D.LT 2.3. BARRIERS AND OBSTACLES AT LEGAL/ORGANIZATIONAL LEVEL IN THE VALORIZATION OF PAST METALLURGICAL SITES & DEPOSITS - A SYSTEMIC APPROACH

14 June 2023

Report on success factors and constraints

Final version

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1 EXECUTIVE SUMMARY

According to the JRC (2013), metallurgical industry represents 13 % of the 2.5 million Potential Contaminated Sites (PCS) in the EU. Consequently, a significant amount of their produced waste was deposited on site/landfills (37.2% of all PCS). NWE REGENERATIS aims to transform this problem into an opportunity, as large volumes of resources (metals, materials & land) from Past Metallurgical Sites and Deposits (PMSD) can be recovered. In order to implement this vision, REGENERATIS tackles the sectoral and contextual barriers.

In order to be successful in the long run, the rehabilitation of PMSD should be supported by organizational and legal instruments. REGENERATIS organised webinars, meetings and excursions to discuss their findings on the 4 main thematic :

- Identification of legal barriers
- solutions/recommendations to overcome those barriers and for the implementation of resource recovery driven projects
- Public-Private-People Partnerships (PPPP)
- implementation guidance

This report points out the similarities and differences with analogue redevelopment and rehabilitation processes at brownfields and megasites. Previous research and experiences had already shown that customization is only possible to a limited extent, especially at the process level. The characterization of the PMSD is a crucial element in the further process. After all, a limited collection of data about the content and context will lead to incomplete or incorrect decisions. REGENERATIS has developed a methodology, called REMICRRAM. The objectives of this methodology are:

- the characterization and selection of post-metallurgical sites and deposits that represent a potential for raw material recovery;
- the demonstration of the interest in recovering certain industrial waste deposits with a high recovery potential from polluted former metallurgical sites;
- the creation of a new business model that will allow to have a transparent cost benefit analysis that will lead to the maximum recovery of materials and land, while reducing the cost of rehabilitation.

We have identified 3 interconnected themes that structure the redevelopment process at these complex sites[1]:

1. **the ambitions**, that provide the incentives that trigger the corresponding project, the goals or objectives that the project seeks to fulfil, based on said ambitions, and the evaluation matrix of its success;

[1] ITRC team definition of a complex site: a/Remediation progress is uncertain and remediation may not achieve closure or even long-term management within a reasonable time frame, b/ “Reasonable time frame” for restoring resources to beneficial use is subject to interpretation and depends on site circumstances.

2. **the planning and design process**, that includes all the relevant steps taken towards the evidence-based realization of the project: from analysis to legal drafting and construction); and
3. **the decision-making and participation process**, that organizes how the various stakeholders, actors and relevant expertise and disciplines come together throughout the entire process.

The idea behind the elaboration of the interconnectivity between these 3 domains rests on the recognized necessity to link any PMSD redevelopment project with both its content (in terms of substances, materials etc.), as well as its context (urbanization trends, climate change etc.).

2 INTRODUCTION

2.1 PMSD AND BROWNFIELD REDEVELOPMENT

More than 200 years of industrialisation have left their impact on the status of soil. Europe has a problem of historical soil contamination due to the use and presence of hazardous substances in many production processes while there was no legal framework to control emissions or deal with the problem once it had appeared. This situation has led to various brownfields[2] and blackfields[3] within Europe, generating sites that are underused or not used and with often a high degree of contamination. The Past Metallurgical Sites and Deposits[4] (PMSD) addressed by REGENERATIS will be referred to as 'PMSD' throughout the text.

The approach to contaminated sites and brownfields varies across the EU and there is no specific directive for soil remediation. Last decades, several EU-funded projects have nevertheless ensured a fairly uniform investigation methodology and risk analysis. In addition, there was also a trend towards more sustainable remediation and a broader integration in the redevelopment of the sites. A similar policy change was noted in the USA: from Environmental Remediation to Sustainable Resilient Remediation.

[2] Brownfield: land that is abandoned or underutilized due to pollution from industrial use. (http://www.brownfieldscenter.org/glossary.cfm)

[3] Blackfield: a brownfield where the remediation costs are substantially much higher than the possible returns from redevelopment; no feasible project unless governmental support.

[4] Past Metallurgical Sites and Deposits (PMSD) have no formal definition in EU-law. In case of PMSD, many larger sites include a landfill. Particularly until the 1990s, it was customary to store the waste produced on site. With regard to this practice, we also use landfill in this report in case of large volumes of waste are stored on site. More detailed information in Annex 9.3.

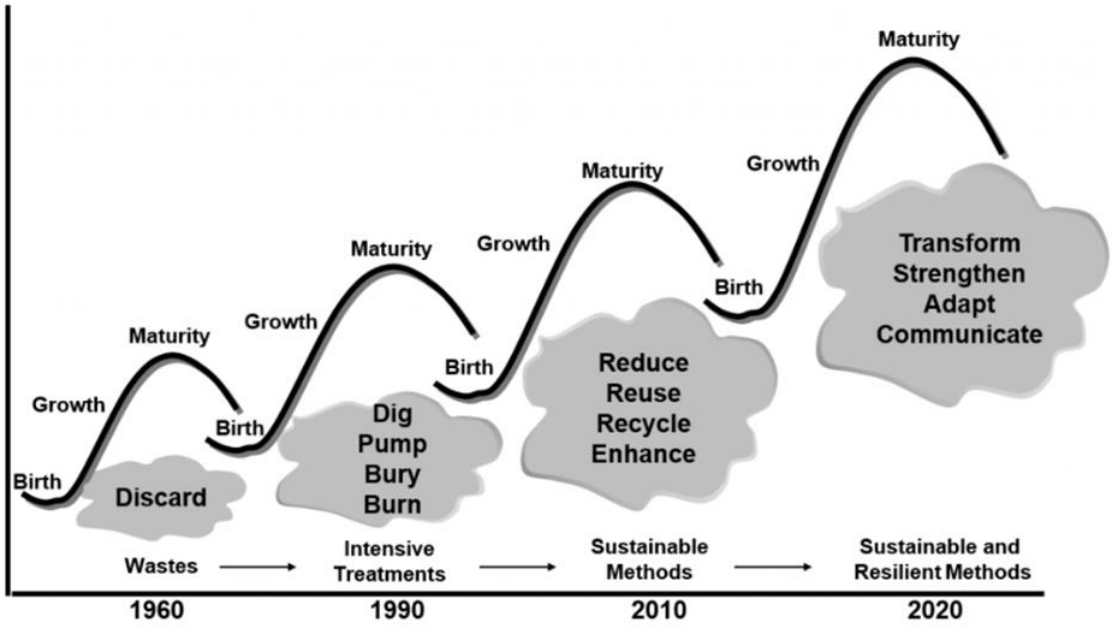


Figure 2-1. Evolution of environmental remediation to SRR.

Source: Adapted from Ellis and Hadley (2009) [2].

Given the scarcity of raw materials and natural resources in Western Europe, we need to handle what is present in our own soils and subsoil carefully and sustainably in the future. We must aim to maximise the valorisation of our own available raw materials in the long run and thus become less dependent on foreign minerals.

The valorisation of materials from post metallurgical sites and deposits (PMSD) can contribute to the circular approach to our raw material consumption. However, the concepts and application possibilities resource recovery through Urban Mining are currently hampered by several barriers and bottlenecks. The current state of the art and the current financial valuation of raw materials make the profitability and feasibility of these concepts still insufficient to roll out as systemic solutions.

The policy towards a circular economy does aim to make the principles of Urban Mining concrete in the longer term. In the meantime, it is important to start facilitating all possibilities towards a circular approach for metal processing sites not only for materials but also regarding the land. At the same time, we can seize opportunities for the redevelopment of these sites. This approach is in line with the concept of Dynamic Landfill Management. Since 2019, this concept has been the all-encompassing term for the sustainable integration of resources (materials, energy and land) from landfill sites into the circular economy. This includes the safe storage of landfills with a high resource valorization potential, in view of enhanced landfill mining (ELFM), providing sustainable interim uses and bridging the gap to a final safe situation and thereby respecting the most stringent social and ecological criteria.

The objective of Dynamic Landfill Management (DLM) is to bring landfills into harmony with their dynamic environment. On the one hand, this includes preventing or reducing negative effects like environmental and health-related risks as far as possible. On the other hand, DLM tries to maximize positive effects, so that old landfill sites can contribute to national as well as European policy goals in the broadest sense, e.g. concerning waste and resource management,

climate change, the Blue Deal, the Green Deal, soil sealing and no net land take. This is also how we want to look at PMSD.

Although DLM and Urban Mining are promising approaches for historical and new or existing problematic sites, it is a novel practice. That currently sees ample implementation in the redevelopment of PMSD (neither in brownfields or landfills). Other redevelopments of these sites (e.g. into residential areas) or non-use of these sites are more often the case. Although on the long run Urban Mining seems promising given possible resource scarcity and given the uncertainties of economic and technological evolutions.

By applying a more systemic approach towards this challenge, we try to uncover barriers and success factors for tackling PMSD within the fields of organization and legislation. In the hope of finding pathways were the mining of PMSD can be a more integral part of their redevelopment.

2.2 Objective and Structure of the Report

This report contains recommendations for relevant policy adaptation that will improve the framework conditions in order to launch more resource recovery driven projects from PMSD. The report is addressed to policy makers from NWE regions summarizing the main drivers for resource-recovery projects, the legal barriers for their implementation and solutions identified. Information and feedback are collected during dedicated workshops, recent reports/good practices and case studies. An overview of these meetings and the summary of each is added in Annex 2.

The report is structured in three parts. Chapter 3 introduces the methodological approach of the research and analysis. The elaborated and proposed framework works as a guiding narrative in the quest to discover the aforementioned barriers, actions to overcome them, and success factors in PMSD and landfill redevelopment. Chapter 4 presents a selection of case-studies and illustrates how they are being read through the employment of the methodological systemic framework. Chapter 5 outlines the main take-ways from the process of research and analysis: the lessons learned from the methodological approach, the obstacles and solutions, and the success factors.

The report concludes with recommendations for further research and 3 annexes where the framework, notes from internal and external meetings and information fiches for the case studies can be thoroughly consulted.

2.3 Earlier insights as a starting point

The success, failure or potential of a PMSD valorization project today is quite straightforward and based on a very limited amount of incentives. From earlier work on the redevelopment of landfills, which have a similar history and approach as PMSD and are, quite often, interrelated (e.g. landfills were developed on PMSD or next to them or in relation to the activity on the PMSD). We identified four types of incentives which are in their most basic origin linked to

money, or public awareness due to (sudden) emerging problems related to the landfill. The four types of landfills are the following ones :

- Type I: redevelopment potential
- Type II: material recovery
- Type III: health benefits
- Type IV: societal benefits

The issue remains that the majority of landfills stays 'out of reach' i.e. they do not fit into one of the above four categories and remain blackfields. One of the key features in landfill redevelopment therefore is to broaden the number of incentives or find clever solutions to activate the blackfields, to be able to fully tackle the complete landfill inventory. This report contains a systemic framework that deals with the problem of those 'forgotten' landfills.

However, in a recent past, some other (decision supporting) tools in a Flemish an European context, already were developed to assist in crunching the large amount of parameters concerning landfill projects into a more forgiving set of indicators. Their common purpose was stimulating landfill redevelopment. Since this report is a continuation of the work of previous projects it is useful to look shortly into these tools, often the main outfit of those same projects, and describe their strengths and weaknesses. Later on, we can link these tools into our systemic framework and indicate when and where they should be used best.

SmartGround[5] is the oldest of the tools and was developed between 2015 and 2018 in an Horizon 2020 project with the same name. SmartGround is a decision support tool focusing on projects that are granted and will be remediated. It helps its user to choose and decide what are the best available techniques to process the landfilled waste in their specific project. The shortcoming of this tool on the other hand is the fact it doesn't say which landfills are the most promising to mine or redevelop for whatever reason.

OnToL[6] is a tool that was developed in a cooperation between TU Wien and OVAM in 2018. It is still to date the most extensive decision support tool available for the Dynamic Landfill Management ecosystem. When used correctly, it will give you a very accurate answer on the net present value of your landfill mining project. However, the extensiveness of the tool is also its weakness: as a user you already need to invest a lot of time and resources to be able to collect all the input you need for the tool, with quite some uncertainty whether you will end up with a feasible project or not. What this tool needs in other words is a preceding financial risk assessment.

[5]SmartGround: SMART data collection and inteGRation platform to enhance availability and accessibility of data and infOrmation in the EU territory on SecoNDary Raw Materials https://cordis.europa.eu/project/id/641988

[6] Ontol : developed by team of prof. Johann Fellner (Christian Doppler Laboratory for Anthropogenic Resources, TU Vienna - Austria), in collaboration with prof. David Laner (University Kassel - Germany) and Dr. Andrea Winterstetter (University Antwerp & VITO – Belgium). Co-Funded by OVAM (Public Waste Agency of Flanders – Belgium) & BMNT (Austrian Federal Ministry for Sustainability - Austria)

The third and most recent tool is, like the first one, a product of an European project. The dual decision tool **Cedalion/Orion**[7], was delivered in 2021. Cedalion requires low investment and exploration costs and only acts as a guide to one of four possible pathways that are waste-to materials, waste-to-energy, waste-to-land and interim use. The most promising landfills then can be explored with more time and resources and that information can be used in one or more tools of Orion, the second decision support tool. Orion is therefore more of a platform containing existing tools, among them the two previously mentioned ones, than a tool on its own. The Cedalion/Orion tool tackles the financial risk assessment that the OnToL tool missed. It also labels the more difficult to develop landfills as 'interim use', however the possible solutions or dealing with this category of landfills could have been more thorough.

The Rawfill project with a Landfill Miner Guide[8] proposed three main drivers related to the decision to launch an Enhanced Landfill Mining Project. An economic driver related to material valorisation and land reclaiming; A territorial strategy driver related to the planned local/regional land development; An environmental driver related to environmental and human health issues. Additional drivers such as reducing the negative visual impact of the landfill on the landscape, nature conservation, etc. were also identified.

All the tools and instruments provide feedback to actors involved in the redevelopment of sites like governmental agencies, developers, … but they are limited to certain stages in the development process, are more in depth – expert driven tools. They don't describe or learn from the dynamics over the long course of the redevelopment of sites. They sometimes address underlying drivers but not linking them into a more methodological systemic framework.

[7] Cedalion and Orion, a decision support tool for dynamic landfill management, part of Interreg Europe project Cocoon: https://projects2014-2020.interregeurope.eu/cocoon/
[8] Landfill Miner Guide, 2021

3 SYSTEMIC FRAMEWORK AS METHOD

3.1 INTRODUCTION

In a similar way that the use of a Conceptual Site Model (CSM) is promoted as "a valuable planning tool (...) to support the site investigation planning and the decision-making process managing the remediation of contaminated land and groundwater on a large scale" (De Rijdt, et al., 2021), a systemic framework that synthesises the steps taken during the process of landfill redevelopment in general, and PMSD in particular, is also needed, in order to uncover the broad range of barriers in reference to the success of said process and strategies to overcome them. The reasoning behind this requirement lies on the nature of the assignment. Legal, financial, organizational, informative and planning-related obstacles and instruments in space-redevelopment projects pertain, at the same time, to the elaboration of visions, the process of drafting relevant plans and documents, the supervision of their implementation, the management of the appropriate actors and their networks, and the control of the quality of the entire project. Both the various elements described, as well as the people and procedures involved in every step of the way, correspond to, potentially, a host of different constraints, triggers or actions to surpass them, such that a methodological elaboration of a broad framework that outlines the whole process is deemed necessary in order to guide the research and evaluation of current, and future, barriers and opportunities in landfill and PMSD redevelopment.

