (mineral deposits) according to different categories (based on the level of geological knowledge available at the time of the planning exercise and as per coordination with the holders of geological information); the definition of Minerals Safeguarding Area boundaries requires up-to-date, factual information on the physical location of mineral resources and should be based principally on the best available mineral resource information at the time Minerals Safeguarding Areas are defined, including that published or held by geological surveys or made available by the industry (e.g. exploration data from industry that is not held by the geological survey, such as shallow borehole information and trial pit investigations). Such identification could be made in cooperation with geological survey or competent experts in geology to ensure the quality of assessment of information received.
- **Identify conflict-free areas:** authorities could also identify areas which have a low possibility of conflicts with mineral development activities, e.g. search for conflict-free areas (or different levels of conflicts) as it was done in the MINATURA2020 project or as it has been implemented in the Austrian Mineral Resources Plan. Implementing such activity may facilitate the identification of areas which can be designated as Minerals Safeguarding Areas more easily than others. However, many mineral potential

areas are actually overlapping with other land uses which could represent conflicts with potential future mineral development activity. Thus, it does not mean that only 'conflict free' areas should be protected or designated Minerals Safeguarding Areas.

- **Undertake consultation on draft Minerals Safeguarding Areas:** The proposed list of minerals to be safeguarded and the justification together with maps of the mineral resources and draft Minerals Safeguarding Areas should be the subject of specialist consultations with the industry and other relevant stakeholders, including groups which normally oppose mineral developments.
- **Designate Areas for the Safeguarding of Minerals** (also termed Minerals Safeguarding Areas) that are not already characterized by urban growth or other land uses, and that have significance in terms of geological potential. As highlighted in MINATURA2020's D4.2, safeguarding tools for undiscovered deposits (with hypothetical resources) should differ from those for recognized (or known) deposits;
- **Ensure that the use of lands adjacent to MSAs does not interfere with the use of the lands for exploration or potential extraction of minerals.** Even very small developments require the greatest scrutiny as they have the potential to sterilise large amounts of mineral or tracts of land for prospecting/exploration.

Those principles described are meant to ensure the future access to minerals; however, it may be too ambitious. Therefore, as long as planning authorities acknowledge and somehow demarcate different areas of importance in terms of mineral resources, then the principles can be considered observed. Below some further recommendations are presented.

As mentioned, undiscovered deposits (with hypothetical resources) should differ from those recognized (or known) deposits. Results from a MINATURA2020 workshop in Sweden testing the proposed methodology to designate MDOPi concluded that one road possible to progress would be to delineate geologically interesting areas, which are fairly big and inside such larger areas such as the Fenno-Scandinavian shield defined in a more detailed way areas of definitive importance. One example of this could be the Swedish '*Riksintresse mineral*'. When the need for more detailed evaluation is required, a more detailed assessment according to the method proposed could be undertaken. In a first step a larger area, which is of high metallogenic importance, could be used. Knowing that this area is not defined in detail but could increase or decrease depending on information that become available in the future.

Another recommendation from the MINATURA2020 workshop in Sweden was that one first step for ensuring that minerals are not sterilized in the future could be to make sure that there are geologists employed by government on local and/or regional basis, to give a geological perspective in land use planning (considering geo hazards and/or potential exploitation of minerals/metals) (MINATURA 2020, Deliverable D5.6, Kozinc & Dolinar, 2018).

The designation of Minerals Safeguarding Areas may face some difficulties in implementation which planners need to take into account:

- **Financial compensation may be required against the establishment of MSAs:** As exemplified by the Polish case in MINATURA2020 (cf. MINATURA2020's D4.2), designation (in spatial/land use documents) of mining activity areas may be contrary to the interests of landowners, because it is related to partial or total limitation of land use in long time perspective. According to the Polish law, if the local spatial plan reduces the value of the property, its owner may demand appropriate compensation from the commune.
- **The designation of MSAs may require costly and time-consuming changes in policy and/or legal framework.** Moreover, it is representing huge administrative burden for policy-makers and LUP practitioners. It must be taken into account the complexity of existing policies and practices when planning the designation of MSAs in order to make the process most efficient and least complicated as possible.

