Enabling Framework Report

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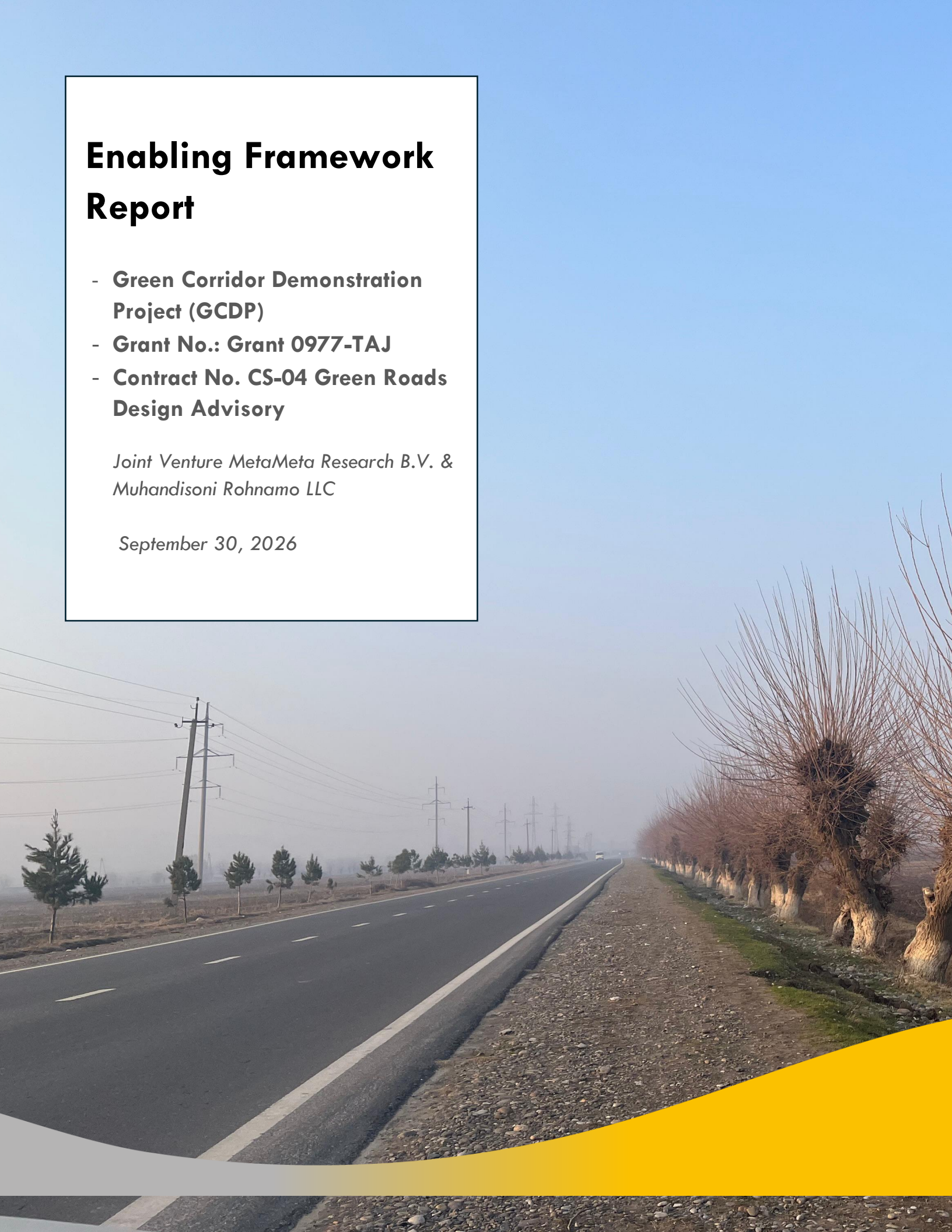

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1. Executive summary

Tajikistan's road network is critical for national connectivity, economic development, access to services, and regional integration. However, roads are increasingly affected by climate-related risks such as floods, landslides, erosion, sedimentation, drought, and waterlogging. In this context, road infrastructure needs to become more resilient while also contributing to environmental sustainability, improved water management, and community well-being.

This Enabling Framework Report was prepared under the Green Corridor Demonstration Project / Green Roads Design Advisory. Its purpose is to assess whether the current policy, institutional, regulatory, financial, and capacity environment in Tajikistan is ready to support the systematic implementation and scaling-up of green road practices.

The report focuses on three priority practices that are particularly relevant for Tajikistan:

1. **Roadside tree and shrub planting** to reduce dust, improve shade, stabilize soils, and enhance the road environment;
2. **Bio-engineering for slope stabilization** to reduce erosion, landslide risks, and slope instability through nature-based measures; and
3. **Improved land and water management along roads** to manage runoff, reduce erosion and flooding, support groundwater recharge, and enable productive use of road-collected water.

The assessment confirms that these practices are well aligned with Tajikistan's national development and climate priorities. Key policies, including the National Strategy for Adaptation to Climate Change, the National Development Strategy until 2030, the Nationally Determined Contribution, and the Green Tajikistan Policy, provide a supportive basis for integrating green and climate-resilient approaches into the transport sector.

At the same time, the report finds that the enabling environment for green roads is still at an **"In Development"** stage. Policy recognition and some pilot experience exist, but green road practices are not yet systematically embedded in road-sector planning, design, procurement, construction, maintenance, or financing. Responsibilities are spread across several institutions, and coordination between road, forestry, environmental, water, agriculture, and local government actors remains limited. Long-term maintenance responsibilities and financing are particularly unclear.

The main gaps identified are:

- lack of a clear national roadmap for scaling up green road practices;
- fragmented institutional responsibilities and weak coordination;
- limited integration of green criteria into design standards, procurement documents, and supervision procedures;
- insufficient dedicated financing for long-term maintenance;

- limited technical capacity at national, district, contractor, and community levels; and
- weak monitoring of tree survival, bio-engineering performance, drainage, erosion, and environmental impacts.

The validation workshops in Roghun and Vose districts confirmed that the proposed green road practices are highly relevant in practice. Stakeholders emphasized that successful implementation depends on practical conditions such as water availability, soil quality, livestock protection, nursery supply, community involvement, and clear maintenance arrangements.

The report recommends a set of practical institutional and implementation measures. These include establishing a clear green roads focal function within MoT/PIURR, creating a Green Roads Working Group, clarifying roles and responsibilities for planning, implementation and maintenance, and integrating green road criteria into the full road project cycle. Green measures should be included in feasibility studies, design documents, bills of quantities, technical specifications, contracts, supervision requirements, taking-over procedures, defects-liability obligations, and routine maintenance plans.

To make these recommendations more operational, the report now includes a consolidated Framework Implementation Roadmap. The roadmap identifies priority actions, responsible institutions, indicative timeframes and expected results for mainstreaming green road practices. It covers institutional coordination, project-cycle integration, procurement, maintenance planning, development of practice-specific roadmaps, capacity building, pilot implementation and future reassessment of institutional maturity.

Sections 6.7 to 6.11 provide more detailed recommendations for each of the three priority practices and for the practical implementation and monitoring of the enabling framework.

For **roadside tree planting**, the report recommends a clear policy statement with measurable targets, clarification of responsibilities for planting and long-term maintenance, improved design standards, better nursery and supply planning, and financing mechanisms that support survival and maintenance rather than one-time planting. The report also recommends the preparation of a national roadmap for roadside tree planting, including implementation models, commercial opportunities, financing requirements, capacity-building needs, monitoring arrangements, and links with the Green Tajikistan program.

For **bio-engineering**, the report recommends a stronger policy commitment to the use of nature-based slope stabilization in sensitive areas, especially where road development contributes to erosion, landslide risk and sedimentation. The Roghun Reservoir

catchment is identified as a priority area because road-related erosion can affect sedimentation and reservoir longevity. The report recommends identifying critical intervention areas, reviewing good practices from Tajikistan and comparable mountain countries, developing standards and bills of quantities for bio-engineering, strengthening capacity at national and local levels, and linking implementation with community labour and local maintenance systems.

For **land and water management along roads**, the report highlights the need to recognize roads as part of the wider surface and subsurface hydrological system. Road drainage should not only be safely disposed of to prevent erosion, flooding and damage to road infrastructure, but should also be used beneficially where possible for groundwater recharge, roadside vegetation, agriculture and landscape restoration. The report recommends a policy statement on improved land and water management along roads, compulsory hydrological design checks for new roads, safe disposal checks for drainage in sensitive areas, maintenance checks based on the principle of “build back better,” and a roadmap identifying critical drainage, drought-prone, flood-prone and erosion-prone areas.

The consolidated Framework Implementation Roadmap provides a practical structure for moving from recommendations to implementation. It covers the designation of a green roads focal function, establishment of a Green Roads Working Group, clarification of institutional responsibilities, adoption and use of the **Green Roads Design Advisory / Green Corridor Guideline**, integration of green criteria into planning, design, procurement and maintenance, preparation of practice-specific roadmaps, capacity building, pilot implementation, updating of standards and future reassessment of institutional maturity. The Monitoring and Evaluation Framework provides a practical basis for tracking progress through indicators related to coordination meetings, project screening, inclusion of green criteria in design TORs and tender documents, inclusion of green measures in contracts and bills of quantities, tree survival rates, inspection and maintenance of bio-engineering sites, safe disposal of road drainage, implementation of land and water management measures along roads, inclusion of green assets in maintenance budgets, staff training and periodic updating of the maturity assessment.

Overall, the report concludes that Tajikistan has a strong opportunity to mainstream green road practices as a practical, low-cost and scalable approach to climate-resilient transport development. The main challenge is the need to strengthen coordination, standards, procurement, financing, maintenance, monitoring and institutional capacity. The implementation roadmap and monitoring framework support the transition from pilot-level application toward systematic implementation. The findings of this report also provide the basis for the accompanying Capacity Building Report, which translates the identified gaps into concrete actions for long-term implementation.

1. Introduction

This report discusses the enabling framework for green roads development in Tajikistan. This aligns with the national Green Tajikistan vision, which explicitly mentions the development of green corridors. The report discusses the different enabling arrangements that would support the systematic introduction of green roads in Tajikistan with the emphasis on roadside tree planting, bio-engineering and water management. This will contribute to multiple objectives, including CO_2 reduction, climate adaptation, improved water management, improved quality of life, pollution control, disaster risk reduction, beautification and the protection of major infrastructure investments.

The report is developed with the use of the Asian Development Bank's Green Roads Toolkit, in particular the Enabling Framework Maturity Assessment. It is based on in-depth interviews, field assessments and review of key documents. The report presents an analysis of green roads priorities, the current enabling framework and recommendations to enhance overall coordination and leadership and specific measures with regards to roadmaps, capacity building, design standards, supply systems, financial arrangements in the green roads priority areas. The supporting documents are given in Annex A to C.

Green roads can add much to the functionality and sustainability of Tajikistan's roads. Tajikistan's road network plays a central role in national development, connectivity, and resilience. Roads are critical for economic activity, access to services, and regional integration, particularly in a country characterized by mountainous terrain, dispersed settlements, and high exposure to climate-related hazards such as floods, landslides, and erosion. As climate change intensifies these risks, there is growing recognition that conventional road planning and maintenance approaches are no longer sufficient. Roads must withstand climate impacts as well as actively contribute to environmental sustainability, landscape resilience, and community well-being.

In this context, the **Green Roads Demonstration Project** supports Tajikistan's transition toward sustainable, resilient, and inclusive transport infrastructure. The project promotes the systematic integration of green road principles into the transport sector through nature-based solutions, climate-resilient design, and environmentally and socially responsible practices. These approaches not only improve road performance and resilience but also generate wider benefits for ecosystems and communities. A central outcome of the project is the development of a national Green Corridor Guideline for Tajikistan, providing a practical framework to support consistent application and scaling across the road network.

While technical solutions for green roads are increasingly well documented, experience shows that their successful uptake depends on more than specific measures on selected roads. The ability to mainstream green road practices across a national road network is shaped **by the enabling environment**: policies, institutional mandates, coordination mechanisms, financing arrangements, standards, procurement systems, and human capacity. Without these enabling conditions in place, green road interventions risk

remaining isolated pilots rather than becoming part of routine planning, design, construction, and maintenance.

This Enabling Framework Report addresses this challenge directly. It focuses on assessing the current institutional, policy, and capacity landscape for green roads in Tajikistan, with the objective of understanding where the country stands today and what is needed to move from pilots to systematic implementation. The report examines whether existing policies support green road practices, how responsibilities are distributed among key stakeholders, and to what extent enabling factors are in place to support scaling and long-term sustainability.

The analysis builds on earlier work under the Green Roads Design Advisory, including the District Opportunity Report and validation workshops with districts and the Ministry of Transport, which explored physical conditions, climate risks, and practical opportunities for green road interventions in Roghun and Vose districts. While that work focused on *where* and *how* green road practices can be applied on the ground, this report looks at *whether the system is ready* to support their wider adoption.

To structure this assessment, the report applies the ADB Enabling Factors Maturity Assessment Tool, developed with MetaMeta and the International Road Federation (IRF). The tool provides a systematic framework for evaluating the maturity of key enabling factors across three priority green road practices. In Tajikistan, roadside tree planting, bio-engineering, and land and water management – all important components of Green Corridors – emerged as highly needed practices. Through a combination of policy review, stakeholder mapping, interviews, and participatory self-assessment with the Ministry of Transport, the report identifies strengths, gaps, and priority areas for improvement.

The purpose of this report is therefore to provide a **clear, evidence-based picture of the enabling environment for green roads in Tajikistan**. Its findings serve as a baseline for dialogue, prioritization, and action, and directly inform the development of a targeted Capacity Building Plan. By strengthening the enabling framework, Tajikistan can unlock the full potential of green roads as a resilient, low-cost, and scalable pathway for sustainable transport development.

2. Methodology

2.1. Description of the approach and steps taken

Task 2 focuses on reviewing and strengthening the enabling policy, institutional, and capacity framework required to mainstream green road practices in Tajikistan. Successful implementation depends not only on technical solutions, but also on clear mandates, supportive policies, coordinated institutions, and sufficient capacity across the road sector.

To address this, the task applies a structured, stepwise analytical approach that combines:

- Institutional mapping and stakeholder engagement;
- Policy, regulatory, and procedural scanning; and
- Systematic assessment of enabling factors using the **Enabling Factors Maturity Assessment Tool** developed for the Asian Development Bank with MetaMeta and IRF.

The approach is designed to:

1. Assess how responsibilities for green road practices are distributed across institutions;
2. Identify how policies, standards, and procedures support or constrain implementation;
3. Evaluate the maturity of key enabling factors; and
4. Highlight practical entry points for institutional strengthening and capacity building.

The task combines consultations, desk-based analysis, and applied assessment tools to provide a high-level scan of how policies and institutional arrangements function in practice and influence day-to-day decision-making in road planning, design, implementation, and maintenance.

The outputs are structured as two complementary deliverables:

- **Enabling Framework Report** – synthesizes findings on institutional arrangements, enabling factors, policy and regulatory review, stakeholder mapping, and priority gaps (this report); and
- **Capacity Building Plan** - translates findings into actionable recommendations to strengthen institutional readiness and implementation capacity (to be delivered separately).

In addition to assessing the current enabling environment, this revised report includes practical recommendations for strengthening institutional arrangements, working

procedures, coordination mechanisms, integration of green criteria into the road project cycle, budget and maintenance arrangements, roles and responsibilities, and baseline monitoring indicators. These recommendations are provided at the enabling-framework level and are intended to support further decision-making by the Ministry of Transport and other relevant institutions

2.2. Use of ADB Enabling Factor Maturity Assessment

The Green Roads Toolkit provides technical solutions, but their uptake depends on the maturity of enabling frameworks such as policies, regulations, financial mechanisms, capacity, and multi-sectoral collaboration. The Maturity Assessment Tool offers a structured, participatory approach to:

- Assess the current level of readiness and integration of key enabling factors for green roads;
- Identify areas where additional effort, investment, or reform are needed;
- Support the design of targeted action plans and policy roadmaps;
- Facilitate dialogue among stakeholders on priorities and sequencing reforms.

The tool is designed for use at the national or subnational level and can be adapted for sector-wide assessments or focused on specific green road dimensions (e.g., decarbonization, climate resilience, inclusive growth). In the **Green Roads Advisory,** this ADB Enabling Factors Maturity Assessment was deployed to assess current regulations under Work Package 2.

Below is an overview of enabling arrangement factors and current standards/regulations that were assessed following the ADB Enabling Factors Maturity Assessment to identify priority improvements in the enabling framework.

- **Policy Development:**

  The development of clear, forward-looking policies is the cornerstone of mainstreaming green roads. A strong policy framework articulates national or regional commitment to sustainable road development, sets out guiding principles, and connects the green roads agenda with broader climate, environmental, and social goals. Policy development is not only about drafting documents but also about building consensus among stakeholders, aligning mandates across government agencies, and providing the strategic direction needed to drive innovation and reform. Effective policies create the mandate for action, unlock resources, and provide a basis for accountability and long-term continuity.

- **Roadmaps for Green Roads:**

A roadmap translates policy vision into a practical, time-bound sequence of actions and milestones. It serves as a strategic plan that outlines how green road principles will be integrated into the sector over time, identifying priorities, responsible agencies, and clear targets. Roadmaps help coordinate efforts across multiple institutions, align investments, and manage change by breaking down the transition into manageable phases. They also provide a mechanism for tracking progress, learning from early experiences, and scaling up successful approaches, ensuring that the shift towards green roads is systematic and sustained rather than ad hoc.

- **Application of New Technologies:**

Adopting and adapting innovative technologies is essential for realizing the full potential of green roads. This includes the use of low-carbon materials, recycled aggregates, digital monitoring tools, and nature-based solutions, among others. The enabling environment must support research, piloting, and validation of these technologies, as well as their integration into mainstream practice. This often requires partnerships with research institutions, flexible procurement systems, and the willingness to experiment and learn. Widespread application of new technologies can drive efficiency, reduce environmental impacts, and enhance the resilience and longevity of road infrastructure.

- **Improved Design Standards:**

Design standards are the technical backbone of road construction and maintenance. Updating these standards to incorporate green road principles ensures that sustainability, climate resilience, and social inclusion are systematically addressed in every project. Improved standards provide clear specifications for materials, construction methods, drainage, landscaping, and safety features, among others. They also facilitate quality control and consistency across the sector, making it easier for engineers, contractors, and regulators to deliver green road outcomes. Flexibility within standards is important to allow for innovation and adaptation to local contexts.

- **Environmental Standards:**

Environmental standards define the minimum acceptable levels of air, water, soil, and noise pollution, as well as requirements for biodiversity protection. These standards are critical for ensuring that road development does not compromise environmental quality or public health. They provide benchmarks for planning, design, construction, and operation, and are often enforced through monitoring and reporting systems. Strong environmental standards drive the adoption of cleaner technologies and practices, promote compliance, and help build public trust in infrastructure projects.

