REPUBLIC OF TURKEY
MINISTRY OF TRANSPORT
AND INFRASTRUCTURE

AYGM
Altyapı Yatırımları Genel Müdürlüğü

ÇINAR®
ENGINEERING
CONSULTANCY INC.

ISTANBUL NORTH RAIL CROSSING PROJECT (INRAIL)

Environmental and Social Management Plan (ESMP)

January 2026

Final

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ABBREVATIONS

AIIB	Asian Infrastructure Investment Bank
AoI	Area of Influence
AYGM	Directorate-General of Infrastructure Investments
CAP	Corrective Action Plans
C-ESMP	Contractor's ESMP
CHMMP	Chemical and Hazardous Material Management Plan
CLO	Community Liaison Officer
CoC	Code of Conduct
CSC	Construction Supervision Consultant
D+B	Design and Build
E&S	Environmental and Social
EBRD	European Bank for Reconstruction and Development
EHS	Environment, Health and Safety
ERP	Emergency Response Plan
EIA	Environmental Impact Assessment
ESCP	Environmental and Social Commitment Plan
ESF	Environmental and Social Framework
ESIA	Environmental and Social Impact Assessment
ESIRT	Environmental and Social Incident Reporting Tool
ESMP	Environmental and Social Management Plan
ESS	Environmental and Social Standards
EU	European Union
GM	Grievance Mechanism
GIIP	Good International Industry Practice
IAS	Invasive Alien Species
IsDB	Islamic Development Bank
LMP	Labor Management Procedures
LOTO	Lockout/Tagout
MoTI	Ministry of Transport and Infrastructure
OHS	Occupational Health and Safety
PIU	Project Implementation Unit
PPE	Personal Protective Equipment
Project	The Istanbul North Rail Crossing (INRAIL) Project
RF	Resettlement Framework
RP	Resettlement Plan
SDS	Safety Data Sheet
SEA/SH	Sexual Exploitation Abuse/Sexual Harassment
TBM	Tunnel Boring Machine
SEP	Stakeholder Engagement Plan
TCDD	Republic of Türkiye State Railways
ToR	Terms of Reference
TTMP	Traffic/Transportation Management Plan
WASH	Water, Sanitation, and Hygiene
WB	World Bank
WCMP	Workers' Camp Management Plan

WGM	Worker Grievance Mechanism
WMP	Waste Management Plan
WWMP	Water and Wastewater Management Plan

1 INTRODUCTION

1.1 Purpose and Scope

The primary objective of the Environmental and Social Management Plan (ESMP) is to establish a comprehensive instrument that details the mitigation measures/actions to be taken during the construction and operation phases of the Project to eliminate or offset adverse Environmental and Social (E&S) impacts or to reduce them to acceptable levels by identifying the actions required to implement these measures. Additionally, it serves as a means to equip project management with the essential tools required to ensure adherence to the Project's standards while effectively addressing the potential E&S risks and impacts identified in the Environmental and Social Impact Assessment (ESIA). Furthermore, in addition to fulfilling the legal and institutional prerequisites necessary for the effective execution of pertinent management strategies, the ESMP also delineates the respective roles and responsibilities of AYGM, and the contractor/sub-contractors involved in the Project. The main objectives of ESMP are as follows:

- To identify and summarize all anticipated adverse E&S impacts, including those related to involuntary resettlement, in line with the ESIA findings.
- To describe each mitigation measure in detail, including technical specifications, designs, and operating procedures, consistent with other mitigation plans (e.g., RP, CHMP).
- To provide estimates of any potential residual E&S impacts of these measures.
- To outline monitoring requirements, capacity development and training needs, implementation schedule, and cost estimates associated with ESMP implementation.
- To ensure integration of the ESMP with overall project planning and management, including contractual obligations of the Design and Build (D+B) Contractors.

In this context, the ESMP, consistent with the ESF applicable due to the Project's risks, land acquisition requirements, biodiversity sensitivities, labor management needs, community safety issues, and cultural heritage interactions, the following Environmental and Social Standards (ESS) are applicable to the Project: ESS1 (Assessment and Management of Environmental and Social Risks and Impacts), ESS2 (Labor and Working Conditions), ESS3 (Resource Efficiency and Pollution Prevention), ESS4 (Community Health and Safety), ESS5 (Land Acquisition, Land Use Restrictions, and Involuntary Resettlement), ESS6 (Biodiversity Conservation), ESS8 (Cultural Heritage), and ESS10 (Stakeholder Participation and Disclosure of Information). These standards apply due to the Project's construction-related risks, land acquisition requirements, biodiversity sensitivities, community safety issues, labor conditions, and interactions with cultural heritage assets.

The ESMP is informed by the findings of the INRAIL ESIA, which identifies the Project’s environmental and social risks as Substantial, consistent with the World Bank ESF risk classification criteria. This classification reflects key risk drivers identified during the ESIA, including:

(i) the linear and district-crossing nature of the corridor, which extends across multiple settlement areas and environmental sensitive zones;
(ii) tunnel and cut-and-cover structures planned particularly in the western segments, requiring deep excavation, shaft construction and associated safety and groundwater-related risks;
(iii) construction-phase impacts documented in baseline and impact assessments, including elevated noise and vibration levels near residential clusters, dust generation from earthworks, increased heavy-vehicle traffic on local roads, and potential deterioration of air quality;
(iv) land acquisition and economic displacement needs, including impacts on privately owned parcels, agricultural lands and small businesses within the defined AoI;

(v) temporary labor influx during the construction phase, with potential implications for community health and safety, traffic safety, and interaction between workers and nearby settlements; and

(vi) biodiversity sensitivities identified along the alignment, including habitat loss and disturbance risks near forested areas, ecological corridors and species of conservation concern.

Key risk drivers identified in the ESIA include the linear and cross-district nature of the alignment, tunneling and cut-and-cover works, construction-phase impacts such as noise, vibration, dust, traffic and air emissions, land acquisition and associated economic displacement, temporary labor influx and community health and safety risks, and biodiversity sensitivities along several segments of the corridor. This ESMP translates the ESIA mitigation hierarchy into clear and implementable construction-phase obligations.

Project Facilities refer to the core railway infrastructure and permanent engineering structures. Auxiliary Facilities include temporary construction-related facilities such as construction camps, batching plants, laydown areas, and spoil disposal sites, which are directly managed under the Project and addressed within the ESMP. Associated Facilities are facilities not financed or implemented by the Project but that are directly related to and necessary for the Project's viability, such as third-party electricity transmission lines supplying construction power, existing or upgraded public roads used for material transport, and off-site licensed excavation disposal facilities that are not constructed by the Project but are necessary for its implementation. While auxiliary facilities fall fully under Project control, associated facilities will be considered within the ESIA in line with ESS1, proportionate to the Project's level of influence.

The ESMP applies to the entire Project Area of Influence (AoI), defined as a 500 m corridor on both sides of the alignment, covering all project facilities and auxiliary facilities including tunnel portals, shafts, viaducts, construction camps, batching plants, laydown areas, spoil disposal sites, temporary access roads, and material storage zones. These spatial boundaries fully align with the ESIA and reflect all locations where Project-related activities may generate E&S impacts.

This ESMP provides the framework for mitigation, monitoring, reporting, and contractor management, ensuring compliance with ESF requirements, national legislation, and commitments outlined in the ESIA and related E&S instruments (RF, LMP, SEP, CHMP, etc.).

2 IMPLEMENTATION OF THE ENVIRONMENTAL & SOCIAL MANAGEMENT PLAN

This ESMP has been prepared as a stand-alone, approved document to be included in the Project's bidding documents. This ESMP provides a framework for managing E&S risks and impacts throughout the Project lifecycle. While it may be updated to reflect the final design, site-specific conditions, and evolving E&S risks, it serves as a formal reference document that specifies the requirements to be followed by the D+B Contractors.

In accordance with the Terms of Reference (ToR) and World Bank ESSs, the D+B Contractors will be required to prepare a site-specific and detailed Contractor's Environmental and Social Management Plan (C-ESMP), based on the guidance and requirements specified in the ESMP.

AYGM will be responsible for ensuring the implementation of both the ESMP and the C-ESMP by deploying qualified and adequate personnel under an appropriate organizational structure, in line with Project standards. AYGM is also responsible for overseeing that all D+B contractors and subcontractors comply with the management requirements and integrate stakeholder engagement, information disclosure, and feedback mechanisms into their implementation.

2.1 Organizational Structure

AYGM is a public institution affiliated to the Ministry of Transport and Infrastructure (MoTI) with a special budget for finance. To prepare and approve the plans and projects of railways, logistic villages, centers or bases, ports, shelters, coastal structures, airports to be built by the state and to construct and / or have this transportation infrastructure handed over are among the roles and responsibilities of AYGM. The Project will be handed over to Republic of Türkiye State Railways (TCDD) General Directorate after the completion of construction. TCDD General Directorate will include the Project in its E&S management system within the scope of railway management.

Once the Project Implementation Unit (PIU) is established within AYGM, the D+B Contractors, who will be responsible for the execution of the land preparation and construction works within the scope of the Project, will be able to manage E&S issues related to construction activities and natural resources within the scope of the ESMP (Contractor not responsible for all social issues, as land acquisition and resettlement is the responsibility of AYGM). The D+B Contractors will use consultancy both from within its organization and by hiring consultants from outside. The D+B Contractors will employ necessary experts on the following subjects regarding the implementation of the management controls determined within the scope of the ESMP, when necessary:

- Environmental Specialists,
- OHS Engineers / Site Safety Engineers,
- Social Specialists,
- Archaeologists/Cultural Heritage Specialists,
- Biodiversity & Ecology Specialists,
- SEA/SH and Community Liaison Specialists,
- Resettlement Specialists.

The D+B Contractors will be responsible for all its staff (including contractor and subcontractor staff) to have E&S responsibility awareness to ensure that E&S requirements are implemented smoothly on site.

D+B Contractors will be contracted by AYGM and they will be responsible from reviewing the final design of the project including the engineering structures, conducting necessary additional E&S studies, in line with both national and WB ESF requirements. While the D+B Contractors will support assessments related to the main Project components, AYGM remains responsible for all E&S assessments of auxiliary and associated facilities (such as access roads, energy transmission lines, borrow pits, etc.) which were not fully assessed in the ESIA due to undefined

layouts at the time of ESIA preparation. Findings of Contractor-led studies for the main Project components will be reflected in the respective sub-management plans and C-ESMP. The Construction Supervision Consultant (CSC) will be contracted once financial closure is finalized and necessary evaluation will be done prior to the construction. Additional pre-construction fauna surveys will be performed by the D+B Contractors under supervision by AYGM. CSC will be contracted once financial closure is finalized and necessary evaluation will be done prior to the construction. In addition, a Project Management Consultant (PMC) will be engaged to carry out independent monitoring, audits, and verification of the Project's E&S performance.

The ESMS structure to be executed by AYGM and the Construction Contractors will be managed with the organizational structure defined in Figure 2-1

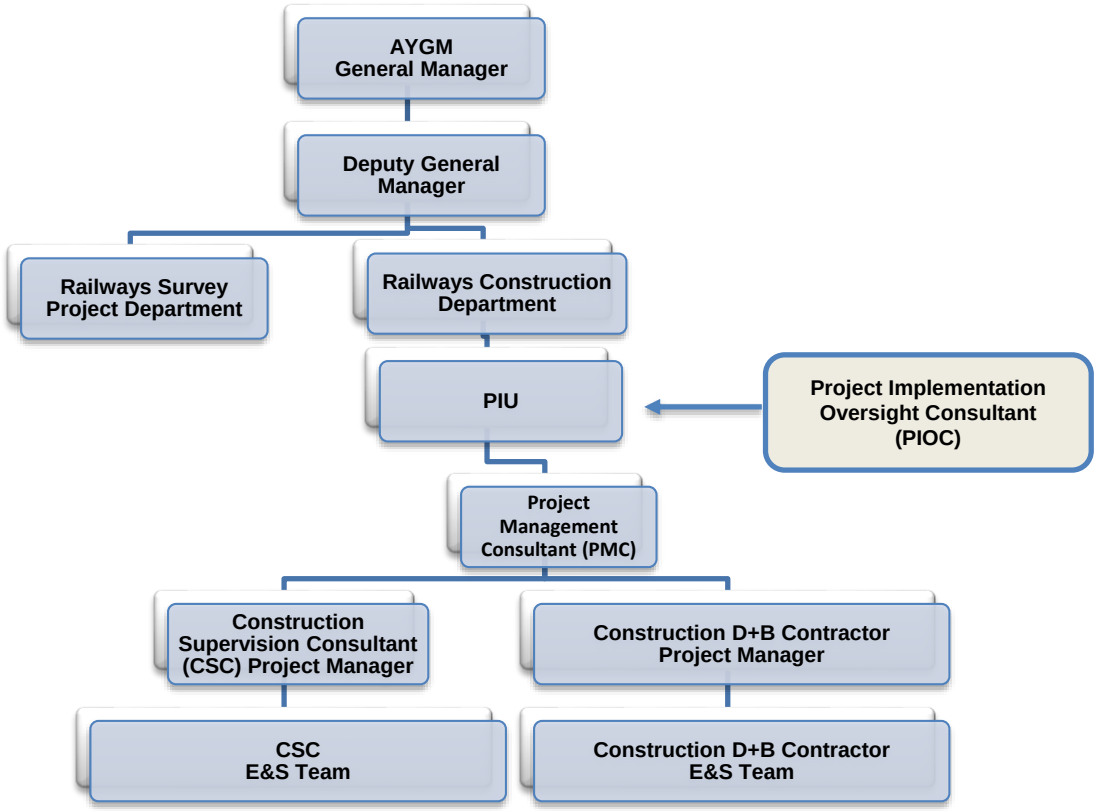

Figure 2-1 ESMS Organizational Structure

2.2 Roles and Responsibilities

As the project owner, it is the responsibility of AYGM to manage the E&S issues of the project and to ensure that the necessary mechanisms are developed and implemented by the D+B Contractors. A framework regarding the roles and responsibilities of AYGM PIU and the D+B Contractors is presented in Table 2-1.

Table 2-1 Roles and Responsibilities Regarding the Implementation of the ESMP

AYGM PIU
▪ Ensure overall compliance of the Project with national environmental legislation, EIA requirements, and World Bank ESSs. ▪ Oversee the implementation of the ESMP by D+B contractors and subcontractors, ensuring that all mitigation and monitoring measures are applied effectively. ▪ Monitor air quality, noise, vibration, soil, and water parameters in accordance with the ESMP and applicable standards; ensure results are documented and corrective actions are taken where necessary.

- Ensure that waste management, wastewater treatment, hazardous material handling, and spill prevention measures are implemented in line with ESMP requirements.
- Supervise implementation of biodiversity-related mitigation measures, including those in the Biodiversity Management Plan (BMP), habitat protection, and species conservation.
- Oversee the implementation of chance find procedures and cultural heritage protection measures in line with national laws and ESS8 requirements.
- Ensure that community health and safety measures are implemented, including traffic safety, dust suppression, and noise control in settlements.
- Coordinate and oversee stakeholder engagement activities, ensuring that affected communities are informed and consulted throughout the project lifecycle, as per the Stakeholder Engagement Plan (SEP).
- Ensure the establishment, operation, and monitoring of a functional grievance mechanism for affected communities, with timely resolution of complaints.
- Supervise the preparation and implementation of Resettlement Plan(s) and Livelihood Restoration Plan(s) in accordance with the Resettlement Framework (RF), national law, and ESS5.
- Notify the World Bank and relevant national authorities within the required timelines about any environmental, social, health, or safety incidents with potential significant adverse effects; prepare follow-up reports and corrective action plans.
- Ensure environmental and social awareness and capacity building for project staff and contractors through training and guidance.
- Ensure communication with the World Bank on OHS-related matters, including compliance with the ESIRT process, and report any cultural chance finds in accordance with Project procedures.
- Prepare and submit periodic environmental, OHS and social monitoring reports to the World Bank, including progress on ESMP implementation and key performance indicators.
- Confirm that no construction activities commence in any location subject to land acquisition, resettlement, informal use or livelihood impacts until RP/LRP implementation is fully completed and verified.
- Issue formal instructions, approvals, suspension or stop-work orders in cases of serious or persistent E&S non-compliance.

Project Management Consultant (PMC)

- Provide technical and advisory support to AYGM PIU on all environmental and social matters throughout the Project lifecycle.
- Support AYGM PIU in coordinating and technically reviewing ESIA, ESMP and SEP finalization undertaken by D+B Contractors.
- Review Contractor-prepared C-ESMPs and all sub-management plans prior to submission to the World Bank for No Objection.
- Support AYGM PIU in supervising RP/LRP preparation, entitlement matrix development, budgeting, and implementation planning.
- Support consolidation and analysis of E&S monitoring data, KPIs and corrective action tracking across all lots.
- Support AYGM PIU during World Bank and co-financier missions, including preparation of responses to comments and action plans.
- Support institutional capacity building and on-the-job training for PIU staff and Contractors.

D+B Contractor(s)

- Implement all project activities in full compliance with national environmental legislation, ESIA/ESMP requirements, and relevant World Bank Environmental and Social Standards.
- Prepare and implement the C-ESMP, including method statements, and sub-plans (e.g., Waste Management Plan, Biodiversity Management Plan, etc.) in line with the ESMP. Relevant sub-plans have been prepared conceptually as part of the current ESMP. Site-specific C-ESMPs will be developed by the D+B Contractor once the final design is confirmed, and any necessary updates based on field conditions will be incorporated at that stage.
- The Contractor shall periodically review and update the C-ESMP, and revise it as necessary to reflect design changes, construction methods, or emerging environmental and social risks, subject to review and No Objection by AYGM PIU and the World Bank.
- Finalize the ESIA, ESMP and SEP as required under the Contract, incorporating final design details, additional surveys, and site-specific mitigation measures, subject to World Bank No Objection.
- Ensure that no construction works commence prior to World Bank No Objection for the C-ESMP and all required sub-management plans.
- The Contractor shall also establish and apply a Design Change and E&S Control Procedure to ensure that any design modifications (alignment, construction methods, materials, or schedule) undergo prior environmental and social re-screening and receive PIU/CSC approval before implementation.
- Conduct regular monitoring of air quality, noise, vibration, soil, and water quality as specified in the ESMP; maintain monitoring records and report results to AYGM PIU.
- Implement waste minimization, segregation, storage, transportation, and disposal procedures; prevent pollution through spill prevention measures and proper hazardous materials handling.
- Implement all biodiversity protection and habitat conservation measures, including those related to Critical Habitat/ Natural Habitat management, seasonal restrictions, and species protection.