- **The opposition of different groups of stakeholders affected by the process could impede or delay the implementation of MSAs.** It must be acknowledged that delineation of MSA may stimulate the mobilization of groups or individuals that may feel endangered or not consent with such decisions. Therefore, the continuous dialogue with all stakeholders and efficient communication and education of the public is a key element of successful implementation.
- **In some cases, the establishment of MSA in a certain place might not be possible.** This could be caused by previously mentioned local opposition, not sufficient financial resources for compensations, incompatibility with other land uses or other reasons which could obstruct the delineation of specific MSA.
- **Other challenges of economic, administrative, conflict resolution or other nature may appear during the implementation process.**

5 Conclusions and Recommendations

Inclusion of mineral resources into land use planning is a challenging task which may encounter different kinds of problems. To mitigate the risks requires commitment by competent authorities. However, it is indispensable for securing the future of our development in a sustainable way. Even though it is difficult at this stage to predict how successful and efficient this initiative would be, some of the existing practices of mineral safeguarding could be indicators that it is possible and necessary.

In this deliverable we have identified three options of mineral safeguarding mechanisms which could be applied, and which could be complementary to each other. From the perspective of feasibility of implementation, less administratively complicated is voluntarily applied guidance for land use practitioners, how to consider mineral resources in planning. The disadvantage of such option is that there is no security if and how the guidance would be or not applied in practice. Other question which arises is if it would be possible to apply such guidance without previous requirements of inclusion of minerals in LUP by law or by policy. The legal approach is, however, challenging as it requires a considerable amount of political willingness not to mention its time-consuming administrative burden, and unnecessary mistakes derived from lack of previous testing and experiences which could be made if the legal implementation is done hastily.

On the midway between these two options stay the policy instruments. These could be the first step in the process of inclusion of mineral resources in land use planning. The importance of security of minerals supply should become very quickly the hot topic in policy discussions and be converted into action as soon as possible, so there would be a chance to change the trend of lack of land available for mineral development. The policy action could be complemented by application of guiding principles or later legal support; thus, it would form the strong framework for mineral sector development. The final strategy taken by policy-makers depends on the conditions and capacity in each country or jurisdiction.

To support them in planning such strategy, we are suggesting applying the Logframe approach which we complemented by general principles we believe could help to design meaningful and efficient plan for implementation of mineral resources in land use and natural resources planning policies. Important elements supporting the framework development are detailed background analysis including legal and policy analysis, stakeholders' involvement, availability of sufficient accurate and relevant data leading to defining the vision of the desired future.

It has to be highlighted that in any case, the land use decision are always also political and ethical decisions which cannot satisfy everybody. Our aim, however, should be to make these decisions transparent, efficient and supported by sufficient data and relevant information.

Finally, this report offers only a few options how to handle an issue of mineral safeguarding based on experiences from MINATURA 2020 projects, existing practices, and numerous discussions in the raw materials community. It is important now to face this proposal to "testing" with the experts outside this silo and open the discussion more to LUP practitioners and people from different backgrounds. The space for discussion about different options of integration of mineral safeguarding could be at local workshops planned in MinLand project within the WP7. The consultation about the topic is also planned for the Task 5.2 through an online survey and face to face meetings.