- **Regulatory Frameworks:**

A robust regulatory framework provides the legal and institutional structure needed to enforce green road practices. This includes laws, regulations, and guidelines that mandate environmental and social assessments, set requirements for stakeholder engagement, and specify responsibilities for compliance and enforcement. Effective regulations clarify the roles of different agencies, set out procedures for permitting and oversight, and establish penalties for non-compliance. They also create opportunities for public participation and recourse, making the system more transparent and accountable.

- **Improved Planning Systems:**

Planning systems determine how projects are identified, prioritized, and designed. Improved planning systems integrate environmental, social, and economic objectives from the outset, using tools such as strategic environmental assessments, multi-criteria analysis, and participatory planning processes. These systems encourage coordination across sectors and levels of government, ensuring that road investments support broader development goals such as disaster risk reduction, watershed management, and inclusive growth. Well-functioning planning systems also facilitate the early identification of risks and opportunities, leading to more resilient and sustainable infrastructure.

- **Capacity Building and Awareness:**

Building the knowledge, skills, and motivation of all stakeholders is essential for the successful implementation of green roads. Capacity building includes formal training for engineers, planners, and contractors; in-house learning for government staff; and awareness campaigns for communities and decision-makers. It also fosters a culture of innovation, collaboration, and continuous improvement. Raising awareness about the benefits of green roads—such as improved safety, resilience, and quality of life—can generate public support and political will, helping to drive the agenda forward.

- **Sustainable Procurement:**

Procurement processes shape the incentives and behaviors of contractors and suppliers. Sustainable procurement incorporates environmental and social criteria into tendering, evaluation, and contract management, encouraging the use of green materials, technologies, and practices. This can include merit-based selection, early contractor engagement, and performance-based contracts with bonuses for exceeding sustainability targets. By aligning market incentives with policy goals, sustainable procurement accelerates the adoption of innovative solutions and ensures that public investments deliver maximum value for society and the environment.

- **Financial Mechanisms:**

Access to appropriate, flexible, and sustained financing is a key enabler for green roads. Financial mechanisms include dedicated budget lines, climate funds, green bonds, public-private partnerships, and grants or subsidies for innovative practices. These mechanisms can be designed to prioritize green projects, support experimentation, and ensure that the costs and benefits of sustainability are fairly distributed. Effective financial systems also enable long-term planning and maintenance, reducing the risk of underinvestment or project abandonment.

- **Supply Systems: Available Resources and Materials:**

Reliable access to sustainable materials, equipment, and skilled labor is essential for implementing green road practices at scale. This includes developing supply chains for recycled materials, promoting local sourcing, and ensuring the availability of environmentally friendly products. Supply systems must be supported by standards, quality control, and market incentives to encourage investment and innovation. By strengthening supply systems, governments can reduce project costs, minimize environmental impacts, and create economic opportunities for local communities.

- **Collaborative Partnerships and Connection with Other Programs:**

Green roads require collaboration across sectors, institutions, and stakeholder groups. Collaborative partnerships bring together government agencies, private sector actors, civil society, and local communities to share knowledge, align objectives, and coordinate action. Connections with other programs—such as those focused on climate adaptation, disaster risk reduction, biodiversity, or social inclusion—amplify the impact of green road initiatives and leverage additional resources and expertise. Strong partnerships foster innovation, build trust, and ensure that green roads contribute to broader sustainable development goals.

Structure and Application of the Maturity Assessment

The Maturity Assessment Tool employed a structured, three-step methodology:

- **Step 1: Data Collection via Self-Assessment Questionnaire**

The first step in the maturity assessment process was gathering information and perspectives from key stakeholders using a structured self-assessment questionnaire. This questionnaire invites participants—such as government officials, road agency staff, contractors, and civil society representatives—to evaluate the status of each enabling factor on a standardized scale, typically from 1 (not initiated) to 5 (mature and sustainable). Participants are encouraged to provide qualitative comments and examples to support their ratings, ensuring that the assessment reflects both quantitative scores and contextual insights. This

participatory approach fosters a shared understanding of the current situation and helps surface diverse viewpoints.

- **Step 2: Analysis and Categorization**

  In the second step, the maturity level of each enabling factor was assessed based on the responses from the questionnaire. This involves analysing the questionnaire responses to categorize the readiness of each factor and identify gaps or areas for improvement. The maturity levels are categorized as Absent, In Development, In Place, and Mature and Sustainable, offering a clear framework to evaluate progress and integration of each enabling factor into national practices.

- **Step 3: Analysis and Categorization of Results**

  The final step involved prioritizing enabling factors that require immediate enhancement. Utilizing the findings from the assessment and the Green Roads Excel toolkit, country teams can prioritize the enabling factors that need urgent attention. This step ensures that the assessment results translate into actionable priorities for addressing a particular Green Road theme in road development practices.

The maturity assessment is meant as a tool to initiate discussion on steps to support the introduction of green roads systematically, beyond the scope of a single project or pilot. In most cases several enabling factors are already in place. They may be or not be used or applied and can be triggered.

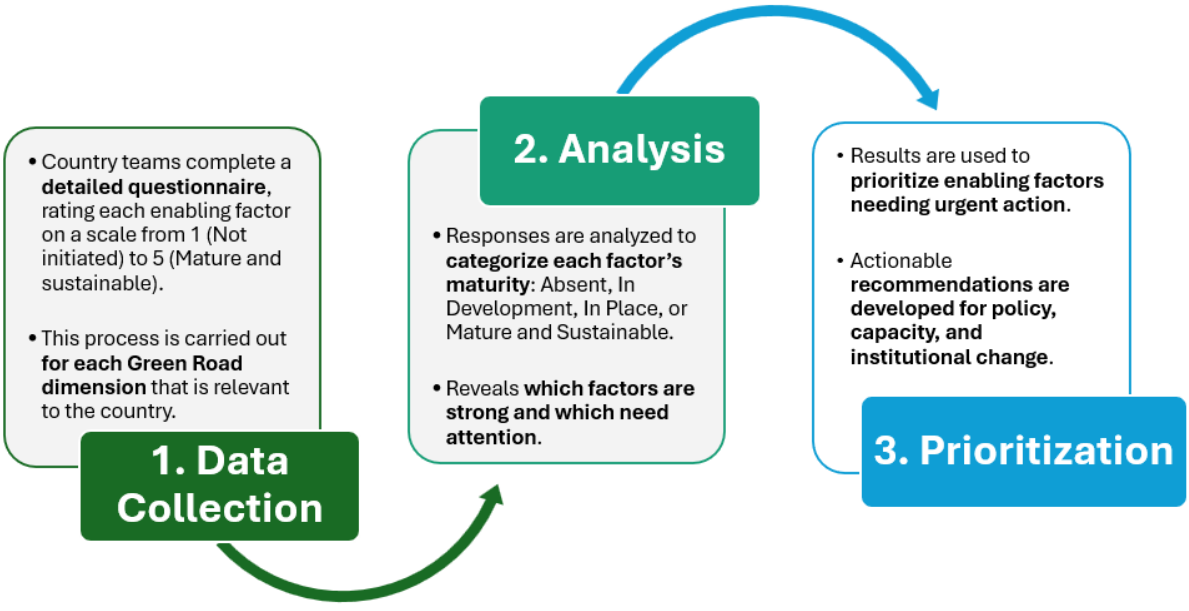

Figure 1: Structure and Application of the Maturity Assessment.

Based on the findings of the **District Opportunity Report**, as well as discussions held during the district validation workshops and the project update meeting at the **PIURR, Ministry of Transport** at the beginning of January 2026, there was clear agreement on the **most promising opportunities for greening the road sector in Tajikistan**. These opportunities build on existing practices and can be scaled systematically across the road network:

1. **Mainstreaming roadside tree and shrub planting**
   This includes planting site-appropriate trees and shrubs along roads, selected based on local conditions and requirements such as water availability, maintenance needs, root behavior, allergies, and potential health impacts. When properly designed, roadside vegetation can provide shade, reduce dust and air pollution, stabilize soils, and enhance road safety and aesthetics.

2. **Introducing and upscaling bio-engineering approaches**
   Bio-engineering techniques use grasses, shrubs, and other vegetation to stabilize slopes and road embankments. These nature-based solutions reduce erosion and landslide risks, enhance slope stability, and offer a cost-effective and environmentally sustainable alternative to conventional hard engineering measures.

3. **Introducing and upscaling improved water management along roads**
   Roads generate significant runoff, which often creates a lot of issues if it is not properly managed. This runoff can instead be managed strategically by diverting water from drainage structures (such as culverts and side drains) into roadside ponds, swales, or borrow pits. Stored water can then be used for agriculture and livestock, contribute to groundwater recharge and higher water tables, improve soil moisture, support regreening initiatives, and in some cases be directly applied to adjacent farmland for agricultural activities.

By **systematically upscaling these three practices**, substantial benefits can be achieved not only for road infrastructure but also for the surrounding landscape. They are at the core of the Green Corridors, that are important part of the Green Tajikistan Vision. Green roads become more resilient to erosion, landslides, flooding, and climate-related damage, reducing closures and maintenance costs. At the same time, roadside environments are transformed through increased vegetation cover, reduced sedimentation from road construction and use, better water availability and improved biodiversity through the preservation and improvement of habitats.

These interventions also generate significant social and health benefits. Greener roads improve air quality, reduce dust, and create safer, more pleasant environments for road users and nearby communities. Importantly, many of these practices can be implemented and maintained with the active involvement of local communities, creating employment

opportunities and strengthening local ownership. Green roads also contribute significantly to road safety, if done well – improving driver alertness, reducing stress and also aiding visibility and perception.

Overall, this approach represents a low-cost, scalable, and sustainable pathway for greening the road sector in Tajikistan. As a nature-based strategy, it delivers multiple co-benefits for infrastructure resilience, water management, ecosystems, livelihoods, and quality of life - making it a compelling foundation for future investment and policy integration.

To support the introduction and large-scale adoption of these practices, the project developed a practical guideline. This guideline addresses the technical aspects of roadside tree planting, bio-engineering, and improved water management. Experience shows that technical solutions alone are not sufficient. The ability of the Ministry of Transport and its implementing agencies to plan, deliver, and maintain these practices depend on a range of enabling factors, including policies, mandates, financing, and capacity building among others. To better understand this, the project applies the Maturity Assessment to assess how ready the Ministry of Transport is to effectively implement and scale these practices.

The outcome of the Maturity Assessment is a clear picture of the current level of development of each enabling factor for the three practices. Based on this assessment, a prioritization is made, identifying which enabling factors require immediate attention and strengthening to unlock successful implementation and scaling.

To operationalize this approach, the project developed three structured checklists, one for each practice. Each checklist includes a set of targeted questions covering institutional dimensions, enabling a systematic assessment of readiness, gaps, and opportunities. The three checklists are presented in Annex A.

2.3. Data Collection methods

2.3.1. Policy Review

A **high-level policy scan** of key national development and climate strategies relevant to green road practices in Tajikistan was conducted. The objective is to understand whether -and how - the proposed greening of the road sector aligns with national priorities, strategic directions, and ongoing initiatives, particularly in relation to climate adaptation, environmental sustainability, and tree planting. The scan focuses on a limited number of high-level, cross-sectoral policies that set the strategic direction for the country and that are most influential for the transport sector.

The policy scan was carried out through a desk-based qualitative analysis of key national strategies and planning documents, complemented by insights from stakeholder discussions conducted under Task 2. The analysis focused on:

- Identifying explicit references to transport, climate resilience, land management, water resources, and nature-based solutions;
- Assessing the strategic relevance of these policies for green road practices, including roadside tree planting, bio-engineering, and improved water management along roads;
- Examining the degree to which national policies enable, encourage, or prioritize interventions that are consistent with road greening approaches.

2.3.2. Stakeholder analysis and engagement plan

The stakeholder mapping and engagement process for the *Green Roads Design Advisory* in Tajikistan was designed to ensure a **comprehensive, inclusive, and context-specific understanding of the institutional landscape and stakeholder priorities**. The approach was grounded in a two-way actor analysis, which systematically examines the roles, mandates, and interactions of all relevant organizations at both national and district levels. This involves, firstly, an actor-based analysis to map key institutions - including the Ministry of Transport, Forestry Agency, Ministry of Finance, Ministry of Agriculture, Committee for Environmental Protection, local administrations, and others - detailing their mandates, tasks, financing roles, and regulatory responsibilities across the public and non-public road networks. Secondly, a task-based analysis is conducted to identify which actors are responsible, supporting, or financing specific green road-related activities, as well as to highlight institutional gaps and overlaps, particularly in areas such as roadside vegetation management, biodiversity protection, and climate adaptation.

To ensure that the analysis is both participatory and actionable, we have undertaken a thorough stakeholder mapping and made targeted efforts to engage relevant stakeholders at both national and regional levels.

- **At the national level (Proposed reference group)**
  Based on the stakeholder mapping and consultations carried out, we recommend a set of stakeholders to be involved in a National Reference Group, including representatives from the Ministry of Transport (MoT), Forestry Agency, Committee for Environmental Protection, local self-governments (Roghun and Kulob districts), the Design Institute, and the Institute of Horticulture, Viticulture, and Vegetable Growing. It is suggested that PIURR Ministry of Transport will initiate the formal establishment of this group, which would support the review and validation of key project outputs, including the *Green Corridor Guideline*. A more detailed proposed coordination mechanism, including suggested mandate, membership, meeting

frequency, reporting arrangements and decision-recording procedures, is presented in Section 6.3.

- **At the district and regional levels**
  We have conducted validation workshops in Roghun and Vose districts (see Annex C), bringing together local authorities, technical staff, forestry and environmental representatives, agricultural experts, and community members. These sessions helped validate key challenges and opportunities identified through road surveys and generated practical insights on the enabling arrangements for roadside tree planting, water management, bio-engineering, and slope stabilization.

- **National-level consultation (PIURR)**
  In January 2026, a national workshop was held with PIURR, Ministry of Transport representatives, and other stakeholders to present initial findings, discuss district-level insights, and align on the development of the *Green Corridor Guideline* with national priorities.

3. Overview of the Green Roads Context in Tajikistan

The context for green roads in Tajikistan is strongly influenced by the country's national strategies, policies, and development priorities. This chapter provides an overview of the strategic framework guiding green road development, highlighting how national policies increasingly emphasize climate resilience, environmental sustainability, and integrated approaches within the transport sector.

The review covers key documents - including the National Strategy for Adaptation to Climate Change, the National Development Strategy, the Medium-Term Development Program, the Nationally Determined Contribution, and the Green Tajikistan Policy - that collectively set the direction for sustainable infrastructure and climate action. By examining the main objectives, priority areas, and cross-sectoral themes of these policies, the chapter identifies clear entry points and mandates for mainstreaming green road practices.

3.1. National Strategy for Adaptation to Climate Change (NSACC) until 2030

The National Strategy for Adaptation to Climate Change (NSACC) is the **primary climate-related strategic framework** in Tajikistan and provides a strong entry point for mainstreaming green road practices. The strategy aims to enhance climate resilience across key economic sectors while supporting sustainable growth, modernization, and increased energy efficiency. Transport is explicitly identified as one of the four priority sectors, alongside energy, water resources, and agriculture. In addition, the NSACC highlights several intersectoral themes - such as environment, health, gender, and disaster risk reduction - that are directly relevant to the greening of road infrastructure.

The emphasis on climate adaptation, ecosystem protection, and long-term planning creates a **clear policy mandate for interventions such as roadside tree planting, bio-engineering for slope stabilization, and climate-resilient land and water management along roads**. These practices directly contribute to reducing erosion, landslide risks, and climate-related damage to infrastructure, while delivering co-benefits for ecosystems and communities.

3.2. National Development Strategy of the Republic of Tajikistan until 2030

The National Development Strategy (NDS 2030) sets out four strategic goals, including breaking the country's communication deadlock and transforming Tajikistan into a transit country. This objective places **road infrastructure development and maintenance** at the center of national development ambitions.

At the same time, the strategy emphasizes food security, energy efficiency, and productive employment - areas that strongly intersect with green road approaches. Roadside tree planting, improved water harvesting from road runoff, and bio-engineering measures can support agricultural productivity, reduce land degradation, and create local employment opportunities, particularly in rural areas.

The NDS 2030 therefore provides a **development-oriented justification** for green roads: not only as an environmental or climate measure, but as a way to ensure that transport infrastructure contributes positively to broader economic and social objectives.

3.3. Medium-Term Development Program (MTDP) 2021–2025

The Medium-Term Development Program (2021–2025) further operationalizes national priorities and includes a dedicated focus on environmental protection, climate change, and natural disasters. The program explicitly recognizes the need for **sectoral adaptation measures**, including in transport, and highlights the importance of integrating climate considerations into planning and implementation. The inclusion of gender-sensitive indicators and adaptive measures strengthens the case for green road practices that are participatory, community-based, and inclusive. Activities such as roadside planting, maintenance of bio-engineering structures, and water management interventions offer tangible opportunities for local engagement and job creation.

3.4. Nationally Determined Contribution (NDC) and NDC Implementation Plan

Tajikistan's updated Nationally Determined Contribution (2021) confirms strong national commitment to both climate mitigation and adaptation. Transport and infrastructure are explicitly included among the priority sectors for adaptation, while land use, forestry, and energy efficiency are central to mitigation efforts.

Although the NDC does not define specific sector-level targets for transport, the accompanying NDC Implementation Plan identifies concrete projects and investment needs across transport, land use, and energy efficiency. The scale of required investment - estimated at approximately USD 1 billion per year - highlights the importance of **cost-effective, nature-based, and multifunctional solutions**, such as green road practices.

3.5. Green Tajikistan Policy

The recently adopted **Green Tajikistan Policy** further reinforces the national commitment to sustainable development and climate-resilient infrastructure. The policy promotes the use of nature-based solutions, ecosystem protection, and sustainable infrastructure investments, including in the transport sector.

For the *Green Roads Design Advisory Project*, this policy provides additional justification for interventions such as roadside tree planting, bio-engineering for slope stabilization, and water management along roads.

3.6. Strategic Alignment and Implications for Green Roads

The high-level policy scan demonstrates that **green road practices are strongly aligned with Tajikistan's national development and climate policy framework**. In particular:

- Roadside tree planting directly supports national priorities on climate adaptation, environmental protection, land restoration, and quality of life;
- Bio-engineering and improved water management along roads respond to climate risk reduction objectives highlighted across multiple strategies;
- The transport sector is consistently recognized as a priority sector for adaptation, creating a clear policy mandate for action.

Overall, the policy environment is **enabling rather than restrictive**, and provides a solid strategic basis for mainstreaming green road practices. The challenge lies less in policy alignment and more in **institutional readiness, coordination, and capacity**, which are addressed in the subsequent chapters of this report.

A special case is the development of the Roghun Reservoir, which is the single-largest investment in Tajikistan, will lead to the production of huge quantities of green energy. It is here that the three elements of green corridor development come together, as the economic lifetime of the Roghun Reservoir is strongly connected to the control of sedimentation, Road development without proper measures such as roadside tree planting, bio-engineering and drainage water management, however, can accelerate erosion and sedimentation, It is therefore of vital importance to implement green road measures in the catchment of Roghun, in particular because much new road development is taking place, triggered by relocation, economic development, new infrastructure and construction.