- Apply chance find procedures immediately upon discovery of any cultural heritage items; suspend works as required and inform AYGM PIU.
- Implement OHS related measures to protect community health and safety, including traffic safety management, dust suppression, noise control, and prevention of unauthorized public access to worksites.
- Support AYGM in community engagement activities and provide necessary information for community consultations, as per the SEP.
- Support the operation of the community grievance mechanism by recording, tracking, and forwarding complaints to AYGM PIU, and implementing agreed corrective actions.
- Facilitate access to work sites for resettlement and land acquisition activities carried out by AYGM; avoid any unauthorized land use or damage outside approved work areas.
- Strictly refrain from entering or using any land parcels that have not been formally cleared through RP/LRP implementation.
- Immediately notify AYGM PIU of any environmental, social, health, OHS or safety incidents with potential adverse effects. Assist the PIU in investigation such incidents and implementing corrective actions., as per the ESMP (Note: Completion of the ESIRT form/process is a separate task and will be the responsibility of AYGM PIU).
- Ensure that all site staff and subcontractors receive environmental, social and OHS induction training before starting work, and regular refresher trainings thereafter.
- The Contractor shall include in all contracts with sub-contractors' explicit requirements to comply with the ESMP, the C-ESMP and all applicable Environmental and Social requirements of the Project, and shall remain fully responsible for subcontractor compliance.
- Maintain detailed records of ESMP implementation, monitoring results, incidents, training activities, and corrective actions; submit monthly reports to AYGM PIU.
- The Contractor shall promptly implement all corrective measures and corrective action requests issued by the AYGM PIU, PMC and/or CSC in relation to Environmental, Social, Health and Safety non-conformities, within the timelines specified.
- Ensure full E&S compliance of all Subcontractors and remain fully responsible for their performance.
- Prepare, submit for World Bank No Objection, and implement a site-specific Labor Management Plan (LMP) in accordance with ESS2, covering direct workers, contracted workers and subcontractor workers, including working conditions, terms of employment, worker grievance mechanism, labor influx management, SEA/SH risk mitigation and occupational health and safety requirements.
- Undertake additional Environmental and Social impact assessment, screening and/or assessment, as required under the World Bank ESF, for any Project Facilities, Associated Facilities or Auxiliary Facilities that are identified, proposed or required after ESIA finalization. Such facilities shall not be established, accessed or used until the relevant Environmental and Social assessments, management plans and mitigation measures have been prepared, disclosed where required, and approved by AYGM PIU and the World Bank.
- Undertake additional environmental baseline studies, monitoring and impact assessments, including but not limited to noise, vibration, air quality and dust, where required due to final design development, construction methods, proximity to sensitive receptors, changes in work schedule or identification of previously unassessed impacts. Such additional studies and monitoring shall be carried out in accordance with the World Bank ESF, WBG EHS Guidelines and applicable Good International Industry Practice, and the results shall be incorporated into the finalized ESIA, ESMP, C-ESMP and relevant sub-management plans, subject to World Bank No Objection.
- Carry out additional biodiversity screening, surveys and impact assessments, including Critical Habitat or Natural Habitat assessments where required, in accordance with ESS6, in cases where final design, construction methods, seasonal conditions or newly identified Project, Associated or Auxiliary Facilities may result in impacts not previously assessed in the draft ESIA. Implement all additional avoidance, minimization, mitigation, offset or management measures identified through such assessments, including seasonal restrictions, species-specific measures and habitat restoration requirements, without constituting a Variation or giving rise to any claim.

Subcontractors

- Comply with all Environmental, Social, Health and Safety requirements applicable to their scope of works.
- Implement mitigation measures defined in the C-ESMP and relevant sub-management plans.
- Participate in E&S training, inspections and audits.
- Report incidents and non-compliances immediately to the D+B Contractor.

Construction Supervision Consultant (CSC)

- Supervise and verify that the D+B Contractor(s) implements all ESMP requirements, national legislation, and World Bank ESS obligations.
- Conduct routine site inspections to monitor environmental, social and OHS performance; verify monitoring results submitted by the D+B Contractor(s).
- Provide on-site technical advice to the Contractor(s) for implementing mitigation measures and resolving environmental or social non-conformances and OHS related issues.
- Identify non-compliance issues, issue corrective action requests, and follow up until closure.

▪ Prepare environmental, social and OHS progress reports for submission to AYGM PIU, summarizing site observations, compliance status, and recommendations. ▪ Support AYGM PIU in communicating environmental and social requirements to stakeholders, including local authorities and affected communities. ▪ Participate in investigations of environmental, OHS and social incidents, jointly with AYGM PIU and the Contractor(s); provide recommendations for preventive measures. ▪ Provide technical training and capacity support to the Contractor(s) and AYGM PIU on environmental, OHS and social management best practices. ▪ Maintain site visit records, photographic evidence, monitoring logs, and follow-up action documentation. ▪ Confirm that World Bank No Objection has been obtained prior to issuing any Notice to Commence where required.
Project Implementation Oversight Consultant (PIOC)
▪ Conduct periodic audits of ESMP implementation and compliance with national regulations and World Bank ESS requirements. ▪ Independently verify the environmental, social and OHS monitoring results collected by the D+B Contractor and reported to AYGM PIU. ▪ Review and assess the effectiveness of mitigation measures in avoiding, minimizing, or compensating project impacts. ▪ Evaluate the overall environmental, social and OHS performance of the Project and provide recommendations for improvement. ▪ Prepare independent audit reports highlighting compliance levels, gaps, and proposed corrective actions; submit directly to AYGM PIU. ▪ Advise AYGM PIU on institutional strengthening, procedural improvements, and best practices in environmental and social management. ▪ Verify implementation of specific plans such as Biodiversity Management, Cultural Heritage Management, and Community Health and Safety. ▪ Assess effectiveness of stakeholder engagement activities and grievance mechanisms; recommend improvements where necessary. ▪ Track the closure of corrective actions from previous audits and inspections. ▪ Provide third-party assurance to the World Bank on E&S compliance, as required. ▪ Conduct independent audits and verification of RP and LRP implementation, including confirmation that compensation payments, assistance measures and livelihood restoration activities have been completed in accordance with ESS5 and approved RP/LRP. ▪ Verify that no construction activities have commenced in any location subject to land acquisition, resettlement, informal use or livelihood impacts prior to full RP/LRP implementation. ▪ Carry out periodic labor and working conditions audits in accordance with ESS2, covering Contractors and all Subcontractors, including wages, working hours, worker GRM, labor influx management and OHS practices. ▪ Prepare independent RP/LRP implementation verification reports and labor audit reports and submit them to AYGM PIU and the World Bank, as required. ▪ Track and verify closure of corrective actions related to resettlement and labor audits. ▪ Provide third-party assurance to the World Bank on E&S, resettlement and labor compliance.

2.3 Guidance for Contractor's Sub-Management Plans

As part of this ESMP, a guidance has been developed to support the preparation of sub-management plans that will be finalized and implemented by the D+B Contractors during the construction stage of the Project. These sub-management plans are required to ensure that all potential E&S impacts identified in the draft ESIA are effectively managed in accordance with national legal requirements and international good practices, including the World Bank Group Environmental, Health and Safety (EHS) Guidelines.

Indicative table of contents and key instructions for each sub-plan provided in Appendix-1. These sub-management plans will address a wide range of topics, including but not limited to: pollution prevention (e.g., noise, dust, fuel and hazardous materials management), solid and liquid waste management, biodiversity protection, surface and groundwater management, occupational health and safety, labor influx, land acquisition and resettlement (if applicable), construction traffic and transportation management, emergency response, contractor and supply chain management, and community health and safety.

Although the responsibility for preparing and implementing these sub-plans lies with the D+B Contractors, the guidance included in Appendix-1 is intended to ensure consistency, clarity, and alignment with the requirements detailed in the ESMP. Based on the final design and detailed construction methodology, the list of sub-management plans may be expanded, refined, or consolidated as necessary.

In addition, the Contractor shall prepare and implement a "Design Change and Environmental & Social (E&S) Control Procedure" as part of the C-ESMP. This procedure will ensure that any proposed design change — including alignment modifications, construction methods, materials, or schedule adjustments — is subject to an E&S re-screening prior to implementation. The re-screening shall identify potential environmental and social impacts, define required mitigation measures, and obtain formal approval from the PIU and the World Bank before implementation. All such changes and related approvals shall be documented and maintained as part of the project's E&S management records.

The list of sub-management plans as follows:

Prepared by AYGM PIU:

- SEA/SH Action Plan and the Accountability Response Framework
- Cultural Heritage Management Plan / Chance Finds Procedure

To be prepared by the D+B Contractors:

- Contractor Environmental and Social Management Plan (C-ESMP),
- Biodiversity Management Plan,
- Security Management Plan.
- Waste Management Plan,
- Chemical and Hazardous Material Management Plan,
- Air Quality Management Plan,
- Noise Management Plan,
- Water and Wastewater Management Plan,
- Pollution Prevention and Control Plan,
- Occupational Health and Safety Plan and procedures,
- Emergency Preparedness and Response Plan (EPRP),
- Traffic/Transportation Management Plan,
- Community Health and Safety Management Plan,
- Resource Efficiency Management Plan,
- Restoration and Revegetation Plan (including Topsoil Management),
- Environmental, Social, Health and Safety (ESHS) Training Management Plan,
- Labor Influx Management Plan,
- E&S Contractor Management Framework (Guidance to ensure adequate E&S management by sub-contractors),
- Preliminary Land Management Plan (with a list of potential landfills and borrow areas),
- Blasting Management Plan,
- Contractor's Labor Management Plan,
- Workers' Camp Management Plan,
- Design Change and Environmental & Social (E&S) Control Procedure.

3 MITIGATION

The ESMP outlines a comprehensive set of mitigation measures for both the Construction and Operation phases, following the mitigation hierarchy—avoidance, minimization, mitigation, and compensation, where necessary. These measures are developed to reduce or offset potential adverse environmental and social impacts to acceptable levels in accordance with Turkish regulatory requirements and the WB-ESF. The ESMP incorporates technical specifications, good international practices, and WB-EHS Guidelines to ensure that identified risks are adequately managed.

The mitigation framework:

- Details each mitigation action with technical specifications, operational requirements (e.g., continuous or situational implementation), and associated procedures,
- Estimates potential residual impacts after mitigation,
- Provides structured guidance for the preparation of sub-management plans (e.g., Waste Management, Biodiversity, Noise, etc.) to be finalized by the D+B Contractors during Phase II of the Project,
- Ensures consistency with national environmental regulations and World Bank standards, including provision for compensatory measures where appropriate.

Mitigation measures for construction and operation phases of the Project are presented in Table 3-1 and Table 3-2.

Where residual E&S impacts remain after application of the mitigation measures defined in Table 3-1 and Table 3-2, the Project shall manage such impacts through enhanced monitoring, adaptive management measures, and, where required, additional mitigation or management actions. Significant residual impacts shall be clearly identified, monitored and reported, and corrective measures shall be implemented to ensure impacts are kept within acceptable levels in accordance with the World Bank ESF.

3.1 Mitigation Measures for Pre-Construction and Construction Phase

Table 3-1 Mitigation Measures for Pre-Construction and Construction Phase

Subject	E&S Risks	Description of Risk/Expected Impact	Mitigation Measures	Final Impact Significance	Responsibility	
					Development / Definition	Implementation
Environmental and Social Management System	Lack of E&S Management System Failure to coordinate environmental and social mitigation measures; non-compliance with ESSs	Major	- Development and implementation of C-ESMP with all sub-management plans - Deployment of qualified E&S staff within PIU and CSC - Regular audits, monitoring and reporting mechanisms	Negligible	AYGM PIU (overall ESMP framework) D+B Contractor (site-specific sub-plans, C-ESMP)	**Implementing:** D+B Contractor **Supervising:** Supervision Consultant **Monitoring:** AYGM and 3rd Party E&S Consultant
Environmental and Social Management System	Lack of continuous environmental and social monitoring may lead to unidentified non-compliance.	Major	- Implement the monitoring plan (air, noise, vibration, water, biodiversity, social etc.) as defined in ESMP. - Apply KPI thresholds defined ib the ESMP(aligned with WB standards). - Regular reporting to AYGM/WB and corrective action plans for exceedances.	Negligible	AYGM PIU (monitoring framework, KPIs) D+B Contractor (detailed site monitoring plan)	**Implementing:** D+B Contractor **Supervising:** Supervision Consultant **Monitoring:** AYGM and 3rd Party E&S Consultant
Seismicity	Risks to human safety, infrastructure, and the environment from earthquakes or earthquake-induced events, including building collapse, landslides, soil liquefaction, and disruption of services, potentially affecting workers, communities, and ecosystems.	Major	- All engineering structure and superstructures (fill, cut) in the project closure will be designed and constructed taking into account the earthquake resistant design parameters and criteria. - The structures planned for construction within the project will strictly comply with regulations outlined in two official publications. These include the “Regulation Regarding Buildings to be Constructed in Disaster Zones” issued by the Emergency Management Presidency of Türkiye published in the Official Gazette dated 18.03.2018, and the “Earthquake Building Regulation” of the Ministry of Public Works and Settlement, published in the Official Gazette dated 14.07.2007. - All engineering designs will be implemented in full compliance with the Turkish Seismic Code, AFAD regulations, and other relevant national standards. In addition, system-level seismic performance objectives and post-event operational criteria will be further defined within the Employer’s Requirements and the detailed design documentation.	Minor	AYGM PIU (design standards, regulatory compliance)	**Implementing:** D+B Contractor **Supervising:** Supervision Consultant **Monitoring:** AYGM and 3rd Party E&S Consultant
Surface Water Quality	Pollution of surface water due to sediment runoff, concrete washout, spills, or wastewater discharge	Moderate	- Implement erosion and sediment controls (silt fences, traps, buffer zones) near water bodies. - Use silt fences, sediment traps, and buffer zones to reduce sediment runoff. - Designate washing/maintenance areas away from streams with oil-water separators. - Prohibit direct discharge of untreated wastewater; maintain continuous flow via proper diversion methods. - Ensure continuous water flow through proper diversion methods; do not allow stream interruption. - Construct upstream and downstream cofferdams based on highest expected flow; design diversion channels with adequate slope to minimize erosion. - Use subsoil excavated from diversion channel areas for cofferdam construction. - Upon completion of stream crossing works, remove cofferdams and backfill diversion channels using excavated native soil. - Reestablish the natural watercourse by removing the downstream cofferdam first, followed by the upstream one, ensuring uninterrupted flow. - Establish buffer zones around sensitive areas; use temporary bridges/culverts for safe crossings. - Construct temporary bridges or culverts to allow safe vehicle and equipment crossing over the riverbed. - Carry out excavations in a controlled manner to prevent abrupt changes in riverbed levels. - Prevent oil/fuel leaks with spill barriers; maintain safe machinery distances near water. - Establish safe working distances for machinery near water bodies; install physical barriers to prevent accidental falls into streams. - Prepare emergency response plans for flood or high-flow events and provide training to site workers accordingly. - Implement strategic land use plans to minimize impacts on agricultural areas and natural habitats. - Monitor and regulate water consumption to prevent over-extraction and contamination of local water resources. In addition, as committed under Section 5.1.4.1 of this ESIA, the Design-Build Contractor will prepare and implement a Reservoir Protection Protocol as an annex to the C-ESMP. The Protocol will define zone-specific method statements, secondary containment for fuels and chemicals, hot-work permit procedures, designated concrete washout areas, real-time turbidity monitoring at sentinel points with stop-work thresholds, immediate notification to İSKİ/DSİ, and a pre-works emergency drill with the managing utility. The Protocol will be approved by the Employer prior to mobilization and subject to weekly inspections during works adjacent to reservoir protection zones.	Minor	AYGM PIU	**Implementing:** D+B Contractor **Supervising:** Supervision Consultant **Monitoring:** AYGM and 3rd Party E&S Consultant
Groundwater	Interference with groundwater flows due to tunneling, deep excavation, or dewatering activities; contamination risk from fuel, wastewater, and construction chemicals	Major	- Conduct hydrogeological surveys prior to deep excavation or tunneling activities - Identify potential aquifer intersections and determine required dewatering measures - Use closed-loop or lined dewatering systems to prevent uncontrolled discharge - Store fuel, chemicals, and construction materials on impermeable surfaces with secondary containment - Install groundwater monitoring wells around sensitive zones - Prohibit direct discharge of contaminated water into soil or karstic areas - Train workers on good groundwater protection practices and emergency spill response	Moderate	AYGM PIU	**Implementing:** D+B Contractor **Supervising:** Supervision Consultant **Monitoring:** AYGM and 3rd Party E&S Consultant