6 References

- Beatley, T., 1994. *Ethical land use: principles of policy and planning*, Baltimore: Johns Hopkins University Press.
- Berčič, J., 2013. The state of public participation in spatial planning in the European union: public participation in spatial planning between theory and practice. *Igra ustvarjalnosti - Creativity game*, 2013(01), pp.054-061. Available at: http://iu-cg.org/paper/2015/IU_CG_03-2015_bercic.pdf.
- Bmmt.gv.at. (2018). The Austrian Mineral Resources Plan, BMNT. [online] Available at: <https://www.bmmt.gv.at/english/Energy---Mining/Mining/The-Austrian-Mineral-Resources-Plan.html> [Accessed 2 July. 2018].
- Carvahlo, J., Lisboa, V., Figueira, M., Dinis, P., Raaness, A., Schiellerup, H., Arvidsson, R. and Schiellerup, T. (2018a). *Milestone MS2 Collection plan for policy and practice, safeguarding, and the existence of spatial data formulated*. MinLand: Mineral resources in sustainable land-use planning, H2020 project under GA: 776679.
- Carvalho, J., Figueira, M., Lisboa, J., Dinis, P., Nike, L., Arvidsson, R., Arvanitidis, N., Barnes, J., Berger, G., Berne, S., Endl, A., Gugerel, K., Hamadová, B., Murguía, D., Raaness, A., Schiellerup, H., Stanley, G. and Tost, M. (2018b). *Deliverable D3.1 Framework for case studies*. MinLand: Mineral resources in sustainable land-use planning, H2020 project under GA: 776679.
- COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT AND THE COUNCIL The raw materials initiative — meeting our critical needs for growth and jobs in Europe. COM (2008)699 final
- COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS Closing the loop - An EU action plan for the Circular Economy.COM/2015/0614 final.
- Creighton, J. (2005). *The Public Participation Handbook: Making Better Decisions Through Citizen Involvement*. 1st ed. San Francisco: Jossey-Bass A Wiley Imprint.
- CRIRSCO (2013). *INTERNATIONAL REPORTING TEMPLATE for the public reporting of EXPLORATION RESULTS, MINERAL RESOURCES AND MINERAL RESERVES*. [ebook] Committee for mineral reserves international reporting standards. Available at: http://www.crirSCO.com/templates/international_reporting_template_november_2013.pdf [Accessed 19 Oct. 2017].
- Ekman, J. & Amnå, E., 2012. Political participation and civic engagement: Towards a new typology. *Human Affairs*, 22(3), p.-. Available at: <http://www.degruyter.com/view/j/humaff.2012.22.issue-3/s13374-012-0024-1/s13374-012-0024-1.xml>.
- Erdmann, L.; Eckartz, K.; Moller, B.; Tercero Espinoza, L.A.; Teufel, B.; Fuchs, M.; Machacek, E.; Thorsøe, K.; Petavratzi, E.; Brown, T.; Voet, E. van der; Falck, E.; Bisevac, V.; Hofmeister, T.; Quental, L.; Katalin, S.; Radwanek-Bak, B.; Arnbom, J.-O. (2016). *Stakeholder identification and analysis*. H2020-Project MICA, D2.1: 115 p., www.mica-project.eu/?page_id=99
- Erdmann, L.; Moller, B.; Tercero Espinoza, L.A.; Oers, L. van; Bisevac, V.; Correia, V.; Delfini, C.; Thorsøe, K.; Falck, E.; Petavratzi, E.; Lauinger, D.; Radwanek-Bak, B.; Arnbom, J.-O. (2017). *Stakeholder Needs*. H2020-Project MICA, D2.2: 78 p., www.mica-project.eu/?page_id=99
- European Commission (2004). *Project Cycle Management Guidelines*. Brussels: EuropeAid Cooperation Office, Development DG.; Available at: https://ec.europa.eu/europeaid/sites/devco/files/methodology-aid-delivery-methods-project-cycle-management-200403_en_2.pdf
- European Commission (2010). *Improving framework conditions for extracting minerals for the EU: EXCHANGING BEST PRACTICE ON LAND USE PLANNING, PERMITTING AND GEOLOGICAL KNOWLEDGE SHARING*. European Commission, Enterprise and Industry,

European Commission (2011). *EC GUIDANCE ON: UNDERTAKING NON-ENERGY EXTRACTIVE ACTIVITIES IN ACCORDANCE WITH NATURA 2000 REQUIREMENTS*. Luxembourg.

European Conference of Ministers responsible for Spatial/Regional Planning (CEMAT) (2007). *Spatial development glossary*. Council of Europe.

