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REECOL Ecological rehabilitation and long term
monitoring of post mining areas

Deliverable 1.1

Definition of management and implementation tools

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TABLE OF CONTENT

1. Introduction.....	3
2. Project Management Framework.....	3
2.1. Organizational Structure.....	3
2.2. Roles and Responsibilities.....	4
2.3. Decision-Making Processes	6
2.4. Change Management	7
3. Work Package Management.....	8
3.1. Overview of Work Packages	8
3.2. Coordination of Activities	13
3.3. Integration of Work Packages.....	14
4. Meeting and Communication Management	15
4.1. Regular Work Progress Meetings.....	15
4.2. Communication Platforms	16
4.3. Document Sharing and Information Management	16
5. Reporting and Documentation	16
5.1. Continuous Reporting.....	16
5.2. Periodic Reporting	17
5.3. Record Keeping and Document Retention	18
6. Budget Management Tools and Techniques.....	19
6.1. Budget Planning and Monitoring.....	19
6.2. Financial Management Strategies	19
7. Maximizing Project Impact	20
7.1. Strategies for Technical and Scientific Impact	20
7.2. Economic and Social Impact Considerations	20
8. Risk Management	21
9. Quality Assurance	22
9.1. Quality Standards and Policies	22
9.2. Quality Control Procedures	23
9.3. Continuous Improvement Processes.....	23
10. Conclusion	23
ANNEX 1: TASK PROGRESS TABLE	24
ANNEX 2: WORK PACKAGE PROGRESS TABLE.....	25

1. Introduction

The REECOL project represents a collaborative endeavour involving eleven partners, including research institutions and industrial entities such as coal mining companies, from five European countries. This consortium is dedicated to advancing long-term environmental sustainability in coal regions experiencing significant transitional phases. The project's primary focus is to enhance ecological rehabilitation methods for post-mining landscapes. These methods are carefully designed to consider various factors such as the extent of ecosystem degradation, prospective land uses, cost-effectiveness, and the influence of climate change.

A critical component of the REECOL project is the development and empirical testing of innovative approaches for land reclamation, revegetation, and ecosystem restoration. These approaches are being applied and evaluated in selected case study areas representative of diverse coal regions in transition. An integral part of this initiative is the establishment of effective monitoring strategies for rehabilitation processes, employing a range of biological, geochemical indicators, and remote sensing technologies. The ultimate goal is to foster the transformation of former mining sites into robust ecosystems, serving multiple environmental functions, including soil erosion control, water quality enhancement, wildlife habitat creation, and aesthetic improvement.

Within the framework of the REECOL project, Work Package 1 (WP1) Coordination and management of the project plays a pivotal role. It is primarily responsible for the coordination and management of the project, ensuring that all activities and efforts are seamlessly integrated and aligned with the overarching goals. WP1 encompasses a wide range of responsibilities, including meticulous planning, continuous monitoring of task implementation, effective communication among partners, and comprehensive reporting of the progress made by each project participant.

The purpose of this document is to articulate the definition of the management and implementation tools employed in WP1. This involves detailing the strategies, methodologies, and practices adopted for the efficient management and coordination of the project. The document serves as a guide to understanding how WP1 contributes to the successful execution of the REECOL project, underlining the importance of structured management and effective communication in achieving the desired outcomes of ecological rehabilitation and sustainability in coal regions undergoing transition.

2. Project Management Framework

2.1. Organizational Structure

The REECOL project brings together a diverse and robust consortium, comprising one coordinator and ten beneficiaries from various European countries. This structure is designed to leverage the unique strengths and expertise of each member, facilitating effective collaboration and knowledge sharing across the project.

I. Coordinator (COO):

- 1) **POLTEGOR INSTITUTE (POLTEGOR INSTYTUT INSTYTUT GORNICTWA ODKRYWKOWEGO-POLTEGOR INSTITUTE)** – Poland

As the lead coordinator, POLTEGOR oversees the overall direction and management of the REECOL project. They are responsible for steering the consortium towards achieving the project's objectives, ensuring compliance with EU guidelines, and facilitating communication between the European Commission and the consortium members.

II. Beneficiaries (BEN):

- 1) **VYZKUMNY USTAV PRO HNEDE UHLI AS (VUHU)** – Czech Republic
Specializing in brown coal research, VUHU contributes its extensive knowledge in coal mining and environmental rehabilitation to the project.

- 2) **GLÓWNY INSTYTUT GÓRNICTWA (GIG)** – Poland
GIG brings expertise in mining and environmental engineering and technology, playing a crucial role in developing innovative rehabilitation methods.
- 3) **BUREAU DE RECHERCHES GEOLOGIQUES ET MINIERES (BRGM)** – France
As a leading geological and mining research agency, BRGM's role is pivotal in providing geological insights and expertise for the project.
- 4) **INSTITUT NATIONAL DE L'ENVIRONNEMENT INDUSTRIEL ET DES RISQUES (INERIS)** – France
INERIS contributes its expertise in industrial and environmental risk management, crucial for assessing and mitigating potential risks in rehabilitation processes.
- 5) **INSTYTUT TECHNIKI GÓRNICZEJ KOMAG (KOMAG)** – Poland
KOMAG's expertise in mining engineering technology supports the development of practical solutions for post-mining land rehabilitation.
- 6) **DIMOSIA EPICHEIRISI ILEKTRISMOU ANONYMI ETAIREIA (PPC)** – Greece
PPC, a public electricity corporation, brings in valuable insights into energy sector implications and sustainable practices in mining.
- 7) **VALORHIZ SAS** – France
Specializing in soil and environmental rehabilitation, VALORHIZ's contributions are key to developing sustainable soil restoration techniques.
- 8) **POLSKA GRUPA GÓRNICZA SA (PGG)** – Poland
As one of the largest coal mining companies in Europe, PGG offers practical insights and operational expertise in mining and rehabilitation.
- 9) **PREMOGOVNIK VELENJE DOO (PV)** – Slovenia
PV's experience in coal mining operations and ecological restoration provides essential practical knowledge for the project.
- 10) **POLYTECHNEIO KRITIS (TUC)** – Greece
TUC brings academic and research expertise, particularly in environmental engineering and sustainable mining practices.

This consortium structure ensures a comprehensive approach to the project, with each member contributing specific expertise and resources. The collaborative efforts of these diverse partners are coordinated by POLTEGOR, which acts as the central hub for communication, decision-making, and strategy implementation.

2.2. Roles and Responsibilities

The success of the REECOL project hinges on the clearly defined roles and cooperative synergy between its consortium members. This delineation of responsibilities ensures that all project activities are well-coordinated and effectively executed.

Coordinator (POLTEGOR):

The coordinator bears the crucial responsibility for the strategic direction and administrative management of the REECOL project. POLTEGOR's specific responsibilities include:

- Leading the project's overarching strategy and ensuring alignment with the project's objectives;
- Acting as the central contact point for the European Commission and consortium members;
- Overseeing the project's financial management, including budget allocation and control;
- Coordinating across all work packages to maintain project cohesion and integration;
- Ensuring project compliance with contractual obligations, and reporting requirements,;
- Facilitating conflict resolution and risk management throughout the project lifecycle.

Work Package and Task Leaders:

Each Work Package (WP) and Task within the REECOL project has a designated leader responsible for its successful execution. These leaders are tasked with:

- Steering the specific WP or Task towards its deliverables and milestones;
- Coordinating with team members and other WPs to ensure interdisciplinary collaboration;

- Managing the technical aspects and day-to-day activities of their respective WPs and Tasks;
- Reporting on progress and addressing any challenges or deviations from the plan.