4. Stakeholder Analysis

A clear understanding of institutional roles, gaps, and challenges is essential for advancing Green Roads in Tajikistan. This stakeholder analysis, initiated during the project's inception phase and continuously refined, provides a living baseline to guide ongoing engagement, coordination, and capacity building as the project evolves.

4.1. Actor-based observations

The main organizations linked to Green Roads have been identified, along with their mandates, performance, and key challenges. Preliminary findings indicate:

- **The Ministry of Transport (MoT**) manages the public road network, consisting of:
  - ~5,300 km of Republican roads, including 17 international corridors.
  - ~8,700 km of local (feeder) roads, comprising 1,261 roads that connect rural settlements to the main network.
- **Departmental or non-public roads** (~12,791 km), including industrial, technological, and agricultural access roads, fall under multiple ministries, committees, and local executive bodies rather than the MoT. Responsibilities for construction, maintenance, and monitoring are dispersed, creating coordination challenges.
- Tasks related to roadside vegetation and tree planting are managed by a **mix of actors**, with ongoing initiatives varying in scope, scale, and continuity.

4.2. Task-based observations

Mapping the distribution of tasks related to Green Roads reveals a complex landscape of responsibilities shared among lead agencies, supporting bodies, financiers, and regulators:

- Planning, budgeting, and implementation of road works are governed by the MoT for public roads, while non-public roads are subject to varying institutional rules and budget cycles.
- Funding and maintenance allocations are uneven across the network, with limited integration of climate-resilient or nature-based practices.
- Coordination between agencies for multi-functional road outcomes - such as water management, erosion control, and biodiversity protection - is limited.

4.3. Results of Actor-Based Analysis

The table below summarizes the main functions, supporting roles, financing, and regulatory responsibilities of key stakeholders in the Green Roads context. It highlights both strengths and areas where mandates or resources are lacking.

Table 1: Results of Actor-Based Analysis

Organization	Main Implementing Tasks	Supporting Tasks (incl. planning)	Financing Tasks	Regulatory Tasks	Remarks
Ministry of Transport	Construction, reconstruction, and maintenance of state roads; coordination of transport policy	Long-term planning; project coordination with agencies and donors	Manages funds via Ministry of Finance; attracts international loans and grants	Develop regulations and standards for construction and operation	Key actor; limited funding and heavy dependence on external investors
Road Maintenance Department	Routine maintenance and repair of public roads	Plans seasonal work (e.g. pothole repair, winter maintenance)	Receives funds from Ministry of Transport	Quality control, compliance with regulations	Limited resources; dependent on central and local budgets
Road Fund	Provides funding for road projects	Contributes to sector budget planning	Collects and distributes taxes, fees, duties	Monitors use of earmarked funds	Main domestic funding source, but revenue is insufficient
Forestry Agency	Maintains access roads in forest areas (often non-state/local roads)	Participates in road planning in forested zones	Receives state funds and environmental program financing	Enforces landscaping and forest preservation rules	Weak enforcement and poor coordination with road agencies
Ministry of Finance	Provides overall financing for infrastructure projects	Budget planning and execution	Allocates funds to road sector and departments	Oversees tax and budgetary policy	Strong role in financing; limited involvement in implementation
Ministry of Agriculture	Provides access roads to farmland	Plans farm-to-market access	Finances agricultural infrastructure	Regulates land use and irrigation near roads	Coordination with Ministry of Transport is often weak
Ministry of Land Reclamation and Water Resources	Maintains roads linked to irrigation/drainage	Plans access to water infrastructure	Limited sectoral financing	Regulates water zones	Relevant where roads serve irrigation/water infrastructure
Committee for Environmental Protection	Oversees environmental risks in road projects	Plans greening, slope protection, biodiversity measures	Co-finances environmental works with donors	Sets environmental norms, issues permits	Oversight often formal and weakly enforced

Committee for Emergency Situations	Provides access during disasters; supports response	Disaster route planning, mitigation	Emergency funds (limited)	Sets standards for emergency access	Important in mountainous/disaster-prone regions
Committee for Land Management and Geodesy	Allocates land for road projects	Manages cadastral planning	Funds cadastral activities	Regulates land use, cadastre	Delays in land allocation approvals are common
Traffic Police	Ensures road safety during/after construction	Plans accident prevention measures	State-funded	Enforces traffic regulations	Key for safety, but poorly equipped
Local State Administrations (Hokimiyats)	Construct/maintain local (non-state) roads	Local road planning; public consultation	Funded from local budgets (limited) + donor support	Local regulatory role	Responsible for local road networks
Local Self-Governments (Jamoats)	Support small-scale road works	Mobilize communities, assess needs	In-kind contributions, small local resources	Local rules within communities	Important for minor/village roads
Municipalities	Manage urban road networks	Plan urban transport schemes	Local budget funding (limited)	Regulate urban planning	Depend heavily on central budget transfers
Universities	Train specialists for road sector	Develop curricula, research	Research funded through grants	Regulate education standards	Weak link between science and practice
Large Construction Companies	Implement large-scale projects	Design in cooperation with institutes	Finance via tenders and loans	Regulated by contracts, licenses	Main executors of major works
Small Construction Companies	Implement small-scale projects and repairs	Collaborate with local authorities	Funded through procurement	Regulated by contracts, licenses	Active at local level
Design Institutes	Prepare design documentation	Provide route planning and engineering	Funded via contracts, grants	Regulated by standards, licenses	Dependent on government procurement

4.4. Results of Task-Based Analysis

The following tables map major road sector tasks to responsible actors for both state and non-state roads. They identify overlaps, gaps, and neglected areas, providing a practical reference for targeting institutional strengthening and coordination efforts.

- **Institutional Gaps:** Some tasks lack a clearly responsible actor, which is noted as a gap.
- **Implementation Challenges:** Remarks in the tables highlight common risks and bottlenecks.

Table 2: Results of Task-Based Analysis for State Roads.

Task	Main Responsible	Support Role	Financing Role	Regulatory Role	Remarks
Road construction	Ministry of Transport	Large construction companies; design institutes	Ministry of Finance; international organizations (ADB, WB)	Ministry of Transport; State Committee for Architecture and Construction	Highly dependent on external funding; frequent delays in tendering
Bridge construction	Ministry of Transport	Large construction companies; design institutes	Ministry of Finance; international loans and grants	Ministry of Transport; State Committee for Architecture and Construction	Capital-intensive projects with significant environmental risks
Road maintenance	Ministry of Transport	Local governments; small contractors	Ministry of Finance	Ministry of Transport; Road Police	Quality of repairs often low; insufficient equipment
Road drainage & water management	Ministry of Land Reclamation and Water Resources	Ministry of Transport; design institutes	State budget; donors (EU, JICA)	Ministry of Land Reclamation; Committee for Environmental Protection	Critical in mountainous areas; frequent flood-related damage
Hillside protection	Ministry of Transport; Committee for Emergency Situations	Design institutes; Forestry Agency	State budget; donors	Committee for Emergency Situations; Committee for Environmental Protection	Landslides and avalanches pose major risks
Right-of-way management	Committee for Land Management and Geodesy	Road Police; Ministry of Transport	–	Committee for Land Management and Geodesy	Encroachments common due to weak enforcement
Roadside vegetation	Ministry of Transport	Forestry Agency	State budget; donors (e.g., FAO)	Committee for Environmental Protection	Largely neglected; minimal funding
Biodiversity protection	Committee for Environmental Protection	Road construction departments	–	Committee for Environmental Protection	Oversight is often reactive rather than preventive
Roadside businesses	Local state administrations (Hokimiyats)	Road Police	Local authorities;	Ministry of Economy; local administrations	Informal kiosks frequently

			private investment		occupy highways
Labor conditions	Ministry of Labor, Migration and Employment	Construction companies	–	Labor Inspectorate	Safety standards often poorly enforced
Traffic regulation & road safety	Traffic Police	Ministry of Transport; municipalities	State budget	Ministry of Internal Affairs; Traffic Police	Safety measures applied mostly post-construction
Dust & air pollution control	Committee for Environmental Protection	Local administrations	–	Committee for Environmental Protection	Air quality rarely monitored along roads
Soil & water pollution control	Committee for Environmental Protection	Ministry of Land Reclamation and Water Resources	–	Committee for Environmental Protection	Drainage-related pollution is common
Noise pollution control	–	–	–	–	No agency has a direct mandate
Carbon emissions control	Committee for Environmental Protection	–	–	Committee for Environmental Protection	Addressed in national climate strategies, not road-specific
Climate adaptation	Committee for Emergency Situations	Ministry of Transport	–	–	Crucial in landslide- and flood-prone areas
Disaster risk management	Committee for Emergency Situations	Ministry of Transport; local administrations	State budget; donors	Committee for Emergency Situations	Especially important in mountainous regions
Construction material sourcing	Ministry of Transport; construction companies	Department of Geology	Construction companies	Ministry of Industry	Weak oversight leads to unsustainable extraction

Table 3: Results of Task-Based Analysis for Non-State Roads.

Task	Main Responsible	Support Role	Financing Role	Regulatory Role	Remarks
Road construction	Local administrations; municipalities	Small construction	Local budgets; community contributions	State Committee for Architecture	Often reliant on donor or

		firms; jamoats		and Construction	community funds
Bridge construction	Local administrations; municipalities	Small construction firms; jamoats	Local budgets; community contributions	State Committee for Architecture and Construction	Bridges are rare; many areas lack crossings entirely
Road maintenance	Local administrations; jamoats	Communities	Local/public funds	Ministry of Transport; Road Police	Limited resources; weak quality control
Road drainage & water management	Local administrations; jamoats	Ministry of Land Reclamation and Water Resources	State budget; donors (EU, JICA)	Ministry of Land Reclamation; Committee for Environmental Protection	Frequently damaged by floods in mountainous areas
Hillside protection	Ministry of Transport; Committee for Emergency Situations	Design institutes; Forestry Agency	State budget; donors	Committee for Emergency Situations; Committee for Environmental Protection	High landslide and avalanche risk
Right-of-way management	Ministry of Transport; local administrations	Jamoats; municipalities	State budget	Committee for Land Management and Geodesy	Land-use conflicts and informal encroachments are common
Roadside vegetation	Forestry Department	Ministry of Transport; jamoats	State budget; donors (e.g., FAO)	Committee for Environmental Protection	Low priority; rarely implemented effectively
Biodiversity protection	Committee for Environmental Protection	Design institutes; Forestry Agency	State programs; donors (WWF)	Committee for Environmental Protection	Monitoring is weak; ecosystems at risk
Roadside businesses	Municipalities; jamoats	Local administrations; Ministry of Transport	Private investments; local taxes	Municipalities	Roadside trading often unregulated and unsafe
Labor conditions	Ministry of Labor and Social Protection	Ministry of Transport; construction companies	State budget; employers	Labor Inspectorate	Occupational safety controls are weak
Traffic regulation & road safety	Traffic Police	Municipalities; Ministry of Transport	State budget	Ministry of Internal Affairs; Traffic Police	Accident rates high; prevention measures limited

Dust & air pollution control	Committee for Environmental Protection	Ministry of Transport; contractors	State programs; donors	Committee for Environmental Protection	Enforcement is inconsistent
Soil & water pollution control	Committee for Environmental Protection	Ministry of Transport; Water Resources Ministry	State programs; donors	Committee for Environmental Protection	Measures often formalistic
Noise pollution control	Committee for Environmental Protection	Municipalities	State programs	Committee for Environmental Protection	No systematic monitoring in place
Carbon emissions control	Committee for Environmental Protection	Ministry of Transport; international projects	Donors (EU, UNDP)	Committee for Environmental Protection	Needs new technologies and updated standards
Climate adaptation	Ministry of Transport; Committee for Emergency Situations	Design institutes; Ministry of Land Reclamation and Water Resources	International donors (ADB, WB, JICA)	Ministry of Transport; Committee for Emergency Situations	Particularly important under climate change pressures
Disaster risk management	Committee for Emergency Situations	Ministry of Transport; local administrations	State budget; donors	Committee for Emergency Situations	Essential in mountainous and disaster-prone areas
Construction material sourcing	Ministry of Transport	Design institutes	Construction companies	Committee for Environmental Protection; Committee for Land Management	Illegal extraction remains a problem

4.5. Recommended Allocation of Roles and Responsibilities for Green Road Implementation

The actor-based and task-based analysis in Tables 1–3 provides a detailed mapping of existing institutional roles in the road sector. To respond more directly to the implementation needs of green road practices, this section consolidates the findings into a recommended allocation of functional responsibilities across the road project cycle. This summary does not replace formal institutional mandates, but provides a practical basis for coordination, planning, implementation, maintenance and monitoring.

For green road implementation, the following functional allocation of responsibilities is recommended:

- **Ministry of Transport / PIURR:** overall coordination, integration of green road criteria into project planning and implementation, procurement oversight, coordination with development partners, and follow-up on implementation.
- **Road Maintenance Department:** integration of green assets into routine maintenance planning, including roadside vegetation, drainage, erosion-control and bio-engineering measures.
- **Design Institutes:** incorporation of green road criteria into feasibility studies, design documentation, technical specifications, drawings, bills of quantities and design review processes.
- **Forestry Agency:** technical input on roadside tree planting, species selection, nursery supply, vegetation establishment, protection from livestock and long-term maintenance of vegetation.
- **Committee for Environmental Protection:** review of environmental risks, biodiversity considerations, pollution prevention, erosion control, environmental safeguards and monitoring requirements.
- **Local administrations and jamoats:** local coordination, community engagement, land-use coordination, support for local maintenance arrangements and reporting of site-level issues.
- **Ministry of Finance / Road Fund, where applicable:** consideration of budget procedures, maintenance funding and possible financing channels for green road measures.
- **Contractors:** implementation of green road measures according to design, technical specifications, environmental requirements and contract obligations.
- **Supervision consultants:** verification of implementation quality, compliance with green criteria, completion of green measures and taking-over requirements.
- **Communities, where appropriate:** support for protection, watering, reporting damage and local stewardship, subject to agreed arrangements with local authorities and responsible agencies.

5. Enabling Factors Maturity Assessment Results

The Enabling Factors Maturity Assessment, developed as part of the Green Roads Toolkit and described in Chapter 2, was used to systematically evaluate the readiness of Tajikistan's road sector to implement and scale up green road practices. For this project, the Maturity Assessment checklists were tailored to the three main green road opportunities identified for Tajikistan: roadside tree planting, bio-engineering, and land and water management (Annex A). The assessment was carried out collaboratively with the Ministry of Transport (MoT), using structured checklists that cover 11 key enabling factors for each practice. For reference, the completed checklists for each opportunity are presented in Annex B. For each enabling factor, a maturity score from 1 to 5 was assigned, where 1 indicates "No Evidence," 2 is "Initial/Ad Hoc," 3 is "In Development," 4 is "Advanced/Operational," and 5 is "Fully Established/Best Practice." This scoring system provides a clear overview of current strengths, gaps, and areas for improvement. The following analysis synthesizes the results, highlighting both cross-cutting and practice-specific barriers and opportunities that influence the readiness to mainstream green road approaches in Tajikistan.

5.1. Roadside Tree Planting

Roadside tree planting is widely recognized as a valuable measure for climate adaptation, erosion control, and community well-being. However, the assessment reveals that while there are notable policies, pilots, and local initiatives, the enabling environment for scaling up and sustaining these practices remains weak and fragmented at the national level - particularly due to major challenges related to the maintenance of plantations.

Table 4: Results of Maturity Assessment Checklist for "Roadside tree Planting".

Enabling Factor	Maturity Level	Observations
Policy Development	3	There is some policy recognition of the value of roadside tree planting, but the mandates for maintenance are fragmented. Responsibilities are inconsistently assigned between MoT, local governments, and environmental agencies, resulting in weak enforcement and unclear accountability.
Roadmaps for Green Roads	2	No national or sectoral roadmap exists. Local plans are ad hoc and lack clear timelines, milestones, or mechanisms for monitoring progress. Without a strategic vision, scaling up remains difficult.
Application of New Technologies	3	Some pilots have introduced drought-resistant and native species, but broader access to advanced planting technologies and knowledge of species selection remains limited. There is no systematic process for evaluating or scaling up successful innovations.
Improved Design Standards	3	Draft standards for roadside planting exist but are not consistently applied. There is a lack of binding requirements for

		species selection, planting density, or maintenance protocols, leading to variable quality and survival rates.
Environmental Standards	2	Environmental protection is referenced in general terms, but there are no specific, enforceable standards for tree planting (e.g., to prevent invasive species or ensure ecosystem compatibility).
Regulatory Framework	2	Legal responsibilities for both planting and maintenance are unclear and often overlap. Permitting is inconsistent, and there is little recourse for non-compliance.
Improved Planning Systems	3	Lifecycle planning for tree planting is informal; handover to maintenance agencies is often ad hoc, resulting in poor long-term survival and limited monitoring.
Capacity Building & Awareness	3	Some training for MoT staff has been implemented, but there is little outreach to local communities or road users. Awareness of the co-benefits of roadside trees (e.g., dust reduction, shade) is generally low.
Sustainable Procurement	2	Procurement processes rarely include tree planting requirements or sustainability criteria, and contractors are not incentivized to ensure long-term survival of plantings.
Financial Mechanisms	2	Funding is sporadic, often tied to specific projects or donor initiatives. Maintenance budgets are insufficient or not ring-fenced, leading to rapid decline in planted trees after initial establishment.
Supply Systems	3	Nurseries are available, but supply chains for high-quality, site-appropriate planting material are unreliable. Coordination between suppliers, contractors, and MoT is weak, leading to mismatches in species selection and planting schedules.
Collaborative Partnerships	3	There is some cooperation with local governments, but formal agreements and long-term commitments are rare. Partnerships with environmental NGOs and community groups are limited and often informal.

Roadside tree planting is at an early stage of systematization. The main barriers are unclear institutional mandates, lack of strategic roadmaps, weak standards, and poor financing for maintenance. Without a clear division of responsibilities and dedicated funding, survival and impact remain limited.

5.2. Bio-engineering (Vegetative Slope Stabilization)

Bio-engineering is increasingly recognized as a cost-effective and sustainable solution for slope stabilization and erosion control. However, the assessment shows that while there are encouraging pilots, the enabling environment is not yet mature for mainstreaming or scaling.

Table 5: Results of Maturity Assessment Checklist for "Bio-engineering".