European Union (2016). *Resource Efficiency Scoreboard 2015*. Resource Efficiency Scoreboard serie. [online] Available at: http://ec.europa.eu/environment/resource_efficiency/targets_indicators/scoreboard/pdf/EU%20Resource%20Efficiency%20Scoreboard%202015.pdf [Accessed 11 Jan. 2018].

Galos, K., Kot-Niewiadomska, A., Nieć, M., (2016). *MINATURA2020 Deliverable D 2.2. Version 2.0: Set of qualifying conditions for a harmonised mapping framework (HMF) for each type of mineral* MINATURA 2020 - project of the European Union's Horizon 2020 research and innovation programme under grant agreement n° 642139.

Horváth, Z., Marasmi, Ch., Sári, K., Szabó, K., Vígh, C., Wårell, L., Kozinc, Z. and G. Tiess (2018a). *MINATURA2020 Deliverable D 3.2.: National/Regional Guidance on incorporating the MDoPI concept and qualifying conditions*. MINATURA 2020 - project of the European Union's Horizon 2020 research and innovation programme under grant agreement n° 642139.

Horváth, Z., Milligan, B., Bleischwitz, R., Sári, K., Hamadová, B., Murguía, D. and G. Tiess (2018b). *MINATURA2020 Deliverable D 3.3.: Towards a European vision for Mineral Deposits of Public Importance (MDoPI) in Europe*. MINATURA 2020 - project of the European Union's Horizon 2020 research and innovation programme under grant agreement n° 642139.

Kozinc, Z. and U. Dolinar (2018). *MINATURA2020 Deliverable D 5.6: Report: Outcomes of the stakeholder consultations on MDoPI in EU countries*. MINATURA 2020 - project of the European Union's Horizon 2020 research and innovation programme under grant agreement n° 642139.

Leal Filho, W. & Brandli, L., 2016. Engaging Stakeholders for Sustainable Development. *Engaging Stakeholders in Education for Sustainable Development at University Level*, pp.335-342. Available at: http://link.springer.com/10.1007/978-3-319-26734-0_21.

Milieu, IIEP, ICF, 2016. Evaluation Study to support the Fitness Check of the Birds and Habitats Directives. Final Report. March 2016. 668p.

MinPol (2017a). *Legal framework for mineral extraction and permitting procedures for exploration and exploitation in the EU. Final report - Study*. Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs.

MinPol (2017b). *DELIVERABLE 3.1 Global raw materials policy context report*. FORAM project the European Union's Horizon 2020 research and innovation programme under Grant Agreement No 730127.

Rokavec, D., Mezga, K., Miletic, S., (2016). *MINATURA2020 Deliverable D 4.1.: List of potential protected areas that suit the selected safeguarding criteria in selected case study countries*. MINATURA 2020 - project of the European Union's Horizon 2020 research and innovation programme under grant agreement n° 642139.

Tiess, G., Murguía, D. and Hamadová, B. (2018). *MINATURA 2020 Deliverable 2.3: Harmonised Mapping Framework*. MINATURA 2020 - project of the European Union's Horizon 2020 research and innovation programme under grant agreement n° 642139.

United Nations (2015). *TRANSFORMING OUR WORLD: THE 2030 AGENDA FOR SUSTAINABLE DEVELOPMENT*. Available at: <https://sustainabledevelopment.un.org/content/documents/21252030%20Agenda%20for%20Sustainable%20Development%20web.pdf>

U.S. Bureau of Mines and U.S. Geological Survey (1976). Principles of the mineral resource classification system of the U.S. Bureau of Mines and U.S. Geological Survey; GEOLOGICAL SURVEY BULLETIN 1450-A. [ebook] U.S. Bureau of Mines and U.S. Geological Survey, p. A4. Available at: <https://pubs.usgs.gov/bul/1450a/report.pdf> [Accessed 16 May 2018].