The leaders of the individual Work Packages and tasks are presented in the table below.

Table 1. Work Package and Task Leaders

Work Package No	Work Package Name	WP Leader	Task	Task Leader
WP1	Coordination and management of the project	POLTEGOR	T.1.1 Project coordination	POLTEGOR
			T.1.2 Preparation for and attendance at progress meetings	POLTEGOR
			T.1.3 Preparation of the publishable report	POLTEGOR
WP2	Promotion and dissemination	KOMAG	T.2.1 Preparation of the comprehensive overview of the project	POLTEGOR
			T.2.2 Creation of Communication and dissemination plan	KOMAG
			T.2.3 Dissemination of the project results	KOMAG
			T.2.4 Development of a handbook and summary of the most important project results	GIG
WP3	Identification of post mining areas and ecosystem rehabilitation approaches	VUHU	T.3.1 Classification of ecosystem degradation and mapping of degraded land	POLTEGOR
			T.3.2 Identification of post –mining rehabilitation schemes regarding future land uses and affordability of the solutions	VUHU
			T.3.3 Climate change influence on post-mining rehabilitation schemes	GIG
			T.3.4 Selection of post mining rehabilitation case study areas	POLTEGOR
WP4	Development of new solutions for post mining land reclamation and their testing in case study areas	POLTEGOR	T.4.1 Development of directed succession methods for revegetation on post-mining terrains with a high redevelopment potential	GIG
			T.4.2 Development of a technology for non-contact remediation and control of soil parameters with use of bio-waste	KOMAG
			T.4.3 Development of a technology for soil regeneration by composts of high biological activity	POLTEGOR
			T.4.4 Analysis of revegetation possibilities regarding future land uses	INERIS
			T.4.5 Cost-benefit analysis of the new solutions for post mining land reclamation	BRGM
WP5	Short and long term monitoring of ecosystem rehabilitation	BRGM	T.5.1 Identification of bio- and geochemical indicators for monitoring of ecological	BRGM
			T.5.2 Short and long term monitoring solutions for post mining rehabilitation activities in the case study areas	VUHU
WP6	Developing an audit catalogue to evaluate and certify ecological rehabilitation industry best practice of post-mining areas	TUC	T.6.1 Development of a European audit catalogue for ecological rehabilitation of post-mining areas	TUC
			T.6.2 Development of a customized visualization tool (dashboard) to	TUC

Work Package No	Work Package Name	WP Leader	Task	Task Leader
			visualize ecological rehabilitation progress	
			T.6.3 Development of a practical guidance document for the audit catalogue by the industry end-user	PPC

Steering Committee:

Composed of one representative from each institution, the Steering Committee plays a pivotal governance role by:

- Providing strategic oversight and high-level guidance to the project.
- Making key decisions on project direction, resource allocation, and policy matters.
- Reviewing progress and ensuring that project objectives are being met.

Exploitation Committee:

With a representative from each institution, the Exploitation Committee is focused on maximizing the project's impact by:

- Identifying and safeguarding opportunities for the application of project results.
- Developing strategies for the dissemination and exploitation of the project's outcomes.
- Ensuring that intellectual property rights are respected and managed appropriately.

Administrative and Support Roles:

To complement the direct project implementation efforts, each partner organization deploys resources that provide critical support functions:

- Managing and facilitating administrative tasks, documentation, and logistical arrangements.
- Supporting the financial management and reporting of each institution's project activities.
- Assisting with communication and dissemination activities to promote the project's visibility and impact.

This defined structure of roles and responsibilities is the backbone of the REECOL project, enabling it to function as a cohesive entity aimed at achieving ambitious goals in ecological rehabilitation and sustainability in coal regions undergoing transition.

2.3. Decision-Making Processes

The REECOL project employs a comprehensive decision-making framework that ensures decisions are made effectively, transparently, and in alignment with the project's objectives.

Table 2. Decision-making framework

OPERATIONAL DECISION-MAKING	At the operational level, task leaders are empowered to make decisions that affect the day-to-day management of their tasks. This includes resource allocation, scheduling, and methodological approaches to their specific areas of work. Task leaders are expected to make these decisions based on predefined criteria and within the scope of their authority, while also considering the input from their teams.
STRATEGIC DECISION-MAKING	Work package leaders are responsible for strategic decision-making within their respective packages. They evaluate the progress and outcomes of the tasks, making decisions that will impact the strategic direction of their work package. This includes adapting plans to address emerging challenges, integrating new research findings, and aligning the work package more closely with the project's overarching goals.
HIGH-LEVEL DECISION-MAKING	The Steering Committee, consisting of representatives from each consortium partner, is charged with making high-level decisions that influence the project as a whole. The Committee convenes at regular intervals and as needed to discuss significant matters such as changes to project scope, budget reallocations, and shifts in strategic focus. These decisions are made following a comprehensive analysis and discussion, with the objective of reaching a consensus among the members. When a consensus cannot be reached, a voting system is in place to ensure decisions are made in a democratic and fair manner.

2.4. Change Management

Change Management is a critical component of the REECOL project, ensuring that any adjustments to the project's scope, timeline, or resources are systematically managed and communicated.

1) Initiation of Change Request:

Change requests can originate from any level within the project, whether from task leaders, work package leaders or consortium partners. Each request is documented using a standardized change request form that captures the nature of the change, the rationale, and the expected impact.

2) Assessment and Impact Analysis:

Upon receiving a change request, the relevant work package leader conducts an initial assessment and impact analysis to determine the implications of the proposed change. This analysis considers factors such as potential benefits, risks, impacts on the project timeline, costs, and resource availability.

3) Consultation with EU Project Officer:

Significant changes that have broader implications on the project's objectives or EU compliance are consulted with the EU Project Officer. This consultation aims to ensure alignment with EU project requirements and to seek preliminary feedback or approval as required.

4) Steering Committee Review:

The Steering Committee reviews all change requests, taking into account the assessment provided by the work package leader and any input from the EU Project Officer. The Committee discusses the merits of the change and makes a decision to approve, reject, or request further information.

5) Approval and Documentation:

Once a change is approved by the Steering Committee, it is formally documented. The documentation details the change, the analysis performed, the decision-making process, and any conditions attached to the approval.

6) Implementation Planning:

An implementation plan is developed for approved changes, outlining the steps necessary to execute the change, individuals responsible, new timelines, and any additional resources required. This plan also includes a communication strategy to inform all consortium members and stakeholders about the change and how it will be managed.

7) Submission by Coordinator:

The coordinator, POLTEGOR, is responsible for submitting all approved changes to the Portal Grant Management System. This submission includes the change documentation, the impact analysis, the implementation plan, and the updated project plan.

8) Communication to Consortium Members:

Following the EU approval, the coordinator communicates the change to all consortium members. This communication ensures that everyone is informed about the change, understands its implications, and is aware of any new roles or responsibilities they may have.

9) Monitoring and Review:

The coordinator monitors the implementation of the change, ensuring that it is executed according to the plan. Regular reviews are conducted to assess the impact of the change on the project and to make any necessary adjustments.

10) Continuous Learning:

The project integrates lessons learned from the change management process into its practices. This continuous learning approach helps refine the change management process, improve future decision-making, and enhance overall project management.