Enabling Factor	Maturity Level	Observations
Policy Development	3	Draft policies reference bio-engineering, but there are no binding mandates or clear assignment of responsibilities for design, implementation, and maintenance.
Roadmaps for Green Roads	2	No national roadmap for bio-engineering exists. Local pilots are not coordinated or linked to a broader scaling strategy.
Application of New Technologies	3	Innovative pilots (e.g., vetiver grass, check dams) have been implemented, but knowledge and expertise are concentrated among a few specialists. There is no systematic evaluation or dissemination.
Improved Design Standards	2	Standards for bio-engineering are under development, but not finalized or enforced. As a result, techniques and materials used vary widely and are often not site-specific or climate-resilient.
Environmental Standards	2	Standards for monitoring biodiversity impacts and ecosystem compatibility are weak or absent, increasing the risk of unintended negative impacts.
Regulatory Framework	2	Legal provisions are fragmented, with significant overlaps between environmental and engineering agencies. This leads to delays and inconsistent permitting.
Improved Planning Systems	3	Planning for bio-engineering is limited to individual projects; there is no lifecycle or maintenance planning. Handover to maintenance agencies is informal.
Capacity Building & Awareness	3	Some training for engineers and contractors exists, but there is little outreach to local communities or district-level staff. Technical knowledge is not widespread.
Sustainable Procurement	2	Procurement rarely incorporates bio-engineering criteria, and contractors are not incentivized to use nature-based solutions.
Financial Mechanisms	2	Funding is sporadic and not institutionalized. Maintenance is not reliably financed, leading to deterioration after initial construction.
Supply Systems	3	Supply chains for plant materials exist but are unreliable, especially for specialized species. There is limited quality control or certification of suppliers.
Collaborative Partnerships	3	Some cooperation with local agencies and research institutions, but formal mechanisms for knowledge exchange and coordination are lacking.

Bio-engineering is recognized in policy and practice, but scaling up is held back by lack of clear standards, fragmented regulatory oversight, insufficient financing, and limited technical capacity outside pilot areas. The absence of a national roadmap and formalized partnerships further limits progress.

5.3. Land and Water Management

Land and water management is increasingly acknowledged as vital for infrastructure resilience and sustainability. However, the enabling environment is fragmented, and integration into road sector planning and operations is still in its infancy.

Table 6: Results of Maturity Assessment Checklist for "Land and Water Management".

Enabling Factor	Maturity Level	Observations
Policy Development	3	Frameworks for water and land management exist but are not specifically tailored to the road sector. Integration into road policies is weak, and mandates are unclear.
Roadmaps for Green Roads	2	No comprehensive roadmap for land and water management in the road sector. Project-level plans exist in some cases, but there is no national vision or coordination.
Application of New Technologies	3	Pilots for erosion control and water-sensitive design exist, but capacity to scale up is limited by lack of technical guidance and funding.
Improved Design Standards	2	Hydrological and land management guidelines are under development, but not yet widely applied or enforced. Standards for water reuse or runoff management are missing.
Environmental Standards	3	Standards for erosion and pollution prevention exist but are not enforced consistently. Monitoring is weak, and compliance is often superficial.
Regulatory Framework	3	Laws for water management exist, but they are not specific to roads. Permitting is inconsistently applied, and agency mandates often overlap, leading to gaps in enforcement.
Improved Planning Systems	2	Strategic planning for sustainable water and land management is limited. Most interventions are reactive (responding to erosion/flooding) rather than proactive or integrated into design.
Capacity Building & Awareness	3	Training for engineers is available, but community education and involvement are minimal. There is little awareness of the benefits of water-sensitive road design.
Sustainable Procurement	2	Procurement rarely integrates water/land management criteria. There are no incentives for innovative or sustainable solutions in tendering processes.
Financial Mechanisms	2	Funding is ad hoc; there are no dedicated incentives or budget lines for sustainable land or water management, and maintenance is often neglected.
Supply Systems	3	Some use of eco-friendly materials, but supply chains for specialized products (e.g., geotextiles, water retention systems) are underdeveloped.
Collaborative Partnerships	3	Coordination with environmental agencies exists but is informal. There are no formalized mechanisms for inter-agency or community collaboration, limiting joint planning and learning.

MoT has begun to address land and water management, but most enabling factors are only partially in place. Integration into road sector policies and planning is especially weak, and regulatory, procurement, and financing mechanisms are not yet supportive of large-scale or sustained implementation.

The assessment highlights a set of recurring enabling factors that require urgent and coordinated attention:

- **Policy Development:** National road sector policies must explicitly integrate green road practices, with clear mandates for implementation and maintenance.

- **Strategic Roadmaps:** There is an urgent need for comprehensive, actionable national roadmaps for each green practice, with targets, timelines, and monitoring mechanisms.
- **Design & Environmental Standards:** Finalization and enforcement of technical and environmental standards for all three practices is required to ensure quality, consistency, and sustainability.
- **Regulatory Frameworks:** Legal responsibilities must be clarified, and agency overlaps resolved, to enable clear lines of accountability and efficient permitting.
- **Sustainable Procurement & Financing:** Green criteria should be systematically included in procurement, and dedicated funding mechanisms established to ensure implementation and long-term maintenance.
- **Capacity Building & Partnerships:** Training and awareness-raising need to be scaled up and extended to local communities, while partnerships with environmental agencies, research institutions, and NGOs should be formalized.

A cross-cutting challenge is the fragmentation of roles and responsibilities across ministries, agencies, and levels of government. This leads to unclear mandates, weak coordination, and inconsistent implementation - especially for maintenance and monitoring.

Based on the analysis above, it is concluded that the Ministry of Transport of Tajikistan is at the **“In Development” stage** for all three green road practices. Recognition and pilot initiatives exist, but the enabling environment is not yet fully established or integrated. The findings provide a robust foundation for prioritizing interventions to strengthen policy, planning, standards, financing, and institutional capacity. **The next step is to develop a detailed capacity-building plan for Green Roads in Tajikistan**, focused on these enabling factors to support national-scale implementation and sustainability.

The maturity assessment findings also provide the basis for practical enabling-environment recommendations. The following chapter translates the identified gaps into priority institutional changes, improved working procedures, coordination arrangements, project-cycle entry points, budget and maintenance options, and monitoring indicators. These recommendations are intended to support the transition from pilot-level application toward systematic implementation of green road practices

6. Practical Recommendations and Implementation Arrangements

The assessment confirms that Tajikistan has high-level policy basis for green roads. Several relevant institutions have undertaken individual activities in roadside regreening, bio-engineering or roadside water management.

However, these scattered activities do not add up to a substantial program. Green road practices are not yet systematically embedded in road-sector procedures. The main constraints are fragmented responsibilities, underdeveloped inter-agency coordination around green road themes, insufficient integration of green criteria into design and procurement, and underdeveloped arrangements for financing or long-term maintenance.

This chapter translates the findings of the stakeholder analysis and maturity assessment into practical recommendations for strengthening the enabling environment. The recommendations are provided at the enabling framework level.

The Green Corridor Guideline, developed under this project, will serve as the main practical guidance document for applying green road principles in Tajikistan. This report identifies the institutional, procedural and financing conditions needed to support the effective use of that Guideline.

6.1. Priority Institutional Changes Required for Green Road Implementation

The priority of institutional need is to move from scattered project-based implementation toward a coordinated system for planning, delivering and maintaining green road measures. The following changes are recommended:

1. **Designate a green roads focal function within MoT/ PIURR.**
   This would provide a clear institutional entry point for coordination, follow-up and mainstreaming of green road practices.
2. **Formalize inter-agency coordination.**
   Roadside tree planting, bio-engineering and road-related water management require cooperation between road, forestry, environmental, water, agriculture and local government institutions.
3. **Clarify long-term maintenance responsibilities before implementation.**
   For roadside trees, bio-engineering vegetation and water-management structures, responsibilities for maintenance, inspection, replacement and financing should be agreed before taking-over.
4. **Introduce district-level focal points for green road measures.**
   Local coordination is essential because water availability, livestock movement, nursery supply, community involvement and maintenance capacity vary by location.

5. **Involve the Forestry Agency and Committee for Environmental Protection earlier in planning and design.**
   Their inputs are important for species selection, biodiversity protection, erosion control, environmental safeguards and vegetation management.
6. **Strengthen the role of design institutes.**
   Design institutes should integrate green road criteria into feasibility studies, design drawings, technical specifications, bills of quantities and design review processes, using the Green Corridor Guideline as the main technical reference.
7. **Establish a clear handover process from construction to maintenance.**
   Green measures should not be considered complete unless maintenance responsibilities, funding source, inspection frequency and correction procedures are identified.

6.2. Improved Working Procedures, Joint Planning and Information Exchange

The district consultations confirmed that many green road challenges are procedural rather than purely technical. Tree survival, slope stabilization and improved land and water management along roads depend on early coordination between road engineers, forestry bodies, environmental authorities, local administrations, contractors and communities.

The following improvements are recommended:

- **Regular joint planning meetings** should be convened by MoT/ PIURR with relevant agencies to identify priority road sections and agree on feasible green road measures.
- **Joint site screening before design** should assess erosion risks, drainage problems, water availability, planting potential, livestock pressure, land-use constraints and maintenance feasibility.
- **Information exchange between agencies** should cover nursery availability, suitable species, water sources, biodiversity issues, erosion-prone sites, livestock routes and local maintenance capacity.
- **Design review procedures** should include green road criteria, using the Green Corridor Guideline as the main reference.
- **Procurement preparation** should ensure that green measures are included in bills of quantities, technical specifications, contract conditions, supervision requirements and maintenance obligations.
- **Construction coordination** should be strengthened where green measures affect local water use, planting areas, land access, livestock movement or community activities.

- **Handover documentation** should identify green assets created, maintenance needs, responsible actors and defects-liability obligations.
- **Maintenance reporting** should include tree survival, condition of bio-engineering measures, drainage performance, erosion damage and replacement needs.

6.3. Coordination Mechanism

PIURR /MoT should consider establishing a **Green Roads Working Group** as the main coordination mechanism for green road implementation.

The proposed mechanism should:

- be chaired by MoT or PIURR;
- include MoT, PIURR, Road Maintenance Department, Forestry Agency, Committee for Environmental Protection, Committee for Emergency Situations, local authorities, design institutes and other relevant institutions;
- meet quarterly during the initial implementation period;
- review green road issues at key stages: design, procurement, construction, taking-over and maintenance;
- support joint identification of priority road sections suitable for roadside tree planting, bio-engineering, erosion control, and improved water management;
- facilitate information exchange on species selection, nursery availability, water sources, biodiversity issues, erosion-prone areas, livestock movement, and local maintenance capacity;
- prepare short action notes after each meeting, identifying agreed decisions, responsible actors, deadlines, and follow-up actions;
- support the use of the Green Corridor Guideline as the main technical reference for green road planning and implementation.

The Green Roads Working Group should not replace the formal mandates of existing institutions. Rather, it should function as a coordination and advisory platform to help align responsibilities, improve communication, reduce overlaps, and support more consistent implementation of green road measures across projects and locations.

Formal establishment, membership, mandate, reporting arrangements, and decision-recording procedures should be confirmed by PIURR /MoT in accordance with national procedures.

The project has already identified and engaged key stakeholders, all of whom have expressed willingness to remain involved. PIURR, as the client and owner of the Green Corridor Guideline, should take the lead in formally establishing the Green Roads

Working Group, based on the proposed composition. The project team remains available to support this process and to follow PIURR /MoT guidance on the next steps.

6.4. Integration of Green Criteria into the Road Project Cycle

Green criteria should be integrated into the full road project cycle as follows:

- **Planning:** identify road sections suitable for roadside planting, bio-engineering, erosion control and improved water management.
- **Design TORs:** require designers to assess green road options – using the Green Corridor Guidelines
- **Detailed design:** include green measures in drawings, specifications and cost estimates.
- **Environmental review:** check biodiversity, land-use, water and community impacts.
- **Procurement:** include green measures in bills of quantities, technical specifications, bid requirements and contractor method statements.
- **Construction:** implement green measures according to approved designs and seasonal/site conditions.
- **Supervision:** verify planting quality, slope stabilization, drainage functionality and erosion-control measures.
- **Taking-over:** confirm that green measures are completed, documented and functional.
- **Defects-liability period:** require replacement of failed trees, vegetation or defective green works.
- **Maintenance:** include green assets in routine maintenance plans and budgets.

6.5. Budgeting, Financing and Long-Term Maintenance

Green road measures should be budgeted and maintained as part of the road asset, not treated as optional additions. The following actions are recommended:

- include green measures as separate bill-of-quantity items;
- include establishment-period maintenance in construction contracts;
- specify contractor replacement obligations during the defects-liability period;
- include green assets in annual road maintenance plans;
- introduce maintenance line items for watering, replanting, pruning, drain cleaning, erosion repair and vegetation management;
- apply multi-year maintenance planning for trees and bio-engineering measures;
- explore use of road maintenance budgets, Road Fund resources where applicable, donor finance, climate finance and environmental/forestry programs;

- consider local/community maintenance arrangements where responsibilities are clearly agreed;
- consider performance-based maintenance contracts for selected green road measures.

Before taking-over, each green measure should have an identified maintenance actor, funding source, inspection frequency and correction procedure.

6.6. Role of the Green Corridor Guideline

The **Green Corridor Guideline** developed under this project should become the main practical reference for applying green road measures in Tajikistan.

It should be used for:

- site screening;
- design preparation and review;
- technical specifications and bills of quantities;
- procurement documents;
- construction supervision;
- taking-over and defects-liability follow-up;
- maintenance planning.

This Enabling Framework Report and the Green Corridor Guideline are complementary. The report defines the enabling conditions, while the Guideline provides the technical guidance for implementation. Together, they support the mainstreaming of green road practices across the road sector.

6.7. Specific measures for Roadside Tree planting

This section sets out in more detail the institutional and policy measures to systematically introduce roadside tree planting in Tajikistan, based on the maturity assessment, In general the Forestry Agency – usually in close cooperation with the Jamoats - has in different locations introduced roadside tree planting, but total coverage is very limited. Different models are used. The Ministry of Transport has committed to plant 5 million trees along roads in Tajikistan, as part of its contribution to the Green Tajikistan program. It is unclear how this commitment will be operationalized and how it is dovetailed with other organizations.

The table below gives detailed recommendations to mainstream roadside tree planting.

The main priorities are:

- Have an explicit policy statement with targets and clarity on institutional responsibilities for planning, planting, maintenance and commercial exploitation

- Develop a roadmap – with all main stakeholders - . The roadmap would include:
- Operationalization of targets (what, where, when) for the entire country, supported by geographical information system for planning and monitoring
- The implementation models used, including the commercial business plan, taking into account different forms of ownership of roadside lands
- The financing requirements and pay-back arrangements
- The supporting capacity development at different levels – including community, roadside workers, local government and Ministry of Transport technical staff
- The connection to technologies in use (with supporting measures), differentiated for different parts of Tajikistan
- Reference to existing and new guidelines and standards
- Development of supporting measures: tightened design criteria, financial arrangements and stimulation packages and capacity building.

Table 7: institutional and policy measures to systematically introduce roadside tree planting in Tajikistan.

Enabling Factor	Observations	Recommendations
Policy Development	There is some policy recognition of the value of roadside tree planting, but the mandates for maintenance are fragmented. Responsibilities are inconsistently assigned between MoT, local governments, and environmental agencies, resulting in weak enforcement and unclear accountability.	An explicit policy statement clarifying quantitative targets on roadside tree planting (number of kilometer to be covered, or percentage) for both roads under Ministry of Transport and other departments, including local government would galvanize efforts in roadside tree planting, This should include the assignment of roles of main organizations both in planting and in maintenance/ rejuvenation.
Roadmaps for Green Roads	No national or sectoral roadmap exists. Local plans are ad hoc and lack clear timelines, milestones, or mechanisms for monitoring progress. Without a strategic vision, scaling up remains difficult.	A road map for roadside tree planting would need to be developed under the focal point leadership. This road map would include: • Operationalization of targets (what, where, when) for the entire country, supported by geographical information system for planning and monitoring • The implementation models used, including the commercial business plan, taking into account different forms of ownership of roadside lands • The financing requirements and pay-back arrangements • The supporting capacity development at different levels – including community, roadside workers, local government and Ministry of Transport technical staff • The connection to technologies in use (with supporting measures),

		differentiated for different parts of Tajikistan • Reference to existing and new guidelines and standards
Application of New Technologies	Some pilots have introduced drought-resistant and native species, but broader access to advanced planting technologies and knowledge of species selection remains limited. There is no systematic process for evaluating or scaling up successful innovations.	The Forestry Agency with its technical institutes will do a review of existing experience in tree planting and formulate best practice, also taking into account promising new practice and combined measures (such as water management)
Improved Design Standards	Draft standards for roadside planting exist but are not consistently applied. There is a lack of binding requirements for species selection, planting density, or maintenance protocols, leading to variable quality and survival rates.	The draft standards will be reviewed and finalized – including species selection, taking into account different functions, planting density, or maintenance protocols (including mowing of grasses, pruning, pollarding)
Environmental Standards	Environmental protection is referenced in general terms, but there are no specific, enforceable standards for tree planting (e.g., to prevent invasive species or ensure ecosystem compatibility).	Additional standards will be formulated as part of the design standards (see above), addressing in particular: • Control of invasive species • Promotion of biodiversity
Regulatory Framework	Legal responsibilities for both planting and maintenance are unclear and often overlap. Permitting is inconsistent, and there is little recourse for non-compliance.	As part of and as a consequence of the road map, the responsibility for both planting and maintenance of different organization would need to anchored in rules and regulation, following the overall guidelines. Also scope for private sector roles (in execution, operation or sourcing material) should be worked out.
Improved Planning Systems	Lifecycle planning for tree planting is informal; handover to maintenance agencies is often ad hoc, resulting in poor long-term survival and limited monitoring.	In guidelines the life cycle planning of tree planting and integrated management (species diversity, grasses) should be incorporated connected to the main and location specific priorities (dust control, road safety, CO2 capture, beautification, quality of life, creating microclimate, slope stabilization, etc)
Capacity Building & Awareness	Some training for MoT staff has been implemented, but there is little outreach to local communities or road users. Awareness of the co-benefits of roadside trees (e.g., dust reduction, shade) is generally low.	Tree planting (and other green road measures) should be mainstreamed into training of departmental and local government staff, as well as private entrepreneurs interested to work in the sector.
Sustainable Procurement	Procurement processes rarely include tree planting requirements or sustainability criteria, and contractors are not	Criteria should be developed for sustainable procurement – connected to survival rates, and not one time planting,

	incentivized to ensure long-term survival of plantings.	
Financial Mechanisms	Funding is sporadic, often tied to specific projects or donor initiatives. Maintenance budgets are insufficient or not ring-fenced, leading to decline in planted trees after initial establishment.	There should be an overhaul of financing mechanisms: • Dedicated amounts (%) in road development programs • Commercial propositions for roadside tree plantations and for nurseries connected to loan or subsidy practices
Supply Systems	Nurseries are available, but supply chains for high-quality, site-appropriate planting material are unreliable. Coordination between suppliers, contractors, and MoT is weak, leading to mismatches in species selection and planting schedules.	As part of the road map, the sourcing of different species of trees, shrubs and grasses, through public and private enterprises/ nurseries should be planned and developed and support measures (investment financing, secured purchase contracts) identified
Collaborative Partnerships	There is some cooperation with local governments, but formal agreements and long-term commitments are rare. Partnerships with environmental NGOs and community groups are limited and often informal.	As part of the roadmap development, there should be close collaboration between the main organizations involved: Ministry of Transport, Forestry Agency, Committee for Environmental Protection, *Jamoats*. The roadmap should be supported and engage these main organizations.