Subject	E&S Risks	Description of Risk/Expected Impact	Mitigation Measures	Final Impact Significance	Responsibility	
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Wastewater	Pollution of soil and water bodies due to improper discharge of domestic and process wastewater (e.g., from worker camps, concrete batching, and vehicle washing areas)	Moderate	- Install mobile or modular treatment units or holding tanks at worker camps and regularly dispose of domestic wastewater through licensed service providers - Design concrete batching and equipment washing areas with impermeable flooring and wastewater collection systems - Install oil-water separators at vehicle and machinery washing zones - Prohibit direct discharge of untreated wastewater into surface waters or the ground - Ensure compliance with the Turkish Water Pollution Control Regulation and integrate measures into CESMP	Minor	AYGM PIU	**Implementing:** D+B Contractor **Supervising:** Supervision Consultant **Monitoring:** AYGM and 3rd Party E&S Consultant
Air Quality	Emission of dust (PM_{10}, $PM_{2.5}$) and exhaust gases from excavation, earthmoving, and vehicle operations; potential exceedance of WHO air quality standards near sensitive receptors	Major	- Apply frequent water spraying on unpaved roads, stockpiles, and active work zones, especially during dry and windy conditions - Cover trucks transporting loose materials and install wheel-washing stations at site exits - Use dust-binding agents (e.g., polymers) on large earth surfaces and stockpiles - Minimize simultaneous operation of heavy equipment near sensitive receptors - Restrict construction activities to daytime hours only (typically 07:00–19:00) - Establish vegetative buffer zones or temporary physical dust barriers near settlements and schools - Conduct continuous PM_{10} and $PM_{2.5}$ monitoring near the most vulnerable locations - Maintain construction equipment regularly to minimize emissions	Minor	AYGM PIU	**Implementing:** D+B Contractor **Supervising:** Supervision Consultant **Monitoring:** AYGM and 3rd Party E&S Consultant
Climate Change	- During construction and operation phases, greenhouse gas (GHG) emissions will occur mainly from diesel-powered machinery, transportation vehicles, energy consumption, and material production (e.g., steel, concrete). - Indirect impacts include land clearing (loss of carbon sinks) and soil carbon loss due to excavation and grading. - Increased GHG emissions may contribute to climate change and potentially affect Turkey's national emission targets (2053 net-zero goal).	Major	- Adopt low-carbon design principles: select construction materials with recycled content and lower embodied carbon. - Optimize rail alignment to minimize land take and forest clearance. - Integrate energy efficiency criteria into equipment procurement and facility design. - Use modern, fuel-efficient, and well-maintained machinery to reduce fuel consumption. - Promote renewable energy sources (e.g., grid electricity, hybrid equipment) where feasible at camps and worksites. - Implement anti-idling policies and schedule works to minimize machinery run time. - Develop a GHG inventory and monitoring system for major emission sources (fuel logs, energy meters). - Provide training for contractors on energy efficiency and carbon footprint reduction.	Minor	AYGM PIU	**Implementing:** D+B Contractor **Supervising:** Supervision Consultant **Monitoring:** AYGM and 3rd Party E&S Consultant
Waste Management	Improper waste handling, storage, or disposal leading to soil, water, and air pollution	Moderate	- Minimize waste through personnel training and adherence to the waste hierarchy (prevent, reduce, reuse, recycle, recover, dispose). - Implement prevention, recycling, reuse, and recovery strategies to reduce waste; dispose of remaining waste with measures to protect health and the environment. - Classify waste as recyclable, hazardous, or non-hazardous; separate mineral construction waste from other waste types through on-site sorting. - Collect non-hazardous, inert, biodegradable, and recyclable waste separately, ensuring no mixing with hazardous waste. - Establish a temporary waste storage area with impermeable ground, roof, drainage, spill kits, and firefighting equipment; store waste in labeled compartments by type. - Limit hazardous waste storage (except medical waste) to 6 months and non-hazardous to 1 year; obtain a storage permit if hazardous waste exceeds 1,000 kg/month. - Keep detailed records of waste generation, storage, and disposal; complete a Waste Registry Information Form and submit an annual waste declaration to MoEUCC via the Integrated Environmental Information System. - Report all waste management agreements and protocols, including recycling and disposal, to the relevant authority.	Minor	AYGM PIU	**Implementing:** D+B Contractor **Supervising:** Supervision Consultant **Monitoring:** AYGM and 3rd Party E&S Consultant
Waste Oils	Improper storage or disposal of waste oil can cause soil and water contamination, leading to environmental damage and toxic exposure risks. Its flammable nature also poses fire hazards. Additionally, it presents health and safety risks to workers.	Moderate	- All maintenance-related waste, including used oil, oil filters, and oily rags, will be collected and disposed of properly. Waste oils will never be discharged onto the ground or into any water bodies. - If different categories of waste oils are generated at the construction site, they will be stored separately to prevent cross-contamination. - Waste oil storage containers will be kept sealed at all times to prevent rainwater infiltration and ensure safe containment. - Waste oils will be transported using licensed vehicles and disposed of at authorized recycling or disposal facilities in compliance with the Waste Oil Management Regulation.	Minor	AYGM PIU	**Implementing:** D+B Contractor **Supervising:** Supervision Consultant **Monitoring:** AYGM and 3rd Party E&S Consultant
Topsoil Management	Loss, degradation or contamination of topsoil due to improper handling, storage, or mixing with subsoil, potentially resulting in reduced land productivity, erosion, and hindered site restoration.	Moderate	- Topsoil will be stored adjacent to its removal area, preferably on flat land with a maximum slope of 5%. Pile height will not exceed 2 m, and side slopes will be limited to 45°. - The pile surface will be lightly compacted to allow rainfall infiltration and prevent anaerobic conditions. - Topsoil will be kept separate from subsoil, with measures such as geotextile covers or silt fences to avoid mixing. - Piles will be positioned to allow free drainage, with surrounding drainage channels connected to natural drains or surface water flow points. - Part of the topsoil from surface facilities will be used for landscaping after construction, with the remainder applied to offset potential losses in nearby areas; any excess may be made available to the local community upon request. - Topsoil from temporary areas will be reapplied to the site during restoration works. - Topsoil will not be used as padding, pipe bedding, or backfill material.	Minor	AYGM PIU	**Implementing:** D+B Contractor **Supervising:** Supervision Consultant **Monitoring:** AYGM and 3rd Party E&S Consultant
Excavation Material Management	Uncontrolled or non-compliant handling, storage, or disposal of excavated materials may lead to land degradation, obstruction of natural drainage patterns, contamination of ecologically or culturally sensitive areas, and violation of legal requirements under national waste regulations.	Moderate	- The subsoil to be formed will be stored in excavation soil storage areas to be approved by the relevant municipalities within the framework of the provisions of "Regulation on the Control of Excavation Soil, Construction, and Debris Wastes" published in the Official Gazette numbered 25406 and dated 18.03.2004. - Existing possible material disposal sites include: Istanbul Leather Organised Industrial Zone; İSTAÇ – İmrahor Excavation Material Storage Area; İSTAÇ – Atalaylar Excavation Material Storage Area; İSTAÇ – Çiftalan Excavation Material Storage Area; and İSTAÇ – Büyükkılıçlı Excavation Material Storage Area. Further details, including capacities, are provided in the ESIA Baseline (see Section 4.2.6.2 and Annex EK-11). If a new excavation storage area is requested by the contractor, approval will be obtained from the relevant municipality within the framework of the provisions of RCESCDW.	Minor	AYGM PIU	**Implementing:** D+B Contractor **Supervising:** Supervision Consultant **Monitoring:** AYGM and 3rd Party E&S Consultant

Subject	E&S Risks	Description of Risk/Expected Impact	Mitigation Measures	Final Impact Significance	Responsibility	
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			- The subsoil to be formed should be temporarily stored on a flat ground next to the construction area at a height of maximum 3 m and with a slope of maximum 450. - The unauthorized storage or disposal of subsoil on agricultural lands, pastures, meadows, or private properties will be strictly prohibited under the relevant regulations. - Excavated soil shall in no way be disposed of in riverbeds, dam lakes, or stream beds, regardless of whether they are seasonal or permanent, nor in areas protected for biological, ecological, or cultural reasons. - The Contractor will prepare a high-level Soil & Excavated Material Management Plan (S-EMMP) to define overarching principles and coordination mechanisms for spoil handling, transport, reuse, and disposal. This plan will guide the D&B Contractor in developing the detailed Soil & Excavated Material Management Plan (S-EMMP) in line with national regulations and ESMP requirements.			
Chemicals and Hazardous Materials Management	- Risk of soil and groundwater contamination due to leaks or spills of hazardous materials - Fire and explosion hazards, especially during transportation and storage of fuels and solvents - Adverse health impacts on workers and surrounding communities - Improper waste management leading to environmental pollution - Lack of emergency preparedness for chemical accidents	Minor	- SDSs shall be available for all hazardous materials and personnel shall be informed accordingly - Chemicals shall be stored in sealed, clearly labeled containers and in designated storage areas with appropriate containment systems - Storage facilities shall be protected against external factors such as flooding or rainwater infiltration - Fuel and chemical refueling operations shall be conducted in designated areas by trained personnel - Spill response kits (absorbents, fire extinguishers, etc.) shall be kept available on site at all times - Hazardous wastes shall be stored in designated temporary storage areas until transferred to licensed facilities, and all handling shall avoid spill risks outside the AoI. - Regular training shall be provided to workers on safe chemical handling and emergency response procedures - Waste management practices shall comply with national regulations such as the Regulation on Control of Hazardous Waste and Waste Oil Management Regulation, as well as IFC/EBRD standards	Negligible	AYGM PIU	**Implementing:** D+B Contractor **Supervising:** Supervision Consultant **Monitoring:** AYGM and 3rd Party E&S Consultant
Noise and Vibration Management	- Disturbance to nearby sensitive receptors such as residential areas, schools, and hospitals due to elevated noise levels - Health impacts such as stress, sleep disturbance, and hearing loss among workers and communities - Potential structural damage to nearby buildings due to vibration from heavy equipment or tunneling activities	Minor	- Conduct baseline noise monitoring at key sensitive receptor points prior to construction - Schedule high-noise activities (e.g. pile driving, heavy excavation) during daytime hours only - Maintain equipment to minimize noise (e.g. mufflers, silencers) - Use low-noise machinery and acoustic barriers near sensitive areas when necessary - Implement vibration monitoring in areas where underground or structural risks exist - Inform nearby communities in advance of planned noisy activities - Provide workers with hearing protection equipment and conduct regular OHS trainings related to noise exposure	Negligible	AYGM PIU	**Implementing:** D+B Contractor **Supervising:** Supervision Consultant **Monitoring:** AYGM and 3rd Party E&S Consultant
Biodiversity	Population of endemik and rare species decrease	Moderate	Several plant species with restricted or critical distribution have been recorded within the project area, including Centaurea hermannii, Cirsium polycephalum, Ferulago confusa, Symphytum tuberosum subsp. nodosum, Leucojum aestivum, and Lilium martagon. In order to ensure the protection and long-term conservation of these species and their habitats, the following measures should be implemented: • Seeds of the aforementioned species should be collected during the appropriate phenological period and submitted to the Turkish Seed Gene Bank for ex-situ conservation. • As the habitat in which these species occur is ecologically sensitive, topsoil storage and management must be conducted in accordance with best practice guidelines to prevent degradation. • Introduction and spread of invasive plant species within this habitat must be strictly prevented through regular monitoring and control measures. • For populations of critically distributed species that would be directly impacted by the project activities, translocation to ecologically suitable habitats should be carried out under the supervision of a qualified botanist or plant ecologist. • Centaurea hermannii seed collection in July • Cirsium polycephalum seed collection in August • Ferulago confusa seed collection in July • Symphytum tuberosum subsp. nodosum seed collection in June • Lilium martagon bulb collection in July • Leucojum aestivum bulb collection in July	Minor	AYGM PIU	**Implementing:** D+B Contractor **Supervising:** Supervision Consultant **Monitoring:** AYGM and 3rd Party E&S Consultant
Biodiversity	Habitat loss and endemic\rare species population decrease Trend and population decrease of threatened species	Moderate	in-situ conservation measures should also be implemented for regionally endemic and/or non-endemic but locally rare plant species. Specifically, for populations that are likely to be adversely affected by the project activities, translocation efforts should be carried out to ecologically suitable and protected habitats to ensure the continued survival of these species in their natural environment. - Centaurea hermannii seed re-location in October-November - Cirsium polycephalum seed re-location in October-November - Ferulago confusa seed re-location in October-November - Symphytum tuberosum subsp. nodosum seed re-location in October-November - Lilium martagon bulb re-location in October-November - Leucojum aestivum bulb re-location in October-November - Replacement planting will be carried out as follows: for trees from natural forests, 2 new trees will be planted for each tree removed; for trees from slopes next to the motorway, 1 new tree will be planted for each tree removed.	Minor	AYGM PIU	**Implementing:** D+B Contractor **Supervising:** Supervision Consultant **Monitoring:** AYGM and 3rd Party E&S Consultant
Biodiversity	Threat to species Miss of identification of geophytes	Major	Since the field surveys along the project corridor were conducted in June, some early spring geophyte species could not be detected. Therefore, an additional field survey should be carried out in February to investigate the presence of regionally endemic species such as Ornithogalum pascheanum Speta, Galanthus plicatus Bieb. subsp. byzantinus (Baker) Beck, and Crocus pestalozzae Boiss.	Minor	AYGM PIU	**Implementing:** D+B Contractor **Supervising:** Supervision Consultant **Monitoring:** AYGM and 3rd Party E&S Consultant

Subject	E&S Risks	Description of Risk/Expected Impact	Mitigation Measures	Final Impact Significance	Responsibility	
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Biodiversity	Habitat loss Trend and population decrease of threatened species	Moderate	In order to assess whether plant species with critical distribution (including regionally endemic or non-endemic but locally rare species) continue to persist along the project corridor and to determine the extent of potential impacts from the project activities, regular monitoring should be conducted. Specifically, monitoring should take place at least twice per year during the construction phase. If necessary, urgent conservation measures must be implemented based on the monitoring results. In addition, to ensure continuity of wildlife movement at the ecological crossing location near km 2 (Cut & Cover-7, aligned with the North Marmara Motorway Ecological Bridge), the following measures will be implemented: - A temporary wildlife passage will be established during construction to maintain crossing functionality. - The reinstated surface over the covered railway will be designed in line with ecological overpass best practice (minimum effective width, substrate continuity, native vegetation cover, perimeter fencing, noise and light minimization, post-construction monitoring). - Coordination with the motorway operator and relevant authorities will be undertaken regarding timing, fencing tie-ins, and maintenance responsibilities. - Adaptive measures (e.g., widening of vegetated platform, enhancement of guide fencing) will be introduced if monitoring indicates residual barrier effects. - Upon completion of the cut-and-cover works and reinstatement of the surface, the land bridge function will be preserved and the wildlife movement corridor will be restored. - If required at detailed design stage, the effective width of the ecological crossing will be extended over the railway section to maintain or enhance habitat connectivity. In addition, the following biodiversity protection measures will be integrated into the Biodiversity Management Plan (BMP): - Seasonal timing windows will be applied for vegetation clearance and high-noise activities to avoid breeding, nesting, and migration periods for fauna species recorded during baseline surveys. - Dark-sky compliant lighting (e.g., downward-directed, low-intensity fixtures) will be adopted at all work sites and approaches to minimize light disturbance to nocturnal fauna. - Invasive-species hygiene protocols will be implemented, including equipment wash-down before site entry and exit, to prevent the spread of invasive alien plant species. - Immediate stop-work and ecologist inspection procedures will be triggered if any active nest, roost, or breeding site of a protected species is discovered during construction. - Post-construction biodiversity monitoring will be maintained for at least two years after reinstatement to evaluate habitat recovery, wildlife usage of the ecological crossing, and effectiveness of mitigation. - Adaptive management actions will be implemented if post-construction monitoring identifies residual barrier or habitat degradation effects. - Special attention will be given to the Bosphorus raptor flyway and other ecologically sensitive crossings, ensuring that mitigation and monitoring cover potential disturbance and collision risks. - Performance indicators such as percentage of native vegetation restoration success (target ≥80%), number of invasive-species incidents controlled, and number of ecological inspections triggered will be used to assess BMP effectiveness	Minor	AYGM PIU	**Implementing:** D+B Contractor **Supervising:** Supervision Consultant **Monitoring:** AYGM and 3rd Party E&S Consultant
Biodiversity	Insufficient wildlife connectivity / lack of fauna crossings	Moderate	- Incorporation of additional underground passages for small animals as a separate biodiversity mitigation measure. - Passages to be installed at every 1 km along rail sections elevated above ground longer than 1 km. - Dimensions of the passages should be suitable for small fauna species, taking into account the size limitations defined by motorway fence openings. - Routine inspection and maintenance to ensure passages remain functional and unobstructed.	Minor	AYGM PIU	**Implementing:** D+B Contractor **Supervising:** Supervision Consultant **Monitoring:** AYGM and 3rd Party E&S Consultant
Biodiversity	Cumulative habitat connectivity loss	Moderate	- Conduct pre-construction ecological connectivity assessment. - Integrate fauna crossings (culverts, underpasses) into detailed design. - Restore disturbed areas with native vegetation after construction. - If required, extend ecological crossing width in detailed design stage.	Minor	AYGM PIU	**Implementing:** D+B Contractor **Supervising:** Supervision Consultant **Monitoring:** AYGM and 3rd Party E&S Consultant
Biodiversity	Blasting impacts on fauna and soil	Moderate	- Prepare and implement Blasting Management Plan. - Restrict blasting to 08:00–18:00 hours, avoid during breeding/migration periods. - Use blasting mats, limit vibration <10 mm/s, conduct fauna scaring before each blast. - Post-blast: stabilize slopes and revegetate disturbed surfaces.	Minor	E&S & HSE Experts	**Implementing:** D+B Contractor **Supervising:** Supervision Consultant **Monitoring:** AYGM and 3rd Party E&S Consultant
Biodiversity	Spread of Invasive Alien Species (IAS)	Minor	- Clean machinery before site entry. - Inspect fill and plant material sources. - Remove detected IAS within 10 days. - Conduct quarterly IAS inspections and maintain records.	Minor	E&S Specialist	**Implementing:** D+B Contractor **Supervising:** Supervision Consultant **Monitoring:** AYGM and 3rd Party E&S Consultant

Subject	E&S Risks	Description of Risk/Expected Impact	Mitigation Measures	Final Impact Significance	Responsibility	
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Biodiversity	Disturbance to breeding bird species	Moderate	- Conduct pre-construction nest survey before vegetation clearance. - If active nests are found, establish 200–500 m buffer zones based on species sensitivity. - Prohibit tree cutting during April–July breeding season. - Resume works only after ornithologist approval.	Minor	Ornithologist, E&S Specialist	**Implementing:** D+B Contractor **Supervising:** Supervision Consultant **Monitoring:** AYGM and 3rd Party E&S Consultant
Cultural Heritage	- Construction works may cause physical damage to military bunkers, aqueducts, slope settlements, Roman water structures, historical cemeteries, and other cultural sites. - Vibration, excavation, and access road construction pose risks to unregistered archaeological remains. - Lack of awareness among workers may lead to accidental destruction of heritage assets. - Risk of failing to identify and protect chance finds during excavation activities.	Moderate	- Conduct pre-construction surveys and GIS-based mapping for all known cultural assets, in accordance with the Cultural Heritage Management Plan. - Apply buffer zones and fencing to protect known sites, as identified in ESIA. - Limit access and use manual techniques near sensitive structures. - Implement the Chance Find Procedure prepared by AYGM, including immediate work stoppage, notification to authorities, and archaeological evaluation. - Provide cultural heritage awareness training for all site personnel. - Ensure continuous monitoring near heritage structures during construction. - Immediate notification to the Istanbul Regional Directorate of Cultural Heritage and Tourism and relevant Conservation Board in case of chance finds or impacts to registered sites. - Establish vibration limits for construction activities in proximity to historical masonry and heritage buildings, based on international standards (e.g., DIN 4150-3 or BS 7385). Continuous vibration monitoring shall be undertaken to ensure compliance. - Define restrictions on night-time construction works, especially near sensitive receptors such as schools, hospitals, and heritage buildings, to minimize noise and vibration disturbance. - Integrate these criteria and working-hour limitations into the C-ESMP.	Minor	AYGM PIU	**Implementing:** D+B Contractor **Supervising:** Supervision Consultant **Monitoring:** AYGM and 3rd Party E&S Consultant
Expected population change	Construction-related employment opportunities and temporary economic activity may lead to short-term population influx in certain sub-settlements, potentially placing additional pressure on local services (housing, infrastructure, and social cohesion). Previous experience with overlapping transport projects indicates that such influx may also lead to 'project fatigue' among local residents and business owners.	Moderate	- AYGM-PIU, in cooperation with district municipalities, will identify settlements most likely to attract temporary workers and monitor population dynamics during construction. - To minimize unplanned in-migration, Labour Camps will be established and managed by the Contractor outside of sensitive settlements, under the supervision and approval of AYGM.. - PIU will coordinate with local service providers (schools, healthcare centers, waste management units) to anticipate and address potential increases in demand. - Awareness-raising meetings will be held with local communities to explain workforce management measures, expected duration of construction-related influx, and grievance channels. - Lessons learned from previous projects in the AoI will be integrated into the Stakeholder Engagement Plan (SEP), with a focus on reducing "project fatigue." - PIU will establish a monitoring mechanism (quarterly reports) on in-migration trends, housing rental price fluctuations, and community concerns.	Minor	AYGM PIU	**Implementing:** AYGM PIU **Supervising:** Supervision Consultant **Monitoring:** 3rd Party E&S Consultant
Stakeholder Engagement Economy and Employment	There is a potential risk of labor management challenges during the construction phase, including shortage of unskilled labor, reliance on informal or irregular migrant workers, and risks of non-compliance with labor laws. These risks may lead to workforce instability, illegal employment, and associated social tensions if not properly managed	Moderate	- AYGM/PIU will coordinate with local employment agencies and municipalities to assess labor availability and ensure transparent recruitment channels. - The Contractor will prepare and implement a Labor Management Plan (LMP) consistent with the Labor Management Procedures of project, national labor law and WB ESS2, including provisions against child and forced labor. - NGOs and local organizations may be engaged by AYGM to support inclusion of vulnerable groups, particularly migrants, under a regulated framework. - Monitoring of illegal or informal employment risks will be jointly carried out by AYGM PIU and Contractor, with corrective actions defined under the LMP.	Minor	AYGM PIU (overall labor policy, coordination with state agencies) + D+B Contractor (site-specific Labor Management Plan)	**Implementing:** D+B Contractor **Supervising:** Supervision Consultant **Monitoring:** AYGM and 3rd Party E&S Consultant
Stakeholder Engagement Housing and residences	Potential housing pressure in the AoI may occur due to temporary population influx during the construction phase. This may lead to insufficient social housing supply and increased demand on existing housing stock, with possible impacts on affordability and land values. These risks are primarily linked to regional planning and fall under the responsibility of governmental housing and urban planning institutions (e.g., TOKİ, municipalities, provincial administrations).	Moderate	- Further analysis will be conducted to assess potential housing demand pressures during construction, - AYGM will engage with TOKİ, municipalities, and provincial administrations to address risks of housing supply shortages and price speculation. - The construction workforce will be primarily accommodated within designated labour camps established and managed by the Contractor, in accordance with the approved Labor Management Plan. A limited number of specialized and managerial personnel will be housed in nearby settlements as part of the overall workforce	Minor	AYGM (in cooperation with TOKİ, municipalities, provincial administrations, NGOs)	**Implementing:** AYGM **Supervising:** Supervision Consultant **Monitoring:** 3rd Party E&S Consultant