3. Work Package Management

3.1. Overview of Work Packages

The REECOL project is structured into a series of distinct work packages, each tailored to perform specific functions within the project's scope. These work packages are designed to ensure a comprehensive approach to the project's implementation, from research and development to dissemination and management. Interrelations and dependencies between the WPs are presented in Figure 1.

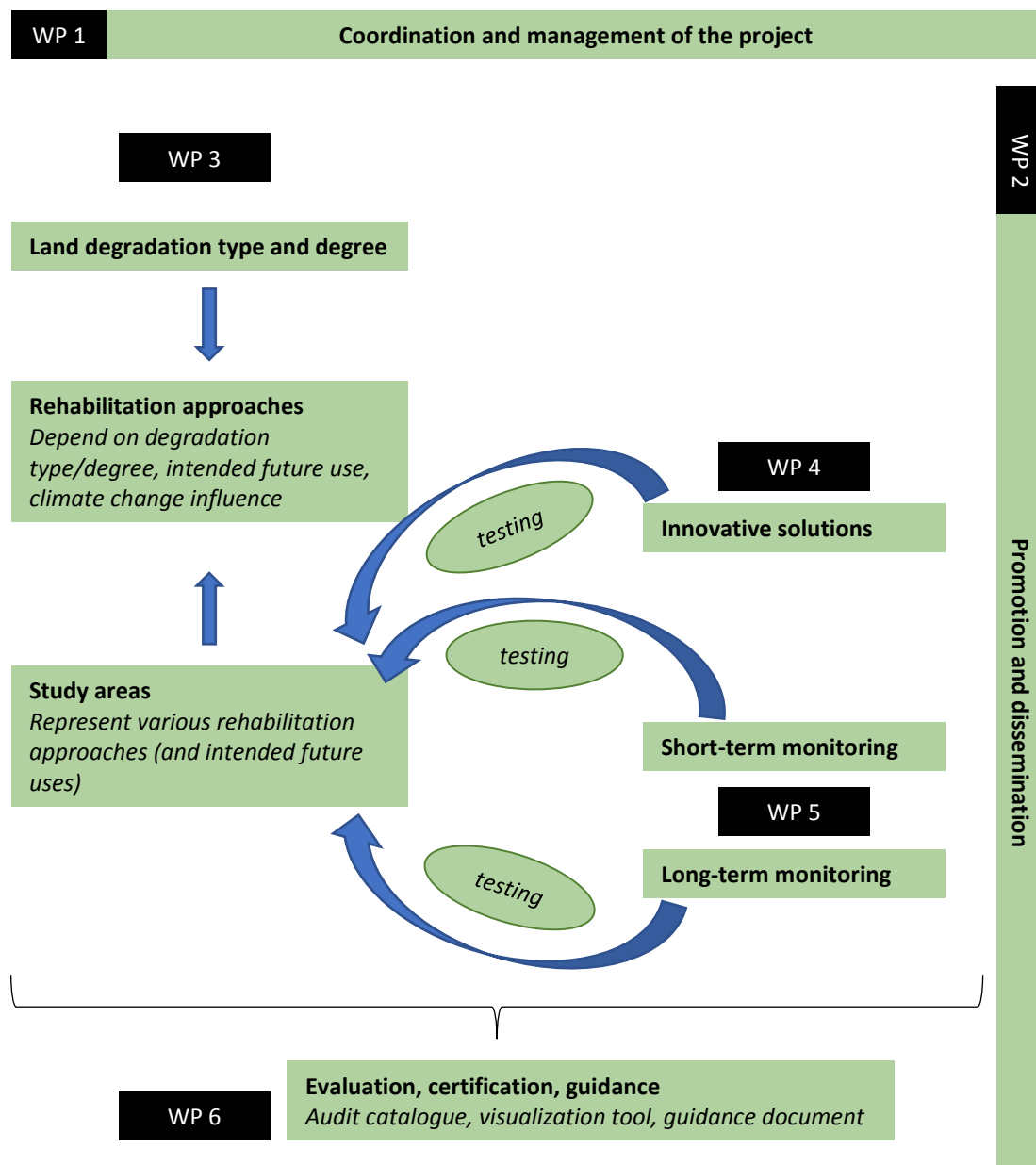


Figure 1. Workflow diagram of Work Package interrelations in the REECOL project

Work Package 1 (WP1): Coordination and Management of the Project

WP1 underpins the project by providing essential coordination and management. It encompasses planning, monitoring, and reporting on the project’s progress and facilitates communication and technical and administrative management among the consortium partners.

Work Package 2 (WP2): Promotion and Dissemination

WP2 centres on the promotion and dissemination of the project’s results. It ensures that the findings and innovations of the project reach a wide audience, including stakeholders in coal regions undergoing transition, to promote sustainable ecological rehabilitation practices.

Work Package 3 (WP3): Identification of Post Mining Areas and Ecosystem Rehabilitation Approaches

WP3 is tasked with characterizing different post-mining reclamation approaches. It involves an analytical review of strategies applied across partner countries, considering various ecosystem attributes and rehabilitation challenges. This work package also evaluates the economic viability of different approaches and selects case study areas for experimental work.

Work Package 4 (WP4): Development of New Solutions for Post Mining Land Reclamation and Their Testing in Case Study Areas

WP4 is the experimental hub where new technological solutions for soil improvement and revegetation are developed and tested in the field. It focuses on innovative methods for soil remediation, including non-contact remediation and the use of highly active composts, alongside exploring various revegetation strategies.

Work Package 5 (WP5): Short and Long Term Monitoring of Ecosystem Rehabilitation

WP5 establishes methodologies for monitoring the rehabilitation of mining areas in the short and long term. It identifies appropriate (bio)indicators and tests toolboxes designed to measure key ecological functions of rehabilitated ecosystems, ensuring the success of reclamation efforts is appropriately tracked.

Work Package 6 (WP6): Developing an Audit Catalogue to Evaluate and Certify Ecological Rehabilitation Industry Best Practice of Post-Mining Areas

WP6 focuses on developing an audit catalogue and visualization tools to document and assess ecological rehabilitation progress. This catalogue will be validated by industrial partners, setting a standard for evaluating and comparing ecological rehabilitation across mining sites.

Each work package, with its defined activities and responsibilities, plays a pivotal role in the progression of the REECOL project. Collectively, they ensure a well-organized execution of the project's activities, fostering innovation, collaboration, and successful outcomes. Detailed overview of each work package, including objectives, tasks and time line is presented in the table below.