6.8. Specific measures for Bio-engineering

Hillside slope instability is a major challenge in Tajikistan, amplified by a warming environment and changing rainfall patterns. The development of roads is a huge factor, with new roads opening up slopes and changing run-off and drainage patterns. Bio-engineering – successfully applied in other mountain areas - is a high priority in Tajikistan. So far it is only applied on a very limited try-out scale, with limited use of the entire range of practices. It is important that bio-engineering is applied far more extensively, starting with the most critical areas. The advantages are that it is cost-effective and long-lasting, is often the only feasible option, is aesthetically pleasing and environmentally friendly and can be implemented locally.

Bio-engineering is recognized in policy and practice, but scaling up is held back by lack of clear standards, fragmented regulatory oversight, insufficient financing, and limited technical capacity outside pilot areas. The absence of a national roadmap and formalized partnerships further limits progress.
The main recommendations are:

- Have a policy statement highlighting the criticality of bio-engineering measures as part of road development and maintenance in sensitive areas, in line with the Green Tajikistan vision

- Highlight the most critical areas where bio-engineering would be introduced, in particular the Roghun Reservoir area, where road development will otherwise accelerate erosion and sedimentation, reducing the life-span of the reservoir
- Assess the best practice from Tajikistan and neighbouring countries (incl Nepal) and capture these in design standards and capacity building programs
- Develop the planning and implementation capabilities, in partnership of main organizations (Ministry of Transport, Committee for Environmental Protection, Ministry of Land Reclamation and Water Resources, Committee for Emergency Situations, *Jamoats*) and making a strong bridge with communal labour programs.

Table 8: institutional and policy measures to systematically introduce bio-engineering along roads in Tajikistan

Enabling Factor	Observations	Recommendations
Policy Development	Draft policies reference bio-engineering, but there are no binding mandates or clear assignment of responsibilities for design, implementation, and maintenance.	A clear policy statement with targets (on critical areas to be covered) building on the Green Tajikistan strategy would be helpful to accelerate the much needed introduction of bio-engineering, including the capacity building, development of plans for critical areas. Along roads in sensitive areas bio-engineering should be compulsory.
Roadmaps for Green Roads	No national roadmap for bio-engineering exists. Local pilots are not coordinated or linked to a broader scaling strategy.	A roadmap is much needed, identifying the most critical areas and making investment plans for those. The Roghun Reservoir area is the highest priority.
Application of New Technologies	Innovative pilots (e.g., vetiver grass, check dams) have been implemented, but knowledge and expertise are concentrated among a few specialists. There is no systematic evaluation or dissemination.	Current limited experience in Tajikistan should be evaluated and compared with experience in comparable mountain countries (in particular Nepal). This should lead to a list of good techniques to be promoted in Tajikistan, and captured in training programs and bill of quantities.
Improved Design Standards	Standards for bio-engineering discussed, but nowhere near being finalized or enforced. As a result, techniques and materials used are limited in scope and are often not site-specific or climate-resilient.	The review of current national and international practice should lead to a consolidated set of recommended practices, taking into account the varying situations in the country.
Environmental Standards	Standards for monitoring biodiversity impacts and ecosystem compatibility are weak or absent, increasing the risk of unintended negative impacts.	The design standard should be complemented with environmental standards, that relate to the national environmental standards, and will elaborate the safeguarding and improvement of local biodiversity and the use of native tree and shrub species and grasses.
Regulatory Framework	Legal provisions are fragmented, with significant overlaps between environmental and engineering agencies. This leads delays and a lack of momentum.	Following the roadmap, the responsibilities and cooperation mechanism between the main stakeholders should be clarified: Ministry of Transport, Committee for Environmental Protection, Ministry of Land Reclamation and Water Resources, Committee for Emergency Situations,

		Design Institutes, *Jamoats* and communities . Also scope for private sector roles (in execution or sourcing material) should be worked out.
Improved Planning Systems	Planning for bio-engineering is limited to individual projects; there is no lifecycle or maintenance planning. Handover to maintenance agencies is informal. On the positive side there is an active practice of community labour (hashr) under which local green infrastructure is maintained.	A strong connection between the communal labour programs, orchestrated by the local government, should be made. The local implementation following bio-engineering principles should be encouraged in densely populated areas. In remote critical areas special crash programmes should be developed, also along roads that were completed earlier. Remote sensing analysis can fast track the identification of crucial high potential locations for bio-engineering measures.
Capacity Building & Awareness	Some training for engineers and contractors exists, but there is little outreach to local communities or district-level staff. Technical knowledge is not widespread.	Based on review of practice to be endorsed, training programs should be set up for local governments, including building up a core of jamoat leaders who understand and support the practice. Within the Forestry Agency a strong knowledge core needs to be introduced.
Sustainable Procurement	Procurement rarely incorporates bio-engineering criteria, and contractors are not incentivized to use nature-based solutions.	Road investments should include standard provisions for nature-based solutions, including bio-engineering, road water management and roadside tree planting,
Financial Mechanisms	Funding is sporadic and not institutionalized. Maintenance is not reliably financed, leading to deterioration after initial construction.	Bio-engineering measures are now initiated on limited scale by Forestry Agency and some NGOs. This should change with (1) compulsory funding for state of the art bio-engineering in road program in highly sensitive areas
Supply Systems	Supply chains for plant materials exist but are unreliable, especially for specialized species. There is limited quality control or certification of suppliers.	As part of the roadmap and the development of design standards, the availability of quality planting material should be reviewed, and assessed how this can be supplied locally and whether additional measures are required.
Collaborative Partnerships	Some cooperation with local agencies and research institutions, but formal mechanisms for knowledge exchange and coordination are lacking.	As part of the roadmap development, there should be close collaboration between the main organizations involved: Ministry of Transport, Committee for Environmental Protection, Ministry of Land Reclamation and Water Resources, Committee for Emergency Situations, *Jamoats* and communities The roadmap should be supported and engage these main organizations.

6.9. Specific measures for Water Management along Roads

There is no significant connection between road development and maintenance and water management. This represents both a missed opportunity and a source of avoidable problems, particularly where roadside erosion is widespread, caused by inadequate and unsafe road water disposal. Roads in Tajikistan are an important part of surface and subsurface hydrology and this needs to be systematically recognized.

The table below gives an overview of the very specific measures to mainstream water management with roads. Areas of special attention are integrating road and water management corrective maintenance, control over road drainage, water quality in sensitive areas.

The priorities would be:

- A policy statement highlighting the necessary connection between roads and water management – and the non negotiable requirement of safe disposal of road drainage in sensitive areas and the intention to make beneficial use of water around the road
- Create a number of water checks that are compulsory and need to be reported on, in particular:
    - Hydrological design check for new roads
    - Safe disposal check for all road drainage in sensitive areas
    - Maintenance check – ensuring all repairs are subject to 'building back better', in other words also addressing the cause of damage
- Develop a road map with all stakeholders - Ministry of Transport, Committee for Environmental Protection, Ministry of Land Reclamation and Water Resources, Committee for Emergency Situations, *Jamoats,* setting in place A road map would be required, including:
    - Inventory of areas where unmanaged road drainage is critical – sensitive mountain areas and areas prone to flooding with plans to equip all drainage outlets to safe disposal
    - Inventory of drought prone areas with plans to address
    - Special instructions for areas where hydrology, soil condition and road structures interact
    - Connection with asset management and maintenance practice.

Table 9: institutional and policy measures to systematically introduce improved land and water management in Tajikistan.

Enabling Factor	Observations	Recommendations
Policy Development	Frameworks for water and land management exist but are not specifically tailored to the road sector. Integration into road policies is weak, and mandates are unclear.	There needs to be a guiding policy statement on the connection between roads and water – mentioning a number of essentials, These essentials are a non negotiable on safe disposal of road drainage in sensitive areas and the intention to make beneficial use of water around the road and to integrate this with design and rehabilitation
Roadmaps for Green Roads	No comprehensive roadmap for land and water management in the road sector. Project-level plans exist	A road map would be required. The road map would contain with: • Inventory of areas where unmanaged road drainage is critical – sensitive

	in some cases, but there is no national vision or coordination.	mountain areas and areas prone to flooding with plans to equip all drainage outlets to safe disposal • Inventory of drought prone areas with plans to address • Special instructions for areas where hydrology, soil condition and road structures interact • Connection with asset management and maintenance practice.
Application of New Technologies	Pilots for erosion control and water-sensitive design exist, yet very limited and capacity to scale up is limited by lack of technical guidance and funding.	Develop and document improved water management (safe disposal, retrofitted drainage designs, water recharge structures, additional water management structures) in selected roads and promote these good examples in internal communication and as part of the capacity building and shared instructions.
Improved Design Standards	Hydrological and land management guidelines are under development, but not yet widely applied or enforced. Standards for water reuse or runoff management are missing.	Prepare and endorse Green Corridor Guidelines that include beneficial water use and safe run-off management, both in work process and in actual designs – including a number of sample designs
Environmental Standards	Standards for erosion and pollution prevention exist but are not enforced consistently. Monitoring is weak, and compliance is often superficial.	Make tailor-made standards for erosion and pollution prevention for road programs, using appropriate road-water management techniques and roadside measures to reduce pollution loads.
Regulatory Framework	Laws for water management exist, but they are not specific to roads. Permitting is inconsistently applied, and agency mandates often overlap, leading to gaps in enforcement.	Initiate a number of water checks that are compulsory and need to be reported on, in particular: (1) Hydrological design check for new roads (2) Safe disposal check for all road drainage in sensitive areas (3) Maintenance check – ensuring all repairs are subject to 'building back better', in other words also addressing the cause of damage
Improved Planning Systems	Strategic planning for sustainable water and land management is limited. Most interventions are reactive (responding to erosion/flooding) rather than proactive or integrated into design.	This follows from the road map and should install a proactive approach, looking at beneficial and no harm use of water around roads. As a standard a hydrological assessment and plan should be part of (1) each new road developed (2) all road maintenance planning (3) whereas for sensitive areas (drought-prone, flood-prone, erosion-prone) special retrofitting plans may be made.
Capacity Building & Awareness	General training for engineers is available, but community education and involvement are minimal. There is little awareness of the benefits of water-sensitive road design.	Develop a capacity building plans for engineers of MoT and of local governments, centered around main opportunities but also feeding into improved planning, with training outputs setting staff on the current track.

Sustainable Procurement	Procurement rarely integrates water/land management criteria. There are no incentives for innovative or sustainable solutions in tendering processes.	Consider awarding design contracts that include water/land management with competing design engineering organizations showcasing their own solutions and approaches
Financial Mechanisms	Funding is ad hoc; there are no dedicated incentives or budget lines for sustainable land or water management, and maintenance is often neglected.	A number of financial measures may be proposed. Foremost is to make safe and beneficial water management part of road development budget (as a contingency percentage). Improved road water management should also be part of maintenance planning with clear instruction not to restore to original condition if damage is related to water damage, but to 'build back better'. Special programs are needed in high importance areas, such as the Roghun Reservoir Area and its partly newly constructed road network, where investment in road water management and bio-engineering is critical.
Supply Systems	Some use of eco-friendly materials, but supply chains for specialized products (e.g., geotextiles, water retention systems) are underdeveloped.	Inventory to be made of necessary material, such as geotextile or other, to see the local supply or production. Consider to stimulate local availability through procurement in road investments.
Collaborative Partnerships	Coordination with environmental agencies exists but is informal. There are no formalized mechanisms for inter-agency or community collaboration, limiting joint planning and learning.	As part of the roadmap development, there should be close collaboration between the main organizations involved: Ministry of Transport, Committee for Environmental Protection, Ministry of Land Reclamation and Water Resources, Committee for Emergency Situations, *Jamoats*. The roadmap should be supported and engage these main organizations.

6.10. Consolidated Framework Implementation Roadmap

The recommendations presented in this report require a phased and coordinated approach. The following consolidated implementation roadmap summarizes the main priority actions required to move from pilot-level and ad hoc application of green road practices toward systematic integration in the road sector. The roadmap is indicative and should be confirmed by MoT/PIURR and relevant institutions during implementation planning.

Table 10: Framework Implementation Roadmap.

No.	Priority action	Responsible institution	Indicative timeframe	Expected result
1	Designate a green roads focal function within MoT/PIURR	MoT / PIURR	Short term: 0–6 months	Clear institutional entry point for coordination, follow-up and mainstreaming of green road practices

2	Establish the Green Roads Working Group	MoT / PIURR, with Forestry Agency, CEP, Road Maintenance Department, local authorities, design institutes and other relevant institutions	Short term: 0–6 months	Formal coordination platform established; regular meetings and action notes introduced
3	Confirm functional roles and responsibilities for planning, design, implementation, maintenance and monitoring of green road measures	MoT / PIURR, Road Maintenance Department, Forestry Agency, CEP, local administrations, design institutes	Short term: 0–12 months	Clearer division of responsibilities and reduced institutional overlaps
4	Adopt the Green Corridor Guideline as the main technical reference for green road planning and implementation	MoT / PIURR	Short term: 0–12 months	Common technical reference used by designers, contractors, supervisors and maintenance actors
5	Introduce joint site screening for priority road sections	MoT / PIURR, Design Institutes, Forestry Agency, CEP, local administrations	Short term and ongoing	Road sections suitable for roadside planting, bio-engineering and water-management measures identified early
6	Integrate green criteria into feasibility studies, design TORs and design review procedures	MoT / PIURR, Design Institutes	Short to medium term: 6–18 months	Green road options systematically considered during project preparation and design
7	Include green measures in drawings, technical specifications, bills of quantities and cost estimates	Design Institutes, MoT / PIURR	Short to medium term: 6–18 months	Green measures become part of approved engineering designs and project budgets
8	Update procurement documents to include green road requirements, contractor method statements, establishment-period maintenance and replacement obligations	MoT / PIURR, Procurement units	Short to medium term: 6–18 months	Contractors are contractually required to implement and maintain green measures during the relevant period
9	Introduce taking-over checks for green assets	MoT / PIURR, Supervision consultants, Road Maintenance Department	Medium term: 12–24 months	Green measures are verified before acceptance and linked to defects-liability obligations
10	Include green assets in annual and multi-year road maintenance plans	Road Maintenance Department, MoT, Ministry of Finance / Road Fund where applicable	Medium term: 12–24 months	Maintenance of trees, bio-engineering works and drainage/water-management measures is planned and budgeted

11	Prepare a national or sectoral roadmap for roadside tree planting, including targets, species selection, nursery supply, maintenance responsibilities and financing	MoT / PIURR, Forestry Agency, CEP, local administrations	Medium term: 12–24 months	Roadside tree planting moves from ad hoc implementation to a planned and monitored program
12	Prepare a roadmap for bio-engineering in priority erosion and landslide-prone road sections, including Roghun Reservoir catchment as a priority area	MoT / PIURR, CEP, Committee for Emergency Situations, Forestry Agency, local administrations, design institutes	Medium term: 12–24 months	Priority sites for bio-engineering identified and investment planning initiated
13	Prepare a roadmap for improved land and water management, including drainage outlet inventories, safe disposal checks and opportunities for beneficial water use	MoT / PIURR, water-related agencies, CEP, local administrations, design institutes	Medium term: 12–24 months	Road drainage risks and water-use opportunities are systematically identified and addressed
14	Deliver targeted capacity building for national, district and local actors	MoT / PIURR, training providers, Forestry Agency, CEP, design institutes	Medium term and ongoing: 12–36 months	Staff and stakeholders have improved practical capacity to plan, design, implement and maintain green road measures
15	Pilot integrated green road measures in selected priority road sections and document lessons learned	MoT / PIURR, local administrations, contractors, supervision consultants, communities where appropriate	Medium term: 12–36 months	Demonstration examples created and used for learning and scaling
16	Update technical standards and standard drawings based on the Green Corridor Guideline and implementation experience	MoT / PIURR, Design Institutes, relevant regulatory bodies	Medium to long term: 24–48 months	Green road practices progressively incorporated into national road-sector standards
17	Repeat the maturity assessment to track progress	MoT / PIURR with relevant institutions	Every 2 years	Progress from “In Development” toward “In Place” or higher maturity levels is measured

This roadmap should be treated as an initial implementation framework. It should be refined by MoT/PIURR and the proposed Green Roads Working Group based on available resources, institutional decisions, donor coordination, and lessons from early implementation.

6.11. Consolidated Monitoring and Evaluation Framework

To support implementation and follow-up of the Green Roads enabling framework, a concise monitoring and evaluation framework is proposed. The framework is intended to track whether green road practices are being progressively integrated into planning, design, procurement, construction, supervision, taking-over, and maintenance processes.

The monitoring framework builds on the maturity assessment presented in Chapter 5 and Annex B. It should be used by MoT/PIURR and relevant partner institutions as a practical management tool. Baseline values reflect the current “In Development” status identified in the assessment. Targets should be reviewed and confirmed by MoT/PIURR once the implementation roadmap is formally adopted.

Table 11: Monitoring and Evaluation Framework.

No.	Indicator	Baseline value	Target value	Responsible institution	Monitoring frequency
1	Green Roads Working Group established and operational	No formal dedicated mechanism currently in place	Working Group established, with regular meetings and action notes	MoT / PIURR	Quarterly
2	Number of coordination meetings held on green road implementation	Ad hoc coordination only	At least 4 meetings per year during initial implementation	MoT / PIURR	Quarterly
3	Road projects screened for roadside tree planting, bio-engineering and improved land and water management opportunities	Not systematically applied	All new priority road projects screened using Green Corridor Guideline	MoT / PIURR, Design Institutes	At project preparation stage
4	Feasibility studies and design TORs including green road criteria	Limited and project-specific	Green criteria included in TORs for all relevant new road projects	MoT / PIURR	Annually
5	Detailed designs including green measures in drawings, specifications and bills of quantities	Not consistently included	Green measures included in all applicable detailed designs	Design Institutes, MoT / PIURR	At design review stage

6	Tender documents including green road requirements	Limited and inconsistent	Green criteria included in bidding documents and technical specifications for relevant projects	MoT / PIURR, Procurement units	For each tender
7	Contracts including establishment-period maintenance and replacement obligations for green measures	Not systematically included	Maintenance and replacement obligations included in relevant contracts	MoT / PIURR, Contractors	For each contract
8	Tree survival rate after establishment period	Not systematically monitored; survival rates vary and are often low	Minimum survival target to be confirmed by MoT/PIURR; recommended initial target: at least 70–80% survival after establishment period	Road Maintenance Department, Forestry Agency, Local administrations	Semi-annually during establishment period
9	Bio-engineering sites inspected and maintained	Inspection and maintenance not systematic	All implemented bio-engineering sites inspected and maintained according to maintenance plan	Road Maintenance Department, MoT / PIURR, Local administrations	Semi-annually and after major rainfall events
10	Road drainage outlets in sensitive areas checked for safe disposal	Not systematically checked	Safe disposal checks applied to all drainage outlets in identified sensitive areas	MoT / PIURR, Design Institutes, Road Maintenance Department	During design, taking-over and annual maintenance inspections
11	Water-management measures implemented along roads, including runoff diversion, erosion control, recharge or storage measures	Implemented only in selected cases	Measures implemented in priority road sections identified in the roadmap	MoT / PIURR, Road Maintenance Department, Water-related agencies, Local administrations	Annually
12	Maintenance budget line/items for green road assets included in annual	Not systematically included	Green road maintenance line/items included in annual maintenance plans	MoT, Road Maintenance Department, Ministry of Finance /	Annually

	maintenance planning			Road Fund where applicable	
13	Staff trained on roadside tree planting, bio-engineering and water-sensitive road management	Training delivered on an ad hoc basis	Training delivered to relevant national, regional and district-level staff according to the Capacity Building Plan	MoT / PIURR, Training providers, Forestry Agency, CEP	Annually
14	Updated maturity assessment completed for the three green road practices	Baseline assessment completed under this report	Maturity assessment updated to track progress from “In Development” toward “In Place”	MoT / PIURR with relevant institutions	Every 2 years

The monitoring framework should be reviewed after the first year of implementation and updated based on practical experience, available budget, institutional decisions and lessons learned from pilot and demonstration activities.