We have identified three (3) interconnected themes that structure the redevelopment process:

1. the ambitions (that provide the incentives that trigger the corresponding project, the goals or objectives that the project seeks to fulfil, based on said ambitions, and the evaluation matrix of its success),

2. the planning and design process (that includes all the relevant steps taken towards the evidence-based realization of the project: from analysis to legal drafting and construction), and

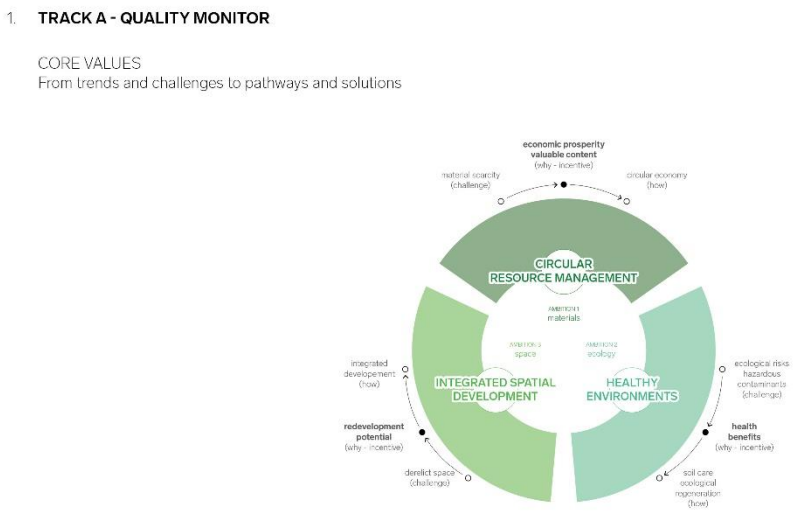
3. the decision-making and participation process (that organizes how the various stakeholders, actors and relevant expertise and disciplines come together throughout the entire process and are co-producing the redevelopment of a site).

The idea behind the elaboration of the interconnectivity between these three domains rests on the recognized necessity to link any landfill or PMSD redevelopment project with both **its content** (in terms of substances, materials etc.), as well as **its context** (urbanization trends, climate change etc.). This 'ideal' scenario represents the basis for an 'integrated project' and is used, for the purposes of this work, in a threefold manner: 1. as a guiding tool that points towards the sectors or practices where barriers and opportunities in landfill and PMSD redevelopment can be found (further assisting in determining where the various existing tools and policy instruments can fit and be situated in the whole process), 2. as an evaluation tool that allows for the assessment of said barriers and opportunities according to the ambitions that drive landfill and PMSD redevelopment, and 3. as a 'projective' that allows for a dialogue

with the relevant stakeholders to happen in order for further integration between the different domains to occur. This chapter presents and explains the structure and contents of this framework.

The integral framework can be consulted in Annex.

3.2 AMBITIONS



With the term ‘ambitions’ we describe the overall objectives that trigger and/or guide the process of landfill and PMSD redevelopment. As discussed previously, we have identified three (3) broad ambitions:

1. healthy environment,
2. integrated spatial development, and
3. circular resource management.

Each of those illustrate, in the largest sense possible, the overarching goals that pertain to ecology, space and materials respectively, effectively bundling all relevant prompts in landfill and PMSD redevelopment. The organization of said ambitions is the outcome of a three-step logic: firstly, a challenge or pressure is identified, secondly an incentive to overcome this challenge or pressure is highlighted, and, finally, a conceptual way of overcoming this is formulated.

As regards healthy environments and ecological management, the identified challenge refers to ecological risks posed by either the landfills or PMSD themselves, or their interaction with a changing climate, where, precisely due to, for example, the presence of contaminants, hazards towards the health of humans and other organisms might trigger the need to, primarily,

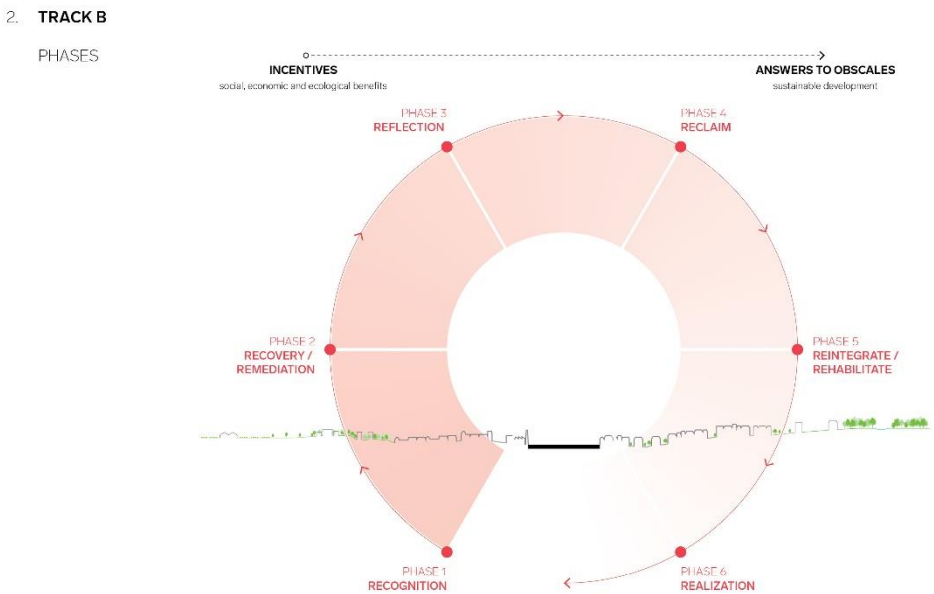
remediate said sites. The health benefits accrued through this remediation represent, thus, an incentive to formulate a project of ecological regeneration.

In reference to integrated spatial development and spatial management, the identified pressure refers to the presence of derelict space that presents as a problem due to urbanization trends (e.g. the need for housing or recreational spaces), where, the underutilization of a particular site in the face of urban expansion and the constraints of agricultural or ecological land use might trigger the need to rehabilitate the site in its broader spatial and programmatic context. The redevelopment potential of a landfill or PMSD to participate in the functioning of its surrounding represents, thus, an incentive to formulate a project of integrated spatial development.

Finally, regarding circular resource and material management, the identified challenge pertains to the scarcity of raw materials and the need to reuse discarded products and substances in product manufacturing and construction processes. The objective of furthering economic prosperity by reusing the valuable content that was once neglected in landfill and PMSD represents, thus, an incentive, to formulate a project of circular economy and circular material flows.

It has to be noted that in any particular site one or more of the above ambitions co-exist, or, rather, that during its redevelopment, one or more might appear and disappear throughout the process. The elaboration of these ambitions, therefore, with their challenges/pressures, incentives, and means, suggests a holistic outlook in the needs and desires that trigger and guide said process: they lay down the foundations of the project, direct the elaboration of the project, inform its realization and evaluate its process and outcomes.

3.3 PLANNING AND DESIGN

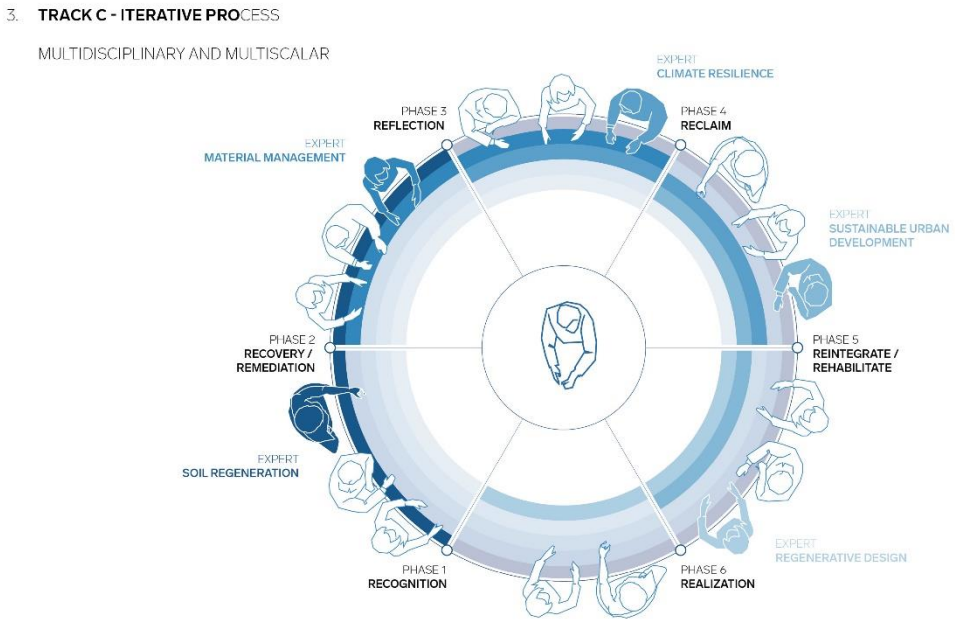


A six (6) part process of landfill and PMSD redevelopment is elaborated that seeks to uncover the ways through which such a project can, simultaneously, link to its material content, its relationship with its context, and the broader administrative processes that govern its use, traversing the appropriate spatial and governance scales.

Starting from “Phase 1: Recognise”, a site is approached on its own in order to understand and correctly value its material content (if any) or the general conditions of its physical characteristics (e.g. soil). “Phase 2: Recover/Remediate” suggests a broadening of the scope that seeks to uncover those technical possibilities that would allow for the site to become, once again, embedded in its surroundings, With “Phase 3: Reflect”, the knowledge of ‘what is there’ and ‘what you can do with it’ comes together in order to formulate a broader sustainability perspective that links the site, its context and the visions and plans of its administrative borders. After that, during “Phase 4: Reclaim” the various stakeholders and actors involved in the redevelopment process come together in order to elaborate the vision for the site. “Phase 5: Rehabilitate/Reintegrate” signifies the drafting of the plans and/or juridical documents that pertain to the realization of the project. And, finally, “Phase 6: Realise” represents the actual implementation of the planed project.

The above steps, move from fieldwork and desk research, analysis and inventory, to scenario-making for the future destinations of the site, all the way to vision and plan drafting as well as the elaborating of strategies and instruments to allow for said plans and visions.

3.4 CO-PRODUCTION

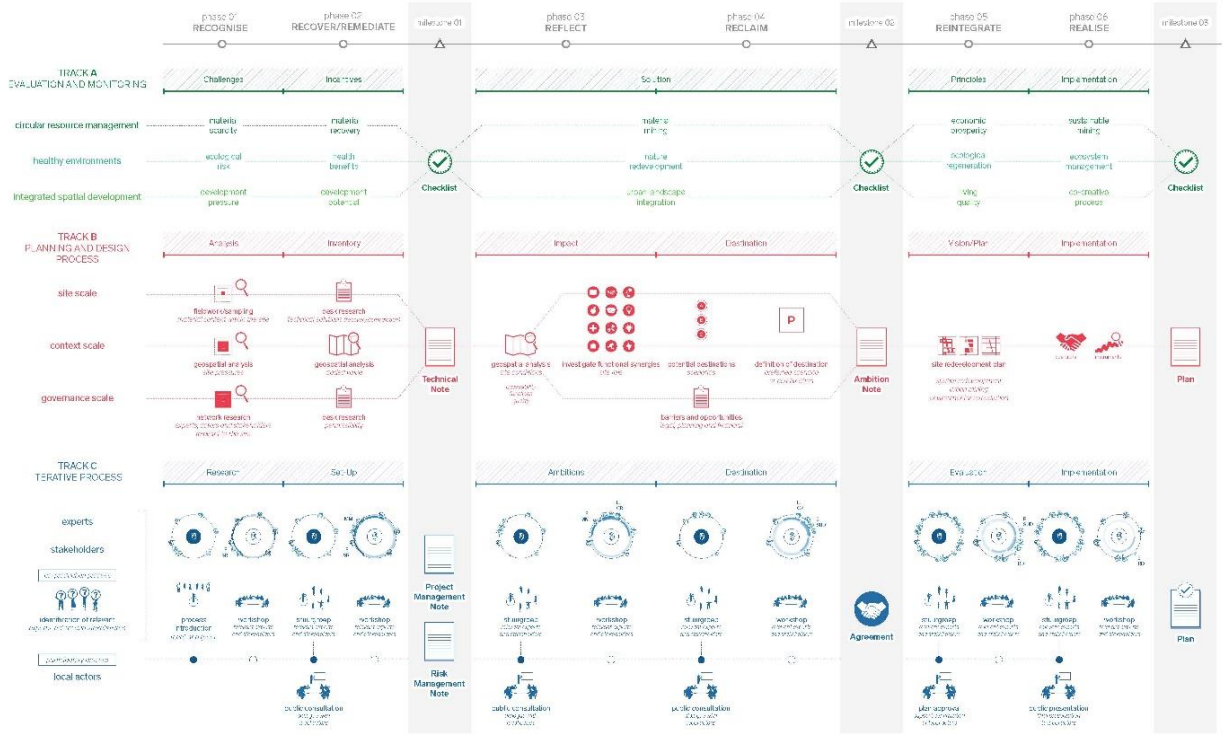


The integrated nature of landfill and PMSD redevelopment not only calls for various types of expertise, but, also, for different stakeholders to be involved. This collaboration, envisioned as a co-production process, represents, at the same time, the setting of ambitions and their

monitoring, as well as the planning and design process and its outcomes. As such, it illustrates how and when different actors come together to steer the process.

With the help of a mediator/facilitator, experts in soil regeneration, material management, climate resilience, sustainable urban development, regenerative design and implementation provide their feedback in all six (6) of the phases of the planning and design process. These are joined by the relevant stakeholders: starting from the site itself and its owners, moving up the spatial and governance scales to include the inhabitants of the context and the administrative authorities that govern it, and, finally, coming back to the site itself and the contractors, the joint collaboration of experts and stakeholders highlights, simultaneously, how the different interests of each have to be mediated, and, also, how each sector comes with its own tools, constraints and opportunities throughout the process.