Table 3. Work Packages overview

Work Package No	Work Package Name	Work Package Objectives	Tasks	Short Task's description	Time line
WP1	Coordination and management of the project	Coordination of activities, management of work packages, information transfer between work packages and partners, and maximization of the project's impact.	T.1.1 Project coordination	Coordinator oversees daily management, partner liaison, data/document storage, promotion oversight, and progress reporting. Partners provide data as needed.	July 2023 – December 2026
			T.1.2 Preparation for and attendance at progress meetings	Biannual meetings to review work and facilitate partner collaboration. Led by host countries.	
			T.1.3 Preparation of the publishable report	Development of a summarized project outcomes report for publication.	
WP2	Promotion and dissemination	Development of exploitation routes for project results, effective dissemination, outreach activities, and visibility to the project's achievements.	T.2.1 Preparation of the comprehensive overview of the project	Crafting a detailed description of project goals, strategies, results, timeline, budget, partners, and deliverables.	July 2023 – December 2026
			T.2.2 Creation of Communication and dissemination plan	Developing and monitoring an outreach plan identifying purpose, audience, message, dissemination methods, and timing.	
			T.2.3 Dissemination of the project results	Creating and updating a project website and social media, publishing papers, and organizing/participating in events to promote project findings.	
			T.2.4 Development of a handbook and summary of the most important project results	Compiling a handbook summarizing key findings for post-mining remediation, acting as a guide and reference, available electronically.	
WP3	Identification of post mining areas and ecosystem rehabilitation approaches	Classification and mapping of degraded lands, identification of rehabilitation schemes, evaluation of best practices in Europe, and selection of case study areas.	T.3.1 Classification of ecosystem degradation and mapping of degraded land	Classify and map post-mining land degradation, considering soil conditions and constraints on revegetation. Link to WP5 indicators for monitoring.	July 2023 – June 2024
			T.3.2 Identification of post – mining rehabilitation schemes regarding future land uses and affordability of the solutions	Characterize post-mining rehabilitation schemes for various land uses, assess economic viability, and define reclamation methodologies for different soil types.	
			T.3.3 Climate change influence on post-mining rehabilitation schemes	Evaluate how climate change influences reclamation schemes, factoring in extreme events and micro-scale land-cover changes.	
			T.3.4 Selection of post mining rehabilitation case study areas	Select diverse areas for testing new reclamation and monitoring solutions under WP4 and WP5, based on their degradation status and anticipated future use.	
WP4	Development of new solutions for post mining land reclamation and	Development and testing of new technological solutions for soil remediation and revegetation in post-mining areas	T.4.1 Development of directed succession methods for revegetation on post-mining	Lab and field tests of low-growing species for directed succession in high-potential post-mining areas. Utilizes cost-effective methods and mineral-rich mine tailings as fertilizers.	October 2023 – June 2026

Work Package No	Work Package Name	Work Package Objectives	Tasks	Short Task's description	Time line
	their testing in case study areas		terrains with a high redevelopment potential		
			T.4.2 Development of a technology for non-contact remediation and control of soil parameters with use of bio-waste	Development of aerosol spray technology for soil stabilization and nutrient enrichment, monitored by sensors and UAVs. Includes prototype development and field testing.	
			T.4.3 Development of a technology for soil regeneration by composts of high biological activity	Creating a technology for soil restoration using compost from lignite, organic waste, and microorganisms. Involves lignite biosolubilization.	
			T.4.4 Analysis of revegetation possibilities regarding future land uses	Evaluating revegetation methods, including energy and industrial crops, for varied land uses. Analyzes soil amendments' impact and adaptation to climate change.	
			T.4.5 Cost-benefit analysis of the new solutions for post mining land reclamation	Framework to assess the most suitable reclamation solution for different contexts, integrating potential ecosystem benefits and regulatory considerations.	
WP5	Short and long term monitoring of ecosystem rehabilitation	Definition of a toolbox for monitoring ecological functions, acquisition of data from field sites, and provision of feedback to WP4 on the success of soil rehabilitation technologies.	T.5.1 Identification of bio- and geochemical indicators for monitoring of ecological	Select robust biological and geochemical indicators for ecosystem monitoring, focusing on microbial, plant, and physico-chemical markers. Link findings to ecological certification in WP6.	October 2023 – September 2026
			T.5.2 Short and long term monitoring solutions for post mining rehabilitation activities in the case study areas	Develop and test short and long-term monitoring solutions based on identified indicators in selected case study areas. Integrate remote sensing and satellite imagery for long-term sustainability assessments.	
WP6	Developing an audit catalogue to evaluate and certify ecological rehabilitation industry best practice of post-mining areas	Review of existing ecological rehabilitation schemes, development of an audit catalogue and a visualization tool for rehabilitation progress, and creation of a practical guidance document.	T.6.1 Development of a European audit catalogue for ecological rehabilitation of post-mining areas	Review existing ecological rehabilitation standards and develop a set of European requirements for post-mining area certification, incorporating UN Sustainable Development Goals and EU Green Deal initiatives	July 2024 – December 2026
			T.6.2 Development of a customized visualization tool (dashboard) to visualize ecological rehabilitation progress	Create a dashboard tool to visually represent ecological restoration progress, integrating various ecosystem and physical factors for stakeholder assessment.	
			T.6.3 Development of a practical guidance document for the audit catalogue by the industry end-user	Develop a user-friendly guide for the audit catalogue, validating its application at pilot sites to ensure easy understanding and implementation.	

3.2. Coordination of Activities

Effective coordination is pivotal for the success of the REECOL project, ensuring that all work packages and tasks are aligned and contribute to the project's objectives. This section outlines the coordination strategies, the role of coordinators, and the integration of activities with the project's overarching goals.

Coordination Strategies:

The coordination within the REECOL project is facilitated by a *central management framework*, as depicted in the figure 2. This approach establishes structured protocols for task allocation, scheduling, and monitoring to ensure project activities are in alignment with planned deliverables and milestones. Tasks are methodically assigned based on the unique expertise and resource availability of partner organizations.

Consistent with the central management framework, regular updates on scheduling and task progress are systematically managed to maintain transparency and to ensure timely completion of all activities. Through coordinated efforts, overseen by the project coordinator, this framework ensures that all partners are regularly updated on the task status, fostering a collaborative environment conducive to the project's success.

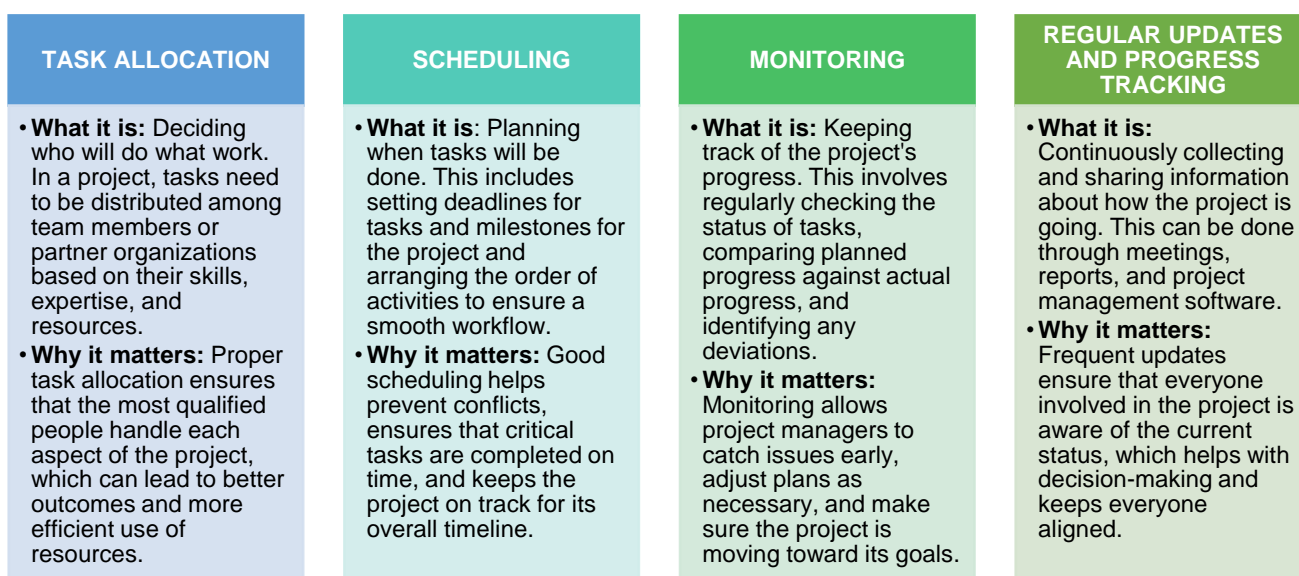


Figure 2. Schematic Overview of the REECOL Project's Central Management Framework

Role of Coordinators:

The REECOL project employs a multi-tiered coordination strategy to ensure that all aspects of the project are managed effectively. This strategy delineates specific roles for coordinators at the task level, work package level, and project level.