Subject	E&S Risks	Description of Risk/Expected Impact	Mitigation Measures	Final Impact Significance	Responsibility	
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			accommodation strategy. Final ratios and specific accommodation arrangements will be defined during the detailed design and workforce planning phase, in coordination with AYGM and relevant local authorities. -These issues fall outside the scope of Contractor responsibilities and will require inter-agency cooperation.			
Stakeholder Engagement Land acquisition-Residential areas	There are areas with high housing density within the zones intersecting the AoI. In predominantly privately owned housing areas, homeowners and users (tenants) may face involuntary physical and economic resettlement due to the project's land acquisition impacts. Efforts will be made to avoid this impact as much as possible. Involuntary physical resettlement caused by other projects overlapping with the AoI may exacerbate the overall effect.	Major	- Involuntary physical resettlement impacts will be avoided. - In cases where avoidance is not possible, a RP will be prepared for the affected areas in line with the RF. - A "No-Works Clause" will be applied to all parcels subject to land acquisition or physical displacement. No mobilization, construction, or site clearance will commence on any parcel or chainage until compensation and assistance measures defined in the RF/RP are verified as fully completed by AYGM and the PIU. - During the implementation of the RP, special attention will be given to disadvantaged groups such as those facing economic hardship, individuals with physical disabilities, people living alone, female-headed households, and migrants, and additional mitigation measures will be applied for these groups. - Special attention will be given to individuals who do not own another residence or are unlikely to have access to alternative housing. - Communication must be established with all homeowners and tenants. - During the communication process, the needs of disadvantaged groups should be identified. - The Contractor will coordinate work schedules with AYGM to ensure compliance with the No-Works Clause and will only mobilize in areas formally cleared by AYGM/PIU.	Moderate	AYGM PIU	**Implementing:** AYGM **Supervising:** Supervision Consultant **Monitoring:** 3rd Party E&S Consultant
Stakeholder Engagement Land acquisition-Commercial areas	The areas intersecting with the AoI include zones with a high concentration of commercial activities. In predominantly privately owned commercial areas, business owners, users (tenants), and employees may face involuntary physical and economic resettlement due to the land acquisition impacts of the project. This impact will be avoided as much as possible. Involuntary physical and economic resettlement caused by other projects overlapping with the AoI may further intensify the overall effect.	Major	- Involuntary physical and economic resettlement impacts will be avoided. - In cases where avoidance is not possible, a Resettlement Plan (RP) will be prepared for the affected areas in line with the RF. - During the implementation of the RP, special attention will be given to disadvantaged groups such as those facing economic hardship, individuals with physical disabilities, people living alone, female-headed households, and migrants, and additional mitigation measures will be applied for these groups. - Special attention will be given to individuals whose sole source of livelihood is the affected business. - Specific mitigation measures will be implemented for individuals employed in the affected facilities. To this end, it is essential to establish cooperation with industrial zones such as Organized Industrial Zones (OIZs) and local employment agencies. - Communication must be established with all business-owners and tenants. - During the communication process, the needs of disadvantaged groups should be identified.	Moderate	AYGM PIU	**Implementing:** AYGM **Supervising:** Supervision Consultant **Monitoring:** 3rd Party E&S Consultant
Stakeholder Engagement Land acquisition-Agricultural areas	There are agricultural activity areas—albeit to a limited extent—within the zones intersecting the AoI, some of which operate as agricultural enterprises. While many agricultural lands are privately owned, agricultural activities are also carried out on common lands. Landowners, as well as formal and informal users, may be subject to involuntary physical and economic resettlement due to the land acquisition impacts of the project. This impact should be avoided as much as possible. Involuntary physical and economic resettlement caused by other projects intersecting with the AoI may further intensify the impact. In particular, settlements that held village status prior to 2013 tend to show heightened sensitivity on this issue.	Major	- Involuntary physical and economic resettlement impacts will be avoided. - In cases where avoidance is not possible, a Resettlement Plan (RP) will be prepared for the affected areas in line with the RF. - During the implementation of the RP, special attention will be given to disadvantaged groups such as those facing economic hardship, individuals with physical disabilities, people living alone, female-headed households, and migrants, and additional mitigation measures will be applied for these groups. - Special attention will be given to individuals whose sole source of livelihood is the affected agricultural area. - Communication must be established with all landowners, formal and/or informal users, and tenants. - During the communication process, the needs of disadvantaged groups will be identified.	Moderate	AYGM PIU	**Implementing:** AYGM **Supervising:** Supervision Consultant **Monitoring:** AYGM and 3rd Party E&S Consultant
Stakeholder Engagement Land acquisition-Livestock areas	There are livestock activity areas within the zones intersecting the AoI, some of which may include livestock-related enterprises. These areas are mostly privately owned and may be located in shared spaces together with residential properties. Both structures used for livestock activities—such as barns—and livestock enterprises themselves may be subject to involuntary physical and economic resettlement due to the project's land acquisition impacts. This impact should be avoided as much as possible. Involuntary physical and economic resettlement resulting from other projects intersecting with the AoI may further intensify this effect. Views regarding the project's impact on livestock is not clear. Migrant individuals involved as labor in these activities are also considered a vulnerable group.	Major	- Involuntary physical and economic resettlement impacts will be avoided. - In cases where avoidance is not possible, a Resettlement Plan (RP) will be prepared for the affected areas in line with the RF. - During the implementation of the RP, special attention will be given to disadvantaged groups such as those facing economic hardship, individuals with physical disabilities, people living alone, female-headed households, and migrants, and additional mitigation measures will be applied for these groups. - Special attention will be given to individuals whose sole source of livelihood is the affected husbandry area. - If applicable, individuals working informally as shepherds will also be duly considered. - In cases involving livestock enterprises, special attention should also be given to individuals employed in these businesses. - Communication must be established with all owners, users, and workforce (formal /informal). - During the communication process, the needs of disadvantaged groups will be identified.	Moderate	AYGM PIU	**Implementing:** AYGM **Supervising:** Supervision Consultant **Monitoring:** 3rd Party E&S Consultant
Stakeholder Engagement Land acquisition-Grazing areas	There are grazing areas within the zones intersecting the AoI, the ownership of which is mostly under public/common property or the treasury. Both formal and informal users of these areas may face involuntary physical and economic resettlement due to the project's land acquisition impacts. This impact will be avoided as much as possible. Involuntary resettlement caused by other projects overlapping with the AoI may further intensify this effect. Views regarding the project's impact on grazing areas are not clear. Migrant individuals involved as labor in these activities are also considered a vulnerable group.	Major	- Involuntary physical and economic resettlement impacts will be avoided. - In cases where avoidance is not possible, a Resettlement Plan (RP) will be prepared for the affected areas in line with the RF. - During the implementation of the RP, special attention will be given to disadvantaged groups such as those facing economic hardship, individuals with physical disabilities, people living alone, female-headed households, and migrants, and additional mitigation measures will be applied for these groups. - Special attention will be given to individuals whose sole source of livelihood is the affected grazing / pasture area. - If applicable, individuals working informally as shepherds will also be duly considered - Communication must be established with all users - During the communication process, the needs of disadvantaged groups will be identified.	Moderate	AYGM PIU	**Implementing:** AYGM **Supervising:** Supervision Consultant **Monitoring:** 3rd Party E&S Consultant
Labor Management	Inadequate labor management can lead to risks such as labor rights violations, unsafe working conditions, labor disputes, and exploitation. Poor management may cause accidents, reduced workforce morale, and non-	Major	- Ensure full compliance with Turkish Labor Law No. 4857, OHS Law No. 6331, and WB ESS2. - Align labor management practices with international good practices and the LMP. All workers to receive written contracts detailing labour conditions, working hours, wages, rights and dutiies code of Conduct (CoC) etc	Minor	AYGM PIU (based on	**Implementing:** D+B Contractor (to develop Labour Management

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	compliance with local labor laws and international standards, including risks related to labor relations such as restrictions on freedom of association, lack of effective grievance mechanisms, or failure to respect collective bargaining rights.		- Implement transparent and non-discriminatory recruitment processes for direct, contracted, and primary supply workers, In line with ESS2, conduct due diligence on labor practices of primary suppliers to ensure compliance with labor laws, prevention of child and forced labor, and take corrective measures where non-compliance is identified - Require contractors to develop site-specific Labor Management Plans (LM Plans) and OHS Plans in accordance with Project standards. - Enforce strict prohibition of child labor and forced labor through regular monitoring and audits. - OHS-related measures (training, PPE, right to refuse unsafe work) are detailed under Occupational Health and Safety risks. - Monitor and regulate working hours to prevent excessive overtime and worker fatigue, in line with applicable legislation. - Implement zero-tolerance policies on SEA/SH with mandatory CoC training. - Establish confidential and accessible GRM specifically for SEA/SH complaints. - Ensure worker camps meet IFC/EBRD minimum standards regarding hygiene, sanitation, water supply, and adequate living conditions - Deliver periodic training on LMP provisions, workers' rights, Coc, and grievance procedures to all workforce categories. - Maintain effective, confidential, and accessible grievance channels for workers, with defined response and resolution protocols. - Conduct ongoing monitoring and supervision by the PIU and CSC. - Prepare regular compliance reports and implement timely corrective actions when deviations are identified.		ESIA/ESMP and LMP)	Plan on the basis of project LMP and apply it on site) **Supervising:** Supervision Consultant **Monitoring:** AYGM and 3rd Party E&S Consultant
Gender and Vulnerable Groups (Women, children, elderly, migrants, disabled)	- Risk of gender-based violence (GBV) and harassment related to labor influx. - Limited access of vulnerable groups to grievance mechanisms. - Unequal impact of construction-related nuisances (noise, dust, restricted access) on vulnerable households. - Exclusion of women and vulnerable groups from stakeholder engagement.	Moderate	- Implement a SEA/SH Action Plan (training, awareness campaigns, CoC for workers, service provider mapping) developed by AYGM. - Ensure accessible GRM (multiple channels, anonymity, gender-sensitive handling). - Develop Accountability and Response Framework to manage SEA/SH complaints by AYGM - Prioritize inclusive stakeholder consultations (separate sessions for women, translation if needed). - Conduct awareness-raising on workers' behavior and community interactions.	Minor	AYGM PIU	**Implementing:** D+B Contractor **Supervising:** Supervision Consultant **Monitoring:** AYGM and 3Ird Party E&S Consultant
Occupational Health and Safety	The failure to develop a comprehensive Occupational Health and Safety Management System or a Construction Phase OHS Plan prior to construction, along with the delayed establishment of qualified site OHS teams, may lead to unsafe conditions such as lack of coordination during mobilization, inadequate emergency preparedness, and an increased risk of workplace accidents.	Major	- A full H&S Management System and Construction Phase H&S Plan will be developed and approved prior to site mobilization. - Full compliance will be ensured with the Turkish Law No. 6331 on Occupational Health and Safety, in addition to international standards (IFC/EBRD). - A qualified and adequate OHS team will be mobilized before the start of any construction activities. - Clear roles, responsibilities, and communication channels for OHS will be defined for all contractors and subcontractors. - A mobilization-specific risk assessment and control plan will be prepared. - Emergency preparedness and response plans will be tested and validated through drills before site works commence. - OHS induction and training for all site personnel will be completed prior to mobilization. - Daily coordination and supervision mechanisms between employer and contractor OHS teams will be established. - Conduct mandatory OHS training for all workers and ensure continuous awareness. - Provide adequate PPE and implement safety protocols to minimize accidents and occupational diseases. - Every worker has the right to refuse unsafe work and report it immediately. No disciplinary action shall be taken for exercising this right	Minor	AYGM PIU	**Implementing:** D+B Contractor **Supervising:** Supervision Consultant **Monitoring:** AYGM and 3rd Party E&S Consultant
Occupational Health and Safety	Inadequate development and implementation of construction-phase OHS documentation such as Risk Assessments, Emergency Response Plans, Permit-to-Work systems, Accident/Incident Records, Root Cause Analyses, Monthly OHS Performance Reports, and OHS Training Records may result in incomplete safety measures, delayed corrective actions, and non-compliance with regulations. The absence of proper monitoring and documentation systems may lead to an increased number of accidents, recurrence of preventable incidents, risks for the project	Major	- The D+B Contractor and all subcontractors will be required to establish and implement a comprehensive set of OHS documents (e.g., risk assessments, emergency response plans, permit-to-work systems etc,, as required under Turkish law, ESIA and ESMP) prior to commencement of works. - Permit-to-Work systems will be applied to all critical and high-risk activities and will be monitored by both the main contractor and subcontractors. - A standardized system for recording accidents and incidents will be implemented, and root cause analyses will be conducted following each case. - Immediately or not later than 24 hours, the PIU or the contractor shall report to the labor Inspectorate and the Ministry of Interior (police), and to the World Bank verbally and in writing, any fatality, collective or individual serious injury, resulting in an employee being unable to work for three consecutive working days, as well as any dangerous event that may put health and safety of the employees at risk - Monthly OHS performance reports will be prepared by the D+B contractor and subcontractors and shared regularly with the project management. - All workers will be required to complete mandatory OHS trainings before beginning work on site. - OHS training participation and completion records will be maintained and monitored for both main and subcontractor personnel. - No worker (including subcontractor personnel) will be allowed to operate on-site without up-to-date OHS training certification. - Training programs (content, frequency, delivery methods) will be regularly reviewed and updated as necessary. - Responsible personnel for preparing, reviewing, and updating OHS documentation will be designated by each contractor. - Periodic internal audits will be conducted by D+B Contractor. to verify the consistency and field-level application of OHS documentation across all contractors.	Minor	AYGM PIU	**Implementing:** D+B Contractor **Supervising:** Supervision Consultant **Monitoring:** AYGM and 3rd Party E&S Consultant

Subject	E&S Risks	Description of Risk/Expected Impact	Mitigation Measures	Final Impact Significance	Responsibility	
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Occupational Health and Safety	During tunnel construction, workers operating in confined and enclosed spaces may be exposed to serious occupational health and safety risks such as insufficient ventilation, low oxygen levels, accumulation of toxic gases, ground instability, tunnel collapse, fire, and explosion. These risks may lead to respiratory problems, poisoning, crushing, severe injuries, or fatalities.	Major	- The D+B contractor and all subcontractors will be required to develop and implement specific OHS procedures for confined space works prior to tunnel construction activities. - Continuous gas detection and air quality monitoring systems will be installed and operated within the tunnel environment. - All workers will receive specialized training on confined space safety, oxygen deficiency, toxic gases, and emergency evacuation before entering tunnel works. - Ventilation systems will be installed at tunnel entrances to ensure constant air circulation. - A Permit-to-Work system will be applied to regulate access to confined areas, allowing entry only to authorized and trained personnel. - Gas detectors and oxygen sensors will be carried by workers or installed at fixed locations inside the tunnel. - Gas testing must be conducted before entry. - Fire detection and suppression equipment will be available and regularly maintained within the tunnel. - Geotechnical assessments will be conducted to evaluate ground stability continuously during tunnel excavation and support works. - Emergency evacuation plans for events such as tunnel collapse or fire will be developed and tested through regular drills. - Rescue teams trained in emergency response will be present and ready during each shift. - Scenario-based emergency planning will include TBM rescue procedures, refuge chamber provisions, maximum cross-passage spacing (≤350 m), and redundant power and ventilation systems to ensure safe egress during power loss or fire events. - Design will account for smoke ventilation and foam/fire suppressant system compatibility to prevent secondary hazards. - Coordination protocols with municipal fire, rescue, and medical services will be established, including joint emergency response simulations during commissioning. - Seismic risk mitigation will include tunnel stability assessments, refuge area integrity checks, and emergency response plans adapted to potential earthquake events. - The D+B Contractor shall comply with international best practices and ensure that emergency infrastructure (refuge chambers, fire suppression, egress signage) is included in the final design and verified prior to construction. - Where hyperbaric (pressurized) tunnelling is applied, specific SOPs for decompression, medical monitoring, and emergency evacuation will be developed and approved prior to works. - No TBM launch shall occur until the Emergency Response Plan is approved by relevant authorities and a multi-agency mass-casualty drill is completed. - Confined-space and evacuation drills will be conducted quarterly, and competency/training records for all tunnel personnel will be maintained and periodically reviewed.	Minor	AYGM PIU	**Implementing:** D+B Contractor **Supervising:** Supervision Consultant **Monitoring:** AYGM and 3rd Party E&S Consultant
Occupational Health and Safety	Bridge and viaduct construction activities involve working at height, which exposes workers to the risk of falling and being struck by falling objects. In the absence of sufficient edge protection, safe scaffolding systems, and fall arrest equipment, serious injuries such as fractures, head trauma, or fatalities may occur.	Major	- The D+B contractor and all subcontractors will be required to prepare and implement a detailed OHS procedure specific to working at height. - Edge protection systems (e.g., guardrails, barriers) will be installed and secured in all elevated work areas. - Safe scaffolding systems will be installed by authorized personnel and will be inspected regularly. - All workers will receive certified working-at-height training, and training records will be maintained. - Workers performing elevated tasks will be provided with and required to use appropriate PPE (e.g., harnesses, lanyards, anchor points). - Protection against falling objects (e.g., overhead netting, covered platforms) will be implemented where necessary. - During lifting operations or material movement, access under elevated areas will be restricted and safety perimeters will be established. - Lifting operations require a lifting plan and weather condition checks. - Access to elevated work areas will be limited to trained and authorized personnel only. - All height-related equipment will undergo regular inspections, and findings will be documented. - Rescue procedures for working at height emergencies will be established, and appropriate rescue equipment will be maintained on site.	Minor	AYGM PIU	**Implementing:** D+B Contractor **Supervising:** Supervision Consultant **Monitoring:** AYGM and 3rd Party E&S Consultant
Occupational Health and Safety	During excavation, filling, and earthworks, unstable soil conditions, slope failures, and loose backfill materials pose serious risks such as burial, suffocation, and crush injuries. The concurrent operation of heavy machinery within excavation zones further increases the likelihood of collisions, entrapment, and major workplace accidents.	Major	- The D+B contractor and all subcontractors will be required to develop safe working procedures for excavation and earthworks based on geotechnical assessments. - Slope stability will be continuously monitored, and appropriate measures such as benching, sloping, or shoring systems will be implemented when necessary. Trenches deeper than 1.2 meters must be sloped, shored, or shielded. - Access to excavation zones will be restricted and controlled using physical barriers to prevent unauthorized entry. - Workers operating in excavation areas will receive specialized training on soil-related risks, collapse prevention, machinery traffic, and emergency escape procedures. - Loose backfill materials will be compacted or stabilized and will not be stockpiled near excavation edges. - All workers within excavation zones will wear high-visibility personal protective equipment (PPE), especially reflective vests. - Designated traffic routes and blind spot warning systems will be implemented for the operation of heavy machinery. - Separate work zones will be defined to minimize interaction between machinery and workers. - Spotters will be assigned for heavy equipment operations, and radio communication systems will be used to enhance coordination. - Excavation areas will be equipped with emergency escape routes, alert systems, and first response equipment.	Minor	AYGM PIU	**Implementing:** D+B Contractor **Supervising:** Supervision Consultant **Monitoring:** AYGM and 3rd Party E&S Consultant