7. Conclusion

This Enabling Framework Report set out to assess whether the institutional, policy, and capacity conditions in Tajikistan are in place to support the systematic mainstreaming of green road practices. Rather than focusing on technical feasibility alone, the analysis examined the broader enabling environment - looking at policies, stakeholder roles, coordination mechanisms, and the maturity of key enabling factors that determine whether green roads can move beyond pilots and become standard practice.

The assessment shows that Tajikistan has a **strong strategic foundation** for green roads. National development and climate policies consistently recognize the transport sector as a priority for climate adaptation and resilience, and explicitly promote nature-based solutions, ecosystem protection, and sustainable infrastructure. Roadside tree planting, bio-engineering, and improved land and water management along roads are well aligned with national objectives related to climate resilience, disaster risk reduction, environmental protection, and rural development. From a policy perspective, the direction of travel is clear and supportive.

At the same time, the stakeholder and institutional analysis highlights a **highly fragmented implementation landscape**. Responsibilities for road construction, maintenance, environmental oversight, vegetation management, and water management are distributed across multiple ministries, agencies, and levels of government. While many relevant mandates exist, coordination mechanisms are weak, roles are not always clearly defined, and responsibilities for long-term maintenance - particularly for green

measures such as tree planting - remain unclear. This fragmentation is more pronounced for non-state and local roads, where resources and oversight are limited.

Across all three priority practices, the overall maturity level is assessed as **“In Development”**. While awareness and pilot experience exist, several enabling factors (such as policy integration, strategic roadmaps, technical and environmental standards, regulatory clarity, procurement, financing, and capacity building) are only partially in place. These gaps result in inconsistent implementation, variable quality, and limited sustainability of green road interventions.

Key barriers identified include:

- Absence of comprehensive national roadmaps and coordinated strategies for scaling up green road practices.
- Incomplete and inconsistently applied technical and environmental standards, leading to variable outcomes and weak monitoring.
- Overlapping and unclear regulatory responsibilities, causing delays and inefficiencies in permitting and enforcement.
- Procurement and financing mechanisms that do not incentivize sustainability or long-term maintenance, resulting in rapid decline of interventions after initial establishment.
- Limited capacity building and partnership development, particularly with local communities, environmental agencies, and research institutions.
- Unreliable supply systems for planting materials and bio-engineering inputs, affecting quality and survival rates.

At the same time, the assessment highlights a window of opportunity: many foundational elements - such as policy recognition, pilot experience, and draft standards - are already present and can be activated, aligned, and strengthened. T**he main challenge is not a lack of ambition or technical options, but the need to build a coherent enabling environment that translates intentions into consistent action at scale.**

This report therefore provides a baseline for action. By clarifying institutional roles, strengthening coordination, finalizing standards, integrating green criteria into planning and procurement, and investing in targeted capacity building, the Ministry of Transport and its partners can move from isolated pilots toward systematic implementation. The findings directly inform the accompanying Capacity Building Plan, which translates these priorities into actions to support the mainstreaming of green roads across Tajikistan’s road network in a sustainable and scalable manner.

Importantly, the Capacity Building Report directly builds on the findings and priority gaps identified in this Enabling Framework Report. The Capacity Building Report goes deeper

by translating the maturity assessment results into a detailed, participatory, and adaptive capacity development program. The approach is based on learning-by-doing, peer exchange, and institutionalization, ensuring that capacity development is not a one-off event but a continuous, embedded process. It prioritizes capacity building needs for each enabling factor, specifies the institutional roles and responsibilities for training at national, regional, and local levels, and lays out a phased implementation timeline. The report outlines concrete actions such as policy dialogue workshops, technical guideline dissemination, legal review sessions, training modules for engineers and communities, and pilot demonstration sites. Monitoring and evaluation are integral, with clear indicators to track progress, skills application, and institutional change, while sustainability is supported by embedding training in HR systems and establishing peer networks and demonstration sites.

By explicitly linking the diagnostic findings of the Enabling Framework Report with the targeted actions in the Capacity Building Report, the project provides an integrated and actionable roadmap for the systematic and sustainable mainstreaming of green road practices in Tajikistan. Together, these two deliverables ensure that capacity building is directly aligned with the enabling environment’s needs and supports lasting institutional change.

Annex

Annex A: Updated Maturity Assessment (Blank) Checklists

Table 12: Updated checklist for assessing the maturity of enabling environment for "Roadside Tree Planting"

Roadside Tree Planting								
Nr	**Enabling factor**	**Questions**	**Rating**					
			Least Positive Most Positive					
			1	**2**	**3**	**4**	**5**
1	**Policy Development**	Are there policies or frameworks that require or encourage both the planting and maintenance of roadside trees in road projects?						
		Do these policies clearly assign responsibilities for planting (e.g., MoT) and maintenance (e.g., Environmental Protection Department, local government, community)?						
		Please list the relevant policies, and explain who is responsible for designing, implementing and maintaining the roadside tree plantations currently						
2	**Roadmaps for Green Roads**	Are there strategic documents including goals, actions, and benchmarks for implementing and maintaining roadside tree planting in road projects?						
		Does the roadmap include clear steps, timelines, and assignment of responsibilities for both planting and maintenance?						
		If yes, please list the relevant documents and procedures						
3	**Application of New Technologies**	Do you have access to and expertise in technologies for both planting (e.g., improved planting tools, drought-resistant species) and maintenance (e.g., irrigation, pruning)?						

		Are there policies or measures to establish pilot projects to test innovative tree planting and maintenance practices?					
		If yes, please list the current technologies used for planting and maintenance of roadside trees.					
4	**Improved Design Standards**	Are there design standards or guidelines specifying species selection, spacing, planting methods, and maintenance requirements for roadside trees?					
		Do these standards clarify who is responsible for implementation and ongoing care at each stage?					
		List the relevant design standards and describe how they are developed, updated, and enforced for roadside tree planting and maintenance.					
5	**Environmental Standards**	Are there standards to ensure tree planting and maintenance practices protect biodiversity, avoid invasive species, and minimize negative environmental impacts?					
		Are there requirements to monitor and mitigate potential negative impacts of maintenance activities (e.g., pesticide use, pruning)?					
		List the relevant environmental standards for roadside tree planting and maintenance and describe how these are applied, monitored, and enforced?					
6	**Regulatory Framework**	Are there clear legal or regulatory provisions assigning authority and responsibility for both planting and maintenance of roadside trees?					
		Is there a mechanism for resolving disputes or gaps in responsibility between agencies involved?					
		List relevant regulatory frameworks for roadside tree planting and maintenance and describe how they are implemented and enforced?					

7	**Improved Planning Systems**	Is the full lifecycle (planting to maintenance) of roadside trees integrated into road project planning, budgeting, and scheduling?					
		Is there a formal process or agreement for handover from planting (MoT) to maintenance (Environmental Protection Department or others)?					
		How is roadside tree planting and maintenance incorporated into planning and project management processes?					
8	**Capacity Building and Awareness**	Are MoT, Environmental Protection Department, districts, contractors, and communities trained in both planting and maintenance best practices?					
		Are there awareness programs or campaigns to encourage community involvement and stewardship of roadside trees?					
		What training or awareness activities are undertaken for roadside tree planting and maintenance, and who participates?					
9	**Sustainable Procurement**	Does the procurement process include requirements for roadside tree planting or other road greening activities?					
		Are there criteria of roadside tree planting included in the evaluation of bids?					
		Describe how this is done in practice?					
10	**Financial Mechanisms**	Are funds allocated for both the initial planting and ongoing maintenance of roadside trees?					
		Are there mechanisms for sharing costs, transferring funds, or incentivizing community-based maintenance (e.g., profit-sharing, benefit agreements)?					

		Are there funds for roadside tree planting and maintenance and how are these allocated and managed?					
11	**Supply systems: available Resources and Materials**	Are nurseries or suppliers able to provide suitable species and replacement seedlings for both planting and maintenance?					
		Are responsibilities for ensuring supply and delivery of materials clearly allocated between MoT and Environmental Protection Department?					
		How are supply chains for planting and maintenance materials organized and monitored?					
12	**Connection with other programs/ collaborative partnership**	Is there effective cooperation between MoT, Environmental Protection Department, forestry agencies, and local communities for both planting and maintenance?					
		Are there mechanisms (formal agreements, joint committees, benefit-sharing schemes) to ensure smooth handover and shared responsibility for maintenance, especially outside the road verge?					
		Please describe any partnerships, agreements, or collaborations for roadside tree planting and maintenance.					

Table 13: Updated checklist for assessing the maturity of enabling environment for "Bio-engineering"

Bio-engineering							
Nr	**Enabling factor**	**Questions**	**Rating**				
			Least Positive Most Positive				
			1	**2**	**3**	**4**	**5**
1	**Policy Development**	Are there policies or frameworks that require or encourage the use of bio-engineering (vegetative slope stabilization) in road projects?					
		Do these policies clearly assign responsibilities for design, implementation, and maintenance of bio-engineering measures (e.g., MoT, Environmental Protection Department, local government, community)?					
		Please list the relevant policies, and explain who is responsible for designing, implementing, and maintaining bio-engineering measures currently.					
2	**Roadmaps for Green Roads**	Are there strategic documents including goals, actions, and benchmarks for implementing and maintaining bio-engineering measures in road projects?					
		Does the roadmap include clear steps, timelines, and assignment of responsibilities for both implementation and maintenance?					
		If yes, please list the relevant documents and procedures					
3	**Application of New Technologies**	Do you have access to and expertise in technologies for both implementation (e.g., check-dams, planting of vetiver grass, leveling and tree planting on slopes) and maintenance of bio-engineering measures?					
		Are there policies or measures to establish pilot projects to test innovative bio-engineering and slope stabilization practices?					

		If yes, please list the current technologies and methods used for bio-engineering in road projects.					
4	**Improved Design Standards**	Are there design standards or guidelines specifying plant species, stabilization techniques, and maintenance requirements for bio-engineering measures?					
		Do these standards clarify who is responsible for implementation and ongoing care at each stage?					
		List the relevant design standards and describe how they are developed, updated, and enforced for bio-engineering in road projects.					
5	**Environmental Standards**	Are there standards to ensure bio-engineering practices protect biodiversity, avoid invasive species, and minimize negative environmental impacts?					
		Are there requirements to monitor and mitigate potential negative impacts of maintenance activities (e.g., erosion, inappropriate species, herbicide use)?					
		List the relevant environmental standards for bio-engineering and describe how these are applied, monitored, and enforced.					
6	**Regulatory Framework**	Are there clear legal or regulatory provisions assigning authority and responsibility for both implementation and maintenance of bio-engineering measures?					
		Is there a mechanism for resolving gaps in responsibility between agencies involved?					
		List relevant regulatory frameworks for bio-engineering and describe how they are implemented and enforced.					

7	**Improved Planning Systems**	Is the full lifecycle (implementation to maintenance) of bio-engineering measures integrated into road project planning, budgeting, and scheduling?					
		Is there a formal process or agreement for handover from implementation (MoT) to maintenance (Environmental Protection Department or others)?					
		How is bio-engineering incorporated into planning and project management processes?					
8	**Capacity Building and Awareness**	Are MoT, Environmental Protection Department, districts, contractors, and communities trained in both implementation and maintenance of bio-engineering best practices?					
		Are there awareness programs or campaigns to encourage community involvement in bio-engineering and slope stabilization?					
		What training or awareness activities are undertaken for bio-engineering, and who participates?					
9	**Sustainable Procurement**	Does the procurement process include requirements for bio-engineering or other nature-based slope stabilization activities?					
		Are there criteria for bio-engineering included in the evaluation of bids?					
		Describe how this is done in practice.					
10	**Financial Mechanisms**	Are funds allocated for both the initial implementation and ongoing maintenance of bio-engineering measures?					
		Are there mechanisms for sharing costs, transferring funds, or incentivizing community-based maintenance (e.g., profit-sharing, benefit agreements)?					

		Are there funds for bio-engineering implementation and maintenance and how are these allocated and managed?					
11	**Supply systems: available Resources and Materials**	Are nurseries or suppliers able to provide suitable plant species, live materials, and other resources needed for bio-engineering?					
		Are responsibilities for ensuring supply and delivery of materials clearly allocated between MoT and Environmental Protection Department?					
		How are supply chains for bio-engineering materials organized and monitored?					
12	**Connection with other programs/ collaborative partnership**	Is there effective cooperation between MoT, Environmental Protection Department, forestry agencies, and local communities for both implementation and maintenance of bio-engineering?					
		Are there mechanisms (formal agreements, joint committees, benefit-sharing schemes) to ensure smooth handover and shared responsibility for maintenance, especially outside the road verge?					
		Please describe any partnerships, agreements, or collaborations for bio-engineering and slope stabilization in road projects.					

Table 14: Updated checklist for assessing the maturity of enabling environment for "Water and Land Management"

Water and Land Management								
Nr	**Enabling factor**	**Questions**	**Rating** Least Positive				Most Positive	
			1	**2**	**3**	**4**	**5**
1	**Policy Development**	Is any framework established to ensure integrated water resources management is applied to road developments?					
		Are there policies to manage land use changes and protect environmental resources during road development?					
		Special considerations/ Comments affecting the score					
2	**Roadmaps for Green Roads**	Are there strategic documents including goals, actions, and benchmarks for implementing water and land management?					
		Does the roadmap include specific steps and timelines for addressing water and land management of road projects?					
		Special considerations/ Comments affecting the score					
3	**Application of New Technologies**	Do you have access and expertise in technologies aimed at promoting water and land management in road projects?					
		Are there policies or measures to establish pilots in road projects to test the effectiveness of new technologies or practices addressing water and land management?					
		Special considerations/ Comments affecting the score					
4	**Improved Design Standards**	Does any hydrological guideline suggest methods for assessing and incorporating water flow patterns into road design to prevent flooding and erosion?					
		Are there any standards to ensure that road design considers potential impacts on surrounding water bodies and land within road projects?					
		Special considerations/ Comments affecting the score					
5	**Environmental Standards**	Are there any standards to prevent soil erosion and water bodies pollution, and manage sedimentation during road construction and operation?					

		Do the standards relevant to biodiversity conservations effectively protect local flora and fauna from the impacts of road development?					
		Special considerations/ Comments affecting the score					
6	**Regulatory Framework**	Are there any laws regulating the use, protection and management of water resources?					
		Is regulatory required road projects to obtain permits related to land and water use?					
		Special considerations/ Comments affecting the score					
7	**Improved Planning Systems**	Are there any strategic documents that guide long-term investments in infrastructure (e.g., infrastructure master plan), with considerations for sustainable water and land management?					
		Do any framework provide a systematic approach for evaluating the environmental effects of proposed plans and programs, including road development?					
		Special considerations/ Comments affecting the score					
8	**Capacity Building and Awareness**	Are there any training programs or resources to educate communities and provide information on sustainable water and lands practices in road development, and water conservation?					
		Are any capacity building programs established that include modules on water and land management, focusing on the impacts of infrastructure projects?					
		Special considerations/ Comments affecting the score					
9	**Sustainable Procurement**	Does the procurement process for road projects include requirements of environmental and social impact assessment?					
		Are there criteria of water and land management practices included in the evaluation of bids?					
		Special considerations/ Comments affecting the score					
10	**Financial Mechanisms**	Is the project financed through mechanisms that support sustainable water and land management, such as watershed protection funds, land restoration grants, or nature-based solutions funding?					

		Are there financial incentives or policies in place to promote water-sensitive road design, erosion control, and sustainable land use practices?					
		Special considerations/ Comments affecting the score					
11	**Supply systems: available Resources and Materials**	Are there any specifications for selecting and using materials that minimize environmental impact and promote effective water and land management?					
		Are eco-friendly materials and technologies prioritized in road construction projects to implement water and land management practices?					
		Special considerations/ Comments affecting the score					
12	**Connection with other programs/ collaborative partnership**	Are there any development plans that align road projects related to water management and land use with existing environmental, social, or community development programs?					
		Are there funding mechanisms in place to leverage resources and collaborate with other programs to enhance water and land management?					
		Special considerations/ Comments affecting the score					

Annex B: Completed Maturity Assessment Checklists

Table 15: Completed checklist assessing the maturity of the enabling environment for Roadside Tree Planting.

Roadside Tree Planting								
Nr	**Enabling factor**	**Questions**	**Rating**					
			Least Positive Most Positive					
			1	**2**	**3**	**4**	**5**
1	**Policy Development**	Are there policies or frameworks that require or encourage both the planting and maintenance of roadside trees in road projects?	✓				
		Do these policies clearly assign responsibilities for planting (e.g., MoT) and maintenance (e.g., Environmental Protection Department, local government, community)?	✓				
		Please list the relevant policies, and explain who is responsible for designing, implementing and maintaining the roadside tree plantations currently Relevant national policies and programmatic initiatives promote roadside greening, including large-scale annual tree planting activities implemented under road and infrastructure projects. This demonstrates a clear level of political support and practical experience. However, responsibilities for the long-term maintenance and care of roadside tree plantations are not always clearly defined across the involved institutions, which may result in institutional gaps during the operational phase.					
2	**Roadmaps for Green Roads**	Are there strategic documents including goals, actions, and benchmarks for implementing and maintaining roadside tree planting in road projects?	✓				
		Does the roadmap include clear steps, timelines, and assignment of responsibilities for both planting and maintenance?	✓				
		If yes, please list the relevant documents and procedures Strategic intentions related to roadside greening are generally recognized and reflected in selected policy and planning documents. However, at present there is no comprehensive and formalized action plan that clearly defines implementation steps, timelines, performance benchmarks, and the allocation of responsibilities among stakeholders for both the planting and long-term maintenance of roadside trees. This limits the systematic and sustainable implementation of roadside greening measures.					
3	**Application of New Technologies**	Do you have access to and expertise in technologies for both planting (e.g., improved planting tools, drought-resistant species) and maintenance (e.g., irrigation, pruning)?	✓				
		Are there policies or measures to establish pilot projects to test innovative tree planting and maintenance practices?	✓				
		If yes, please list the current technologies used for planting and maintenance of roadside trees.					