- **Task Leaders** - are responsible for overseeing the completion of individual tasks within each work package. They ensure that tasks are executed according to the plan and are instrumental in managing the details of the task, solving problems, and keeping the task on schedule. They regularly communicate with the WP coordinator, providing updates and flagging any issues that may affect the task's outcome.
- **Work Package Coordinators** - have an overarching role that covers entire work packages. They manage a suite of tasks and ensure that the work package goals are being met. They oversee task coordinators, ensuring that each component of the work package integrates smoothly with others and that the work package remains on track. They act as a bridge between task coordinators and the project coordinator, facilitating communication and cohesive operation within the work package.

- **Project Coordinator** – operates at the highest level of project management. They are responsible for the overall direction and success of the entire project. This role involves strategic planning, integrating the various work packages, managing risks, and ensuring that the project achieves its overall objectives. The project coordinator maintains communication with WP coordinators and the project's governance bodies, providing updates on progress and steering the project through any high-level challenges.

Integration with Overall Project Goals:

The activities within individual work packages are not isolated; they are intricately planned to ensure that each step contributes to the REECOL project's overarching goals. The coordination strategies are developed to support a cohesive approach, where the outputs of one work package feed into the others, creating a streamlined process from research and development to dissemination. This ensures that the project not only meets its individual objectives but does so in a manner that is synergistic and amplifies the overall impact of the project. This integrative dynamic is visually captured in Figure 3.

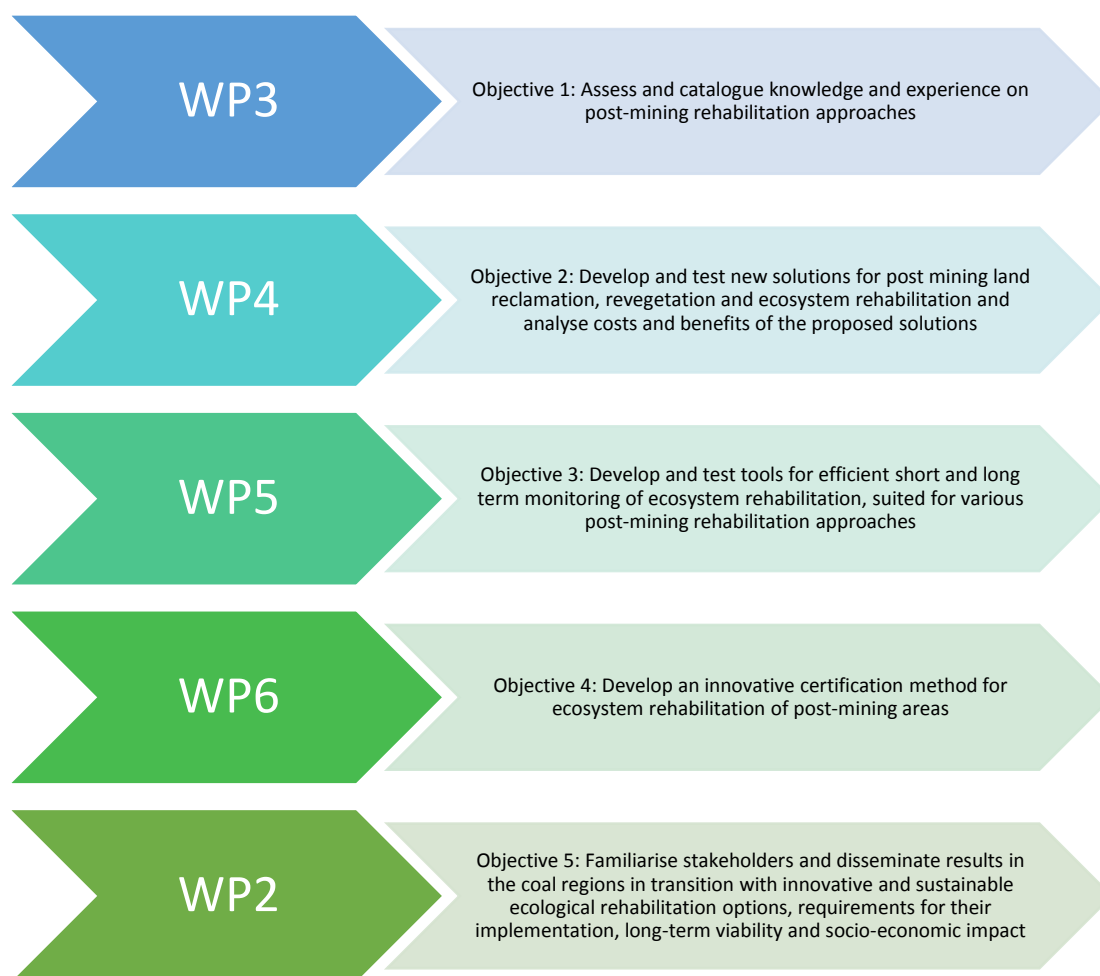


Figure 3. Alignment of Work Packages with Project Objectives

3.3. Integration of Work Packages

To maintain the synergy between various tasks and work packages, the REECOL project employs a robust tracking and integration mechanism that allows for the seamless convergence of individual efforts into the project's collective goals.

1) Task Progress Tracking:

Each task leader is responsible for regularly updating a task progress table (please see Appendix 1.), a document that captures the detailed status of their specific tasks, including milestones achieved,

issues encountered, and resources utilized. This living document is a critical tool for task leaders to manage their activities and for the work package leader to monitor the overall progress.

2) Work Package Consolidation:

The task progress tables are synthesized by work package leaders into a comprehensive work package progress table (please see Appendix 2.). This consolidation process allows for a multi-layered review of how individual tasks align with the broader objectives of the work package and the project as a whole. It serves as a reflection point for work package leaders to identify any deviations from the plan and to ensure that interdependencies between tasks are managed effectively.

3) Bi-Monthly Submission Cycle:

Every two months, the work package progress table is submitted to the coordinator or uploaded to the shared drive. This bi-monthly cycle strikes a balance between providing timely updates and allowing sufficient time for meaningful progress to occur between submissions. It also facilitates the coordinator's task of integrating the various work package updates into a global project progress report.

4) Feedback Loop:

A feedback loop is established where the coordinator, after reviewing the work package progress tables, communicates with work package leaders to address any concerns, offer support, or realign activities with the project's strategic objectives. This loop ensures that all partners remain informed of the project's status and that any necessary adjustments can be made in a timely and coordinated manner.

5) Continuous Improvement:

The work package integration process is subject to continuous improvement. Lessons learned are documented and shared across the consortium to refine the integration mechanism, improve efficiency, and optimize the collaborative efforts of the project.