Subject	E&S Risks	Description of Risk/Expected Impact	Mitigation Measures	Final Impact Significance	Responsibility	
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Occupational Health and Safety	In heavy equipment operation and material handling activities, machinery such as cranes, excavators, loaders, and dump trucks often operate with limited visibility especially during reversing maneuvers or when carrying unbalanced loads. Workers in the vicinity may suffer from crushing, collision, or entrapment injuries, which could lead to long-term disability or fatalities.	Major	- The D+B contractor and all subcontractors will be required to develop and implement detailed safe work procedures for heavy equipment operations. - All heavy equipment operators will be licensed and properly trained before being assigned to machinery operation. - During reversing, turning, or load-carrying operations, cameras, proximity sensors, and audible alarms (e.g., reverse beepers) will be activated. - A spotter will be assigned during reversing and blind maneuvers, maintaining continuous communication with the operator via radio or hand signals. - Only trained and licensed operators are permitted to use heavy machinery. - All site personnel will receive training on maintaining safe distance from heavy equipment, understanding blind spots, and adhering to communication protocols. - Operational zones for heavy equipment will be clearly demarcated with visible signs and physical barriers to restrict pedestrian access. - Loads being transported will be properly balanced, secured, or supported to prevent tipping or loss of control. - Daily pre-shift inspections and maintenance checks will be conducted on all equipment, including brakes, steering, and warning systems. - Site layout will separate vehicle and pedestrian pathways, and one-way traffic flow and visual signage will be established. - Emergency response protocols and equipment specific to collision, overturning, and entrapment incidents will be available on site.	Minor	AYGM PIU	**Implementing:** D+B Contractor **Supervising:** Supervision Consultant **Monitoring:** AYGM and 3rd Party E&S Consultant
Occupational Health and Safety	During work on temporary or permanent electrical systems, if isolation, grounding, and lock-out/tag-out (LOTO) procedures are not properly implemented, workers are exposed to life-threatening hazards such as electric shock, arc flash, and burns due to accidental contact with live conductors. These incidents may result in severe burns, permanent nerve damage, or fatalities.	Major	- The D+B contractor and all subcontractors will be required to develop and implement detailed electrical safety procedures for all activities involving temporary or permanent electrical systems. - LOTO procedures will be clearly defined in writing, implemented on all relevant electrical equipment, and communicated to workers. - Prior to any electrical work, proper isolation and grounding will be carried out, and the work area will be tested to ensure de-energization. - Only authorized and trained personnel will be permitted to perform tasks involving electrical systems. - Workers will receive specialized training on electrical hazards, arc flash risks, safe working distances, and correct use of PPE. - Electrical panels, temporary lines, and work zones will be marked with warning signs, and unauthorized access will be restricted. - Arc-rated PPE (including protective clothing, gloves, face shields, etc.) will be provided and used during all electrical work. - Prior to critical tasks, energy isolation plans and risk assessments will be prepared and approved. - Emergency response plans specific to electrical incidents will be established, and first aid equipment suitable for electrical injuries will be maintained on site.	Minor	AYGM PIU	**Implementing:** D+B Contractor **Supervising:** Supervision Consultant **Monitoring:** AYGM and 3rd Party E&S Consultant
Occupational Health and Safety	Mechanical activities such as drilling, cutting, blasting, transportation, and breaking generate high levels of noise, vibration, and dust. In the absence of proper PPE, prolonged exposure to these hazards may lead to hearing loss, respiratory illnesses, headaches, and musculoskeletal disorders.	Major	- The D+B contractor and all subcontractors will be required to develop and implement OHS procedures specifically addressing noise, vibration, and dust control in mechanical operations. - Dust suppression systems (e.g., water spraying, local exhaust ventilation) will be installed and maintained in active work areas. - Workers exposed to high noise levels will be provided with hearing protection (e.g., earplugs, earmuffs), and their use will be mandatory. - Respiratory protective equipment (e.g., P2/P3-rated masks) will be supplied to all workers exposed to airborne particulates. - For vibration-related tasks, anti-vibration tools and ergonomic work plans will be adopted. - PPE requirements will be determined based on task-specific risk assessments and reinforced through training and regular supervision. - Noise, dust, and vibration levels will be regularly monitored, and records will be maintained. - Where exposure limits are exceeded, work durations will be restricted and rest periods will be implemented. - All PPE will undergo routine maintenance, and worn or unsuitable equipment will be replaced immediately. - Workers will undergo regular health screenings, including respiratory function and hearing tests, and results will be tracked over time.	Minor	AYGM PIU	**Implementing:** D+B Contractor **Supervising:** Supervision Consultant **Monitoring:** AYGM and 3rd Party E&S Consultant
Occupational Health and Safety	Jobs involving manual handling, loading/unloading, and repetitive physical strain pose ergonomic risks. Inadequate working posture and lack of lifting aids may lead to lumbar disc herniation, muscle-tendon injuries, wrist disorders, and long-term functional limitations.	Major	- The D+B contractor and all subcontractors will be required to conduct ergonomic risk assessments for tasks involving manual handling and physical strain, and define control measures accordingly. - Workers will receive practical training on correct lifting techniques, body mechanics, and safe material handling. - Mechanical aids such as pallet jacks, forklifts, hoists, and lifting straps will be provided and promoted for use in lifting and transporting heavy items. - Weight limits per worker will be defined, and the maximum allowable load for manual handling tasks will be communicated. - For repetitive tasks, job rotation strategies will be implemented to avoid overuse of the same muscle groups. - Rest breaks will be scheduled for high-strain physical activities, and working durations will be limited accordingly. - Workstations will be designed or adjusted to fit ergonomic principles regarding height, reach, and layout. - Periodic medical screenings will be conducted to monitor musculoskeletal health and detect early signs of strain. - Ergonomic support gear (e.g., back support belts, knee pads, wrist braces) will be made available for high-risk activities.	Minor	AYGM PIU	**Implementing:** D+B Contractor **Supervising:** Supervision Consultant **Monitoring:** AYGM and 3rd Party E&S Consultant

Subject	E&S Risks	Description of Risk/Expected Impact	Mitigation Measures	Final Impact Significance	Responsibility	
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Occupational Health and Safety	In operations involving hazardous chemicals such as paint, solvents, adhesives, fuels, and lubricants, insufficient ventilation or inadequate use of PPE may result in direct chemical exposure. This may lead to skin and eye irritation, poisoning, respiratory problems, and an increased risk of fire or explosion.	Major	- The D+B contractor and all subcontractors will be required to establish and implement chemical management procedures for all activities involving hazardous substances. - Hazardous chemicals will only be handled by authorized and trained personnel, and workers will receive training on hazardous materials. - All chemicals will be stored and used with corresponding SDSs readily available on site. - Work areas involving chemical use will be equipped with adequate natural or mechanical ventilation, including local exhaust systems in enclosed spaces. - To prevent exposure, appropriate PPE (e.g., safety goggles, respirators, gloves, protective suits) will be provided and required. - Chemicals will be stored in their original, clearly labeled containers, and improper or mixed storage will be strictly prohibited. - To mitigate fire and explosion risks, flammable substances will be stored away from ignition sources, and only flame-proof equipment will be used; fire extinguishers will be readily available. - Spill response kits will be made available on site, and workers will be trained in spill management procedures. - During transport, secondary containment or sealed transport boxes will be used to prevent leakage. - Hazardous chemical waste will be segregated, labeled, and disposed of in accordance with applicable regulations.	Minor	AYGM PIU	**Implementing:** D+B Contractor **Supervising:** Supervision Consultant **Monitoring:** AYGM and 3rd Party E&S Consultant
Occupational Health and Safety	Outdoor activities in extreme weather conditions expose workers to environmental stress. High temperatures may cause heat stroke, fainting, and dehydration, while cold environments may lead to frostbite, hypothermia, and reduced motor coordination. These conditions also increase the likelihood of secondary accidents due to loss of concentration.	Major	- The D+B contractor and all subcontractors will be required to develop and implement specific work plans for extreme weather conditions. - In hot weather, working hours will be adjusted to cooler times of the day, and shaded rest areas and sufficient drinking water will be provided. - In cold weather, heated shelters, insulated layered clothing, and warm beverages will be made available. - Workers will receive training on recognizing symptoms and first aid for heat stress, hypothermia, and related conditions. - Work durations will be limited, and scheduled rest breaks will be implemented under extreme conditions. - Weather forecasts will be monitored daily, and work will be suspended when hazardous conditions are expected. - The health status of personnel working outdoors will be monitored, and medical support will be arranged as necessary. - A buddy system will be established for outdoor teams to ensure early detection of heat exhaustion or cold-related issues. - In cold environments, non-slip footwear and de-icing materials will be used to reduce slip and fall risks. - Emergency response plans will include specific scenarios for environmental exposures (e.g., response to heat stroke) and will be supported by practical drills.	Minor	AYGM PIU	**Implementing:** D+B Contractor **Supervising:** Supervision Consultant **Monitoring:** AYGM and 3rd Party E&S Consultant
Occupational Health and Safety	Construction activities conducted in rural or natural areas may expose workers to biological hazards such as bee stings, snake bites, or insect infestations. Such incidents may lead to allergic reactions, panic-induced falls or equipment-related accidents, and situations requiring emergency medical response.	Major	- The D+B contractor and all subcontractors will be required to conduct a risk assessment specific to biological hazards associated with construction in rural or natural environments. - Preventive measures will be taken against common regional biological threats (e.g., pest control, physical barriers against insects and snakes). - All workers will receive training on biological hazards, recognizing symptoms of allergic reactions, snakebite response, and first aid. - Personnel operating in high-risk areas will be equipped with appropriate PPE, such as high-ankle boots, gloves, and protective clothing. - In the event of discovering bee colonies or infestations, professional pest control teams will be contacted, and workers will be evacuated from the area. - Additional safety measures will be implemented in areas involving work at height or with heavy equipment to prevent accidents triggered by panic reactions. - A communication and coordination plan with the nearest medical facility will be established, and transport arrangements will be made available. - Prior to each shift, the area will be scanned for potential biological threats, which will be marked or isolated. - A reporting and incident analysis system will be implemented for all biological hazard-related events to prevent recurrence.	Minor	AYGM PIU	**Implementing:** D+B Contractor **Supervising:** Supervision Consultant **Monitoring:** AYGM and 3rd Party E&S Consultant
Occupational Health and Safety	During on-site vehicle and machinery traffic, the lack of proper signage, inadequate traffic separation, and limited visibility may result in collision, entrapment, or crushing incidents involving pedestrians. These types of accidents frequently cause severe injuries or fatalities.	Major	- The D+B contractor and all subcontractors will be required to develop and implement a detailed site traffic management plan. - Vehicle and pedestrian routes will be physically separated, using barriers where necessary to prevent interaction. - Clear and internationally recognizable traffic signage will be installed throughout the site. - Mirrors, warning lights, and slowdown signage will be placed at intersections, blind spots, and high-traffic zones. - Both vehicle operators and site personnel will receive regular training on site traffic rules and pedestrian safety. - In pedestrian-heavy areas, vehicle speed limits will be enforced, and speed restriction signs will be clearly posted. - A spotter will be assigned during reversing maneuvers, and radio communication will be maintained. - The traffic management plan will define one-way routes, designated parking areas, and emergency access paths. - Vehicle and machinery movement will be restricted outside of working hours or controlled via a permitting system. - In case of accidents, first aid kits, warning lights, and incident reporting procedures will be made readily available.	Minor	AYGM PIU	**Implementing:** D+B Contractor **Supervising:** Supervision Consultant **Monitoring:** AYGM and 3rd Party E&S Consultant
Occupational Health and Safety	Electrification and signaling works involve the installation and energization of high-voltage catenary systems and the commissioning of signaling equipment. During these tasks, workers are exposed to serious risks such as electric shock, uncontrolled energization, short circuits, fire, and arc flash. In addition, functional testing of signaling systems carries the risk of	Major	- The D+B contractor and all subcontractors will be required to develop and implement specialized safety procedures for high-voltage and signaling works. - Only authorized, trained, and certified personnel will be permitted to perform tasks related to the installation and testing of high-voltage systems. - Isolation, grounding, and lock-out/tag-out procedures will be fully applied before energizing the catenary system. - All workers will receive training on high-voltage safety, short circuit risks, arc flash protection, and fire prevention	Minor	AYGM PIU	**Implementing:** D+B Contractor **Supervising:** Supervision Consultant **Monitoring:**

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					Development / Definition	Implementation
	technical failure, which may result in unexpected system behavior and accidents affecting technical personnel.		measures. - During the commissioning of signaling systems, controlled testing protocols will be implemented, and tests will be conducted step by step. - Functional tests will be carried out in safe modes, and test zones will be physically isolated to prevent unintended exposure. - Appropriate PPE including arc-rated clothing, insulated gloves, and face shields will be provided and used by all responsible personnel. - All temporary and permanent electrical panels will be clearly marked with warning signs and physically restricted from unauthorized access. - Emergency response plans for system failures, short circuits, and uncontrolled signaling will be established and tested. - A permit-to-work system will be applied to all electrical and signaling test operations, requiring prior approval before commencement. - Temporary power systems must include Residual Current Device protection and proper grounding.			AYGM and 3rd Party E&S Consultant
Occupational Health and Safety	Workers living or working in shared accommodation and natural areas may be exposed to infectious diseases due to poor hygiene, limited access to clean water, or insufficient preventive health services. Vector-borne diseases such as Crimean-Congo Hemorrhagic Fever (CCHF), transmitted by ticks and regionally endemic during spring and summer months, pose a seasonal risk to outdoor construction workers. If not properly monitored and controlled, outbreaks of such diseases may result in absenteeism, reduced labor productivity, increased healthcare burden, and public health concerns.	Major	- Ensure worker camps meet IFC/EBRD minimum standards regarding hygiene, sanitation, water supply, and adequate living conditions - The D+B contractor and all subcontractors will be required to develop and implement health and hygiene management plans tailored to local infectious disease risks. - Cleaning and sanitation standards will be established in shared living spaces, with regular inspections and disinfection carried out. - All workers will be provided with clean drinking water, sufficient restroom/shower facilities, and proper waste management services. - Training will be delivered to workers on symptoms and prevention of infectious diseases, including risks such as tick bites. - During spring and summer months, tick control programs (e.g., area spraying, personal tick checks) will be implemented and monitored. - Outdoor workers will be equipped with protective clothing (e.g., long-sleeved garments, light-colored uniforms) and tick repellents. - Isolation protocols, on-site health monitoring, and emergency medical response procedures will be established in case of potential outbreaks. - Regular health screenings will be conducted to detect and contain infectious cases early. - Medical staff and basic emergency medical equipment will be made available on-site or at nearby facilities.	Minor	AYGM PIU	**Implementing:** D+B Contractor **Supervising:** Supervision Consultant **Monitoring:** AYGM and 3rd Party E&S Consultant
Occupational Health and Safety	If OHS performance is not systematically monitored, the root causes of incidents may not be identified, risk trends may go unnoticed, and necessary preventive measures may not be implemented.	Major	- Indicators such as TRIR (Total Recordable Incident Rate), LTIFR (Lost Time Injury Frequency Rate), and the number of near-misses will be periodically monitored and reported. -These indicators will be mandatory for both contractors and subcontractors and will be regularly submitted to project management. - Weekly and monthly OHS inspections will be undertaken, and compliance records/reports will be prepared and regularly submitted by CSC to project management. - Any identified non-compliances will be corrected immediately; if not resolved, related works will be suspended until compliance is ensured.	Minor	AYGM PIU	**Implementing:** D+B Contractor **Supervising:** Supervision Consultant **Monitoring:** AYGM and 3rd Party E&S Consultant
Occupational Health and Safety	Occupational accidents and health issues may arise due to subcontractors insufficient OHS capacity, lack of documented systems, and low compliance with applicable legislation and standards. Implementation gaps may lead to additional risks concerning worker safety.	Major	-An OHS competence assessment will be conducted during the selection of subcontractors. -OHS compliance obligations and associated sanctions in case of non-compliance will be incorporated into the contracts signed with subcontractors. -Subcontractor performance will be monitored through periodic audits, and evaluation scores will be assigned accordingly.	Minor	AYGM PIU	**Implementing:** D+B Contractor **Supervising:** Supervision Consultant **Monitoring:** AYGM and 3rd Party E&S Consultant
Occupational Health and Safety	Factors such as long working shifts, excessive workload, poor management practices, and social isolation may lead to work-related stress, burnout, low motivation, and psychological disorders among employees.	Major	-Awareness-raising trainings on psychosocial risks will be organized, and confidential employee support hotlines will be established. -Employee satisfaction surveys and grievance mechanisms will be actively implemented. -Workload levels, shift durations, and task distribution will be regularly reviewed.	Minor	AYGM PIU	**Implementing:** D+B Contractor **Supervising:** Supervision Consultant **Monitoring:** AYGM and 3rd Party E&S Consultant
Occupational Health and Safety	Workers residing in on-site camps or off-site accommodations may face increased health, hygiene, and safety risks in the event that living conditions do not meet required standards.	Major	-Worker accommodation areas will be designed and monitored in accordance with the IFC's Worker Accommodation: Processes and Standards guidance note and aligned with the Labour Management Plan (LMP). -Access to clean water, adequate ventilation, waste management, fire safety, hygiene standards, and personal privacy will be ensured. -Accommodation facilities will be subject to periodic inspections and independent verification by independent experts including aspects related to emergency preparedness and response. -A Workers' Camp Management Plan (WCMP) will be developed and implemented, defining minimum space and WASH standards, visitor management, and transport arrangements. -The WCMP will also include provisions for Code of Conduct adherence, SEA/SH (Sexual Exploitation, Abuse, and Harassment) prevention training, and safe access to the Workers' Grievance Mechanism (GM) with non-retaliation measures.	Minor	AYGM PIU	**Implementing:** D+B Contractor **Supervising:** Supervision Consultant **Monitoring:** AYGM and 3rd Party E&S Consultant