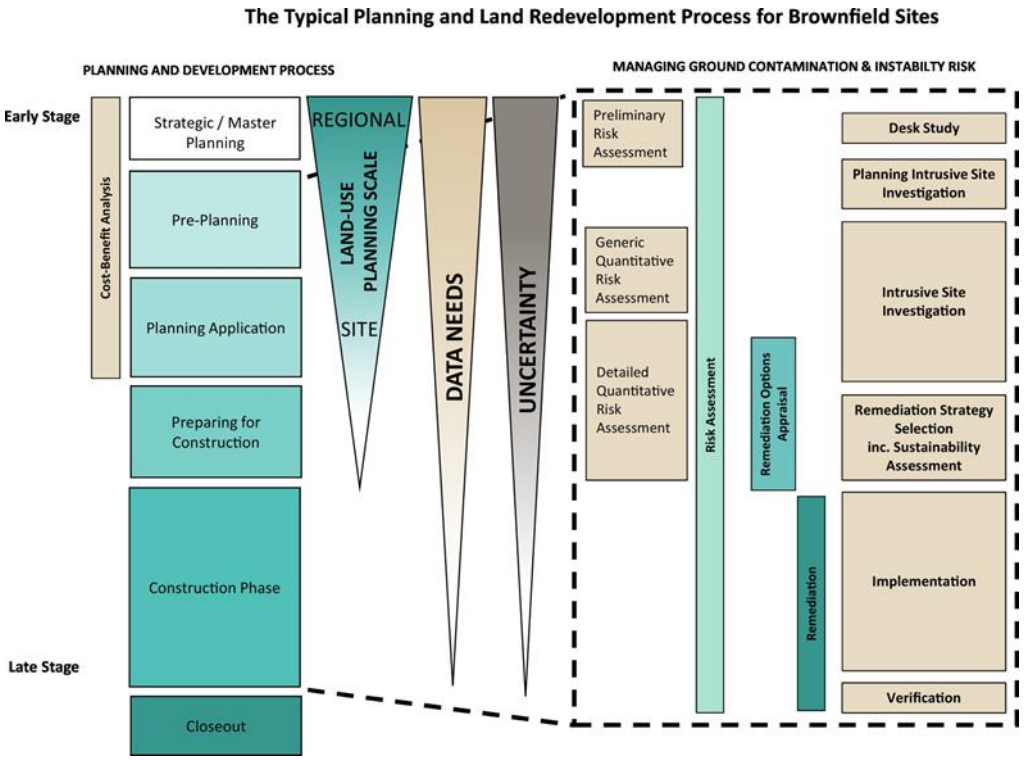
3.5 PROCESS AND CONCLUSIONS



The strength of the systemic framework lies, however, not only on the precise elaboration of the different tracks of the project, but on their interconnection. From “Phase 1” to “Phase 6”, the ambitions track shifts from understanding the challenges and incentives, to formulating a solution, finishing as a guiding and evaluation matrix for the principles and monitoring guidelines of the implementation of the project. Similarly, the planning and design track starts as analysis, turns into a research-by-design process, and ends as a spatial plan or legal document. Finally, the co-creation process, while exhibiting similarities in its organization (namely, the public consultation and workshops moments), begins as an ambitions- and project management-setting environment, to go through a collaborative planning and design step that brings full agreement, and finalize as a comprehensive plan for approval and realization guidance.

The elaboration of the above tracks, both internally as well as through their interconnections, allowed us to not only structure the research into the legal and organization barriers in landfill and PMSD redevelopment, but, also, to communicate with the various partners of the project and develop a common storyline that made possible the uncovering of distinct storylines, constraints and opportunities.

Keep in mind the connection and links between the remediation and redevelopment process and the following scheme shows the steps in a time perspective (Ellis B. Hammond et.al., 2021).



4 CASE STUDIES

3 cases were analysed in more depth and described in sheets. These fiches are a working tool representing the dynamics of a PMSD for third parties. They serve as inspiration material for other sites. As a methodological representation of where in the development process obstacles were visible where and which levers were deployed.

Detailed fiches added in Annex 3.

Case 1: Hemiksem - Hemiksveer:

In the past, the location along the river 'Schelde' was used for industrial activities with a clay quarry, landfill activities (municipal and industrial waste) and ship repair. After these activities, the location was abandoned around 1970 and left inaccessible, which resulted in the natural creation of a forest. Currently the location and the surrounding is changed to a residential area with recreation facilities such as playgrounds and walking trails through the forest and around 2 small lakes in the center of the location.

Case 2: Bocholt ' Arsenic factory Reppel'

The arsenic factory of Reppel, also known as 'Groot Fabriek' (big factory) was active between 1899 and 1971. The toxic compound Arsenic was derived from Moroccan ore that was mixed with coke, chalk and other products to finally come to a pure form of arsenic that was used in the production of insecticides, medicines and other products . Due to the long-term exploitation of the factory, an important charge of arsenic compounds has been emitted into the environment (soil, air, groundwater, surface water).

Case 3: Terranova – Zelzate :

This site was home to a sulphuric acid plant from early 1912, a phosphoric acid plant and a cokes factory. On the site, there was also a gypsum landfill where residual products from the past chemical activities were deposited. The landfill (a white waste mountain) was an eyesore for the surrounding area with concerns for safety and health.

Around 2000, activities stopped at the site, due to a Bankruptcy, and a future use for the site was sought, taking into account the highly contaminated subsoil and the negative perception in the surrounding area.

The site was dormant for 10 years and then taken over by 2 companies (Deme-Dec and Jan De Nul – Envisan). The objective was to build a center for sustainable processing of dredged material and a business park on the site. The sludge will be brought in from the canal and processed so that it can be reused as construction material. Before the sludge processing center is built, the contaminated site (approx. 140 ha) has to be remediated. This site is contaminated with heavy metals, cyanides and hydrocarbons. At the site of the gypsum landfill, the developers (DEMA and Jan De Nul) came up with the idea of developing a large solar park, in order to gain revenues from the site and make the sanitation profitable.

5 LESSONS LEARNED

5.1 USING THE SYSTEMIC FRAMEWORK

The systemic framework was tested in two opportunities:

- A workshop with *t*he public waste agency of Flanders (OVAM) and soil/brownfield experts from the consulting firm SWECO.
- An international workshop (in collaboration with Common Forum) with stakeholders (public and private) - experts on brownfield development.

The framework was also presented at the RemTech conference (25 May 2023) with interactive exchange to discuss "Sustainable remediation and management of mega sites, experience from Europe and other continents".

In general the framework is found useful in its purpose as a guiding tool. The 3 levels (ambitions, planning and design and the decision/participation process) feel complete. The visualisation of the steps makes it comprehensible and attractive for users. Although we noticed that in an unguided or unfacilitated session the framework is not easy to use also due to the complexity of all the processes in brownfield development. Skilled facilitators guiding the participants towards more deeper systemic layers had an added value.

Local/regional dynamics (e.g. soil legislation, spatial dynamics, …) imply that not every ambition is equally present in every European Country or region. In more dense, urban regions like Flanders the spatial ambition is a highly used lever most often in combination with an ambition on healthy environments. In other regions ambitions tend to focus especially on healthy environments. We also noticed that spatial redevelopment in certain regions could be framed around a sound economy and job creation.

The framework was very useful in determining barriers and incentives in redevelopment of sites. It was used in a historical analysis of sites where their redevelopment journeys were constructed using a narrative approach. The framework was most useful in a guiding/facilitated session where the redevelopment process of a site in retrospect was described. In comparison with methods like learning histories or reflexive process description[9], it lets an actor reconstruct the journey that has been run through from its own experience, supported by formal documents, policy decisions, public sources (press, …) in order to gain insights in the significant momentums in the journey and the elements that create a dynamic move in projects.

The framework was also used in a projective way by using it to construct the stories of the current or future redevelopment of a landfill. It wasn't used in a multi-stakeholder setting, where it would have more impact, but it proofed to serve as a reflexive tool to strategize on possible next steps given certain obstacles and barriers actors stumble upon. It seems that the framework could be developed further in this direction, by adding more tools or methodologies.

[9] Reflexive monitoring in action ; online source

5.2 Barriers/Obstacles in Brownfield Redevelopment and Strategies/Instruments to Overcome them

This part describes the barriers discovered by using the narrative reflexive approach in the workshops. The barriers and solutions are coupled with the process phases. In a first chapter a general overview on relevant legislation is presented. According to the JRC "To date, soil is not subject to a comprehensive and coherent set of rules in the Union. The protection and sustainable use of soil is scattered in different Community policies contributing in various degrees to mainly indirect protection of soil, for example through environmental policies on waste, water, chemicals, industrial pollution prevention, nature protection and biodiversity, nitrates and pesticides, sewage sludge, forestry strategy, climate change adaptation and mitigation, and biofuels. For soil contamination 13 different pieces of EU legislation apply (...)." (European achievements in soil remediation and brownfield redevelopment ,JRC, 2017)

In this context, reference should be made to the generally complex legal framework surrounding the themes of waste, soil, materials management, remediation, environment, nature, state aid, etc. These are important and sensitive themes that were initially managed separately from a need to control, but without a coherent whole across the subjects. This led to piecemeal legislation, the joint application of which can lead to contradictions. It complicates the redevelopment of landfills or other contaminated sites.

Similar experiences were noted by ITRC[10] on their research on the Reuse of Mining Waste: "During the investigative process, the team has searched for a variety of solutions to these barriers and recommended ways to overcome them. ITRC's experience in past projects suggests that statutory and regulatory barriers often do not exist since exceptions, variances, or waivers are available. Even so, these are time-consuming, costly, uncertain, and biased toward existing or conventional technologies. This bias is part of what we are trying to overcome to allow new technologies to be tested, demonstrated, and earn an appropriate place in the toolbox of environmental professionals. The Mining Waste Team has identified the following issues. »[11]

Within the EU, not all these themes were regulated with specific directives. There is no harmonization within the European countries, so that the various national legislations form new obstacles across national borders.

In the meantime, the realization has grown that the issues surrounding waste, soil, use of materials and sustainable use of the environment must be managed from Europe as a larger whole, with an indication of the interfaces between these themes.

The EU uses different types of legal acts to achieve its objectives. Some of them are binding, some apply to all EU countries, some to just a few.

[10] ITRC: Interstate Technology and Regulatory Council
[11] https://projects.itrcweb.org/miningwaste-guidance/

Depending on the type of legal acts, their content may or may not be directly applicable in the Member States. Only the Regulation has direct effect. The Directives set objectives, but leave the concrete details to the Member States, so that national legislation differs from one another. The use by the EU of these different types of legal acts further increases the legal complexity. Moreover, the objectives of the Directives are sometimes more or less lost when transposing Directives into national legislation. 51% of waste prevention plans of member states are not consistent with the EU definition of waste prevention[12].

5.2.1 PHASE 1 – RECOGNITION

An important barrier for redevelopment of is a lack of knowledge on what is actually present in the soil. Due to the historical activities, a lot of sites suffer from what is called a historical contamination. Because of a lack of data[13], PMSD and brownfields are often left vacant as isolated areas. In many cases there is a need to have access to all kind of data:

- which substances are actually in the soil
- which kind of activities were present on the site
- what could be potentially interesting materials or resources from a site
- what are the risks (health, migration, financial, …) related to contaminations on-site
- …

The REGENERATIS project already takes the first step in overcoming this barrier: the MESIS summarizes all data that is necessary to estimate the resource potential of a PMSD. Also the guideline for historical studies on PMSD can significantly improve the availability of the necessary data. Furthermore, the REGENERATIS project shows that geophysical investigation methods can be an innovative non-invasive technique to gather valuable information. Although this guideline, desk dataset and geophysical investigation provide support when gathering information, it is not yet obliged to do it in practice.

This could be solved by including it in legislation. For example the Flemish soil decree requires a soil investigation in case of a transfer of a site or zone with potential (historical) risk activity. Moreover a periodical obligation exists in Flanders to realize a soil investigation related to risk activities. With more recent soil, waste and environmental legislations the possible contents of sites (landfills, PMSD, …) are more closely monitored and inventoried.

The introduction of the legislation had the effect of incentivizing owners of 'dormant sites'. Often additional factors were important such as the risk of image damage, an additional risk of health or effects, pressure from the surroundings of the site (local residents, action groups, local authorities, etc.) that resulted in certain owners of brownfield sites feeling called to take action.

Still, given the amount of sites with none or less information on contamination and risk, public waste and environmental agencies set up initiatives to gain more insights in the kind of

[12] Zero Waste Europe, Waste Framework Directive review: Why we need waste prevention targets now, Joint policy paper, July 2022, p. 4.
[13] Also recommendation of Minea

contamination at uninvestigated sites and in the potential opportunities of different sites in the future.

Main characteristics of the current juridical framework (e.g. legislation) is that legal measures are of a controlling and sanctioning nature. Given the ambitions of stimulating revalorization of PMSDs , a movement towards a more dynamic legal framework would be interesting. For now the focus of these instruments is also mainly on risk containment, mostly aimed to health and or ecological risks. Not on making possible valuable resources available in the future.

Other existing legislation focuses on the temporary storage and/or reuse of materials, but mainly in a context within existing business activities. This legislation is therefore not suitable for the re-storage or reuse of materials extracted from a landfill.

Within a European context, reference can be made to the Waste Framework Directive[14]: According to Article 6 (1) and (2) of the Waste Framework Directive, certain specified waste ceases to be waste when it has undergone a recovery operation (including recycling) and complies with specific criteria. This criteria for specific materials is set by the Commission through the "comitology" procedure.

This currently only offers a very limited field of application. These criteria have been laid down for

- iron, steel and aluminium scrap (see Council Regulation (EU) N° 333/2011)
- glass cullet (see Commission Regulation (EU) N° 1179/2012)
- copper scrap (see Commission Regulation (EU) N° 715/2013)

Notwithstanding the aforementioned provision that allows the reuse of waste, the directive is still based on the principle: *Preventing waste is the preferred option, and sending waste to landfill should be the last resort*.

Waste prevention is of course useful, but perhaps the focus should be more on a clear and correct inventory of waste and allowing it to be stored in an organized and safe manner, even in the long term. The shift must be made to accepting that waste is inevitable, with the focus and starting point on the economical use of raw materials and the reuse of waste in the future.

The Waste Framework Directive is due for a review. The European Commission has the following recorded on this[15]:

> Despite existing legislation, for some specific streams, such as waste oils and textile, evidence indicated that the polluter pays principle is not fully implemented and that some waste may be illegally disposed of, leading to pollution.
>
> The Commission is currently working on a targeted revision of the Waste Framework Directive and has conducted a preliminary analysis in the context of assessing impacts, including stakeholder consultations. Based on this analysis and taking into account the ongoing efforts across the EU to implement "the 2018 waste package" and the variety of new and ongoing initiatives by the Commission (including the review of the Packaging and packaging waste

[14] Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives

[15] https://environment.ec.europa.eu/topics/waste-and-recycling/waste-framework-directive_en

Directive, Batteries Regulation, Industrial Emission Directive, Eco-design for Sustainable Products regulation), the Commission has defined the scope of the policy initiative for the targeted amendment of the Waste Framework Directive in 2023. The initiative will focus on policy options to bring about a more circular and sustainable management of textile waste in view of the objectives set out in the EU Strategy for Sustainable and Circular Textiles. The initiative will also assess the feasibility of setting food waste reduction targets to implement the Union's commitments under the UN Sustainable Development Goals and the Farm to Fork Strategy and limit the food supply chain's impact on the environment and climate.

In view of this scope, stakeholder consultations have focused on textiles. A second workshop was held on 7 July 2022 to discuss possible measures to improve the collection and treatment of textile waste. In addition, the study team supporting the Commission for the impact assessment of those measures has conducted targeted consultations. The consultation activities for the other areas (waste prevention and preparation for reuse and recycling) will not be held as these will not be the focus of this targeted initiative.