4. Meeting and Communication Management

4.1. Regular Work Progress Meetings

The REECOL project holds bi-annual progress meetings in accordance with a preliminary schedule that allows for adjustments as necessary. These meetings are pivotal for consortium partners to review project advances, identify challenges, and ensure alignment across work packages. Detailed agendas for these meetings will focus on work package updates, project dissemination efforts, and management-related discussions. While the primary expectation is for partners to host these sessions on-site, virtual participation is supported to accommodate all consortium members.

Table 4. Progress Meeting Calendar

Progress Meeting No.	Progress Meeting Estimate Date	Organizer
1.	October 2023	POLTEGOR
2.	March 2024	PV
3.	September 2024	TUC+PPC
4.	March 2025	BRGM
5.	September 2025	Poland (Organizer - TBC)
6.	March 2025	VUHU
7.	September/October 2026	GIG (combined with final conference)

Note: This schedule is subject to change based on project needs and partner availability.

In addition to these bi-annual meetings, the REECOL project facilitates **Online Working Group Meetings**. These meetings are organized as required by the specific needs of each task and are led by the respective task leaders. This flexible and task-oriented approach ensures that focused groups can convene to address

specialized topics or issues as they arise, promoting agility and responsiveness within the project management structure.

4.2. Communication Platforms

Communication among consortium members primarily takes place via email, with at least two representatives from each institution included in every correspondence to ensure transparency and avoid information silos. A comprehensive contact list has been created and is maintained on a shared drive managed by POLTEGOR, which facilitates easy access to partner contacts

4.3. Document Sharing and Information Management

In the complex and dynamic environment of the REECOL project, effective document sharing and information management are critical for maintaining coherence and ensuring that all consortium members are working from the most current and accurate information.

POLTEGOR, as the project coordinator, oversees a centralized document repository on a shared drive. This drive acts as the central repository for all project-related documents, encompassing research data, reports, deliverables, communication materials, and administrative documents. Access to this repository is regulated to ensure confidentiality and integrity while providing all partners with the necessary documents for their work.

Regular updates and distributions of new or updated documents are systematically conducted. When significant changes are made to key documents or new files are added to the shared drive, email notifications are sent to relevant consortium members. This ensures that all members are aware of and have access to the latest information necessary for their tasks.

5. Reporting and Documentation

In line with the Grant Agreement with the EU, the REECOL project adheres to strict reporting and documentation protocols to ensure transparency, governance, and compliance.

5.1. Continuous Reporting

Continuous reporting in the REECOL project is a fundamental aspect of project governance, ensuring that all progress and challenges are transparently communicated to the European Commission in compliance with the Grant Agreement. The primary goal of continuous reporting is to ensure proactive management of the project. It allows for:

- Immediate identification and resolution of issues.
- Real-time adjustments to project plans, if necessary.
- Transparent communication with the European Commission and other stakeholders.

The consortium is required to continuously report on the action's progress, which includes updates on deliverables, milestones, outputs, outcomes, critical risks, and performance indicators. This process is facilitated through the EU's Portal Continuous Reporting tool, which serves as the central platform for all reporting activities.

Each consortium partner is responsible for contributing to the continuous reporting process. Specific responsibilities include:

- Gathering and verifying information relevant to their scope of work.
- Timely submission of updates to the project coordinator.
- Ensuring the accuracy and completeness of the information provided.

The project coordinator is tasked with:

- Compiling the continuous reports from all partners.
- Submitting the compiled reports to the EU's Portal.
- Monitoring the submission process to ensure that reporting deadlines are met.

To ensure effective continuous reporting, partners will be provided with comprehensive support materials. These resources will guide them through the use of the reporting tool and help clarify the reporting requirements. Adherence to the continuous reporting process is mandatory, and non-compliance may affect the consortium's standing with the European Commission. It is essential that all consortium members prioritize this activity and allocate the necessary resources to maintain a consistent reporting

5.2. Periodic Reporting

Periodic reporting complements the ongoing insights of continuous reporting with more comprehensive, interval-based updates, crucial for evaluating the project's holistic progress and financial status. Periodic reporting is not only a requirement but also a tool for accountability. It ensures that:

- The project adheres to its contractual obligations with the European Commission.
- Stakeholders have a transparent view of the project's progression and financial integrity.

The periodic reporting within the REECOL project is conducted in two distinct phases to provide a detailed account of activities over set timeframes:

- **Phase 1** covers the initial period from the project's start to the 21st month.
- **Phase 2** spans from the 22nd to the 42nd month, culminating in the project's conclusion.

Each periodic report must encompass both technical and financial aspects:

- **Technical Report:** This should reflect the advancements towards scientific and technical objectives, summarizing the work completed, outlining the results obtained, and detailing any deviations from the work plan.
- **Financial Report:** This should provide a full account of all expenses incurred, ensuring they align with the project's budget and financial guidelines set by the European Commission.

Partners are responsible for submitting their individual reports to the project coordinator in a timely manner, adhering to the following deadlines:

- Draft reports are to be provided to the coordinator no later than two weeks before the official submission date to the European Commission.
- This timeframe allows for review, consolidation, and any necessary revisions to ensure accuracy and compliance.

The project coordinator plays a pivotal role in the periodic reporting process:

- Compiling individual partner reports into a cohesive document.
- Ensuring that all information is consistent and meets the reporting standards.
- Submitting the consolidated report to the European Commission.

Prior to submission, periodic reports are subjected to an internal review process to ensure:

- All information is factually correct and sufficiently detailed.
- The project's progress is accurately represented.
- Financial expenditures are properly documented and justified.

In line with the Grant Agreement, all partners must maintain accurate and up-to-date records to substantiate the reported data. This includes:

- Documenting evidence of work performed and results achieved.
- Keeping financial records in accordance with EU accounting standards.
- Preserving all supporting documents that validate the reported expenses.

To support partners in fulfilling their reporting obligations, the project will provide:

- Specific guidelines and templates for both technical and financial reporting.
- Access to comprehensive documentation and resources to guide partners through reporting requirements and the use of the submission portal

5.3. Record Keeping and Document Retention

Effective record keeping and document retention are critical components of the REECOL project, ensuring adherence to EU regulations and the ability to substantiate all project activities and expenditures. This section outlines the systematic approach to managing all project-related documents, including technical reports, financial records, and supporting evidence. It ensures that documentation is organized, up-to-date, and easily retrievable for the duration of the project and beyond.

Record Keeping Procedures:

- All project partners are required to maintain comprehensive records of activities, financial transactions, and outcomes.
- Records must be kept in a manner that allows for easy cross-referencing with reported data and financial claims.
- Partners should employ a consistent filing system, either digital or physical, to manage documents effectively.

Essential Documentation:

This section outlines the types of documents that must be systematically recorded and retained, including but not limited to:

- Contracts, subcontracts, invoices, and accounting records that substantiate costs declared,
- Documentation of personnel costs, such as time records signed by the personnel and their supervisors or equivalent evidence of work performed for the action,
- Documents evidencing the implementation of project tasks such as reports, deliverables, and communication records,
- Records on the calculation of flat-rate costs, unit costs, and contributions.

In accordance with the Grant Agreement, all records and supporting documents must be retained for a period of five years following the end of the project. This includes contracts, invoices, timesheets, receipts, audit reports, and any other documents that verify the costs declared and activities undertaken. The retention period ensures availability for any post-project audits, reviews, or inquiries. Digital records must be stored in secure, backed-up environments, and physical documents must be kept in a secure and accessible location.