Weber, L. (Hrsg.) (2012): Der Österreichische Rohstoffplan. – Archiv für Lagerstättenforschung, 26, 264 S., Geol. B.-A., Wien. Available at: https://opac.geologie.ac.at/wwwopacx/wwwopac.ashx?command=getcontent&server=images&value=AL0026_001_A.pdf, [Accessed 2 July 2018].

Wrighton, C.E., Bee, E.J., Mankelow, J.M. 2014. The development and implementation of mineral safeguarding policies at national and local levels in the United Kingdom. Resources Policy 41:160-170. doi: 10.1016/j.resourpol.2014.05.006

7 Annex

Table 3: List of technical deliverables produced within the MINATURA 2020 project (excluding WP6 – Dissemination and Communication; WP7 – Project management and WP8 Ethics requirements)

Deliverable	Title of Deliverable	WP No.	Lead beneficiary	Type	Dissemination level
D1.1	Overview of spatial data available in the form of a table, where gaps for the case study countries are identified and possible alternatives (proxies) are indicated	WP1	11 - DLO	Report	Public
D1.2	Overview of rules how the available data can be combined to locate conflict zones	WP1	11 - DLO	Report	Public
D1.3	Maps of potential conflict and conflict free zones in case study countries, based on the current situation, and ultimate rules used to create these maps	WP1	11 - DLO	Report	Public
D1.4	Future land use maps showing future potential conflict zones in case study countries	WP1	11 - DLO	Report	Public
D2.1	Exploring Options for a Harmonised Mapping Framework	WP2	1 - Minpol	Report	Public
D2.2	Set of Qualifying Conditions of the Harmonised Mapping Framework (HMF) for each type of mineral	WP2	7 - IGSMIE PAN	Report	Public

Deliverable	Title of Deliverable	WP No.	Lead beneficiary	Type	Dissemination level
D2.3	Harmonised Mapping Framework	WP2	1 - Minpol	Report	Public
D3.1	Multi-sectoral analysis of minerals policies and land use policies in EU countries	WP3	13 - MFGI	Report	Public
D3.2	National/Regional Guidance on incorporating the MDOPI concept and qualifying conditions into the national/regional minerals policies and land use policies	WP3	1 - Minpol	Report	Public
D3.3	Towards a European Vision for the MDoPI	WP3	13 - MFGI	Report	Public
D4.1	List of potential protected areas that suits the selected safeguarding criteria in selected case-study countries	WP4	15 - GeoZS	Report	Public
D4.2	Report of testing results showing potential gaps of the Harmonised Mapping Framework	WP4	15 - GeoZS	Report	Public
D4.3	Recommendations for adapting primary version of methodology/qualifying conditions	WP4	15 - GeoZS	Report	Public
D5.1	Guidelines for consultations on mineral deposits of public importance with stakeholders	WP5	12 - ISKRIVA	Report	Public
D5.2	3 feedback reports from stakeholder consultations per participating country - report 1	WP5	12 - ISKRIVA	Report	Public
D5.3	3 joint reports – outcomes of the stakeholder consultations on MDoPI in EU countries - report 1	WP5	12 - ISKRIVA	Report	Public
D5.4	Process plans and workshop summaries for each participating country	WP5	12 - ISKRIVA	Report	Public
D5.5	List of members of the Council of Stakeholders for each participating country	WP5	4 - FEDERATION EUROPEENNE DES GEOLOGUES	Report	Public

Deliverable	Title of Deliverable	WP No.	Lead beneficiary	Type	Dissemination level
D.5.6	3 feedback reports from stakeholder consultations per participating country - report 2	WP5	12 - ISKRIVA	Report	Public
D.5.7	3 feedback reports from stakeholder consultations per participating country - report 3	WP5	12 - ISKRIVA	Report	Public
D.5.8	3 joint reports – outcomes of the stakeholder consultations on MDoPI in EU countries - Report 2	WP5	12 - ISKRIVA	Report	Public
D.5.9	3 joint reports – outcomes of the stakeholder consultations on MDoPI in EU countries - report 3	WP5	12 - ISKRIVA	Report	Public