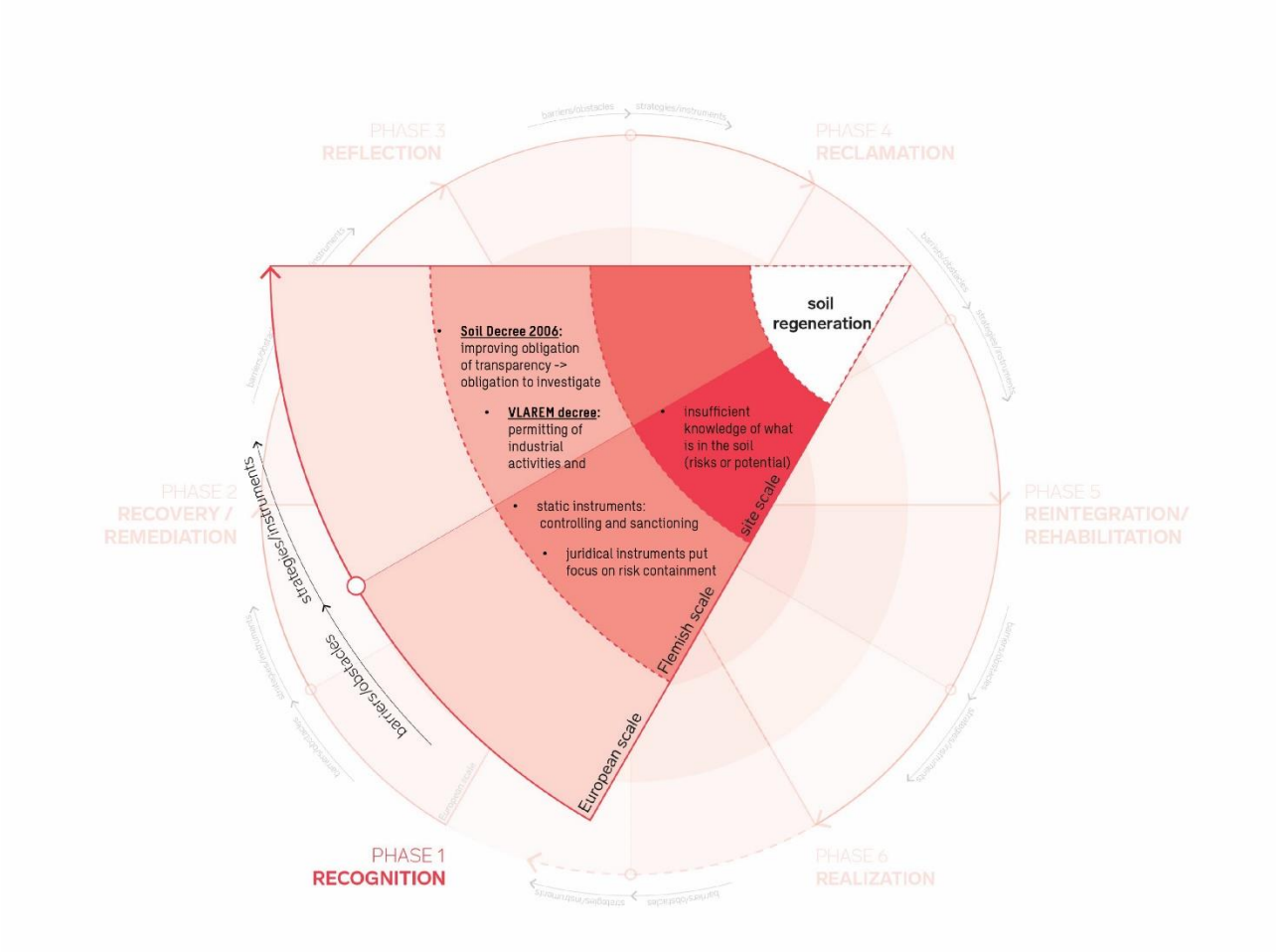
Furthermore, the Commission aims to share and promote the best practices identified in the support studies, as regards waste prevention monitoring, separate collection of dry recyclables and biowaste, and the sustainable management of waste oils. For that purpose, the Commission, in cooperation with the EEA, is finalising the ongoing analysis and reports are in preparation.

The Call for Evidence was published in January and February 2022, and the Commission received just under 200 separate responses. A large number of the respondents reflected on the need to address consumption and promote direct re-use and design for circularity in order to address waste prevention. A large number of respondents supported the concept that separate collection is a precondition for improving reuse and recycling and several respondents highlighted the importance of packaging waste in this respect. Several business associations mentioned the importance of EPR schemes, particularly for textiles.

A broader set of consultations took place in the first half of 2022 to ensure that all relevant stakeholders could express their views. The main stakeholders are national authorities, producers and producer responsibility organisations, waste collectors and recyclers, households and businesses, NGOs and scientific experts. As part of those efforts, the public consultation was open for feedback until 24 August 2022. More information is on Have Your Say: WFD revision.

In line with Better Regulation, the Commission will draft an impact assessment report in support of this revision to set out the options and assess their impacts.

The problem statement as formulated by the Commission is in line with the findings in this report, but the envisaged expanded scope is still limited. Unfortunately, the legislative evolution is progressing very slowly.



: Example of the use of the framework in structuring barriers and levers

5.2.2 PHASE 2 – RECOVERY - REMEDIATION

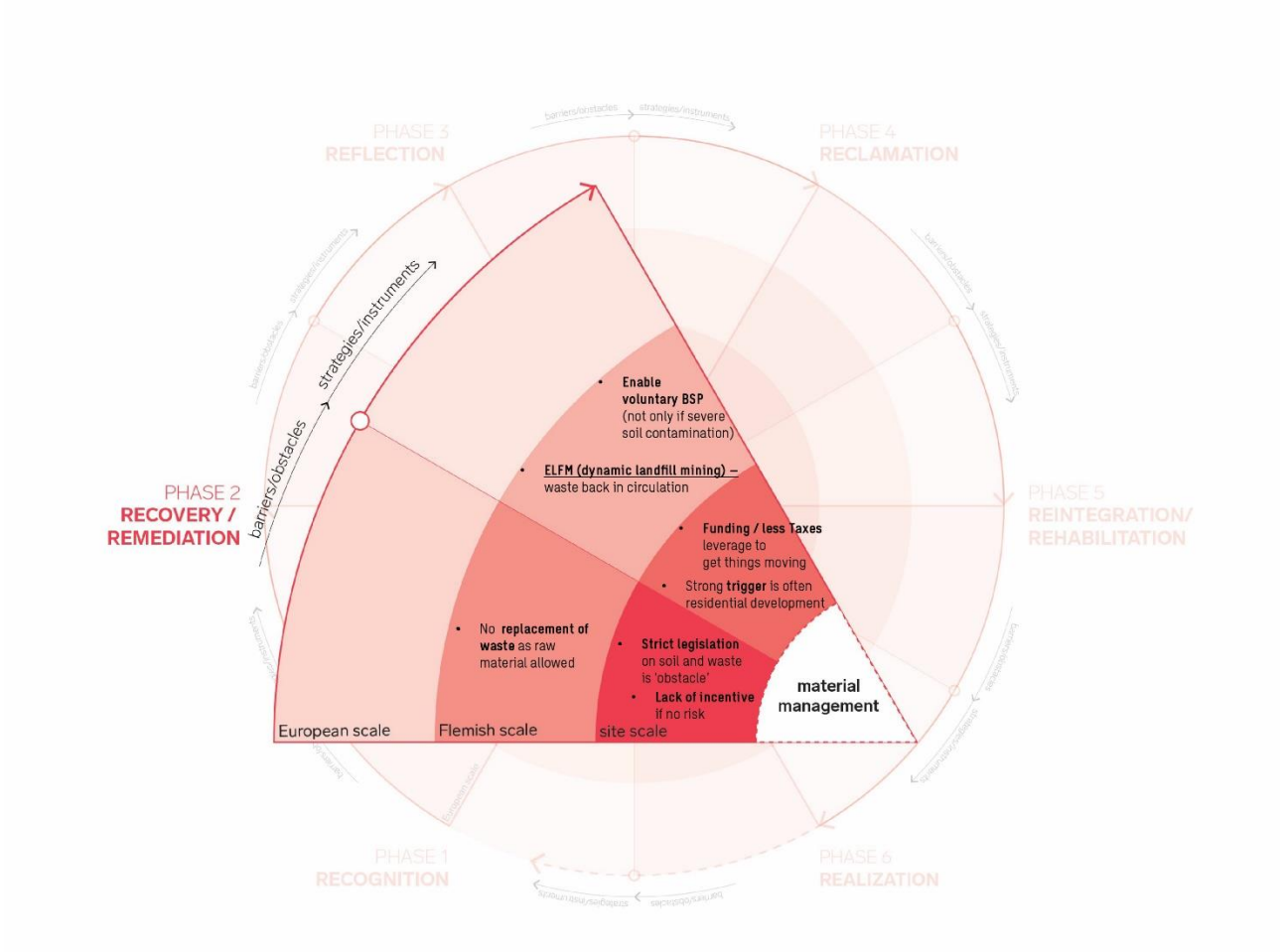
The current legislation on waste and soil management prohibits the movement of residues of waste on landfill and/or PMSD. If there is no current risk for health, ecology, … a remediation is not mandatory. The current soil legislation in Flanders, for example, entails the risk that new manipulations (e.g. in function of landfill mining) of existing soil contamination can be regarded as a "new" contamination, with important responsibilities (including financial ones) as a result and with criminal sanctions if these responsibilities are not correctly assumed. This puts a major brake on incentives to redevelop these sites.

Current legislation is aimed at safeguarding soil contamination by either removing and processing the contamination, or by embedding the contamination on site (e.g. with layers of clay). For the operation of landfill sites, the legislation also provides for safe storage and proper sealing of the landfill site, not aimed at recovering materials from that landfill site. This again illustrates the static nature of the current legislation, aimed at a fixed end point (such as, for example, the remediation of the soil or the sealing of a landfill site). Current legislation does not support the incentives as identified above.

Incentives for more voluntary remediations are for now not foreseen in the legal framework. In the cases evaluated in this study, specific custom or ad hoc solutions were found leading to

win-win situations. For example with the case of Hemixveer, thanks to good relations between soil experts, OVAM[16] , developers of a site and local administration, solutions where found for the containment of the landfill and lucrative opportunities for the redevelopment of the site came together.

For the mining of valuable resources, specific permissions for transport of waste/resources across borders could be granted. For now the strategies for bringing waste back into circulation seems ad hoc and not a common practice. This is partly due to the aforementioned static legislation, which only allows ad hoc solutions. The extra costs on moving waste and or valuable materials from the sites where they are now towards possible restorage or reuse are an extra obstacle for the redevelopment process.



5.2.3 PHASE 3 – REFLECTION

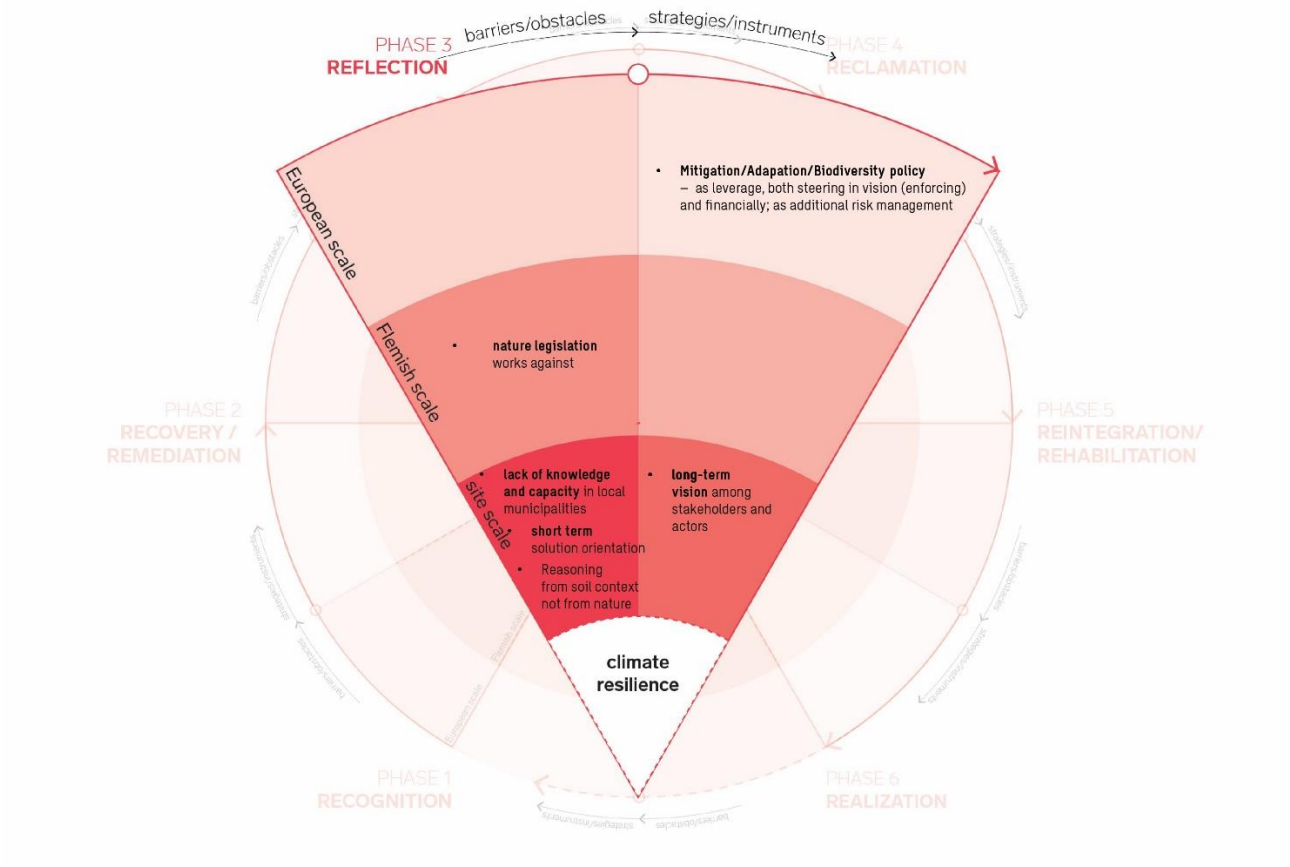
Including PMSD or landfill sites in general it is a challenge to integrate these sites within broader ambitions. For example not only reintroducing them in the circular economy but trying to couple them towards integral spatial planning and climate policies are not evident. On a local scale actors like site owners or municipalities often lack the capacity and knowledge. Triggers

[16] OVAM (Public Waste Agency of Flanders): competent authority for soil remediation and waste management in region of Flanders (Belgium).

for acting on a site are mostly short term, activated by a short term need that needs to be solved, for example a health hazard, a development opportunity. Rarely these sites are incorporated in a long term strategy. An integrated approach with new developments is often seen as to difficult, as a burden within the planning process that is not likely to tackle right now. So these sites are really 'blind-spots' within the broader context.