Access to sensitive documents will be restricted to authorized personnel to ensure confidentiality and data protection. A protocol for granting, tracking, and revoking access will be established and followed rigorously.

Preparation for Audits and Reviews:

- Partners must be prepared to present all required documents promptly in case of audits, reviews, or investigations by the European Commission and other authorities.

- The project will maintain a readiness to extend the retention period if any checks or audits are open or pending at the end of the five-year term.

6. Budget Management Tools and Techniques

The REECOL project requires meticulous budget management to fulfil the objectives outlined in the Grant Agreement. This chapter outlines the methods and practices for managing the project's finances, ensuring all partners adhere to the principles of transparency, accountability, and fiscal efficiency.

6.1. Budget Planning and Monitoring

Each consortium partner is expected to manage their budget diligently, utilizing their established financial systems to plan and monitor expenditures. The following are recommended practices:

- **Adopt Proven Budget Planning Practices:** Partners are advised to leverage their established financial management systems, which may include software or manual tracking, to forecast expenses and track actual spending against the project plan.
- **Regular Financial Review:** Conduct regular financial reviews to ensure that spending aligns with the project milestones and deliverables. These reviews will help identify variances between projected and actual expenditures and facilitate timely adjustments.
- **Cost Monitoring:** Establish a routine for monitoring costs to confirm that all expenditures are allowable under the EU Grant Agreement and are essential for the implementation of the project.
- **Expenditure Documentation:** Maintain detailed records of financial transactions to substantiate the financial activities. This documentation should include invoices, receipts, contracts, and proof of payments.
- **Internal Financial Reporting:** Create internal financial reports periodically to maintain an up-to-date financial overview of the project. These reports will serve as a basis for transparency within the consortium and as preparatory work for the periodic reports required by the EU.

The implementation of these budget planning and monitoring practices will ensure the efficient use of resources and will support the project's compliance with EU financial management requirements.

6.2. Financial Management Strategies

The REECOL project's financial management strategies are designed to ensure prudent and effective use of resources, aligned with both the project's objectives and the requirements of EU grant funding. These strategies facilitate the management of allocated funds in a way that maximizes value while adhering to the principles of economy, efficiency, and effectiveness. Detailed strategies are delineated in the table below.

Table 5. Financial Management Strategies

Strategy	Description
Prudent Budget Allocation	Resources are to be allocated based on a strategic assessment of the project's needs, with a clear justification for the funds assigned to each task. This assessment will consider the complexity, scope, and duration of each task, aligning resources to the project's critical path.
Cost Monitoring and Contingency Planning	Regular monitoring of expenses against the budget will be instituted to detect and address any discrepancies. A contingency plan will be in place to manage unforeseen costs, ensuring that such expenses do not compromise the project's financial stability or objectives.
Value for Money	All expenditures will be scrutinized to ensure they provide value for money. This involves comparing options, negotiating favorable terms, and seeking efficiency gains without compromising quality or project deliverables.
Risk Management	Financial risks will be assessed, and mitigation strategies will be developed. This may include diversification of supply chains, ensuring contractual safeguards, and maintaining a reserve budget for critical components of the project.

Strategy	Description
Financial Audits and Checks	Internal and, if necessary, external audits will be planned to ensure the integrity and accuracy of financial reporting. Regular checks will be performed to ensure that financial practices remain in compliance with both the EU guidelines and the consortium's financial policies
Transparent Financial Communication	Clear and open communication regarding financial matters will be maintained among consortium members. This includes regular financial updates at consortium meetings and the provision of comprehensive financial data to support decision-making processes.
Sustainable Financial Practices	Long-term financial sustainability will be considered in all financial decisions, ensuring that the project's outcomes are not compromised by short-term financial expediency.

7. Maximizing Project Impact

The REECOL project is committed not just to achieving its set objectives but to transcending them by ensuring that the project's outcomes resonate with enduring technical, scientific, economic, and social effects. This ambition is not confined to the project's lifecycle but is envisaged to create ripples of impact that extend into the future, shaping industry practices, informing policy, and benefiting communities. This chapter delineates the consortium's strategic approach to amplifying the project's influence, with detailed actions further explicated in Deliverable 2.1, the Promotion and Dissemination Plan. Through carefully crafted strategies and thoughtful considerations, the consortium intends to broaden the project's reach and catalyse benefits.

7.1. Strategies for Technical and Scientific Impact

The REECOL project aspires to generate significant technical and scientific impacts that extend well beyond the confines of its immediate research environment. To achieve this, the consortium will implement a multifaceted approach aimed at amplifying the reach and application of its findings.

1) Knowledge Creation and Dissemination:

- **Publications and Presentations:** Findings from the project will be disseminated through publications in high-impact scientific and technical journals and presentations at international conferences, ensuring that the scientific community is informed of the advancements made.
- **Open Access Repositories:** To promote accessibility and foster further research, all publications will be made available in open-access formats where possible.

2) Collaborative Networks and Partnerships:

- **Inter-Project Synergies:** The consortium will actively collaborate with other EU projects, sharing knowledge and best practices to enhance the impact of the project's outcomes.
- **Academic Partnerships:** Partnerships with academic and research institutions will be established, aiming to integrate project outcomes into academic curricula and promote their application in future research.

3) Technology Transfer and Intellectual Property:

- **IPR Strategy:** A comprehensive Intellectual Property Rights (IPR) strategy will be formulated to protect the project's innovations and facilitate their transfer to applicable sectors.
- **Commercialization Efforts:** Pathways for the commercialization of the project's outputs will be identified, in collaboration with technology transfer offices and relevant industry partners.

7.2. Economic and Social Impact Considerations

The REECOL project is not only focused on technical and scientific advancements but also on creating significant economic and social impacts. The consortium will employ various strategies to ensure that the project's outcomes contribute positively to economic growth, social development, and community engagement.

1) Economic Analysis and Enhancement:

- **Cost-Benefit Analysis of Reclamation Solutions:** The project will conduct in-depth cost-benefit analyses of new post-mining land reclamation solutions, focusing on their economic viability and potential benefits for revitalizing post-mining areas.
- **European Audit Catalogue Development:** A comprehensive review of ecological rehabilitation guidelines and standards will be undertaken, incorporating UN Sustainable Development Goals and EU Green Deal initiatives, to formulate a set of European requirements for ecological rehabilitation.
- **Guidance Document for Audit Catalogue:** A practical guide will be developed for industry end-users to facilitate the effective application of the audit catalogue, ensuring the project's rehabilitation approaches meet international best practices.

2) Social Engagement and Outreach:

- **Stakeholder Communication:** The project's results and updates will be communicated actively to a broad range of stakeholders, ensuring extensive awareness and engagement.
- **Digital Platforms for Outreach:** All project results and updates will be shared consistently on the project's website and social media platforms, making the information widely accessible.
- **Inclusive Information Sharing:** The project aims to engage diverse groups, including industry professionals, academia, local communities, and policymakers, through digital platforms, promoting a comprehensive understanding of the project's impacts and advancements.

8. Risk Management

Risk management in the REECOL project is a systematic process aimed at identifying, evaluating, and mitigating risks that could impact the project's objectives. It involves the following steps:

1) Risk Identification:

The process begins with a thorough risk identification exercise, where all consortium members contribute to identifying potential risks. This collaborative approach ensures a comprehensive risk profile that encompasses various perspectives and expertise areas within the project.