Subject	E&S Risks	Description of Risk/Expected Impact	Mitigation Measures	Final Impact Significance	Responsibility	
					Development / Definition	Implementation
			-Establishment of ad-hoc or unauthorized worker camps will be strictly prohibited, and compliance will be monitored by the Contractor and E&S Consultant.			
Occupational Health and Safety	In the absence of an effective and confidential grievance mechanism through which workers can report their concerns, systematic OHS violations may be overlooked and workers' rights may be infringed.	Major	-An independent and confidential worker grievance mechanism will be established and introduced to all employees. -The tracking of complaints, response times, and resolution processes will be formalized through defined procedures. - Immediate notification of all OHS incidents will be ensured, followed by the preparation and implementation of Corrective Action Plans (CAP) as required. - Incident reporting and CAP follow-up will be carried out in line with the procedures specified in the Environmental and Social Incident Reporting Tool (ESIRT).	Minor	AYGM PIU	**Implementing:** D+B Contractor **Supervising:** Supervision Consultant **Monitoring:** AYGM and 3rd Party E&S Consultant
Community Health and Safety() (CHS) including risks of Sexual Exploitation and Abuse / Sexual Harassment (SEA/SH)	- Increased risk of traffic accidents, accidents related to the worksites due to movement of construction machinery and heavy vehicles near settlements - Unauthorized access to construction sites, posing safety risks to the public - Exposure of communities to dust, noise, and visual disturbances which may disproportionately affect vulnerable groups and individuals such as persons with disabilities and the elderly during construction activities. - Risk of communicable disease transmission (e.g. through labor influx) - Anxiety or psychological stress among local residents due to construction nuisances - Risks of SEA/SH resulting from interactions between workers, third-party security personnel, and community members, particularly affecting women, girls and vulnerable groups. - Security personnel may use excessive force or act without proper guidance while maintaining site security, potentially causing physical or psychological harm to workers or community members, - Lack of communication or understanding between security personnel and local communities/workers may lead to misunderstandings, tension, or negative perceptions of the security presence, - Unauthorized persons entering the site or failure to implement security procedures may increase risks of injury, theft, or other security incidents for workers and visitors.	Moderate	- Prepare and implement a site-specific Construction Traffic Management Plan for each active workfront, with safety measures especially near schools and residential zones, - Each Construction Traffic Management Plan will define approved haul routes and operating hours, pedestrian detours, safety signage, and temporary access arrangements for emergency services. - No lane closures or night works will be permitted until the relevant Construction Traffic Management Plan is approved by AYGM/PIU and disclosed to local stakeholders at least 14 days in advance, in line with the SEP. - Weekly haulage and routing maps will be requested from Contractors and published through local communication channels. - Special attention will be given to ensuring pedestrian and community safety near schools, clinics, and densely populated areas. - Install fencing, barriers, and warning signs around active construction zones to prevent unauthorized entry - Regularly water exposed surfaces and unpaved roads to control dust emissions near communities - Limit construction work to daytime hours to reduce disturbance - Provide regular updates to the community regarding construction schedules and any disruptions - Implement communicable disease prevention measures (e.g., hygiene protocols, awareness campaigns) if needed - A unified Project Grievance Mechanism (GM), managed by the PIU, will be established and operated in coordination with the SEP. This mechanism will integrate all grievance channels, including contractor-level hotlines, and CİMER/YİMER, ensuring accessible, confidential, and transparent resolution of community concerns. - Implement a Code of Conduct for all workers and security personnel covering SEA/SH, respectful behaviour and zero tolerance of GBV/SEA/SH incidents; ensure all workers receive mandatory induction and refresher training, in line with the SEA/SH Action Plan and Accountability Response Framework and the Security Management Plan. - Mandatory training on human rights, ethical conduct, and proportionate use of force for all security personnel. - Clear written procedures and limits for use of force. - Incident reporting and regular audits to prevent inappropriate behavior. - Training on conflict resolution, crowd management, and effective communication. - Regular community engagement meetings and open communication channels, including SEA/SH-related awareness-raising for communities (if appropriate). - Coordination mechanisms with local authorities and community representatives. - Implement access control measures, ID verification, and regular security patrols. - Train all workers and security personnel on emergency procedures. - Conduct regular drills and inspections to ensure security measures are effective. - A Security Management Plan will be implemented to ensure that any security personnel engaged for the Project operate in line with ESS4 principles, including respect for human rights, proportional use of force, and effective grievance mechanisms for affected communities.	Minor	AYGM PIU	**Implementing:** D+B Contractor **Supervising:** Supervision Consultant **Monitoring:** AYGM and 3rd Party E&S Consultant

3.2 Mitigation Measures for Operation Phase

The operation phase of the INRAIL Project will be managed by the TCDD. Prior to the commencement of operations, an E&S handover process will be conducted between AYGM and TCDD to ensure a seamless transition of all environmental and social responsibilities. This handover will cover the transfer of: (i) operation and maintenance (O&M) environmental and social procedures, (ii) monitoring points and thresholds, (iii) maintenance obligations for barriers and wildlife crossings, (iv) tunnel and viaduct emergency procedures, (v) any outstanding land or resettlement commitments, and (vi) the transition of the Project Grievance Mechanism (GM).

An E&S Acceptance Certificate will be issued by AYGM to formally confirm that all mitigation, monitoring, and corrective measures have been completed or properly transferred prior to the start of operations. Following the handover, TCDD will assume full responsibility for implementing and monitoring E&S measures during operation, while AYGM will retain oversight to ensure compliance with project commitments and regulatory requirements. Mitigation measures specific to the operation phase are presented in Table 3-2.

Table 3-2 Mitigation Measures for Operation Phase

Subject	E&S Risks	Description of Risk/Expected Impact	Mitigation Measures	Final Impact Significance	Responsibility	
					Development / Definition	Implementation
Surface Water Quality	- Surface water contamination risk due to accidental spills, runoff from maintenance yards, and drainage discharges. - Increased sedimentation and turbidity in streams near bridges and culverts.	Minor	- Install and maintain oil-water separators in drainage systems. - Implement regular water quality monitoring upstream and downstream of discharge points. - Develop Spill Prevention and Response Plan for operational facilities. - Ensure proper stormwater management and sediment control measures.	Negligible	AYGM PIU	**Implementing:** TCDD **Supervising:** Supervision Consultant **Monitoring:** 3rd Party E&S Consultant
Groundwater	- Risk of contamination from fuel or chemical leaks at maintenance depots. - Potential impact on groundwater-dependent ecosystems due to long-term dewatering (if applicable).	Minor	- Provide secondary containment for underground fuel/chemical tanks. - Conduct periodic groundwater quality monitoring near sensitive receptors and wells. - Ensure proper sealing and lining of wastewater and stormwater channels to prevent infiltration.	Negligible	AYGM PIU	**Implementing:** TCDD **Supervising:** Supervision Consultant **Monitoring:** 3rd Party E&S Consultant
Wastewater	- Generation of wastewater from stations, cleaning operations, and maintenance facilities. - Risk of untreated wastewater discharge into nearby surface or groundwater.	Minor	- Connect station and maintenance facilities to municipal wastewater treatment systems where available. - Where not available, construct onsite treatment (e.g., package WWTP) compliant with WB/IFC standards and Turkish Regulation. - Conduct regular inspections and maintenance of wastewater treatment systems. - Monitor effluent quality to ensure compliance with discharge limits.	Negligible	AYGM PIU	**Implementing:** TCDD **Supervising:** Supervision Consultant **Monitoring:** 3rd Party E&S Consultant
Air Quality	- Emissions from maintenance vehicles and auxiliary equipment. - Dust generation from maintenance works (e.g., ballast replacement). - Possible air quality deterioration around stations due to increased traffic.	Minor	- Use electric or low-emission vehicles for maintenance. - Implement dust suppression measures (e.g., water spraying during maintenance). - Periodic air quality monitoring at sensitive receptors (schools, residential areas).	Negligible	AYGM PIU	**Implementing:** TCDD **Supervising:** Supervision Consultant **Monitoring:** 3rd Party E&S Consultant
Climate Change	- High GHG emissions from diesel machinery, transportation, and energy use. - Indirect emissions from land clearing (loss of carbon sinks).	Major	- Use fuel-efficient and well-maintained equipment; minimize idling. - Optimize logistics to reduce transport emissions. - Integrate low-carbon materials (e.g., recycled aggregates, low clinker cement). - Establish GHG inventory and annual reporting. - Apply energy efficiency measures and renewable energy in operation.	Minor	AYGM PIU	**Implementing:** TCDD **Supervising:** Supervision Consultant **Monitoring:** 3rd Party E&S Consultant
Chemicals (Fuel, Lubricants, Cleaning Agents)	- Risk of spills during storage or handling at maintenance facilities. - Improper disposal of chemical wastes (e.g., oils, solvents) causing soil and water contamination.	Moderate	- Implement Hazardous Materials Management Plan (storage, labeling, spill kits). - Train staff in safe chemical handling and emergency response. - Ensure secondary containment in storage areas. - Comply with national hazardous waste regulations and WB/IFC standards for disposal.	Minor	AYGM PIU	**Implementing:** TCDD **Supervising:** Supervision Consultant **Monitoring:** 3rd Party E&S Consultant
Noise and Vibration	- Noise from train operations (wheel-rail interaction, braking). - Vibration impacts on nearby sensitive receptors (houses, schools, cultural sites).	Minor	- Install noise barriers and low-noise rail technology (rail grinding, dampers). - Speed control near sensitive areas. - Regular track maintenance to minimize vibration levels. - Conduct periodic noise and vibration monitoring and adjust operations if thresholds are exceeded.	Negligible	AYGM PIU	**Implementing:** TCDD **Supervising:** Supervision Consultant **Monitoring:** 3rd Party E&S Consultant
Seismicity	During operations, seismic events may threaten worker and community safety, damage operational facilities, disrupt critical services, and cause environmental harm such as spills or soil instability.	Moderate	- By carrying out periodic control and maintenance activities along the routes, additional durability and structural measures will be developed and implemented in cuts and fills when necessary. (cracks, breaks, slips, deformations etc. of engineering structures that could happen especially after natural disasters)	Minor	AYGM PIU	**Implementing:** TCDD **Supervising:** Supervision Consultant **Monitoring:** 3rd Party E&S Consultant
Biodiversity	Habitat loss Trend and population decrease of threatened species	Moderate	In order to assess whether plant species with critical distribution (including regionally endemic or non-endemic but locally rare species) continue to persist along the project corridor and to determine the extent of potential impacts from the project activities, regular monitoring should be conducted. Specifically, monitoring should take place at least twice per year during the construction phase. If necessary, urgent conservation measures must be implemented based on the monitoring results.	Minor	AYGM PIU	**Implementing:** TCDD **Supervising:** Supervision Consultant **Monitoring:** 3rd Party E&S Consultant
Biodiversity	Habitat loss and degradation (existing vegetation areas)	Moderate	- Implement vegetation maintenance protocols avoiding extensive clearing. - Conduct maintenance works outside of breeding and flowering seasons. - Maintain native ground cover in non-critical zones to prevent erosion and maintain soil biota. - Replant disturbed strips annually using native species.	Minor	AYGM PIU	**Implementation:** TCDD **Monitoring:** 3rd Party E&S Consultant

Subject	E&S Risks	Description of Risk/Expected Impact	Mitigation Measures	Final Impact Significance	Responsibility	
					Development / Definition	Implementation
Biodiversity	Wildlife mortality from rail collision	Moderate	- Install and maintain wildlife fencing and underpasses to guide animal movement. - Conduct annual wildlife mortality monitoring along the corridor. - Adjust fencing and passage structures based on monitoring results. - Train drivers to report fauna collision incidents.	Minor	AYGM PIU	**Implementation:** TCDD **Monitoring:** 3rd Party E&S Consultant
Biodiversity	Noise and vibration impact on fauna	Minor	- Restrict use of loud warning horns near sensitive habitats. - Conduct acoustic monitoring annually during migration season. - Adjust operational schedules if significant disturbance detected.	Negligible	AYGM PIU	**Implementation:** TCDD **Monitoring:** 3rd Party E&S Consultant
Biodiversity	Light pollution	Minor	- Install timers and motion sensors to minimize night illumination. - Avoid floodlights in natural or wetland zones. - Monitor bat and bird behavior annually near lighted structures.	Negligible	AYGM PIU	**Implementation:** TCDD **Monitoring:** 3rd Party E&S Consultant
Biodiversity	Invasive Alien Species (IAS) spread	Minor	- Conduct annual IAS inspections along right-of-way. - Remove detected species manually or by controlled treatment. - Ensure maintenance contractors clean vehicles and tools between work zones. - Keep IAS management log as part of biodiversity monitoring program.	Minor	E&S	**Implementation:** TCDD **Monitoring:** 3rd Party E&S Consultant
Biodiversity	Biodiversity Monitoring of sensitive and protected species	Moderate	- Continue Critical Habitat Monitoring Program (fauna and flora). - Conduct seasonal surveys (spring–autumn) by qualified ecologists. - Update Biodiversity Action Plan (BAP) every 3 years based on results. - Implement adaptive management measures if population trends decline.	Minor	AYGM PIU, E&S Specialist	**Implementation:** TCDD **Monitoring:** 3rd Party E&S Consultant
Stakeholder Engagement Expected population change	No permanent impact that could lead to population growth is expected, except for a short-term fluctuation during the operation phase.	Minor	- During this period, stakeholder engagement activities are expected to be carried out on an annual basis. - The GRM should remain active.	Negligible	AYGM PIU	**Implementing:** TCDD **Supervising:** Supervision Consultant **Monitoring:** 3rd Party E&S Consultant
Stakeholder Engagement Economy and Employment	The blue-collar workforce potential typical of the construction phase will not be present during this period. Employment will mostly consist of skilled white-collar personnel. Therefore, no significant risks or impacts are anticipated in this regard.	Minor	- During this period, stakeholder engagement activities are expected to be carried out on an annual basis. - The GRM should remain active.	Negligible	AYGM PIU	**Implementing:** TCDD **Supervising:** Supervision Consultant **Monitoring:** 3rd Party E&S Consultant
Stakeholder Engagement Housing and residences	No temporary or permanent accommodation areas/facilities are planned for white-collar personnel.	Minor	- During this period, stakeholder engagement activities are expected to be carried out on an annual basis. - The GRM should remain active.	Negligible	AYGM PIU	**Implementing:** TCDD **Supervising:** Supervision Consultant **Monitoring:** 3rd Party E&S Consultant
Stakeholder Engagement Land acquisition	No land acquisition is planned for the operation phase.	Minor	- During this period, stakeholder engagement activities are expected to be carried out on an annual basis. - The GRM should remain active.	Negligible	AYGM PIU	**Implementing:** TCDD **Supervising:** Supervision Consultant **Monitoring:** 3rd Party E&S Consultant
Labor Management	Inadequate labor management can lead to risks such as labor rights violations, unsafe working conditions, labor disputes, and exploitation. Poor management may cause accidents, reduced workforce morale, and non-compliance with local labor laws and international standards.	Minor	- Ensure full compliance with Turkish Labor Law No. 4857, OHS Law No. 6331, and WB ESS2. - Align labor management practices with international good practices and the LMP. - Implement transparent and non-discriminatory recruitment processes for direct, contracted, and primary supply workers. - Require contractors to develop site-specific Labor Management Plans (LM Plans) and Occupational Health and Safety (OHS) Plans in accordance with Project standards. - Enforce strict prohibition of child labor and forced labor through regular monitoring and audits. - Conduct mandatory OHS training for all workers and ensure continuous awareness. - Provide adequate Personal Protective Equipment (PPE) and implement safety protocols to minimize accidents and occupational diseases. - Every worker has the right to refuse unsafe work and report it immediately. No disciplinary action shall be taken for exercising this right. - Monitor and regulate working hours to prevent excessive overtime and worker fatigue, in line with applicable legislation. - Implement zero-tolerance policies on SEA/SH with mandatory CoC training. - Establish confidential and accessible grievance mechanisms specifically for SEA/SH complaints. - Ensure worker camps meet IFC/EBRD minimum standards regarding hygiene, sanitation, water supply, and adequate living conditions. - Deliver periodic training on LMP provisions, workers' rights, CoC, and grievance procedures to all workforce categories.	Negligible	AYGM PIU	**Implementing:** TCDD **Supervising:** Supervision Consultant **Monitoring:** 3rd Party E&S Consultant