A lot of PMSD are left untouched for decades, which gave nature the opportunity to 'take-back' these sites. Within a dense urban field where nature and biodiversity are under pressure, these nature developments are becoming quite valuable. The existing legislation of forests, nature, species, … hinders then the redevelopment of these sites. Strategies where the redevelopment takes into consideration the value of the existing nature seems more successful. We encounter strategies around nature as a lever for more valuable residential development, climate adaptation strategies, where sites can be incorporated in water security strategies, …

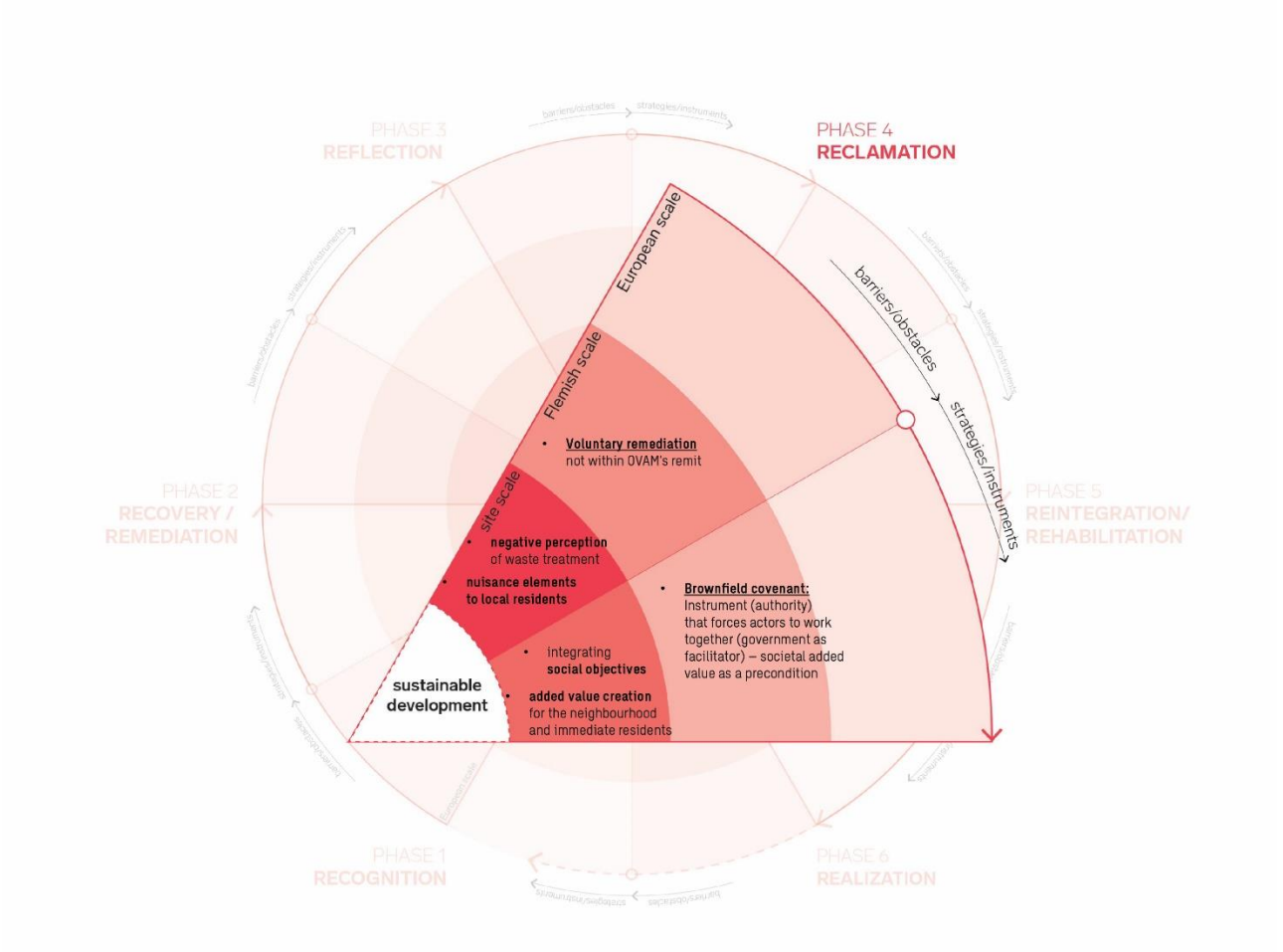
The financial considerations and the enforcing nature of climate / nature legislation are essential parameters in the development of strategies and incentives. Where actors can bring their strategies in line with redevelopment of sites or integral spatial development, we see an possible acceleration.



5.2.4 PHASE 4 – RECLAMATION

When the ambition is clear, precaution is needed on further implementation. Historical sites suffer from negative perceptions. Where on-site measures are taken to mitigate nuisance elements (noise, dust, …) in favour of the stakeholders, the process runs smoother. On a broader scale we see sites take effort to explain and sensitize local residents or stakeholders on the possible effects but also the potential value of the activities on the site.

Some process instruments like the Flemish Brownfield Covenants[17] are extremely valuable in these phases. These instruments can create a direct and clear process around the given project and make space for contact and negotiation between actors.

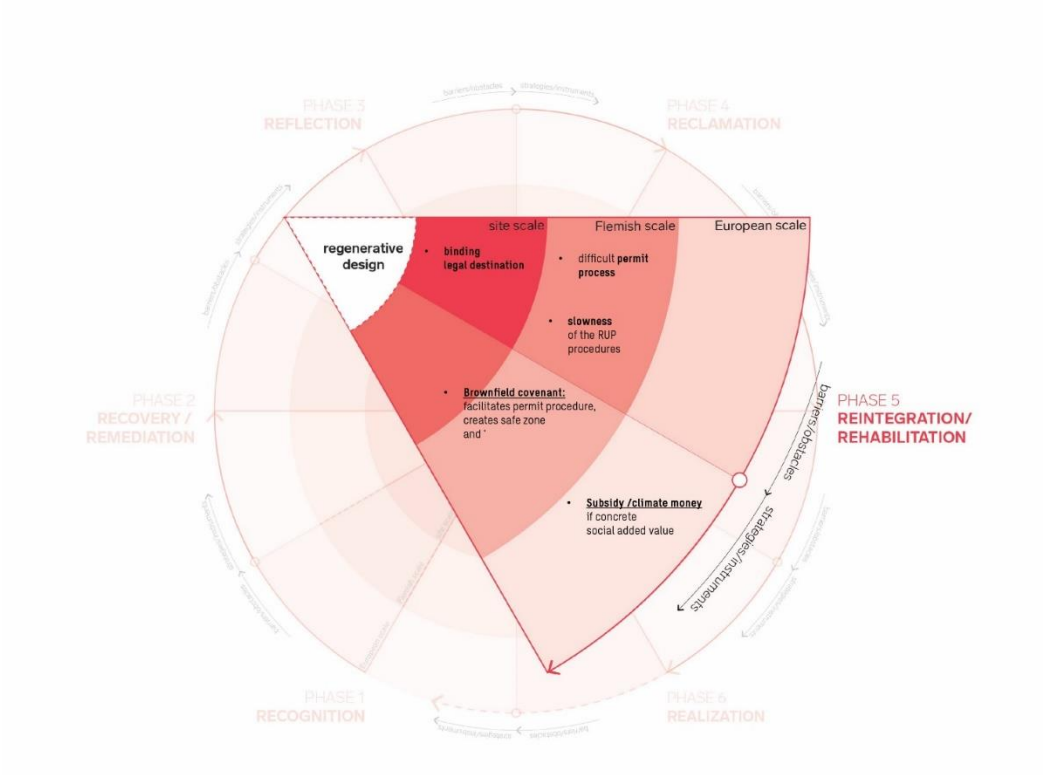


5.2.5 PHASE 5 – INTEGRATION

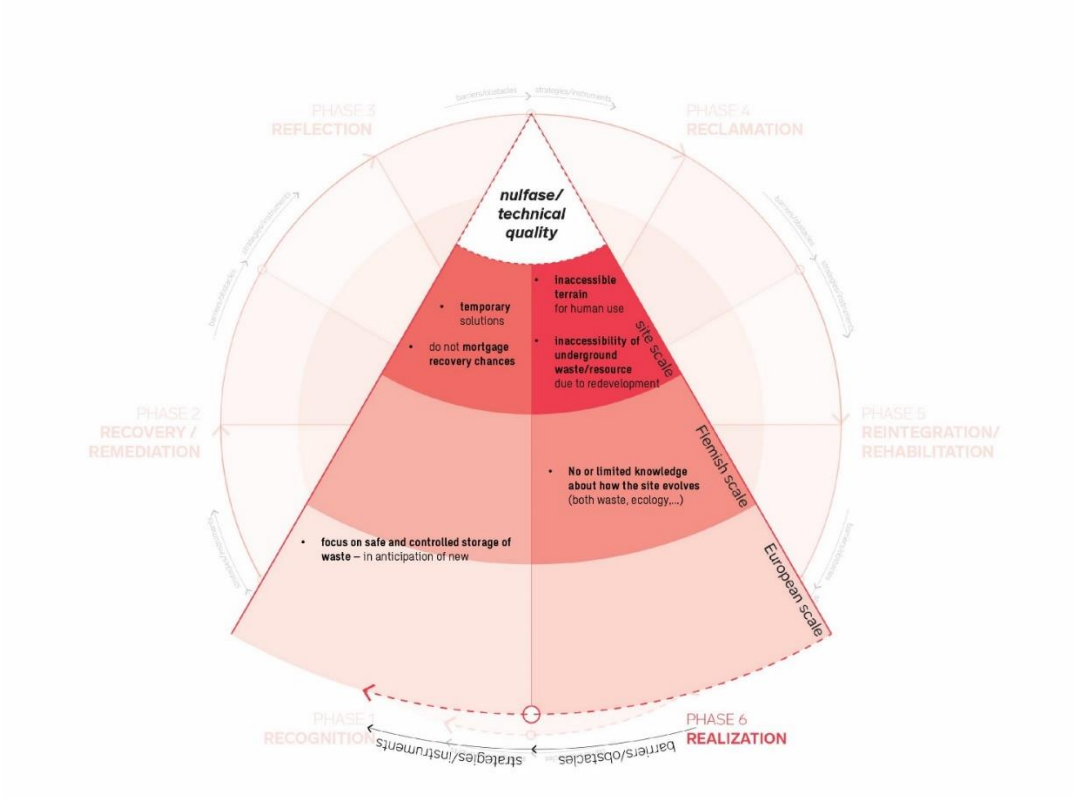
Main barriers in the implementation process is still the financial feasibility. Where on the site scale either binding legislation or a revenue path is clear, the redevelopment seems evident. Where these are lacking or more unclear, the development paths encounters obstacles. The introduction of new incentives like the monetarization of climate is a possible strategy.

[17] https://www.vlaio.be/en/subsidies/brownfield-covenant

Spatial processes and instruments take time. The slowness of these processes is an opportunity as well as an obstacle. Given the slowness, it gives actors time to come up with solutions for problems they encounter. On the other side, an endless process of reintroducing these sites into its surroundings is not beneficial for society.



5.2.6 Phase 6 – Realization/Null phase



5.3 CRITICAL SUCCESS FACTORS IN PMSD REDEVELOPMENT

The general critical success factors in PMSD redevelopment are closely linked with brownfield redevelopment in general and following items should be considered. [18]

- Understand the landscape and the context where the site is located: Conduct an inventory, determine regulatory obligations and policy options, and identify key stakeholders.
- Build partnerships: Enhance relationships with pertinent local organizations, financial institutions, developers, regulators and other organizations, and create a community brownfield advisory group.
- Devise a strategy: Develop a strategy that considers what the future ambitions of the site, its content and surroundings might be. Build also programs to encourage redevelopment.
- Promote programs and opportunities: Build awareness by creating a communication plan and promotional materials and by participating in or hosting local events.
- Manage programs and projects: Administer your municipal brownfield programs, and facilitate the redevelopment of local properties.

[18] https://greenmunicipalfund.ca/leadership-brownfield-renewal-network and own processing

- Evaluate, improve and celebrate: Assess and ensure ongoing improvement of policies and programs, and celebrate your successes.

Based on lessons learned from past site redevelopments, WHO[19] formulated the following key messages for urban planners and stakeholders considering future interventions:

1) Redeveloping contaminated sites is a promising public health intervention
2) A sound site investigation is the baseline for all decision-making
3) Effective and transparent coordination and communication is a key requirement
4) The need for knowledge transfer and building capacities
5) Acknowledging site diversity and finding tailored responses
6) The relevance of national structures and frameworks
7) Consider lessons learned in the past for future site closures and contamination scenarios

The REGENERATIS-analysis sets focus on PMSD but these messages are relevant as well. A specific barrier relates to the recycling potential of metals. The REMICCRAM supports the feasibility study and viability of a valorization project.

6 RECOMMENDATIONS

From a preventive perspective, avoid that PMSD become brownfields. Sustainable operations are pursued by granting permits. This measure is only effective for the new operations and doesn't deal with contamination of the past. Specific regulations on soil remediation offer options to deal with polluted soil even generated decades ago. In order to avoid a long time gap between to closure of activities and the start of the redevelopment process, consider the obligation of a soil survey at the moment of closure.

Promote databases entailing a broad range of information on PMSD (and contaminated sites in general) that can prompt both governments and potential developers to take action.

Given that the redevelopment of PMSD are complex processes where a multi-disciplinary approach is necessary, we recommend that parties (or a party) have an overview of the 'journey' of the site on as a whole. A party that can take the role of the guide, facilitator or captain can facilitate the process. The brownfield covenant legislation provides this opportunity. It might take the same role in the future but the framework needs adaptation towards the ideas of dynamic landfill mining. We are not considering the possible long-term reuse of the contents of such sites. Neither do we have a strategic approach on the redevelopment as a whole of PMSD. Process/journeys of successful sites are more often ad hoc, even lucky shots that the result of a strategic approach. For the latter the frameworks (organisational and juridical) are still lacking. The incentives for redevelopment fall short on translating our historical industrial heritage to a future proofed development.

[19] World Health Organization (WHO). Regional Office for Europe. (2021). Protecting health through urban redevelopment of contaminated sites. A planning brief. https://apps.who.int/iris/rest/bitstreams/1397250/retrieve.

Different actors and stakeholders hold positions that are risk averse and less solution oriented. With an increased capacity for policy makers to act on a strong stakeholder management (a role as a site transition manager) more dynamic on our PMSD would be possible. The ideas and legislation around voluntary remediation could be more developed.

We also recommend to consider specific deviations/exemptions in the legislation to support these complex redevelopment projects. Not to fall short on the risks or potential hazards these sites often form. But an overarching law that creates a very open framework for certain contexts in response to the amalgam of legislations (soil, waste, materials, spatial, …) could form the base for a more dynamic usage of our PMSD. The brownfield covenants form such an example. A unique account manager might also improve the process flow.

The concept of save storage of waste, in anticipation of future technologies for recycling and reuse should be taken into consideration. We should be careful not to hypothecate recovery chances. An actual discussion should be 'where to store temporarily interesting streams of resources'. And what kind of temporal activity can we allow on certain sites. We should move away from the current idea of orphan sites, abandoned in our landscape to integrated treasuries for the future.

The current static, linear and sanctioning legislation often hinders the reintegration of PMSD. We hope for the openness to talk and work towards a more dynamic, circular and facilitating framework.

Waste and other production residues are "materials", just like raw materials. Its reuse is not always immediately possible, but it can be set as a goal to develop a new approach to materials in general, split into "new raw materials" and "secondary raw materials". In an ideal world, all waste can always be reused, and any remediation of contaminated soil would lead directly to the conversion of the contamination into secondary raw materials. We are however still a long way from that, so that an interim solution is needed for this contamination/waste in the meantime. But this should not prevent the legislative framework from already being directed towards that goal.

So far, EU member states' waste prevention plans do not adequately implement quantitative targets. On the one hand, the definition of waste prevention is confusing, as it is often associated with waste management measures – such as recycling – and not linked to reduction of primary resource consumption. The production of ecocatalyst is in line with this objective of reducing the extraction of (fossil) resources. On the other hand, many waste prevention measures focus on consumer initiatives, especially through awareness raising and campaigns. While these soft measures are useful, the priority should be on stronger and more binding measures. Moreover, targets should also focus on ensuring manufacturers are held accountable for placing an overwhelming flow of materials, goods, and substances on the market[20].

[20] Zero Waste Europe, Waste Framework Directive review: Why we need waste prevention targets now, Joint policy paper, July 2022, p. 2.

7 CONCLUSIONS

The redevelopment and valorisation of Past Metallurgical Sites and Deposits are complex processes where a variety of insights and evaluations come together. An integrated spatial development, circular resource management as well as a healthy environment are different elements which have to be taken into account or have to be in balance to give rise to a promising and successful project at the starting phase.