2) Risk Analysis and Evaluation:

Once risks have been identified, they are analysed to determine their potential impact and the likelihood of their occurrence. This analysis considers both qualitative and quantitative data to prioritize risks based on their severity and the urgency of needed responses.

3) Risk Register Creation:

A Risk Management Table, or risk register, is created and managed by the coordinator. This table serves as a living document that provides a detailed overview of all identified risks, including:

- **Risk description:** A brief statement outlining the nature of the risk.
- **Likelihood:** The probability of the risk occurring, often classified as low, medium, or high.
- **Impact:** The potential consequence on the project if the risk materializes, classified as low, medium, or high.
- **Mitigation strategies:** Actions planned or taken to reduce the likelihood or impact of the risk.
- **Owner:** The individual or team responsible for monitoring the risk and implementing mitigation strategies.
- **Status:** The current status of the risk and any ongoing mitigation efforts.

Table 6. Risk Management Table Template with examples

Risk ID	Description	Likelihood	Impact	Mitigation Strategies	Owner	Status
R001	Example: Delay in task completion due to equipment unavailability.	Medium	High	Procure equipment from multiple suppliers. Establish backup options.	WP4 Leader	Ongoing
R002	Example: Legislative change affecting project funding.	Low	High	Regularly review policy changes. Consult with legal experts.	Project Coordinator	Monitoring
...

4) Mitigation Strategy Development:

For each identified risk, mitigation strategies are developed. These strategies are designed to either prevent the risk from occurring or to minimize its impact on the project. They are crafted with consideration to the cost, time, and effort required, ensuring that the response is proportional to the risk.

5) Implementation and Monitoring:

Risk mitigation strategies are then implemented, and their effectiveness is continuously monitored by the assigned owners. The coordinator oversees this process, ensuring that mitigation actions are carried out and that the risk register is updated to reflect any changes in the risk landscape.

6) Regular Review and Adjustment:

The risk register is reviewed regularly, typically at key project milestones or during Steering Committee meetings. This ensures that the project's risk profile is always current, and adjustments to mitigation strategies can be made in response to new risks or changes in existing risks.

7) Communication:

Effective communication is integral to risk management. Updates on risk status and changes to the risk register are communicated to all consortium members, ensuring that the entire project team is aware of and can respond to risks as required.

9. Quality Assurance

The Quality Assurance chapter for the REECOL project outlines the project's commitment to maintaining high standards in all aspects of its work. This encompasses systematic processes and procedures designed to ensure that every component of the project aligns with the established quality benchmarks. The focus is on delivering results that are not only compliant with technical requirements but also meet the broader objectives of efficiency, reliability, and stakeholder satisfaction. This commitment to quality is foundational to the project's success, guiding the consortium in achieving its goals effectively and with excellence.

9.1. Quality Standards and Policies

The REECOL project adheres to a comprehensive set of quality standards and policies that guide its operational and research practices. This includes:

- **Adherence to International and Industry-Specific Standards:** The project will align with recognized quality standards such as ISO norms, ensuring that all activities meet global best practices.
- **Clear Quality Policies:** The project will have a set of defined policies that outline expectations for quality in various aspects, from research and development to stakeholder engagement and output dissemination.

- **Consistency and Compliance:** Emphasis will be placed on maintaining consistency in applying these standards and policies, ensuring that all project components are compliant and of high quality.

This framework serves as the cornerstone for ensuring that the REECOL project achieves its objectives while maintaining the highest quality in its processes and outputs.

9.2. Quality Control Procedures

In the REECOL project, the following quality control procedures will be strategically integrated:

- **Quality Checks at Milestone Stages:** The project will incorporate quality checks at crucial milestone stages. These checks aim to ensure deliverables and processes align with the project's standards and objectives.
- **Data Verification Processes:** Emphasis will be placed on verifying the accuracy and reliability of data collected and used in the project. This involves cross-referencing data sources and employing robust data validation techniques.
- **Continuous Process Evaluation:** The project will employ continuous evaluation of processes to identify areas for improvement. This approach enables the project team to adapt and refine methods in real-time, enhancing overall quality.

By adopting these procedures, the REECOL project ensures a systematic approach to quality control, enhancing the integrity and effectiveness of its activities and outputs.

9.3. Continuous Improvement Processes

To ensure the REECOL project consistently advances in quality and effectiveness, a comprehensive continuous improvement process will be implemented:

- **Incorporation of Learning and Development:** The REECOL project will prioritize learning from its ongoing activities. This involves a systematic approach to capturing key insights and lessons from each phase of the project and integrating this knowledge into future planning and execution. Emphasis will be on utilizing real-time experiences to refine methodologies, enhance problem-solving capabilities, and optimize project outcomes.
- **Innovative Thinking and Adaptability:** The project will actively foster a culture of innovation and adaptability among team members. This includes creating spaces for brainstorming, encouraging experimental approaches, and being open to revising traditional practices. Innovative thinking will be regarded as a vital component in project development.
- **Regular Assessment:** The project will engage in frequent internal assessments to evaluate methodologies and technologies. These assessments aim to identify areas for improvement, driving continuous enhancements in project management practices and technological applications, ensuring the project remains aligned with its objectives and internal feedback.

10. Conclusion

The "Definition of Management and Implementation Tools" document for the REECOL project has been a cornerstone in guiding the project's strategic execution. It has provided a clear and detailed roadmap for managing various aspects, ensuring all processes align with the project's goals. As the project nears its conclusion, the effectiveness of these tools is evident in the successful delivery of outcomes, reflecting a balance of rigorous planning and practical implementation.

Looking ahead, the lessons learned and methodologies developed offer valuable insights for similar projects in the future. This document serves not just as a blueprint for the current project but as a valuable resource for future endeavours in the field of ecological rehabilitation. The emphasis on systematic management, adherence to quality standards, and continuous improvement will have a lasting impact on how similar projects are approached and executed.

ANNEX 1: TASK PROGRESS TABLE

TASK DETAILS			
Task no.	Task name		
Responsible partner		Partners involved	
Start date:		End date:	
TASK PROGRESS DETAILS			
Reporting period:			
Activities performed during the reporting period			
UNFINISHED ACTIVITIES, CHALLENGES, AND PROPOSED SOLUTIONS			
Unfinished/delayed activity	Challenge faced	Proposed solution	
NEXT PERIOD ACTIVITIES			
Activity		Assigned to	
COMMENTS/NOTES			
<p><i>A section for any additional information or context that might not fit into the structured parts of the report.</i></p>			

ANNEX 2: WORK PACKAGE PROGRESS TABLE

WORK PACKAGE DETAILS				
WP no.	WP name			
WP leader		Start date:		End date:
WORK PACKAGE PROGRESS DETAILS				
Reporting period:				
Tasks breakdown				
	Not started	In progress	Delayed	Completed
Task no.				
Task no.				
Task no.				
Issues/Challenges Faced and Proposed Solutions	<p><i>A dedicated space for WP leaders to communicate challenges, ensuring that these issues don't get buried in other comments or overlooked.</i></p> <p><i>While individual task leaders will be reporting challenges specific to their tasks, the Work Package (WP) leader, who oversees multiple tasks, might be aware of broader challenges that affect the entire work package. This section would allow them to communicate those overarching issues.</i></p>			
Comments/Notes	<p><i>A section for any additional information or context that might not fit into the structured parts of the report.</i></p>			