Subject	E&S Risks	Description of Risk/Expected Impact	Mitigation Measures	Final Impact Significance	Responsibility	
					Development / Definition	Implementation
			- Maintain effective, confidential, and accessible grievance channels for workers, with defined response and resolution protocols. - Conduct ongoing monitoring and supervision by the PIU and CSC. - Prepare regular compliance reports and implement timely corrective actions when deviations are identified.			
Gender and Vulnerable Groups (Community access and mobility)	- Possible safety concerns for women at stations and in trains (lighting, security). - Unequal access to project benefits (transport affordability, station design not considering disabled).	Moderate	- Design stations and trains to meet universal accessibility standards (ramps, lifts, signage), with due consideration to user access, circulation, lighting and SEA/SH risk prevention, as reflected in related Project documents and design contracts. - Provide adequate lighting, CCTV, and security presence to enhance safety. - Include women and vulnerable groups in monitoring and feedback processes during operation.	Minor	AYGM PIU	**Implementing:** TCDD **Supervising:** Supervision Consultant **Monitoring:** 3rd Party E&S Consultant
Occupational Health and Safety	Failure to develop a comprehensive Operation Phase Health and Safety Management System , including clear procedures for routine and emergency conditions, regular reporting, and performance monitoring, may result in inconsistent safety implementation. The absence of documented OHS procedures during the operation phase may lead to inadequate hazard control, uncoordinated response actions, weak regulatory compliance, and long-term safety performance issues.	Major	The operating entity will be required to develop and implement a comprehensive Health and Safety Management System specific to the operation phase. - The system will include written procedures for both routine operations and emergency conditions, and these procedures will be communicated to all personnel. - All OHS procedures will be documented and approved, in alignment with applicable legal requirements and best practices. - Regular risk assessments will be conducted, and OHS practices will be updated based on assessment findings. - A system for periodic monitoring and internal audits of OHS performance will be established, and findings will be reported to senior management. - OHS training programs will be developed for all employees, and trainings will be delivered at regular intervals and documented. - Emergency response plans will be prepared and maintained in an operational state, and their effectiveness will be tested through drills. - Clear roles and responsibilities for OHS implementation will be defined and assigned within the organizational structure. - Incident and non-compliance reporting, root cause analysis, and corrective action mechanisms will be implemented. - Key performance indicators for long-term safety performance will be defined, monitored, and used to guide preventive strategies.	Minor	AYGM PIU	**Implementing:** TCDD **Supervising:** Supervision Consultant **Monitoring:** 3rd Party E&S Consultant
Occupational Health and Safety	Inadequate development and use of operation phase OHS documentation including risk analyses, maintenance instructions, safety checklists, work permits, incident investigation reports, and monthly OHS performance indicators may result in gaps in safety implementation and reduced responsiveness to incidents. This may lead to repetitive safety violations, unreported near misses, and occupational accidents, posing risks for the operator.	Major	- The operating entity will be required to develop, standardize, and actively implement all operation-phase OHS documents (e.g., risk analyses, maintenance instructions, checklists). - Daily, weekly, and monthly maintenance and safety checks will be assigned with clear responsibilities and tracked using formal records. - Work permit systems will be made mandatory, especially for high-risk activities, and the validity of permits will be routinely verified. - All incidents and near misses will be reported, and root cause analyses will be conducted to initiate corrective and preventive actions. - Monthly OHS performance indicators (e.g., accident frequency rate, training completion, inspection results) will be defined, monitored, and reported to management. - All OHS documents will be reviewed regularly, with clear revision dates and responsible persons assigned. - Employees will be trained on the use of OHS documentation and reporting procedures and will be encouraged to actively participate in implementation. - A digital documentation and recordkeeping system will be used to improve traceability and enable data-driven analysis. - For any gaps, incorrect entries, or audit findings, corrective action plans will be developed and their implementation will be tracked. - To ensure the effective field application of documentation, periodic audit mechanisms will be established, and results will be reported.	Minor	AYGM PIU	**Implementing:** TCDD **Supervising:** Supervision Consultant **Monitoring:** 3rd Party E&S Consultant
Occupational Health and Safety	During continuous operation and maintenance of high-voltage electrification systems such as overhead catenary systems and traction substations workers may face significant risks including electric shock, arc flash, and equipment-induced fire or explosion. Failure to follow lock-out/tag-out procedures and poor system isolation may result in fatalities, infrastructure damage, and service disruption.	Major	-The operating entity will be required to develop and implement specific procedures for the safe operation and maintenance of high-voltage systems. - Lock-out/tag-out procedures will be strictly applied, and all energy sources will be fully isolated prior to intervention. - Only authorized personnel trained in high-voltage operations will be permitted to perform tasks on the system. - Arc-rated PPE including insulated gloves, face shields, and protective suits will be provided and used to prevent arc flash and electric shock injuries. - Standardized labeling and lockout points will be applied to all equipment, and these will be checked prior to each maintenance activity. - All electrical infrastructure components will be subject to periodic inspection, and maintenance records will be kept up to date. - Emergency response plans for equipment failure, short circuits, or fire will be developed and tested through drills. - Access to high-voltage areas will be physically restricted, allowing only authorized personnel to enter. - A permit-to-work system will be enforced for all maintenance and intervention activities on traction substations and catenary lines. - All workers will receive awareness training on the risks associated with re-energization after maintenance or service work.	Minor	AYGM PIU	**Implementing:** TCDD **Supervising:** Supervision Consultant **Monitoring:** 3rd Party E&S Consultant
Occupational Health and Safety	Software errors, human mistakes during testing, or system overload may lead to loss of train control, unauthorized	Major	-Standard operating and testing procedures will be implemented for signaling and control systems. - Functional tests will be performed only by authorized and trained personnel.	Minor	AYGM PIU	**Implementing:** TCDD **Supervising:** Supervision

Subject	E&S Risks	Description of Risk/Expected Impact	Mitigation Measures	Final Impact Significance	Responsibility	
					Development / Definition	Implementation
	movements, and accidents involving both personnel and passengers.		- Software updates will be tested in offline environments before deployment. - System overloads will be monitored, and backup and fail-safe mechanisms will be ensured. - All system components will be regularly tested with version and configuration control. - Personnel will be trained on fault detection and emergency response.			Consultant **Monitoring:** 3rd Party E&S Consultant
Occupational Health and Safety	Routine inspection and maintenance of rail tracks, switches, bridges, tunnels, and technical buildings expose workers to hazards associated with working near railway lines. These include being struck by moving trains, slipping on tracks, or falling from structures especially in poor weather or low visibility conditions.	Major	-Safe work procedures for activities near railway lines will be developed and implemented for all inspection and maintenance tasks. - All works will be scheduled and coordinated based on train traffic timetables to avoid active rail operations. - Work permits will be obtained from authorized rail authorities, and coordination with signaling and control systems will be ensured before accessing the tracks. - All personnel will wear high-visibility PPE (e.g., reflective vests, illuminated helmets) and will use designated safe walkways. - A lookout person will be assigned to monitor for approaching trains and alert workers in advance. - In conditions involving wet surfaces, ice, or poor visibility, special precautions will be taken, and workers will be equipped with anti-slip footwear and headlamps. - When working on bridges, tunnels, or elevated structures, fall protection systems (e.g., lifelines, guardrails) will be used. - Workers walking or working along the tracks will maintain situational awareness in both directions, and use of distracting devices such as headphones will be prohibited. - All field staff will receive training on railway safety, train detection, and emergency escape procedures. - Non-essential activities will be postponed during hazardous weather conditions, and emergency response protocols will be activated if needed.	Minor	AYGM PIU	**Implementing:** TCDD **Supervising:** Supervision Consultant **Monitoring:** 3rd Party E&S Consultant
Occupational Health and Safety	During tunnel and enclosed structure inspections, workers may face exposure to poor ventilation, gas accumulation, and limited escape routes. Without adequate lighting, oxygen level monitoring, or confined space entry procedures, these tasks may result in respiratory problems, collapse, or fatal entrapment incidents.	Major	-The operating entity will be required to develop and implement confined space safety procedures for all tunnel and enclosed structure inspections. - Prior to any inspection, gas measurements, oxygen level checks, and ventilation assessments will be carried out. - Portable gas detectors and oxygen sensors will be used and carried by all personnel entering risk-prone areas. - A permit-to-work system will be applied to all confined space entries, and only authorized personnel will be permitted to enter. - All confined space workers will receive certified training on confined space entry and emergency response protocols. - Adequate lighting systems and backup light sources will be provided for the full duration of inspections. - A standby or watch person will remain outside the confined space at all times to maintain continuous communication. - Two-way radios, audio alarms, or signal systems will be used for communication, and emergency exits will be clearly marked. - Rescue equipment and evacuation plans will be made available and ready for immediate use in case of collapse, gas exposure, or entrapment. - Non-essential inspections in high-risk areas will be postponed based on weather conditions or technical constraints where appropriate. - Temporary power systems must include Residual Current Device protection and proper grounding.	Minor	AYGM PIU	**Implementing:** TCDD **Supervising:** Supervision Consultant **Monitoring:** 3rd Party E&S Consultant
Occupational Health and Safety	Operation and handling of hazardous materials such as fuels, degreasers, paints, and cleaning agents without proper ventilation and PPE may expose workers to chemical burns, respiratory hazards, and increased fire risk. Spills and leakages may also cause environmental contamination and public health concerns.	Major	-The operating entity will be required to develop and implement chemical safety procedures for the use and handling of all hazardous substances. - Hazardous chemicals will only be handled by authorized and trained personnel, and SDS will be made available and accessible. - Natural or mechanical ventilation systems will be installed in all chemical usage areas, with local exhaust ventilation for enclosed spaces. - Appropriate PPE (e.g., gloves, masks, goggles, protective suits) will be selected based on the chemical risk and its use will be mandatory. - All chemicals will be stored in original, clearly labeled containers, and improper or mixed storage will be strictly prohibited. - Spill response kits and trained personnel will be available on site to immediately respond to leaks or accidental discharges. - Flammable substances will be stored away from ignition sources, in designated safe areas, and fire extinguishers will be readily accessible. - Spilled chemicals and hazardous waste will be disposed of through licensed and authorized service providers in compliance with environmental regulations. - During chemical transportation, sealed containers and secondary containment will be used to prevent leaks or spills - In long railway tunnels and enclosed infrastructure with limited evacuation options, automated fire suppression systems such as high-pressure water mist or foam-based localized extinguishing units will be installed, particularly in technical rooms, cable shafts, and equipment chambers. The design shall be based on tunnel-specific fire risk assessments and be integrated with tunnel ventilation and emergency response systems.	Minor	AYGM PIU	**Implementing:** TCDD **Supervising:** Supervision Consultant **Monitoring:** 3rd Party E&S Consultant
Occupational Health and Safety	Long-term exposure to noise and vibration from operational trains and maintenance activities may lead to hearing damage, stress related disorders, and reduced concentration levels among workers.	Major	-The operating entity will be required to conduct workplace exposure assessments for noise and vibration risks and develop corresponding mitigation strategies. - Hearing protection devices (e.g., earplugs, earmuffs) will be provided to personnel at high-risk locations, and their use will be mandatory. - Vibration-dampening tools, shock-absorbing flooring, and ergonomic operator seats will be implemented where	Minor	AYGM PIU	**Implementing:** TCDD **Supervising:** Supervision Consultant **Monitoring:** 3rd Party E&S Consultant

Subject	E&S Risks	Description of Risk/Expected Impact	Mitigation Measures	Final Impact Significance	Responsibility	
					Development / Definition	Implementation
			applicable. - Worker exposure durations will be limited in accordance with threshold limits, and rotational work schedules will be planned to minimize continuous exposure. - Noise and vibration levels will be measured regularly, recorded, and monitored over time. - Warning signs will be posted in high-exposure areas, and access without protective equipment will be restricted. - All personnel will receive training on noise and vibration hazards, protective measures, and correct PPE usage. - Periodic medical screenings focusing on hearing and balance health will be conducted for exposed workers. - Source-level noise reduction measures, such as sound-absorbing panels and insulation materials, will be applied where feasible.			
Occupational Health and Safety	Increased passenger traffic and pedestrian movement in and around stations and railway crossings may pose collision and fall risks. Overcrowded areas, lack of clear signage, or panic during emergencies may result in injuries, especially for vulnerable groups such as elderly or disabled passengers.	Major	- Pedestrian and passenger safety plans will be developed and implemented for areas with high foot traffic. - Walkways, entry/exit points, and crossing areas will be clearly marked with signage, ensuring barrier-free accessibility. - Crowd control measures (e.g., barriers, directional lanes, informational boards) will be used to guide flow on platforms and other critical areas. - Emergency evacuation plans will be prepared for stations and crossings and drilled with relevant staff. - Audio and visual communication systems will be integrated to assist visually or hearing-impaired passengers. - Warning signs and safety announcements will be made available and broadcast regularly for passenger awareness. - Floor surfaces will be made slip-resistant, and stairs, ramps, and platform edges will be marked with safety indicators. - During peak hours, additional safety personnel will be deployed to monitor movement and assist in emergencies.	Minor	AYGM PIU	**Implementing:** TCDD **Supervising:** Supervision Consultant **Monitoring:** 3rd Party E&S Consultant
Occupational Health and Safety	Emergency scenarios such as train derailments, onboard fires, technical breakdowns, or sabotage may cause major disruptions if response teams are untrained or equipment is insufficient. Delayed intervention or lack of coordination with local emergency services may increase the severity of injuries and infrastructure damage.	Major	- The operating entity will be required to develop and implement a comprehensive Emergency Preparedness and Response Plan (EPRP) covering all major emergency scenarios. - Response teams will receive regular training on fire response, evacuation, rescue, sabotage handling, and technical failure management. - Emergency response tools and equipment (e.g., fire extinguishers, first aid kits, rescue gear) will be made available and maintained at every station and critical point. - Clear roles and responsibilities will be assigned to all personnel involved in emergency situations and validated through practical drills. - Rapid and multi-channel communication systems will be established between stations, train crew, and control centers. - Protocols for coordination with local fire departments, medical services, and law enforcement will be pre-established and reinforced through joint drills. - A crisis communication plan will be prepared for managing information sharing, passenger evacuation, and media response during emergencies. - Monitoring systems and security partnerships will be strengthened to mitigate sabotage risks at critical infrastructure points.	Minor	AYGM PIU	**Implementing:** TCDD **Supervising:** Supervision Consultant **Monitoring:** 3rd Party E&S Consultant
Occupational Health and Safety	Lone workers operating in remote or sparsely monitored areas such as track sections far from urban centers face increased risks in case of accidents, health emergencies, or acts of aggression. Delayed emergency detection or response may result in avoidable injury severity or death.	Major	- The operating entity will be required to develop and implement a lone worker safety procedure for all relevant operations. - Workers assigned to remote areas will be equipped with wearable emergency alert devices and/or GPS tracking systems. - Scheduled check-ins or automated location updates will be made mandatory for all lone working assignments. - A risk assessment will be conducted in advance for any lone work, and tasks deemed unsafe for solo execution will be prohibited. - Mobile applications or alert systems with automatic emergency notification features will be used for lone workers. - A designated standby support team will be assigned to monitor and respond to emergencies involving lone workers. - Reliable communication infrastructure (e.g., radio, mobile phone networks) will be ensured, and alternative communication methods will be evaluated in areas with poor signal coverage. - All personnel will receive training on lone working risks, emergency protocols, and self-protection techniques. - Pre-defined response plans for incidents involving lone workers will be integrated into the central emergency system. - Records of lone worker activities, incident responses, and reports will be regularly reviewed to support continuous improvement.	Minor	AYGM PIU	**Implementing:** TCDD **Supervising:** Supervision Consultant **Monitoring:** 3rd Party E&S Consultant
Occupational Health and Safety	The operation of freight trains carrying dangerous goods such as flammable, explosive, toxic, or corrosive substances through stations and railway lines shared with passenger trains poses elevated health and safety risks. In the event of derailment, leakage, fire, or accidental release, these materials may endanger not only railway staff but also passengers, station personnel, and nearby communities. The absence of dedicated hazardous material handling protocols, real-time risk communication systems, and emergency isolation procedures increases the likelihood and severity of impacts. Mixed-use of stations and tracks without proper segregation or scheduling	Major	- In order to protect passenger trains from possible leaks, fires, or explosions involving freight trains, a durable barrier resistant to fire and blast will be installed between freight train tracks and passenger areas at shared stations. - Automatic fire suppression systems (e.g., water-based sprinkler systems) will be installed in all passenger stations, technical rooms, and critical equipment areas in accordance with national fire protection legislation and international standards. - These systems will significantly reduce the risk of fire spread, improve evacuation safety, and enhance infrastructure resilience against fire-induced operational disruptions. - The operating entity will be required to establish and implement specific safety protocols, transport restrictions, and monitoring procedures for freight trains carrying hazardous materials. - The movement of such trains will be scheduled in advance and, where possible, planned for off-peak hours with low passenger traffic.	Minor	AYGM PIU	**Implementing:** TCDD **Supervising:** Supervision Consultant **Monitoring:** 3rd Party E&S Consultant

Subject	E&S Risks	Description of Risk/Expected Impact	Mitigation Measures	Final Impact Significance	Responsibility	
					Development / Definition	Implementation
	controls further raises the risk of exposure, evacuation challenges, and cascading disruptions in case of an incident.		- All transport units, containers, and wagons will be properly labeled in accordance with international standards, and transport documentation will be complete and accurate. - Emergency isolation plans will be developed to enable rapid containment of affected areas in case of fire, leakage, or gas release. - Real-time hazard communication systems will be implemented to alert passenger trains, station staff, and emergency response teams. - During the approach or passage of hazardous material trains through stations, personnel movement within the station will be restricted, and passenger announcements will be made. - To reduce post-incident impact, evacuation plans, quarantine zones, and alternative routing scenarios will be prepared and ready for deployment.			
Occupational Health and Safety	The absence of a confidential and accessible grievance mechanism for workers may result in unresolved complaints, increased dissatisfaction, and exposure to labor rights violations, including harassment and unsafe conditions.	High	- A confidential and accessible worker grievance mechanism will be established and communicated to all workers. -The mechanism will ensure anonymous submissions, protection against retaliation, and defined response times. -Grievances and resolution outcomes will be regularly monitored to identify systemic issues.	Minor	AYGM PIU	**Implementing:** TCDD **Supervising:** Supervision Consultant **Monitoring:** 3rd Party E&S Consultant
Occupational Health and Safety	Prolonged working hours, isolated worksites, monotonous tasks, or high-pressure roles may lead to psychosocial risks such as stress, fatigue, anxiety, and decreased performance.	High	-Psychosocial risks will be assessed through worker feedback, health checks, and supervision. -Stress management and mental health awareness training will be provided to workers. -Rest and rotation schedules will be adjusted to reduce fatigue and improve mental well-being.	Minor	AYGM PIU	**Implementing:** TCDD **Supervising:** Supervision Consultant **Monitoring:** 3rd Party E&S Consultant
Occupational Health and Safety	Inadequate monitoring of safety performance metrics may lead to missed trends, ineffective corrective actions, and reduced accountability in occupational health and safety management.	High	-Key indicators such as TRIR, LTIFR, incident rate, and near-miss frequency will be monitored and reported monthly. -Root cause analysis will be required for all reportable events. -Management reviews will incorporate KPI analysis to guide preventive strategies.	Minor	AYGM PIU	**Implementing:** TCDD **Supervising:** Supervision Consultant **Monitoring:** 3rd Party E&S Consultant
Community Health and Safety (CHS)	- Increased safety risks near stations and crossings (trespassing, accidents). - Electromagnetic field (EMF) exposure near lines.	Moderate	- Fencing and controlled access to rail corridors. - Install signage and warning systems at crossings. - Emergency preparedness drills for nearby communities.	Minor	AYGM PIU	**Implementing:** TCDD **Supervising:** Supervision Consultant **Monitoring:** 3rd Party E&S Consultant

4 MONITORING AND REPORTING

The monitoring program aims to ensure compliance with the ESMP and related sub-plans, assess the effectiveness of mitigation measures, and respond to non-compliances or emerging E&S issues. It will verify that project activities meet national legislation, World Bank ESF, and contractual requirements through regular audits and reporting. Main objectives are to:

- Control that all mitigation measures are in place,
- Measure effectiveness of the mitigation measures,
- Enable timely action to be taken when unexpected environmental and social incidents are encountered.