Diverse themes, such as soil, water, mobility, energy, nature, biodiversity, spatial quality, ... come together and need to be implemented in coherence. Static planning processes with a defined linear sequence of planning (authorization-realization) no longer suffice in this integrated approach. Static spatial and legal instruments as a regulatory system also fall short. The time of single space use is over and we are evolving towards a context where a multifunctional use of space is becoming the norm, especially in cities where space is scarce. The challenge is to embrace the complexity.

This evolution means individual stakeholders are becoming more dependent on mutual partnerships. Much more attention than today should therefore be paid to processes that create sustainable cooperative structures. Therefore, an open attitude towards a more iterative process approach and towards cooperation within coalitions of actors in a context of trust are critical success factors for successful future-proof developments.

The systemic framework developed for the REGENERATIS project seemed to be useful to structure the different elements and reflections during the complex process and approach of landfills and PMDS sites. Considering another way of reasoning within this integrated approach, the framework gives insight in the different steps of the process. The functioning of the framework supposes an iterative journey at multiple levels and scales. Six phases in the process can be distinguished:

1. Recognition
2. Recovery / Remediation
3. Reflection
4. Reclamation
5. Reintegration / Rehabilitation
6. Realization

In each of these phases it is possible to look for the underlying and relevant levers to bring a project in motion.

The systemic framework gives the possibility to create an overview of the whole process on which different actions and initiatives can be related and put in their context. The framework

might reveal where organizational barriers appear and where specific actions can give the solution to activate the process for the redevelopment of PMDS sites.

In accordance with this systemic framework it is clear that also in the juridical sphere a lot of connections and interferences between different legislations can be considered in these complicated processes. The main juridical barrier in the redevelopment of PMDS sites is therefore the separate legal approach from each domain of interest. Instead of thinking within one legislation (spatial planning, soil, environment, mobility, …), there is a need for a transversal, dynamic thinking throughout the different legislations to determine new creative interpretations of the different legislations. Frameworks with this way of thinking which can facilitate these legal connections, could function as a leverage for a project. It will give more certainty to promotors on the long term to continue with the redevelopment of a contaminated site.

Especially in order to create a legal framework for the valorisation of PMSD, an integrated approach is necessary from a juridical point of view. A first attempt in this approach can be found in the Flemish brownfield covenants.

At European level, further adaptation of the Waste Framework Directive can serve to implement these objectives.

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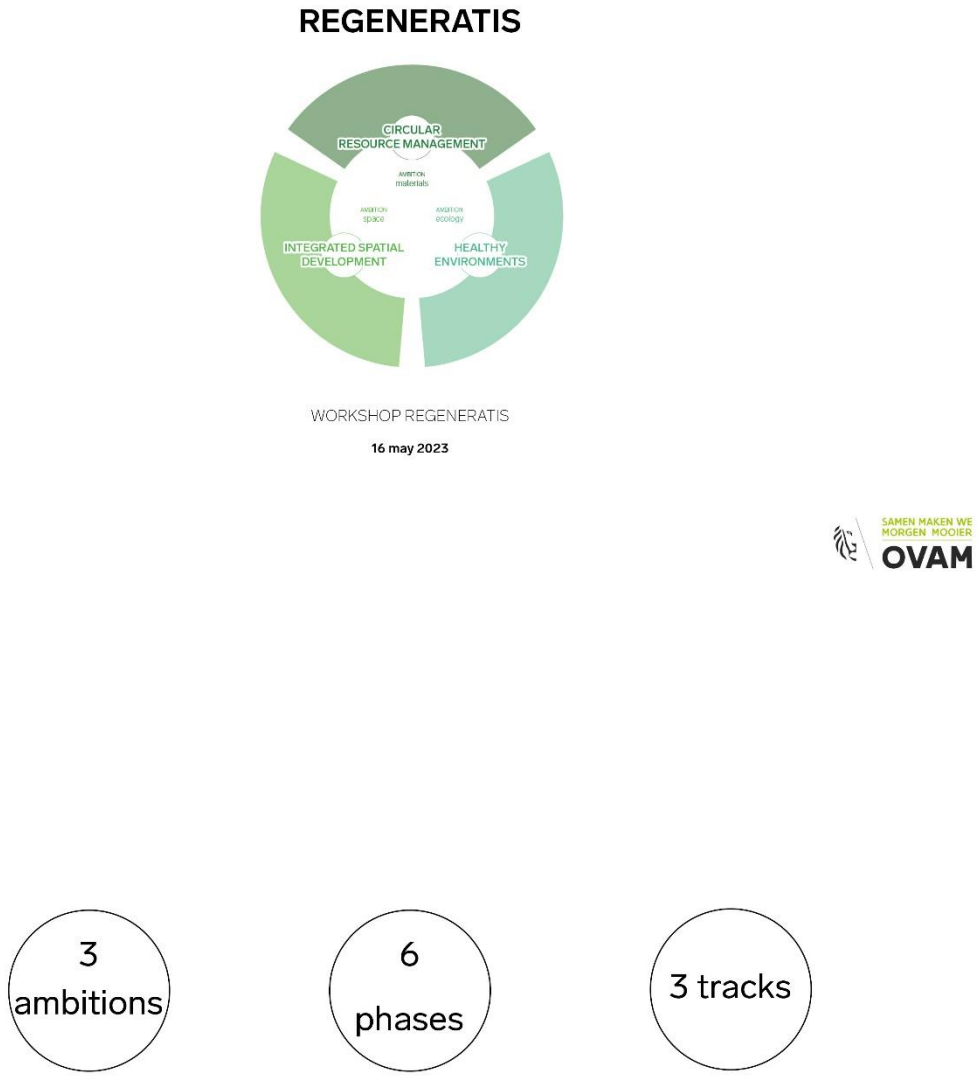
9 ANNEXES

9.1 ANNEX 1: SYSTEMIC FRAMEWORK



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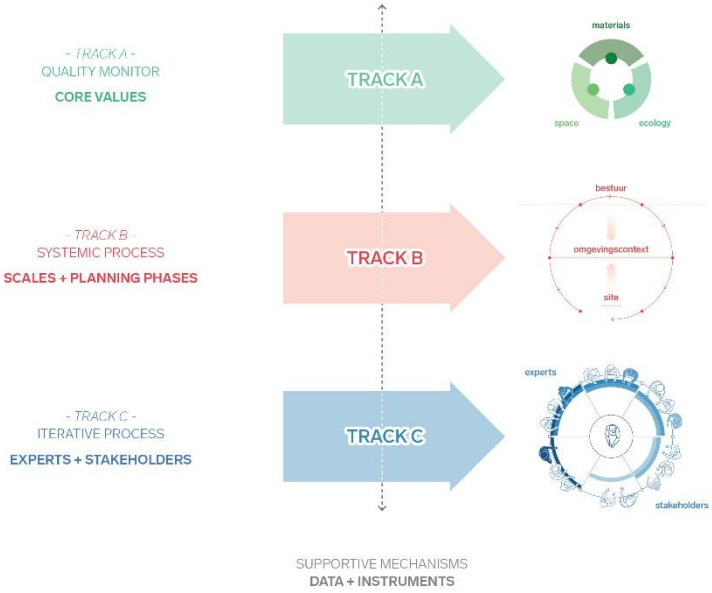
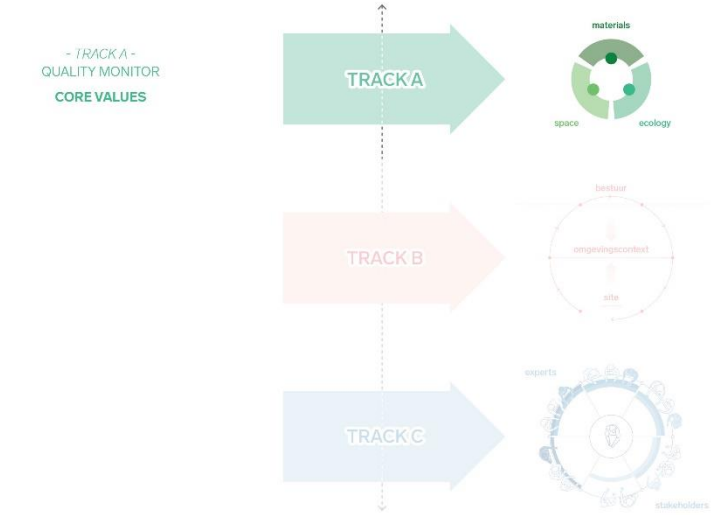
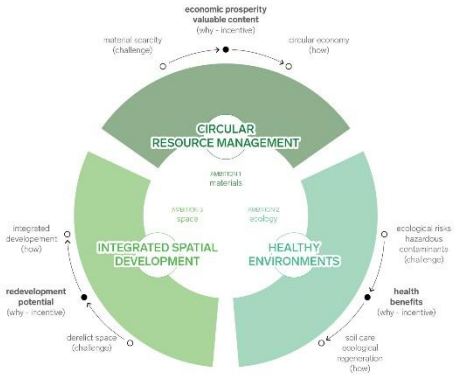


1. **TRACK A - QUALITY MONITOR**



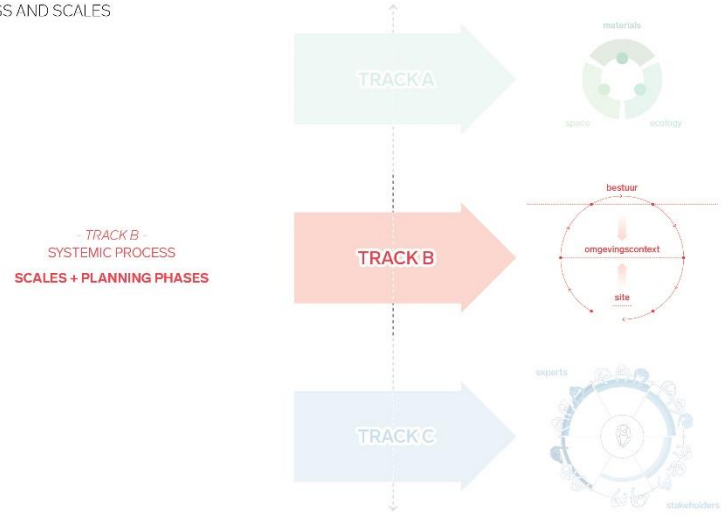
1. **TRACK A - QUALITY MONITOR**

CORE VALUES
From trends and challenges to pathways and solutions



2. **TRACK B - THE CASE STUDY**

SYSTEMIC PROCESS AND SCALES

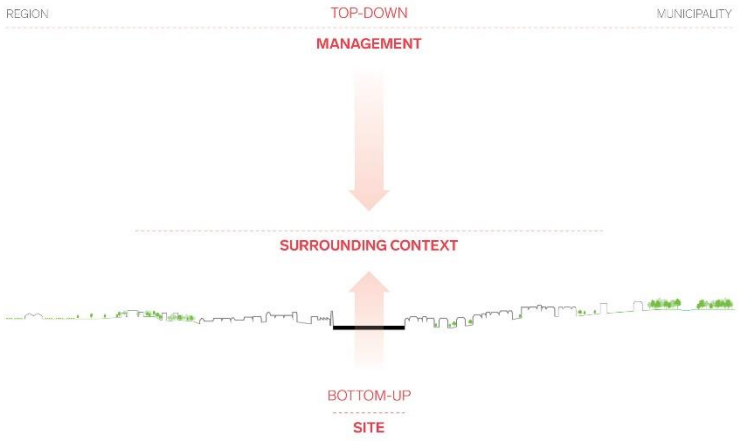


2. **TRACK B - THE CASE STUDY**

SYSTEMIC PROCESS AND SCALES

2. **TRACK B**

SCALES AND APPROACHES



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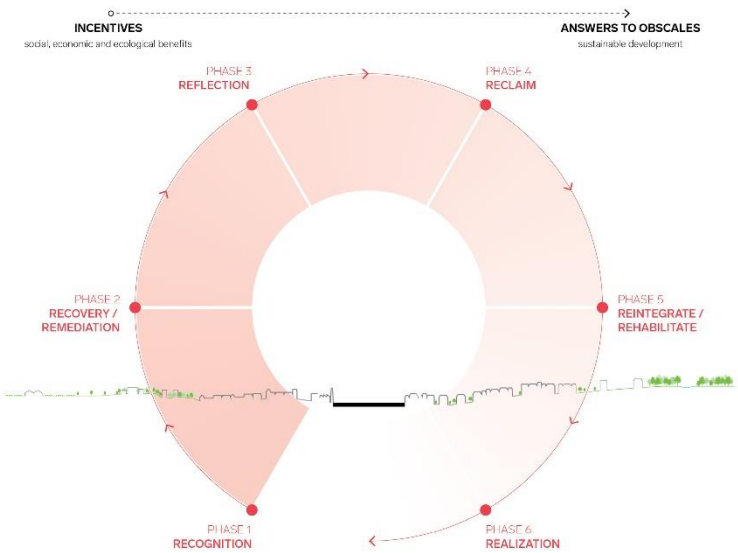
PHASES



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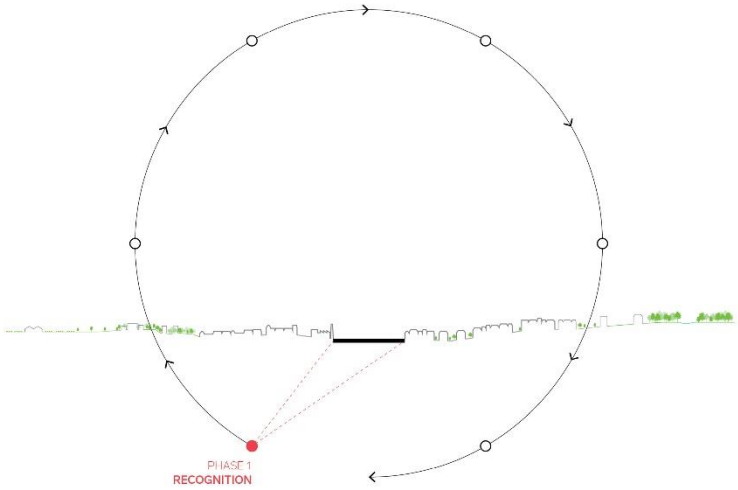
PHASE 1



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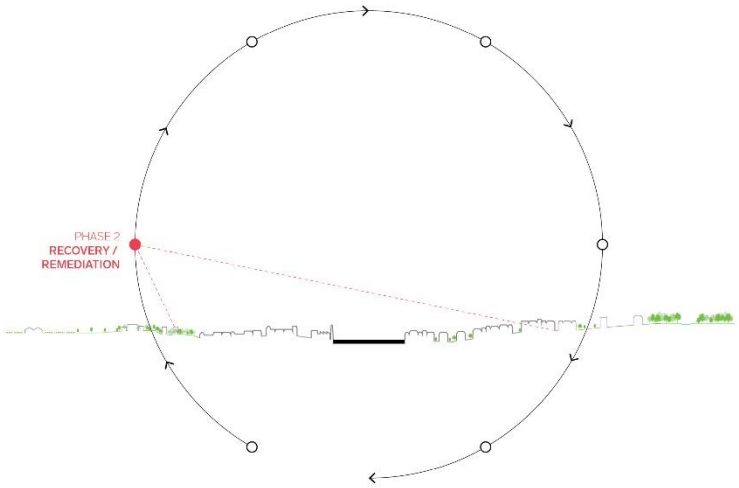
PHASE 2