		At present, roadside tree planting is largely based on conventional and traditional methods. Access to innovative technologies—such as drought-resistant species, improved planting tools, and systematic maintenance solutions including irrigation, pruning, and monitoring—remains limited and is mainly applied on a project or pilot basis. The lack of large-scale adoption of such approaches reduces the overall effectiveness and long-term sustainability of roadside tree planting efforts.					
4	**Improved Design Standards**	Are there design standards or guidelines specifying species selection, spacing, planting methods, and maintenance requirements for roadside trees?	✓				
		Do these standards clarify who is responsible for implementation and ongoing care at each stage?	✓				
		List the relevant design standards and describe how they are developed, updated, and enforced for roadside tree planting and maintenance. General road design standards and regulations are in place and partially address landscaping and greening aspects. However, existing documents do not always clearly define or consistently apply detailed guidance on tree species selection, spacing, planting methods, and the allocation of long-term maintenance responsibilities. This limits the consistency and effectiveness of roadside tree planting and maintenance across different road projects.					
5	**Environmental Standards**	Are there standards to ensure tree planting and maintenance practices protect biodiversity, avoid invasive species, and minimize negative environmental impacts?	✓				
		Are there requirements to monitor and mitigate potential negative impacts of maintenance activities (e.g., pesticide use, pruning)?	✓				
		List the relevant environmental standards for roadside tree planting and maintenance and describe how these are applied, monitored, and enforced? Environmental standards and requirements related to biodiversity protection are in place and applied within road projects. However, monitoring of potential impacts on biodiversity, as well as risks associated with maintenance activities (such as pruning, use of chemical agents, and other interventions), is implemented inconsistently and is often project-specific. This limits the ability to systematically identify and mitigate potential negative environmental impacts.					
6	**Regulatory Framework**	Are there clear legal or regulatory provisions assigning authority and responsibility for both planting and maintenance of roadside trees?	✓				
		Is there a mechanism for resolving disputes or gaps in responsibility between agencies involved?	✓				
		List relevant regulatory frameworks for roadside tree planting and maintenance and describe how they are implemented and enforced? Relevant legal and regulatory provisions governing roadside tree planting and maintenance are generally in place. However, in practice, overlaps and gaps in the allocation of institutional responsibilities for long-term maintenance are not always fully resolved, which may lead to unclear accountability during the operational phase.					
7	**Improved Planning Systems**	Is the full lifecycle (planting to maintenance) of roadside trees integrated into road project planning, budgeting, and scheduling?	✓				

		Is there a formal process or agreement for handover from planting (MoT) to maintenance (Environmental Protection Department or others)?	✓				
		How is roadside tree planting and maintenance incorporated into planning and project management processes? Roadside tree planting is generally considered during the project preparation and design stages. However, the integration of greening activities across the full project lifecycle—from planting to long-term maintenance—including systematic planning, budgeting, and formal handover mechanisms, remains insufficiently developed. This limits the sustainability and effectiveness of roadside tree maintenance efforts.					
8	**Capacity Building and Awareness**	Are MoT, Environmental Protection Department, districts, contractors, and communities trained in both planting and maintenance best practices?	✓				
		Are there awareness programs or campaigns to encourage community involvement and stewardship of roadside trees?	✓				
		What training or awareness activities are undertaken for roadside tree planting and maintenance, and who participates? Training and awareness-raising activities for public institutions, contractors, and other stakeholders are conducted on an as-needed and ad-hoc basis. However, coverage of long-term maintenance practices and community engagement in the stewardship of roadside trees remains limited. This reduces the potential for sustainable management of roadside green assets.					
9	**Sustainable Procurement**	Does the procurement process include requirements for roadside tree planting or other road greening activities?			✓		
		Are there criteria of roadside tree planting included in the evaluation of bids?			✓		
		Describe how this is done in practice? Procurement and bidding documents may include references to road greening activities, including roadside tree planting. However, evaluation criteria related to the quality of planting works and subsequent maintenance of roadside trees are not always clearly defined or consistently applied during bid evaluation and contract implementation. This limits incentives for sustainable and high-quality greening solutions within procurement processes.					
10	**Financial Mechanisms**	Are funds allocated for both the initial planting and ongoing maintenance of roadside trees?			✓		
		Are there mechanisms for sharing costs, transferring funds, or incentivizing community-based maintenance (e.g., profit-sharing, benefit agreements)?	✓				
		Are there funds for roadside tree planting and maintenance and how are these allocated and managed? Funding for the initial planting of roadside trees is generally available through road projects and public programs. However, dedicated, predictable, and sustainable financing for long-term maintenance, upkeep, and replacement of roadside trees remains limited or ad-hoc. This creates risks for the durability and sustainability of achieved greening outcomes.					

11	**Supply systems: available Resources and Materials**	Are nurseries or suppliers able to provide suitable species and replacement seedlings for both planting and maintenance?					✓
		Are responsibilities for ensuring supply and delivery of materials clearly allocated between MoT and Environmental Protection Department?	✓				
		How are supply chains for planting and maintenance materials organized and monitored? Nurseries and suppliers capable of providing planting materials for roadside greening are generally available. However, coordination among responsible institutions and long-term planning for the replacement of planting materials, stock management, and maintenance support require further strengthening. This may affect the continuity and effectiveness of roadside tree maintenance activities.					
12	**Connection with other programs/ collaborative partnership**	Is there effective cooperation between MoT, Environmental Protection Department, forestry agencies, and local communities for both planting and maintenance?	✓				
		Are there mechanisms (formal agreements, joint committees, benefit-sharing schemes) to ensure smooth handover and shared responsibility for maintenance, especially outside the road verge?	✓				
		Please describe any partnerships, agreements, or collaborations for roadside tree planting and maintenance. Cooperation among key institutions and stakeholders involved in roadside tree planting and maintenance generally exists and is implemented through specific projects and initiatives. However, formalized partnerships—such as inter-agency agreements, joint committees, or shared maintenance mechanisms—are not always well established or systematically applied. This limits coordination efficiency and the sustainability of collaborative efforts.					

Table 16: Completed checklist assessing the maturity of the enabling environment for Bio-engineering.

Bio-engineering							
Nr	**Enabling factor**	**Questions**	**Rating**				
			Least Positive Most Positive				
			1	**2**	**3**	**4**	**5**
1	**Policy Development**	Are there policies or frameworks that require or encourage the use of bio-engineering (vegetative slope stabilization) in road projects?	✓				
		Do these policies clearly assign responsibilities for design, implementation, and maintenance of bio-engineering measures (e.g., MoT, Environmental Protection Department, local government, community)?	✓				
		Please list the relevant policies, and explain who is responsible for designing, implementing, and maintaining bio-engineering measures currently. At the policy level, the need for slope stabilization within road projects is generally recognized. However, the application of bio-engineering (nature-based) measures is not systematically required and is often optional rather than mandatory. In addition, responsibilities for the design, implementation, and especially the long-term maintenance of bio-engineering measures are not clearly defined across involved institutions, creating institutional gaps during the operational phase.					
2	**Roadmaps for Green Roads**	Are there strategic documents including goals, actions, and benchmarks for implementing and maintaining bio-engineering measures in road projects?	✓				
		Does the roadmap include clear steps, timelines, and assignment of responsibilities for both implementation and maintenance?	✓				
		If yes, please list the relevant documents and procedures Strategic intentions related to the use of nature-based solutions, including bio-engineering measures for slope stabilization, are generally acknowledged. However, there is no dedicated roadmap that clearly defines implementation actions, timelines, performance benchmarks, and the allocation of responsibilities for both the implementation and long-term maintenance of bio-engineering measures. This limits the systematic and scalable application of such solutions in road projects.					
3	**Application of New Technologies**	Do you have access to and expertise in technologies for both implementation (e.g., check-dams, planting of vetiver grass, leveling and tree planting on slopes) and maintenance of bio-engineering measures?	✓				

		Are there policies or measures to establish pilot projects to test innovative bio-engineering and slope stabilization practices?	✓				
		If yes, please list the current technologies and methods used for bio-engineering in road projects. Basic bio-engineering techniques for slope stabilization are applied on a limited scale, primarily within individual road projects. Access to more innovative approaches and technologies—including enhanced use of vegetative materials, combined engineering–nature-based solutions, and systematic long-term maintenance practices—remains limited and largely project-based and ad-hoc. This constrains the effectiveness and long-term sustainability of bio-engineering measures.					
4	**Improved Design Standards**	Are there design standards or guidelines specifying plant species, stabilization techniques, and maintenance requirements for bio-engineering measures?	✓				
		Do these standards clarify who is responsible for implementation and ongoing care at each stage?	✓				
		List the relevant design standards and describe how they are developed, updated, and enforced for bio-engineering in road projects. General road design standards are in place and applied during project preparation. However, detailed technical guidelines covering plant species selection, specific bio-engineering techniques for slope stabilization, and the allocation of long-term maintenance responsibilities are not consistently specified or enforced. This limits the consistency and quality of bio-engineering implementation across road projects.					
5	**Environmental Standards**	Are there standards to ensure bio-engineering practices protect biodiversity, avoid invasive species, and minimize negative environmental impacts?	✓				
		Are there requirements to monitor and mitigate potential negative impacts of maintenance activities (e.g., erosion, inappropriate species, herbicide use)?	✓				
		List the relevant environmental standards for bio-engineering and describe how these are applied, monitored, and enforced. Environmental standards applicable to road projects are in place and generally applied, including requirements related to environmental protection and biodiversity. However, systematic monitoring of the performance of bio-engineering measures, as well as potential environmental risks arising during their operation and maintenance, is not consistently conducted. This limits opportunities for timely corrective actions and improved environmental performance.					
6	**Regulatory Framework**	Are there clear legal or regulatory provisions assigning authority and responsibility for both implementation and maintenance of bio-engineering measures?	✓				
		Is there a mechanism for resolving gaps in responsibility between agencies involved?	✓				
		List relevant regulatory frameworks for bio-engineering and describe how they are implemented and enforced.					

		Relevant regulatory provisions governing the use of bio-engineering measures in road projects are generally in place. However, institutional mandates for implementation and, in particular, long-term maintenance remain fragmented across agencies, with limited mechanisms in place to resolve gaps in responsibility. This may result in unclear accountability during the operational phase.					
7	**Improved Planning Systems**	Is the full lifecycle (implementation to maintenance) of bio-engineering measures integrated into road project planning, budgeting, and scheduling?	✓				
		Is there a formal process or agreement for handover from implementation (MoT) to maintenance (Environmental Protection Department or others)?	✓				
		How is bio-engineering incorporated into planning and project management processes? Bio-engineering measures for slope stabilization are occasionally considered during the project design stage. However, full lifecycle integration into planning, budgeting, and formal handover to entities responsible for long-term maintenance remains limited. This reduces the sustainability and effectiveness of bio-engineering applications in road projects.					
8	**Capacity Building and Awareness**	Are MoT, Environmental Protection Department, districts, contractors, and communities trained in both implementation and maintenance of bio-engineering best practices?	✓				
		Are there awareness programs or campaigns to encourage community involvement in bio-engineering and slope stabilization?	✓				
		What training or awareness activities are undertaken for bio-engineering, and who participates? Training and awareness-raising activities related to bio-engineering are conducted sporadically, mainly within individual projects. Coverage of long-term maintenance practices and community involvement in slope stabilization and upkeep remains limited. This constrains institutional and community capacity for the sustainable implementation of bio-engineering measures.					
9	**Sustainable Procurement**	Does the procurement process include requirements for bio-engineering or other nature-based slope stabilization activities?	✓				
		Are there criteria for bio-engineering included in the evaluation of bids?	✓				
		Describe how this is done in practice. Procurement and bidding documents generally allow the use of bio-engineering and nature-based solutions for slope stabilization. However, specific technical requirements and evaluation criteria related to the design, implementation, and maintenance quality of bio-engineering measures are not consistently defined or systematically applied during bid evaluation and contract implementation. This limits incentives for the broader and higher-quality adoption of nature-based slope stabilization solutions.					
10	**Financial Mechanisms**	Are funds allocated for both the initial implementation and ongoing maintenance of bio-engineering measures?	✓				

		Are there mechanisms for sharing costs, transferring funds, or incentivizing community-based maintenance (e.g., profit-sharing, benefit agreements)?	✓				
		Are there funds for bio-engineering implementation and maintenance and how are these allocated and managed? Funding for the initial implementation of bio-engineering slope stabilization measures is typically available through road projects. However, dedicated, predictable, and sustainable financing mechanisms to support long-term maintenance and upkeep of bio-engineering measures remain limited or ad-hoc. This poses risks to the long-term effectiveness and durability of such interventions.					
11	**Supply systems: available Resources and Materials**	Are nurseries or suppliers able to provide suitable plant species, live materials, and other resources needed for bio-engineering?					✓
		Are responsibilities for ensuring supply and delivery of materials clearly allocated between MoT and Environmental Protection Department?	✓				
		How are supply chains for bio-engineering materials organized and monitored? Local materials, plant resources, and planting materials required for bio-engineering slope stabilization are generally available. However, coordination among responsible institutions and long-term planning of supply chains—including the timely provision of replacement materials—require further strengthening. This may affect the continuity and effectiveness of bio-engineering interventions.					
12	**Connection with other programs/ collaborative partnership**	Is there effective cooperation between MoT, Environmental Protection Department, forestry agencies, and local communities for both implementation and maintenance of bio-engineering?	✓				
		Are there mechanisms (formal agreements, joint committees, benefit-sharing schemes) to ensure smooth handover and shared responsibility for maintenance, especially outside the road verge?	✓				
		Please describe any partnerships, agreements, or collaborations for bio-engineering and slope stabilization in road projects. Cooperation among relevant institutions involved in bio-engineering applications within road projects generally exists and is implemented through specific initiatives and projects. However, formalized partnerships—such as inter-agency agreements, joint working mechanisms, and shared arrangements for long-term maintenance—are not consistently established or systematically applied. This limits coordination effectiveness and the sustainability of bio-engineering measures, particularly during the operational phase.					

Table 17: Completed checklist assessing the maturity of the enabling environment for Water and Land Management.

Water and Land Management							
Nr	**Enabling factor**	**Questions**	**Rating** Least Positive			Most Positive	
			1	**2**	**3**	**4**	**5**
1	**Policy Development**	Is any framework established to ensure integrated water resources management is applied to road developments?				✓	
		Are there policies to manage land use changes and protect environmental resources during road development?				✓	
		Special considerations/ Comments affecting the score Policies and regulatory frameworks addressing water resource management and land use are generally in place and applied at the national level. These frameworks cover the protection of water bodies, land use regulation, and environmental conservation. However, their integrated application specifically tailored to road development projects—particularly with regard to surface water management from precipitation and roadside land use—remains limited. This reduces the coherence of water and land management considerations during the planning and implementation of road infrastructure.					
2	**Roadmaps for Green Roads**	Are there strategic documents including goals, actions, and benchmarks for implementing water and land management?				✓	
		Does the roadmap include specific steps and timelines for addressing water and land management of road projects?				✓	
		Special considerations/ Comments affecting the score Strategic intentions related to water and land management are generally recognized and reflected in relevant policy and planning documents. However, there is no dedicated roadmap that clearly defines implementation actions, timelines, and performance benchmarks specifically for road projects, including surface water management and roadside land use. This limits the systematic and long-term application of water and land management measures in the road sector.					
3	**Application of New Technologies**	Do you have access and expertise in technologies aimed at promoting water and land management in road projects?			✓		
		Are there policies or measures to establish pilots in road projects to test the effectiveness of new technologies or practices addressing water and land management?			✓		
		Special considerations/ Comments affecting the score Conventional drainage and roadside land management practices are predominantly applied in road projects, including standard drainage systems and engineered structures. Access to more innovative and water-sensitive technologies—such as nature-based solutions, runoff attenuation, and infiltration systems—remains limited and is largely implemented through individual pilot or					

		project-based initiatives. This constrains the wider adoption of modern water and land management approaches in the road sector.					
4	**Improved Design Standards**	Does any hydrological guideline suggest methods for assessing and incorporating water flow patterns into road design to prevent flooding and erosion?				✓	
		Are there any standards to ensure that road design considers potential impacts on surrounding water bodies and land within road projects?				✓	
		Special considerations/ Comments affecting the score Hydrological and road design guidelines are generally in place and applied during project preparation. However, the systematic integration of runoff pattern analysis, erosion control measures, and assessments of impacts on surrounding land and water bodies is not consistently applied. This limits the effectiveness of design solutions from a sustainable water and land management perspective.					
5	**Environmental Standards**	Are there any standards to prevent soil erosion and water bodies pollution, and manage sedimentation during road construction and operation?				✓	
		Do the standards relevant to biodiversity conservations effectively protect local flora and fauna from the impacts of road development?				✓	
		Special considerations/ Comments affecting the score Standards addressing erosion control, sediment management, and pollution prevention are in place and generally applied within road projects. However, monitoring and enforcement of these standards during the operational and maintenance phases remain inconsistent. This reduces the long-term effectiveness of measures aimed at protecting water and land resources.					
6	**Regulatory Framework**	Are there any laws regulating the use, protection and management of water resources?				✓	
		Is regulatory required road projects to obtain permits related to land and water use?				✓	
		Special considerations/ Comments affecting the score Legal and regulatory provisions governing water use and land management are in place, and relevant permits are generally required for road projects. However, coordination across sectors and the effectiveness of enforcement mechanisms could be further strengthened, particularly during the operational phase.					
7	**Improved Planning Systems**	Are there any strategic documents that guide long-term investments in infrastructure (e.g., infrastructure master plan), with considerations for sustainable water and land management?				✓	
		Do any framework provide a systematic approach for evaluating the environmental effects of proposed plans and programs, including road development?				✓	
		Special considerations/ Comments affecting the score Strategic infrastructure and investment planning documents are in place and provide general guidance for road sector development. However, the long-term and systematic integration of water and land management considerations—					

		including surface water management, erosion control, and sustainable use of roadside land—into road investment planning remains limited. This reduces the ability to proactively address environmental and climate-related risks at the planning stage.					
8	**Capacity Building and Awareness**	Are there any training programs or resources to educate communities and provide information on sustainable water and lands practices in road development, and water conservation?				✓	
		Are any capacity building programs established that include modules on water and land management, focusing on the impacts of infrastructure projects?				✓	
		Special considerations/ Comments affecting the score Training and awareness-raising initiatives on sustainable water and land management are conducted, but largely on a sporadic basis. Limited emphasis is placed on infrastructure-related impacts, including surface water management from precipitation, erosion control, and effects on roadside land. This constrains the development of practical knowledge and capacity among stakeholders involved in road planning, implementation, and operation.					
9	**Sustainable Procurement**	Does the procurement process for road projects include requirements of environmental and social impact assessment?				✓	
		Are there criteria of water and land management practices included in the evaluation of bids?	✓				
		Special considerations/ Comments affecting the score Environmental and social assessments are generally required within procurement procedures for road projects. However, specific evaluation criteria related to water and land management practices—such as drainage design, erosion control, and protection of roadside areas—are not consistently defined or applied during bid evaluation and contract implementation. This limits incentives for more sustainable and water-sensitive solutions within procurement processes.					
10	**Financial Mechanisms**	Is the project financed through mechanisms that support sustainable water and land management, such as watershed protection funds, land restoration grants, or nature-based solutions funding?			✓		
		Are there financial incentives or policies in place to promote water-sensitive road design, erosion control, and sustainable land use practices?			✓		
		Special considerations/ Comments affecting the score Financing for basic mitigation measures related to water and land management is generally available within road projects. However, dedicated financial mechanisms and incentives to promote water-sensitive road design, nature-based solutions, and sustainable roadside land management remain limited. This constrains the wider adoption of innovative and long-term sustainable practices.					
11	**Supply systems: available Resources and Materials**	Are there any specifications for selecting and using materials that minimize environmental impact and promote effective water and land management?				✓	
		Are eco-friendly materials and technologies prioritized in road construction projects to				✓	

		implement water and land management practices?					
		Special considerations/ Comments affecting the score Specifications for the use of environmentally appropriate materials in road projects are generally in place and applied. However, the systematic prioritization of eco-friendly materials and technologies that support effective surface water management and sustainable roadside land use remains uneven. This limits the broader adoption of environmentally oriented and innovative solutions in road construction and operation.					
12	**Connection with other programs/ collaborative partnership**	Are there any development plans that align road projects related to water management and land use with existing environmental, social, or community development programs?				✓	
		Are there funding mechanisms in place to leverage resources and collaborate with other programs to enhance water and land management?	✓				
		Special considerations/ Comments affecting the score Coordination with environmental and development programs related to water and land management generally exists and is implemented through specific initiatives and projects. However, structured partnerships—such as formal cooperation agreements and joint financing mechanisms—are not consistently established or systematically applied. This limits opportunities for synergy, resource leveraging, and the scaling up of effective water and land management solutions within road projects.					