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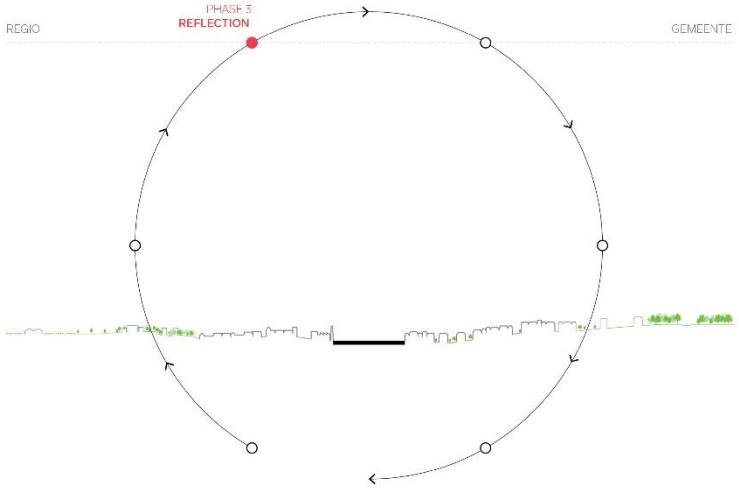
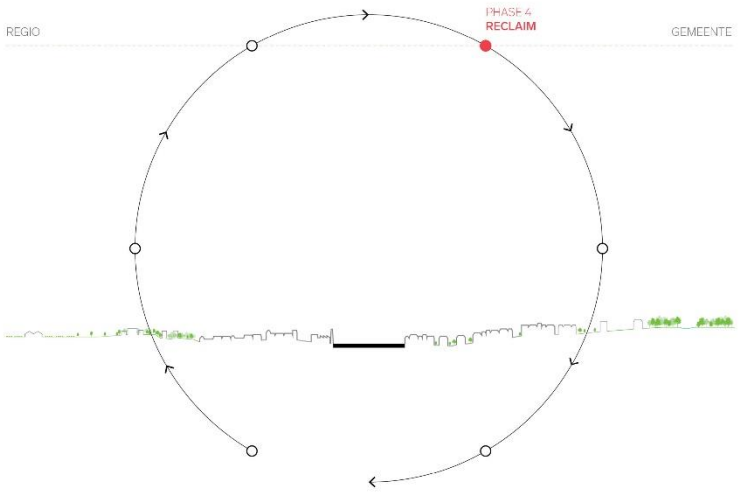
PHASE 3



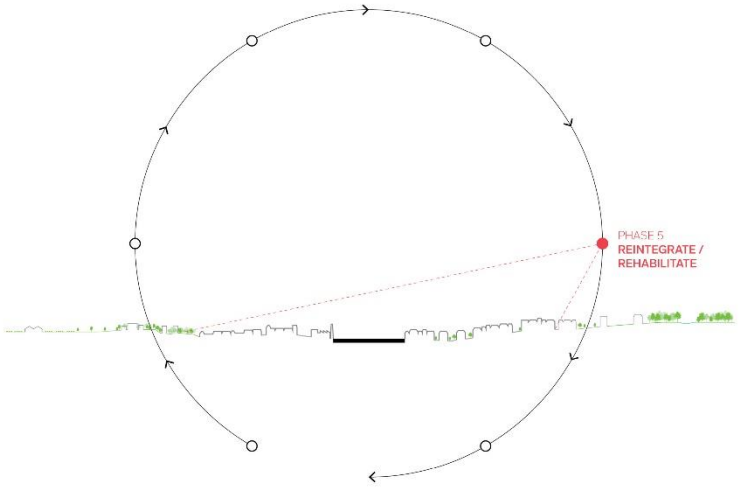
2. **TRACK B**

PHASE 4



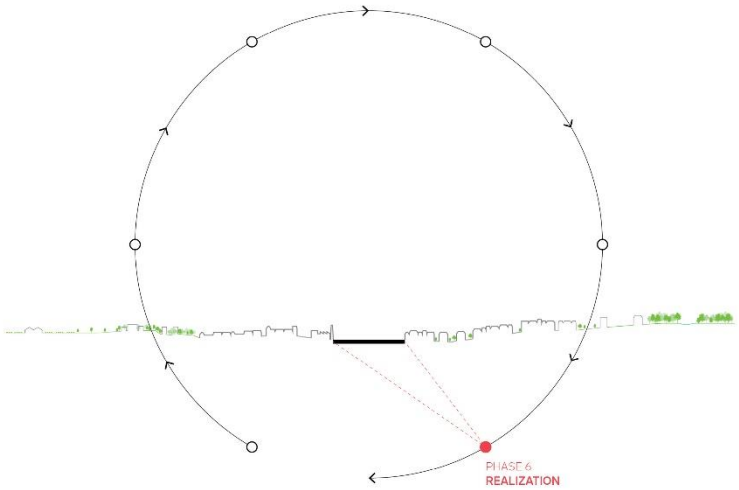
2. **TRACK B**

PHASE 5



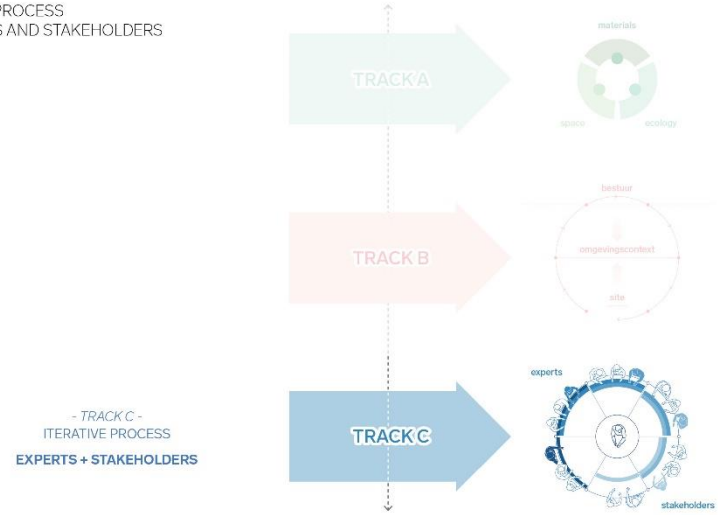
2. **TRACK B**

PHASE 6



3. **TRACK C - ITERATIVE PROCESS**

CO-PRODUCTION PROCESS
BETWEEN EXPERTS AND STAKEHOLDERS

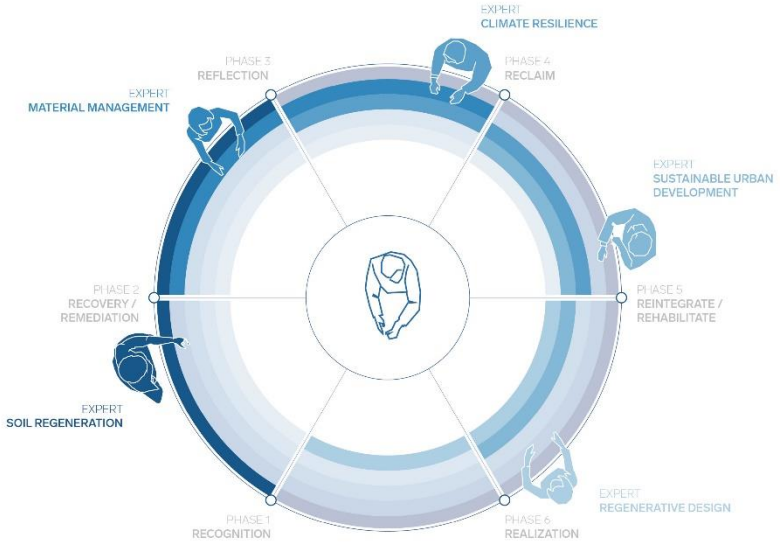


3. **TRACK C - ITERATIVE PROCESS**

FACILITATOR

3. **TRACK C - ITERATIVE PRO**CESS

EXPERTS



3. **TRACK C - ITERATIVE PRO**CESS

STAKEHOLDERS

3. **TRACK C - ITERATIVE PRO**CESS

PHASE 1 - RECOGNITION

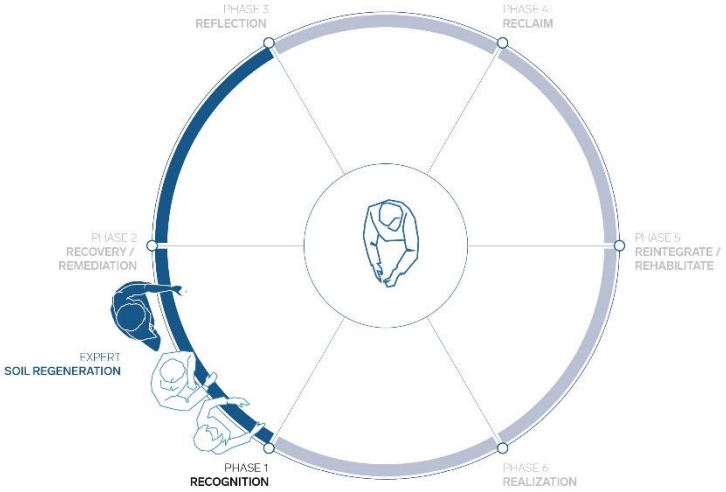
EXPERTS

- Soil Regeneration

STAKEHOLDERS

-

-

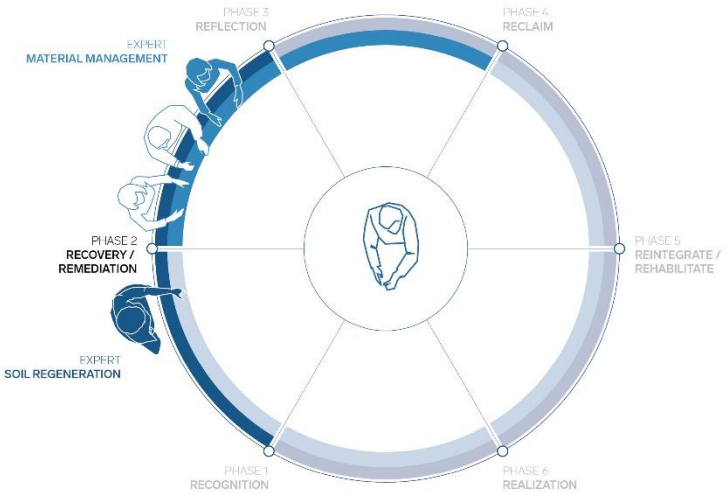


3. **TRACK C - ITERATIVE PRO**CESS

PHASE 2 - RECOVERY / REMEDIATION

EXPERTS
- Soil Regeneration
- Material Management

STAKEHOLDERS
-
-

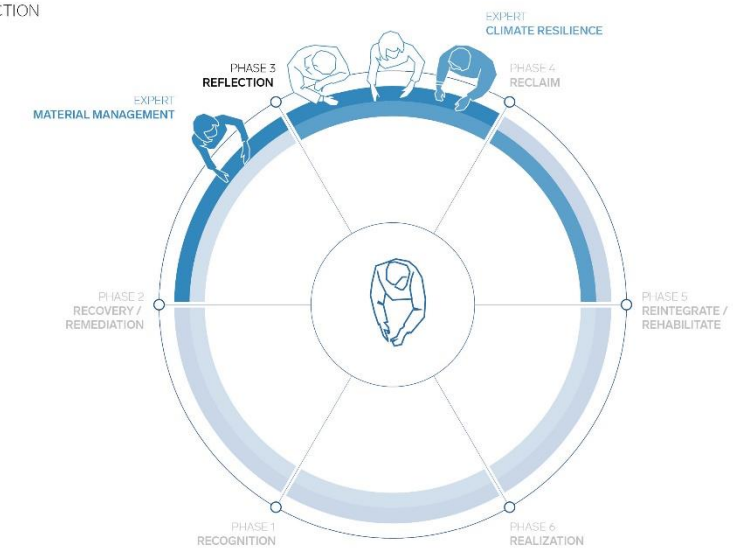


3. **TRACK C - ITERATIVE PRO**CESS

PHASE 3 - REFLECTION

EXPERTS
- Material Management
- Climate Resilience

STAKEHOLDERS
-
-



3. **TRACK C - ITERATIVE PRO**CESS

PHASE 4 - RECLAIM

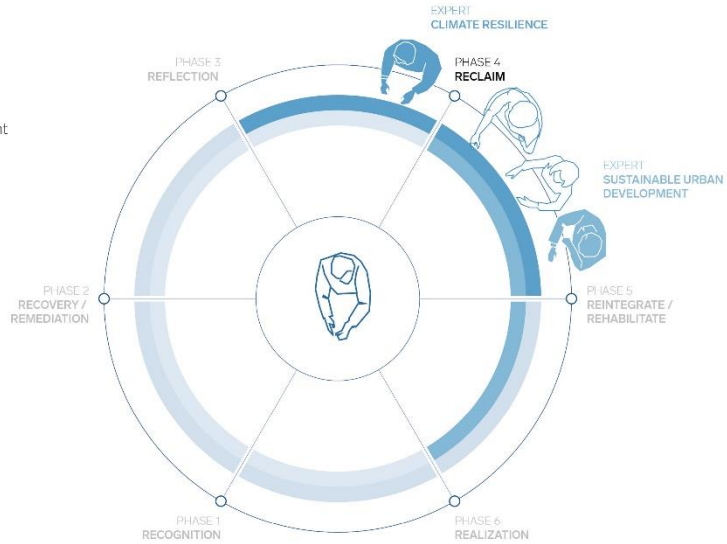
EXPERTS

- Climate Resilience
- Sustainable Urban Development

STAKEHOLDERS

-

-



3. **TRACK C - ITERATIVE PRO**CESS

PHASE 5 - REINTEGRATE / REHABILITATE

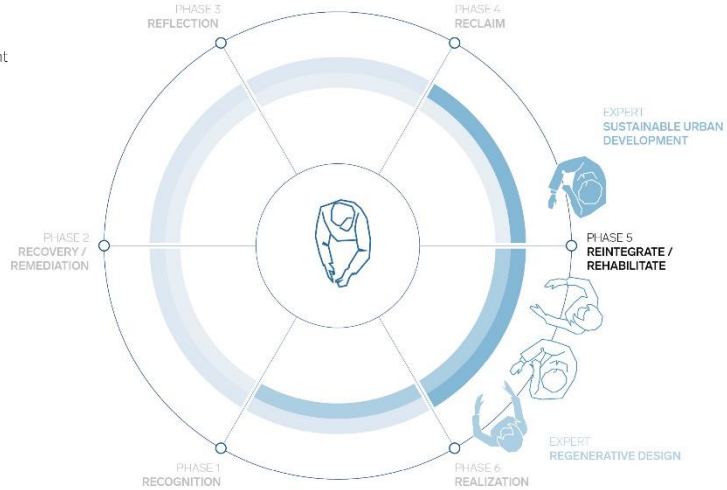
EXPERTS

- Sustainable Urban Development
- Regenerative Design

STAKEHOLDERS

-

-

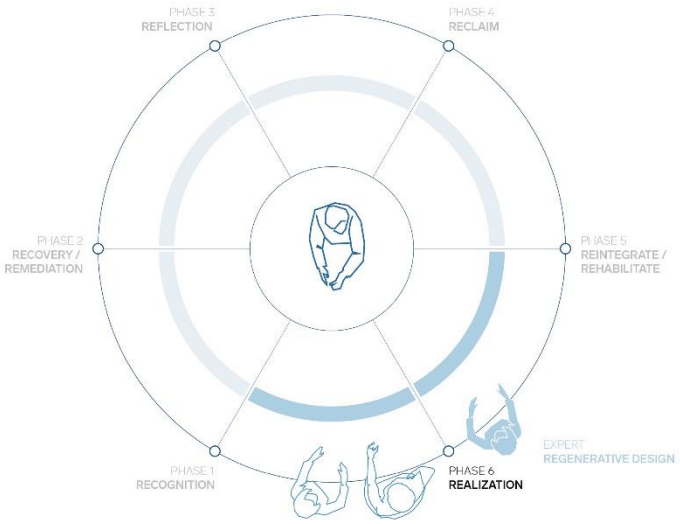


3. **TRACK C - ITERATIVE PRO**CESS

PHASE 6 - REALIZATION

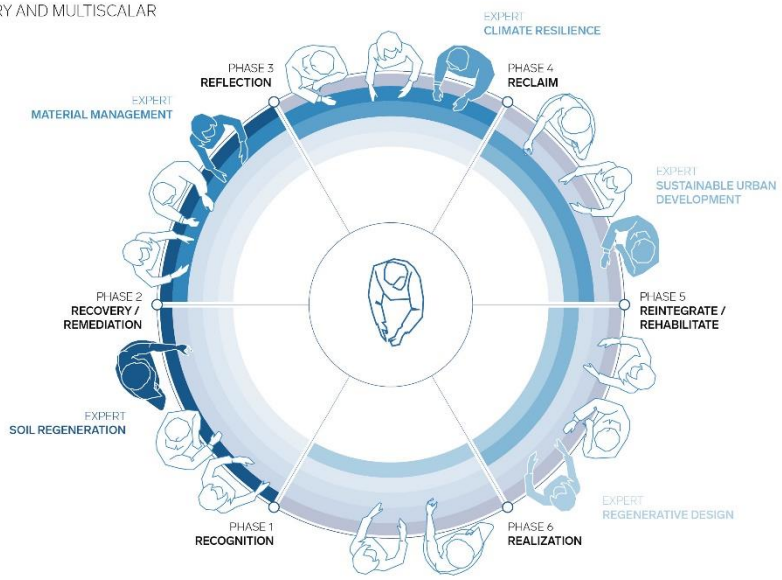
EXPERTS
- Regenerative Design

STAKEHOLDERS
-
-



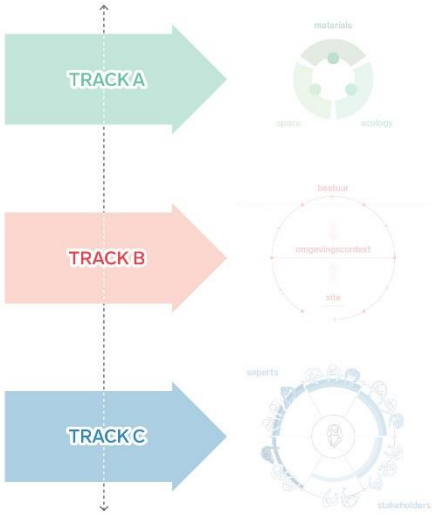
3. **TRACK C - ITERATIVE PRO**CESS

MULTIDISCIPLINARY AND MULTISCALAR



3. **SUPPORT MECHANISMS - DATA AND INSTRUMENTS**

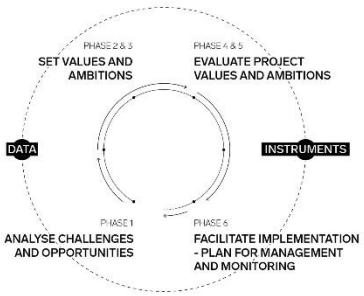
ACROSS TRACKS



SUPPORTIVE MECHANISMS
DATA + INSTRUMENTS

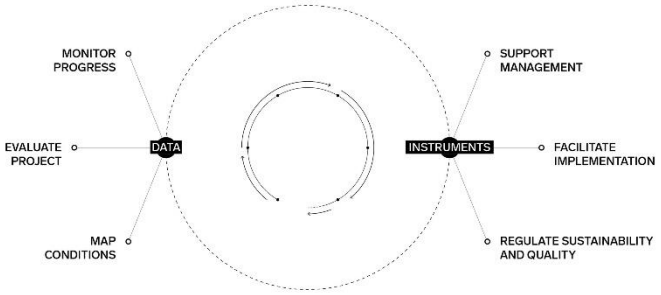
3. **SUPPORT MECHANISMS - DATA AND INSTRUMENTS**

PHASES



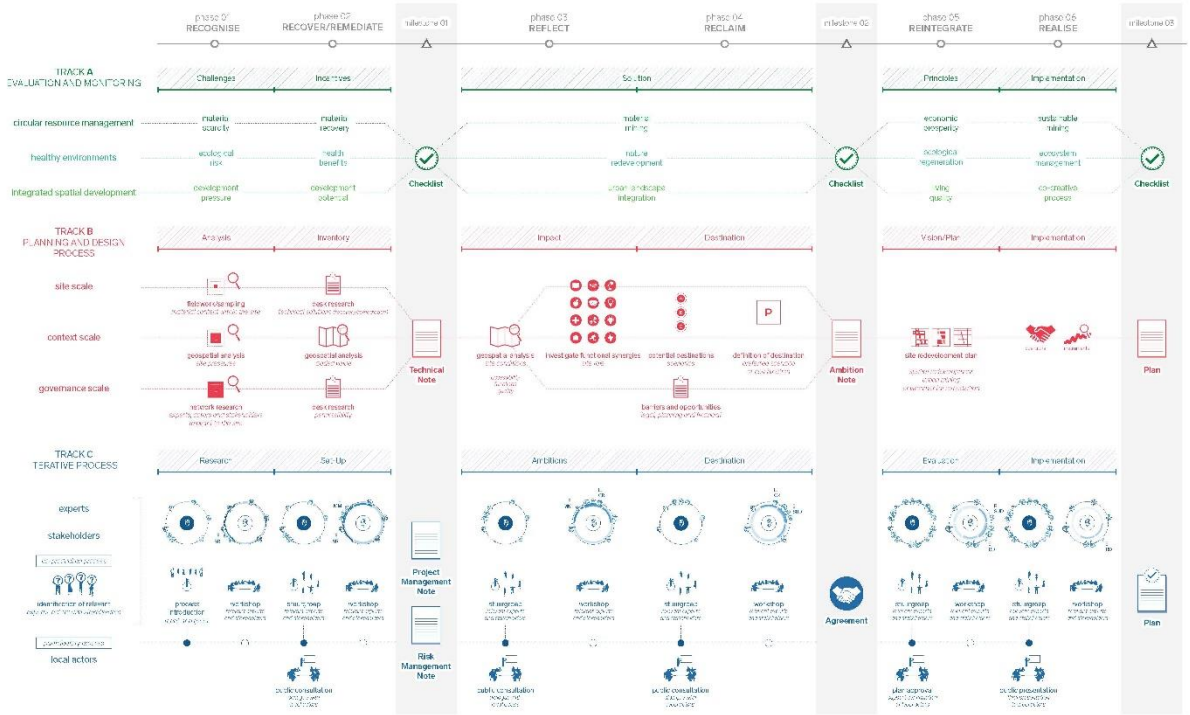
3. **SUPPORT MECHANISMS - DATA AND INSTRUMENTS**

GOALS



3. **SUPPORT MECHANISMS - DATA AND INSTRUMENTS**

TYPES



9.2 ANNEX 2: WORKSHOPS OVERVIEW

Exchange of experiences and opinion on legal barriers for launching resource-recovery driven projects from PMSD (LT 2.2)

1. NWE REGENERATIS Mid-term event (3 February 2022, Froyennes – B)

The workshop on 'Valorization of PMSD - challenges and new perspectives' included 3 discussion sessions relevant for the Barrier report:

- The regulatory framework and contaminated site redevelopment(Eddy Wille, NWE REGENERATIS);
- Alternative financing models and administrative facilitation for launching material recovery projects from PMSD (Stéphane Verstraete, Brownfield Academy);
- The instrument "Brownfield covenants" (Eddy Wille, NWE REGENERATIS).

2. Intersoil Conference (5 and 6 October 2022, Brussels – B)

« What strategy for European Soils in 2030 ? » was the question addressed during the Intersoil Conference. Also the NWE REGENERATIS project was represent during the conference, and hosted a afternoon workshop on the valorization of soils and polluted materials from metallurgical sites: current challenges and new tools developed in the framework of the NWE-REGENERATIS project. After the workshop, a debate/discussion was hosted on identification of the barriers and solutions to prepare recommendations for the implementation of the projects focused on resource recovery.

On the second day, there was a round table on policy, legislation and practices in the recycling of degraded land: how to remove the obstacles to the circularity of such sites?

Participants :

• *Saïd El Fadili, Director Soils sub-division - Brussels Environment*
• *Philippe Scauflaire, Remediation and Valorization of Polluted Soils - SPAQuE*
• *Pascal Seret, Co-Manager - DCI Monaco & Partner - Tubize Outlet Mall*
• *Kim Eric Möric, Lawyer partner - Parresia Avocats*
• *Olivier Waleffe, Managing Director - Duferco*
• *Eddy Wille, Negociator/Facilitator of the "Brownfieldconvenant" program - Flemish Region Ministry*

Atelier thématique Brownfield covenants (9 Mars 2023, Mechelen – B)

This workshop was a collaboration between the Brownfield Academy and the Flemish government (represented by Wim Van Asschot and Eddy Wille , NWE REGENERATIS). The introductory session on the legal instrument of Brownfield covenants was followed by a field trip at 3 covenant sites (one of them a PMSD).

3. Reverse Metallurgy – NWE REGENERATIS (14 April 2023, Liège, B)

During this workshop, the main project results were presented and discussed with stakeholders from the metallurgy and sites valorization sector from Wallonia. The main incentives and barriers for launching valorisation projects were also discussed.

4. OVAM - NWE REGENERATIS workshop (28 April 2023, Mechelen – B)

In preparation of the Barrier report, a workshop at OVAM was organized by Sweco. Various aspects of PMSD redevelopment projects were discussed, especially with regard to bottlenecks and feasibility.

5. Nicole – NWE REGENERATIS (12 May 2023, Paris – F)

The final NWE REGENERATIS conference was held at the Nicole meeting. The decision support tools (Smartix etc.) as well as the results of the technical applications on investigation and recovery of metals were presented. Also questions on barriers and incentives were posed and these reflections are part of this report.

6. Common Forum - NWE REGENERATIS (16 May 2023, online)

Together with Common Forum () NWE REGENERATIS organized a feedback session on the draft Barrier report. Additional information was added to the report.

7. RemTech Europe (25 May 2023, Taranto - I)

RemTech organized an interactive exchange to discuss "Sustainable remediation and management of mega sites, experience from Europe and other continents". During this session, Eddy Wille (OVAM / NWE REGENERATIS) presented the draft conclusions of this report and participated in the discussion.

9.3 ANNEX 3: DEFINITIONS LANDFILLS & PMSD

9.3.1 Definitions of a Landfill

The Landfill Directive (Council Directive 1999/31/EC of 26 April 1999) is a European Union directive which regulates waste management of landfills in the European Union. It was to be implemented by EU Member States by 16 July 2001. Directive (EU) 2018/850 amended the 1999 directive with effect from 5 July 2020.

'landfill' means a waste disposal site for the deposit of the waste onto or into land (i.e. underground), including:

— internal waste disposal sites (i.e. landfill where a producer of waste is carrying out its own waste disposal at the place of production), and

— a permanent site (i.e. more than one year) which is used for temporary storage of waste,

(…)

Excluded from the scope of this Directive are the management of waste from land-based extractive industries, that is to say, the waste arising from the prospecting, extraction, including the pre-production development stage, treatment and storage of mineral resources and from the working of quarries shall be excluded from the scope of this Directive where it falls within the scope of other Union legislative acts.

Applicable for these waste types is Directive 2006/21/EC of 15 March 2006 on the management of waste from extractive industries and amending Directive 2004/35/EC.

9.3.2 Definition of PMSD

Past Metallurgical Sites and Deposits (PMSD) have no definition in EU-regulations. Due to the absence of a Soil Directive, the applicable legislation to deal with PMSD are mainly related to the Waste and Landfills directives, unless the member state has specific legislation in place. Since the 1990s, several members states and regions have specific legislation on soil contamination. Even in those circumstances, discussions arise on the applicability of laws: regulations on soil management or waste management? Some member states introduced specific regulations on excavated soil in order to avoid the denomination of waste.

In case of PMSD, many larger sites include a landfill. Particularly until the 1990s, it was customary to store the waste produced on site.

9.3.3 Definitions of a Deposit

Deposit is not defined in the EU and mostly linked to the mining vocabulary. In case of waste deposited onto or into the soil, the definition of landfill is suitable. However, discussions may arise if backfilling is detected and in how far these layers should be denominated as landfill. In many cases those backfillings were not accompanied by an environmental permit.

An ore is defined as a mineral or rock from which some valuable constituent, usually a metal, can be profitably extracted. Thus hematite and magnetite are ores of iron; galena is an ore of lead; zinc blende is an ore of zinc. With the ore-mineral is more or less material of no value, called gangue; and whether the ore as a whole can be profitably mined or not depends partly on the proportion of ore to gangue. The expression mineral deposits is conveniently used to cover both metal ores and other valuable minerals.

According to their origin, mineral deposits may be conveniently put in three classes:

1. Magmatic segregations.
2. Veins and other deposits in fissures, shear zones, joints, etc.
3. Sedimentary deposits.

- a layer of a mineral, metal etc. that is left in soil or rocks through a natural process (Longman Dictionary of Contemporary English)
- A deposit is a site of concentration of one or more elements or objects (deposit of minerals, oil, fossil...). However, in geology, the term deposit is now often taken in a restrictive economic sense and denotes a concentration of substances which can be exploited profitably.(https://www.le-comptoir-geologique.com/deposit-glossary.html)
- “Mineral deposits” are aggregate of mineral and/or group of minerals in an unusually high concentration. The mineral deposits must have three-dimensional configuration that includes shape in plan and sectional view, continuity in strike and depth to represent volume, and size with average characteristics. The shape can be regular (iron ore, coal, and bauxite) to extremely irregular (gold and platinum) posing economic mining and extraction. (S.K. Haldar, Josip Tišljar, in Introduction to Mineralogy and Petrology, 2014)
- Mineral deposits are accumulations of valuable minerals that are of economic interest to humans. These deposits can be found in a variety of geological settings, including igneous, sedimentary, and metamorphic rocks, and they are formed through a range of geological processes. The minerals in these deposits may be metals, such as copper, gold, or zinc, or nonmetals, such as salt or sulfur.
  The basic concept behind mineral deposits is that valuable minerals are concentrated in certain areas of the Earth’s crust. This concentration can be the result of a number of factors, including magmatic processes, hydrothermal fluids, sedimentary processes, and weathering. The formation of mineral deposits can take millions of years, and they may be located at various depths below the surface of the Earth.
  The discovery and development of mineral deposits is an important aspect of the mining industry, which provides the raw materials needed for many products and industries. Understanding the geological processes that lead to the formation of mineral deposits is important for locating and extracting these resources in an efficient and sustainable manner. (https://geologyscience.com/geology-branches/mining-geology/mineral-deposit/)