Annex C: District Validation Workshop report

Roghun Validation Workshop – 7 January 2026

Workshop Structure

The first meeting of the mission was the Roghun Validation Workshop, held on 7 January 2026. The workshop was structured around three main parts:

- The session opened with an introduction and a presentation of the meeting agenda, outlining the objectives of the workshop and setting the context for the discussions.
- The project team then presented the overall project and shared key findings from the road survey conducted in the Roghun districts. This included an overview of the main challenges observed in the field, as well as practical recommendations for improving current practices.
- An open discussion followed with all participating stakeholders. This exchange focused on validating the fieldwork findings, understanding whether recommended practices are already being applied, and identifying existing gaps, constraints, and support needs. A specific part of the discussion explored the potential for roadside replanting in Roghun, highlighting its relevance for environmental improvement and as a potential component of the concept note to be developed jointly with the Committee of Environmental Protection.

Discussion

<u>Key perspectives from stakeholders and Discussion on Roadside Tree Planting</u>

A dedicated part of the workshop focused on roadside tree planting and reforestation. Stakeholders from different institutions and communities shared experiences, challenges, and priorities. The discussion revealed strong interest and commitment to roadside greening, but also highlighted significant constraints related to implementation, maintenance, and survival of planted trees.

- **Road Engineer, Roghun District**
  The district road engineer explained that his team is responsible for the Nurobad road, including tree planting activities. While planting is already taking place, the main challenge is maintenance and survival of seedlings. Livestock damage and limited water availability were identified as critical constraints. He suggested that planting fewer trees with reliable irrigation (for example, through spray irrigation) would be more effective than large-scale planting without maintenance capacity.
- **Forestry Representative, Roghun District**
  The forestry representative emphasized that roadside planting has begun but faces multiple structural challenges, including limited budgets, staff shortages,

lack of water, high tree mortality, and the absence of local nurseries. Transporting seedlings from distant locations damages roots and increases costs. He also noted slope erosion caused by livestock movement and stressed the need to plant grasses alongside trees for slope stabilization. The lack of basic equipment such as fertilizers, digging tools, and fencing further constrains implementation.

- **Chairman, Sicharoug Village**
  The village chairman supported the recommendations on tree planting but reported very low survival rates. Even on two hectares planted with fruit trees, many seedlings failed. Poor soil conditions were identified as a likely limiting factor.
- **Environmental Protection Officer, Roghun**
  The Environmental Protection Officer confirmed similar constraints, particularly rocky soils that require soil to be brought from elsewhere. Limited water access was also highlighted. He stressed the need for technical and expert support, especially on soil improvement and water management, to make roadside planting viable.
- **Representative from the Agriculture Sector**
  The agricultural representative noted that in some areas the soil is “white soil,” which retains water poorly. As a result, even irrigated trees often fail, reinforcing the importance of soil assessment and adapted planting techniques.
- **Village Chairman jamoat Mujikharf (Governance Perspective)**
  Another village chairman highlighted coordination and responsibility gaps. Responsibilities are passed from local authorities to jamoats and then to communities, often without compensation. This creates frustration, particularly given poor soils, limited water, lack of budget, and insufficient equipment.
- **Village Chairman jamoat Hakimi (Coordination Perspective)**
  A further intervention stressed the need for a clearly designated lead authority to organize planting, allocate budgets, and ensure equipment provision. At present, responsibilities are fragmented and institutional coordination is weak.
- **Nurobad Forestry Agency**
  The forestry agency confirmed that many trees have been planted along roads, but survival rates remain low due to water shortages, lack of maintenance, and limited resources. With sufficient budget, the agency could hire dedicated staff, improve maintenance, and develop better systems for supplying water to roadside plantations.

Discussion on Water Management and Its Role in Roadside Replanting

The workshop then shifted focus to water management, recognizing it as a critical factor for road protection, erosion control, and the success of roadside replanting in Roghun.

Using road runoff for water storage and landscape restoration
A representative from Roghun District agreed with the ideas for managing road runoff more effectively. One proposal involved diverting water from culverts into small reservoirs or storage structures to protect roads from erosion, store water for later use, improve groundwater recharge and soil moisture, and provide irrigation for roadside planting and nearby agriculture. Participants emphasized that sediment control would be essential, as runoff carries large amounts of sediment, requiring filters or sediment traps.

Priority locations for interventions
The forestry representative highlighted the stretch between Kandak and Eshonon villages, where a large gully is actively eroding, as a priority site for combined runoff diversion, sediment trapping, and small-scale water storage.

Flexible solutions where reservoirs are not feasible
Alternative options were discussed for locations where reservoirs cannot be constructed, including diverting culvert runoff directly to farmland, channeling water into swales or infiltration trenches, and using combinations of tanks, ponds, and small basins depending on local conditions.

Drainage design to be reconsidered:

Design drainage should ensure:

- Safe, dispersed disposal of runoff to avoid concentrated erosive flows.
- Beneficial use of road-collected water for roadside vegetation or local reservoirs (bio-swales, reservoirs where needed)
- Avoidance of gully formation below drainage outlets (using chutes)

Roadside springs as both a resource and a risk
Stakeholders confirmed that roadside springs are common in the area. Spring water that currently damages road infrastructure could be diverted for productive use, such as irrigating roadside plantations/ nurseries. However, participants cautioned that over-diversion could cause springs to dry up, stressing the need for balanced approaches that combine controlled use with recharge measures. Reduced snowfall in recent years has made some springs less reliable, impacting planned irrigation or protection efforts.

Discussion on Livestock Management and Roadside Plantations

Livestock management was identified as a major challenge affecting roadside tree planting and slope stabilization.

Livestock pressure on roadsides
Participants explained that livestock damages roadside environments through browsing on young trees and trampling along roads and slopes. This leads to low survival rates of seedlings, soil compaction, and accelerated erosion on embankments and cut slopes.

Existing regulations and limitations
Local authorities explained that a regulation introduced about a year ago established designated routes and areas for livestock movement along roads. However, compliance remains low, with only an estimated 20–30% of livestock owners following the rules. Limited awareness, weak enforcement (particularly at night), and insufficient capacity of local authorities were identified as key constraints.

Discussion on Proposed measures

The following measures were discussed**:**

- *Compulsory slope stabilization* should be incorporated into road design and implementation.
- Vegetation should be **systematically planned**, including:
    - Wider roadside vegetation belts.
    - Native grasses and shrubs alongside tree plantings.
    - Use of larger planting stock and active irrigation or biodegradable water-retaining containers to improve survival.
- Bio-engineering elements that have proven effective elsewhere (e.g., *Nepal*) include:
    - Live staking, brush layering, erosion control blankets, woody soil anchors.
    - Protection of rock structures with vegetation to prevent undercutting.
    - Combine with hard measures.
- Protect plantings from animal movement through fencing/ use of mesh or delineated grazing exclusions
- Develop collaborative approaches with herder communities to introduce **controlled holistic grazing** and prevent access to highly sensitive areas (animal tracks becoming triggers of larger land slips)
- Use grazing management to restore range vegetation, improve soil moisture absorption, and support broader landscape rehabilitation.
- Introduce native soil stabilizing grasses

Discussion on Enhanced Revegetation and Soil Improvement

The following measures were discussed as worth introducing

- Establish local nurseries near reliable water sources to raise planting stock.
- Explore water-stabilizing strategies (e.g., artificial glaciers/ice stupas) in spring recharge zones to maintain water supply throughout the year.

- Use *warping dams* in gullied areas to trap fertile sediments, form flat, rich soils, and reduce downstream sediment delivery — enhancing planting potential.
- Do small soil harvesting measures (demi-lunes) to create conducive growing environment
- Explore the use of local planting boxes to enhance survival rates in tree planting
- Protect spontaneously regenerating wild trees from grazing and browsing – rather than only focus on new tree planting

- Implement principles of *farmer-managed natural regeneration*, supported through emerging regulations on seasonal pastures and livestock movement corridors (currently ~20–30% enforced).

Discussion on Enhanced institutional capacity

The following was discussed:

- There is no single ownership for such a program – either stronger coordination or designated authority will help
- Forestry Agency staff are widely distributed over large areas, limiting their ability to protect and maintain planting.
- Community engagement is active in regreening – but the regreening efforts need to produce tangible results and not repeat setbacks.
- Several promising options are available, but they need proper introduction and capacity building to get going.

The Roghun Validation Workshop confirmed that the main challenges identified in the road surveys and documented in the District Opportunity Report remain highly relevant. Addressing these challenges requires an integrated approach combining technical, environmental, and institutional measures.

Key overall takeaways include:

- **Roadside tree planting** should shift from large-scale planting to well-maintained, site-specific interventions, supported by proper tree species selection, improved soil preparation, reliable water supply, protection from livestock, the use of local nurseries, and good coordination between all institutions involved in roadside tree planting.
- **Water management** is a central entry point for both road protection and productive use, through improved cross-drainage, harvesting road runoff, protecting and managing roadside springs, and using water for irrigation and groundwater recharge/soil moisture improvement.
- **Bio-engineering and slope stabilization** measures, including grasses, shrubs, and trees, are essential to address widespread erosion along road embankments and cut slopes that currently threaten road safety and durability.

- **Livestock management** must be better coordinated and enforced to protect roadside plantations and stabilized slopes, supported by clearer communication, designated routes, and community engagement.
- **Cross-drainage improvements and integrated design** are critical to reduce erosion damage, stabilize slopes, and ensure that water is safely conveyed while being productively reused.

Together, these measures directly respond to the priority issues identified during road surveys in Roghun and provide a good foundation for updating roadside tree planting practices, strengthening road resilience, and integrating nature-based solutions into future district-level interventions. The program will serve several strategic objectives :

- Integrating green roads with sediment control and revegetation supports reservoir longevity, reduces long-term maintenance costs, and enhances resilience of water infrastructure.
- Systematic water and vegetation management will improve local ecosystem functions, soil stability, and biodiversity — providing co-benefits for tourism, livelihood opportunities, and climate adaptation.
- Proactive measures now can reduce the high economic costs of future sedimentation interventions, which can reach significant annual values if reservoir operating life is reduced.

Vose District Validation Workshop – 8 January 2026

Workshop Structure

The second validation workshop of the mission was held on 8 January 2026 in Vose District. The meeting brought together a broad range of stakeholders from the environmental, agricultural, and forestry sectors at both district and regional levels.

Participants included representatives from Environmental Protection in Vose, the Deputy Head of the Agriculture Department of the local government in Vose, the Chief Agronomist of Vose District, the Chief of Agriculture of Temurmalik District, the Head of Environmental Protection of Temurmalik District, the Head of the Nursery Agency of Vose, the Chief Engineer of the Forest Agency of Mir Said Alii Hamadoni District, and the Deputy Directors of Forestry of both Kulob Region and Vose District.

The workshop followed the same general format as the Roghun validation meeting. The session opened with an introduction and overview of the project, followed by a presentation of findings from the road survey in Vose District and a set of recommendations for greening roads. This was followed by an open discussion with participants to validate the findings and recommendations, reflect on current practices, identify constraints, and clarify support needs.

In addition, the facilitation team used a set of guiding statements to structure the discussion. Participants were asked to react to these statements based on their experience, which helped stimulate reflection on existing practices, challenges, and opportunities in Vose District.

Discussion

Agricultural Context of Vose District

Several participants emphasized that Vose is predominantly an agricultural district. The landscape includes approximately 60,000 hectares of agricultural land, around 40,000 hectares are irrigated by pumping stations and 20,000 hectares are irrigated naturally. This agricultural context was repeatedly referenced during the discussion as highly relevant for roadside greening, water management, and landscape restoration, as interventions along roads can directly support agricultural productivity and resilience.

Discussion on Roadside Tree Planting and Greening

Participants broadly agreed that roadside trees play an important role in reducing dust, heat, and noise, while also improving road safety, landscape quality, and living conditions for communities along roads. Through the validation statements, stakeholders confirmed that these benefits are clearly visible and highly relevant in Vose District.

The discussion highlighted the importance of **site-specific species selection**, particularly given the presence of both irrigated and dry lands. Participants stressed that increasing tree survival rates is more important than planting large numbers of trees. Forestry services indicated that seedlings can be supplied, but that survival is often

constrained by limited irrigation during the establishment phase, lack of fencing, and insufficient equipment for planting and maintenance.
The presence of **2.5 hectares of nursery land in Vose** was highlighted as a major asset, enabling local supply of seedlings for roadside planting. Participants also noted opportunities to link roadside planting with productive species, including fruit trees and species with economic value such as mulberry and trees used for silk production.

Experiences shared from **Temurmalik District** demonstrated that positive results can be achieved through careful species selection, fencing to protect seedlings from livestock, and prioritizing irrigation during dry periods. These experiences were discussed as practical examples that could be adapted and expanded in Vose.

Discussion on Water Management, Drainage, and Flood Risk

Water management emerged as a central theme throughout the workshop. Participants explained that Vose faces contrasting water challenges: in some areas groundwater levels are high, leading to seasonal waterlogging, while in other periods water scarcity affects agriculture and roadside vegetation.

Through the validation statements, stakeholders confirmed the relevance of **storing water during the rainy season** in ponds, wells, and other structures for use during dry periods. The relatively flat terrain in much of Vose was seen as favorable for such interventions, reducing the risk of damage to storage structures. Participants also discussed the use of small pumps to access groundwater where appropriate.

Waterlogged areas along roads were identified as a persistent problem affecting roads, agriculture, and public health. The cause of this lies in the management of the irrigation system – with relatively high irrigation duties and a discontinuation of conjunctive use. The system constructed several decades ago now functions far below its design standards. Moreover, limited staff capacity and budgets mean that maintenance is uneven and prioritization is required. Participants also noted that land degradation have rendered some agricultural areas unusable, reinforcing the need to combine drainage improvements with slope protection and bio-engineering measures.

The discussion hence highlighted the importance of **balancing irrigation and drainage**. Over-irrigation was recognized as a contributing factor to waterlogging in some areas. Participants discussed the relevance of regulating water supply according to crop needs, expanding drip irrigation to reduce erosion and water use, and reintroducing wells and pumping systems to better manage groundwater levels - practices that were common during the Soviet period and are now gradually being reintroduced.

Discussion on Nurseries, Bio-engineering, and Slope Stabilization

Participants discussed the role of nurseries not only for trees, but also for grasses and other vegetation needed for slope stabilization and grazing management. At present, most nurseries focus on tree production, but stakeholders agreed that developing **grass nurseries** is highly relevant for bio-engineering measures, erosion control, and slope stabilization along roads.

A pilot initiative on grass cultivation was mentioned, but participants noted that it requires scaling up. The discussion emphasized that effective land and slope management requires closer coordination between forestry, agriculture, livestock, and road authorities, particularly where grazing pressure, erosion, and roadside planting intersect. The potential to cultivate medicinal and economically valuable grasses was also highlighted.

Discussion on Livestock and Grazing Management

Livestock and grazing management were discussed in relation to both roadside vegetation and public health. Participants confirmed that grazing is regulated in Vose District, with defined plans for livestock density and grazing areas, and restrictions on livestock from other districts. These measures were described as important for protecting roadside vegetation and managing environmental pressures.

At the same time, participants acknowledged that enforcement remains a challenge in practice. The discussion underlined the need for continued coordination between forestry services, agricultural authorities, and communities to ensure that grazing management supports roadside planting, slope stability, and broader landscape objectives.

Community Involvement and Institutional Coordination

The workshop highlighted strong community engagement in greening activities in Vose District. Participants described active involvement through committees and working groups at different levels of government, as well as regular community mobilization, with citizens contributing to greening activities every Saturday. In addition to roadside planting, households plant fruit trees and ornamental species around their homes. To date, approximately 4,000 trees have been planted through these combined efforts.

Participants also emphasized the importance of sustained coordination between environmental, agricultural, forestry, and road institutions, as well as alignment with national policies such as the Greening Strategy 2040 and large-scale tree planting initiatives. The presence of other donor-supported projects in the district was seen as an opportunity to share lessons and reinforce good practices.

Overall Key Takeaways

The Vose District Validation Workshop confirmed that the challenges and opportunities identified in the road surveys and documented in the District Opportunity Report are well aligned with local realities and ongoing practices.

Key overall takeaways include:

- **Roadside tree planting** in Vose should build on existing nursery capacity and strong community engagement, with greater emphasis on species selection, tree survival, fencing, and irrigation during establishment.
- **Water management** is a critical entry point for improving road resilience and agricultural productivity, particularly through improved drainage, water storage, groundwater management, and efficient irrigation practices.
- **Bio-engineering and slope stabilization**, including the use of grasses and mixed vegetation, are essential to address erosion, protect roads, and restore degraded land alongside drainage improvements.
- **Livestock and grazing management** already benefits from regulatory frameworks in Vose, but continued enforcement, coordination, and integration with roadside greening efforts are needed.
- **Cross-drainage improvements and integrated road design** can help reduce waterlogging, erosion, and flood risks, while enabling productive use of water for roadside planting and agriculture.

Together, these elements demonstrate that Vose District has strong institutional ownership, practical experience, and enabling conditions to advance integrated roadside greening and water-sensitive road management, and to serve as a model for scaling up similar approaches in other districts.