Prior to commencement of construction works, baseline monitoring will be conducted for key environmental parameters including noise, vibration, dust (PM_{10}/$PM_{2.5}$), and water quality at agreed receptor locations. These baseline measurements will establish reference conditions against which construction and operation phase monitoring results will be evaluated.

Mitigation measures for each E&S component of the Monitoring Plan are provided within the scope of the ESMP (see Section 2). Parameters, locations, frequencies, methods, thresholds values, key performance indicators for the monitoring studies are identified along with identification of the responsible parties, reporting frequencies and corresponding budget in the Monitoring Plans for construction and operation phases (see Table 4-1 and Table 4-2). To determine whether monitoring outcomes comply with the Project standards, implementation of mitigation measures will be observed and measured, effectiveness of measures will be verified, all results will be recorded and monitored.

The CSC will conduct periodic supervision of contractor's OHS performance, including site visits, at least monthly and weekly in case of large infrastructure works. These supervisions will cover compliance with the project standards, accidents, violations of golden rules, recommendations, and progress of ongoing corrective actions. The AYGM will include in the contract(s) as requirement for contractors to report on issues such as number of accidents rates, severity rates, number of recurring non-compliances, violations of Golden rules, fatalities and serious injuries, and penalties for non-completion. Furthermore, the CSC will review and approve contractors' safety plans and procedures. D+B Contractor(s) will be required to provide periodic information on the performance in terms of labor, occupational health, and safety issues. The information will be included in the construction contractor's monthly report and will be reviewed by the supervision consultant's team.

In addition, D+B Contractors shall report to the AYGM about any inspections and audits carried out by the respective ministries such as the Labor Inspection. The findings of the labor audits will be presented to the AYGM and the Bank, if requested.

To strengthen environmental and social governance and ensure transparent compliance with national regulations and lender requirements, the Project will be subject to third-party Independent Environmental and Social Monitoring (IESM) conducted by PIOC. An independent and qualified external consultants will be appointed by PIOC, separate from the D+B Contractors and CSC, to periodically monitor the Project's E&S performance.

The scope of the IESM will include, but not be limited to, compliance with the ESIA commitments, implementation of the ESMP and C-ESMP, adherence to applicable national legislation, and alignment with the relevant lender environmental and social standards. The IESM will conduct regular site inspections, review documentation, and prepare independent monitoring reports, which will be shared with the AYGM and the Lenders. Corrective actions identified through the IESM process will be tracked and addressed through the Project's environmental and social

management system. IESM activities will be carried out at regular intervals (e.g. quarterly during construction and annually during operation), or more frequently if required by the Lenders. IESM reports will be considered formal project documents and will inform management decisions and corrective action plans.

Reporting on accidents and incidents: Immediately or not later than 24 hours, the PIU or the contractor shall report to the labor Inspectorate and the Ministry of Interior (police), and to the World Bank verbally and in writing, any fatality, collective or individual serious injury, due to which the employee is unable to work for three consecutive working days, as well as any dangerous event that may put health and safety of the employees at risk.

The AYGM will inform the Bank within 24 hours about any incident or accident related to the project which has or is likely to have a significant adverse effect on the environment, the affected communities, the public or workers (labor, health and safety, or security incident, accident, or circumstance), but no later than three calendar days after the occurrence of the event. Such events can include strikes or other labor protests, serious worker injuries or fatalities, project-caused injuries to community members or property damage. AYGM will prepare a report on the event and the corrective action and submit it to the Bank within 30 calendar days of the event and follow the ESIRT process as requested.

In addition, AYGM will maintain a monthly public E&S Dashboard summarizing key indicators such as air quality and noise exceedances, vibration levels, traffic incidents, biodiversity observations, SEA/SH and grievance mechanism statistics, and non-compliances with corresponding corrective actions. The dashboard will be publicly disclosed through the Project's communication channels in accordance with the SEP.

4.1 Monitoring Plan for Construction Phase

Table 4-1 Monitoring Plan for Construction Phase

Issue	Monitoring Parameter	Monitoring Location	Responsible Party for Implementation	Monitoring Frequency / Timing	Monitoring Method	Threshold Values (when available)	Management Plan detailing Monitoring Requirements / Relevant Legislation - Standard	Key Performance Indicator	Reporting Frequency	Implementation Cost
Establishing Project's Grievance Mechanism	Implementation status of the GM	All project areas along with AoI	**Implementation:** AYGM and Contractor **Supervision/ Monitoring:** CSC	Before construction starts	Documentation	-	ESS1: Assessment and Management of Environmental and Social Risks and Impacts ESS10: Stakeholder Engagement and Information Disclosure SEP including GM	Grievance Mechanism established and documented according to SEP/ESS10 requirements Grievance Mechanism established and documented according to SEP/ESS10 requirements **Percentage of grievances resolved within the timeframe specified in the GM procedure**	Monthly	Additional cost on preventive corrective actions
RF preparation and Stakeholder Engagement Activities	Quality, quantity and effectiveness of the stakeholder engagement activities Implementation status of the SEP and RF	All project areas	**Implementation:** AYGM and/or E&S Consultant **Supervision/ Monitoring:** CSC	Before construction starts	Documentation	-	Expropriation Law ESS5: Land Acquisition, Restrictions on Land Use and Involuntary Resettlement ESS10: Stakeholder Engagement and Information Disclosure RF SEP including GM	SEP and RF are prepared prior to construction Stakeholder List is prepared prior to construction Resolution of issues collected through the GM Fulfillment of the issues outlined in the RF	Monthly	Assignment of the E&S Consultant
SEP preparation and Stakeholder Engagement Activities	Quality, quantity and effectiveness of the stakeholder engagement activities conducted under SEP Implementation status of the SEP	All project areas	**Implementation:** AYGM and/or E&S Consultant **Supervision/ Monitoring:** CSC	Before construction starts During Final ESIA preparation stage	Documentation	-	ESS10: Stakeholder Engagement and Information Disclosure	SEP is prepared prior to construction Stakeholder List is prepared prior to construction Resolution of issues collected through the GM Fulfillment of the issues outlined in the SEP	Monthly	Assignment of another E&S Consultant Cost: USD 250,000
Employment Opportunities and Local Procurement	- Number of local hires directly employed by the project - Number of women employed in project-related activities - Volume/value of goods/services procured locally - Number of engagement activities with vulnerable groups	All project working areas	**Implementation:** Contractor **Supervision/ Monitoring:** CSC	Monthly	Documentation, Training Records, Percentage of local people, women etc. groups among employees GM records	-	Labor Law and Regulation on Classification, Labeling and Packaging of Substances and Mixtures ESS2 Labor and Working Conditions Labour Management Procedures Labour Influx Management Plan prepared by Contractor	% of project workforce hired locally % of female workers among total workforce % of project procurement sourced from local suppliers Number of information/engagement sessions conducted for vulnerable groups	Monthly	Included in Construction Cost
SEA/SH risk management and Prevention	Quality and effectiveness of SEA/SH risk management and prevention measures	All project working areas	**Implementation:** Contractor **Supervision/ Monitoring:** CSC	Monthly	Documentation, (contracts, code of conducts) Training Records, GM records		Labor Law and Regulation on Classification, Labeling and Packaging of Substances and Mixtures ESS2: Labor and Working Conditions Labour Management Procedures Labour Influx Management Plan prepared by Contractor	□ % of workers trained on SEA/SH □ Number of SEA/SH grievances reported and resolved	Monthly	Included in Construction Cost

Issue	Monitoring Parameter	Monitoring Location	Responsible Party for Implementation	Monitoring Frequency / Timing	Monitoring Method	Threshold Values (when available)	Management Plan detailing Monitoring Requirements / Relevant Legislation - Standard	Key Performance Indicator	Reporting Frequency	Implementation Cost
							Workers GM			
Worker Health and Safety (OHS Compliance)	Implementation of OHS measures and safety compliance	All project working areas	**Implementation:** Contractor / **Supervision & Monitoring:** CSC	Monthly	Document control, Visual observations at site	-	ESS2: Labor and Working Conditions, WBG EHS Guidelines, Occupational Health and Safety Management Plan	% of safety inspections completed on schedule; % of workers using PPE correctly	Monthly	Included in Construction Cost
Worker Code of Conduct	Adherence to worker Code of Conduct	All project working areas	**Implementation:** Contractor / **Supervision & Monitoring:** CSC	Monthly	Documentation, Training Records, Contracts	-	ESS2: Labor and Working Conditions, Labour Management Procedures	% of workers who signed and acknowledged the Code of Conduct; Number of induction and refresher trainings completed	Monthly	Included in Construction Cost
Child Labour and Forced Labour	Safety working conditions Training records. Preventive corrective measures taken Internal audit records Trainings Contracts Code of Conduct GM records	Trainings Contracts Code of Conduct GM	**Implementation:** Contractor **Supervision/ Monitoring:** CSC	Monthly	Documentation, GM records, Spot checks, Review of employment contracts and ID documents	Compliance with national labor laws on minimum working age	Labor Law and Regulation on Classification, Labeling and Packaging of Substances and Mixtures ESS2: Labor and Working Conditions Labour Management Procedures Labour Influx Management Plan prepared by Contractor Workers GM	- Number of complaints collected via Workers' GM and resolved. - Verification of age and employment eligibility through document review and spot checks	Monthly	Included in Construction Cost
Discrimination	Safety working conditions Training records. Preventive corrective measures taken Internal audit records Trainings Contracts Code of Conduct GM records	All project working areas	**Implementation:** Contractor **Supervision/ Monitoring:** CSC	Monthly	Documentation, (contracts, code of conducts) Training Records, GM records		Labor Law and Regulation on Classification, Labeling and Packaging of Substances and Mixtures ESS2: Labor and Working Conditions Labour Management Procedures Labour Influx Management Plan prepared by Contractor Workers GM	Number of complaints collected via Workers' GM and resolving rate Number of relevant cases submitted through Stakeholder GM	Monthly	Included in Construction Cost
Impacts on Livelihoods	Engagement records. Preventive corrective measures taken Trainings for workers GM records	Residential areas directly or indirectly affected by the project	**Implementation:** Contractor **Supervision/ Monitoring:** CSC	Monthly	Grievance records related to income loss Grievance records related to loss of income sources	100% redressed grievances related to income /income source loss	SEP including GM ESS10: Stakeholder Engagement and Information Disclosure	- Changes in household income levels and employment rates within the Area of Influence (AoI) compared to baseline conditions - Number of local residents employed by contractors or benefiting from project-related economic activities - Perceptions of livelihood conditions among AoI settlements (based on periodic community surveys or consultations) - Trends in local commodity prices or access to essential goods and services (if applicable)	Monthly	Included in Stakeholder Engagement Budget
Permission Regarding Non-Agricultural Use of Agricultural Areas	Non-agricultural use permit	All project areas	**Implementation:** AYGM **Supervision/ Monitoring:** CSC	Before construction starts	Documentation	-	Soil Conservation and Land Use Law	Obtaining all necessary permits before starting construction activities	Monthly	No additional cost
Determination of the camp site, access roads and excavation storage areas and obtaining the necessary permissions	Site selection process for camp site, access roads and excavation areas and relevant approval letters	All project areas	**Implementation:** Contractor **Supervision/ Monitoring:** CSC	Before construction starts	Documentation	-	ESS1: Assessment and Management of Environmental and	Obtaining all necessary permits before starting construction activities	Monthly	Included in Construction Cost

Issue	Monitoring Parameter	Monitoring Location	Responsible Party for Implementation	Monitoring Frequency / Timing	Monitoring Method	Threshold Values (when available)	Management Plan detailing Monitoring Requirements / Relevant Legislation - Standard	Key Performance Indicator	Reporting Frequency	Implementation Cost
	and/or permits						Social Risks and Impacts ESS3: Resource Efficiency and Pollution Prevention and Management ESS10: Stakeholder Engagement and Information Disclosure			
Ensuring Ground Safety	Resilience/Durability of the structures	Project Route and all Engineering Structures	**Implementation:** AYGM **Supervision/ Monitoring:** CSC	Before construction starts	Documentation Visual observations at site	-	Regulation on Structures to be Built in Disaster Areas	Compliance of the structures with design standards	Monthly	No additional cost
Preparation of Site-specific Management Plans and Procedures	Site-specific management plans and procedures	Office	**Implementation:** Contractor **Supervision/ Monitoring:** CSC	Before construction starts	Documentation	-	ESS1: Assessment and Management of Environmental and Social Risks and Impacts ESS3: Resource Efficiency and Pollution Prevention and Management	Number of site specific management plans and competence	-	Included in Construction Cost
Seismicity resistance of the built structure	Project components following large seismic events occurred (to check in terms of their resilience/ durability)	Project route and all engineering structures	**Implementation:** Contractor **Supervision/ Monitoring:** CSC	After an earthquake	Visual observations at all routes and structures Documentation: Building permits and certificates	-	Regulation on Structures to be Built in Disaster Areas Türkiye Building Earthquake Regulation Emergency Preparedness and Response Plan ESS4: Community Health and Safety WBG EHS Guidelines	Number of related accidents/incidents recorded Effective implementation of the Emergency Preparedness and Response Plan Damage situation after the earthquake	Monthly	Included in Construction Cost
Soil Contamination	Parameters given in Appendix 2, Table 2 of the Regulation on Soil Pollution Control and Point Source Polluted Sites (Official Gazette dated 08.06.2010 and numbered 27605) ([1])	Points to be selected to represent near stations which were selected during ESIA Report	**Implementation:** Contractor **Supervision/ Monitoring:** CSC	Every three month and monthly until resolved in case of a complaint/spill incident or leakage to soil	On-site visual observations/ inspections Soil sampling and analysis (by accredited and competent firms) Documentation: Training records, incident reports	Baseline measurement results specified in the ESIA Report	Regulation on Soil Pollution Control and Point Source Contaminated Sites Pollution Prevention Plan prepared by the Contractor ESS3: Resource Efficiency and Pollution Prevention and Management	Number of leakages/spill incidents Number of the non-compliances with the applicable standards (Target: Zero non-compliance) Amount of contaminated soil (m3) and (ha) Number and percent of the personnel trained regarding emergency response to spills and leaks	Monthly	Included in Construction Cost Additional cost on Soil Sampling and Analysis: USD 10,000 total
Increase in Noise Level	Noise	Baseline measurement points determined within the scope of ESIA Studies / Closest settlement in case of complaint	**Implementation:** Contractor **Supervision/ Monitoring:** CSC	Quarterly and if there is a complaint	On-site visual observations/ inspections Noise level measurements (at least 48 hours of uninterrupted noise measurements by accredited and competent firms) Documentation: Training records, grievance records, correspondence with the relevant stakeholders, measurement reports	Baseline measurement results specified in the ESIA Report Legislative and WBG EHS Guidelines limit values	Regulation on Environmental Noise Control Pollution Prevention Plan prepared by the Contractor ESS3: Resource Efficiency and Pollution Prevention and Management	No exceedance of noise limit values observed in the noise measurements Number of noise related community grievances Number and percent of the personnel trained on noise management	Monthly	Included in Construction Cost Additional cost on Noise Measurement and Analysis

[1] *BTEX, TPH, TVOCs, pH, Oil-Grease, Cadmium, Mercury, Zinc, Copper, Nickel, Chromium, Lead, Selenium, Arsenic, Antimony, Molybdenum, Titanium, Tin, Barium, Beryllium, Boron, Uranium, Vanadium, Cobalt, Thallium, Silver*

Issue	Monitoring Parameter	Monitoring Location	Responsible Party for Implementation	Monitoring Frequency / Timing	Monitoring Method	Threshold Values (when available)	Management Plan detailing Monitoring Requirements / Relevant Legislation - Standard	Key Performance Indicator	Reporting Frequency	Implementation Cost
Air Quality	Settled Dust PM10 PM2.5	Baseline measurement points determined within the scope of ESIA Studies / Closest settlement in case of complaint	**Implementation:** Contractor **Supervision/ Monitoring:** CSC	Quarterly and if there is a complaint	On-site visual observations/ inspections PM10, and PM2.5 measurements (by accredited and competent firms) Documentation: Training records, grievance records, measurement records	Baseline measurement results specified in the ESIA Report Legislative and WBG EHS Guidelines limit values	Regulation on Control of Industrial Source Air Pollution WHO - Outdoor Air Quality Guidelines Air Quality Management Plan prepared by the Contractor Pollution Prevention Plan prepared by the Contractor ESS3: Resource Efficiency and Pollution Prevention and Management	No exceedance of air quality limit values observed in air quality measurements Number of air quality related grievances Number and percent of the personnel trained on air quality	Monthly	Included in Construction Cost Additional cost on Air Quality Measurement and Analysis: USD 15,000 / Year
Air Quality	Vehicle emissions	Construction equipment and vehicles	**Implementation:** Contractor **Supervision/ Monitoring:** CSC	Daily	Documentation: Vehicle and equipment maintenance records On-site visual observations/ inspections	-	Regulation on Control of Exhaust Gas Emission and Gasoline and Diesel Oil Quality Air Quality Management Plan prepared by the Contractor	The ratio of maintained vehicles and equipment to the total number	Monthly	Included in Construction Cost
Wastewater Generation	Septic tank integrity and impermeability Septic tank emptying frequency Generated wastewater quantity Vacuum truck records Wastewater disposal receipts Leakage or overflow related incidents and complaints Trainings	Construction Site	**Implementation:** Contractor **Supervision/ Monitoring:** CSC	Daily	On-site visual observations/ inspections Documentation: Vacuum truck records, training records, wastewater amounts, grievance records on wastewater issues	-	Implementing Regulation on Pits to be Made in Sedimentation Areas Where Construction is Not Possible Water Pollution Control Regulation WBG General EHS Guidelines Water and Wastewater Management Plan prepared by the Contractor	100% of septic tanks inspected regularly, with all tanks meeting impermeability and structural standards Adherence to the scheduled emptying frequency (as septic tank fills) Complete and accurate recording of wastewater volumes (100% data availability per reporting cycle) All vacuum truck operations supported with verified records (trip logs, dates, destinations) All wastewater disposals documented with valid receipts from licensed WWTPs Zero incidents and complaints of uncontrolled discharge, leakage, or overflow reported All personnel trained on wastewater and septic system management	Monthly	Included in Construction Cost
Surface Water Quality	Parameters given in Annex-5, Table 2 of the Surface Water Quality Regulation (Official Gazette dated 30.11.2012 and numbered 28483)	Baseline measurement points determined within the scope of ESIA Studies	**Implementation:** Contractor **Supervision/ Monitoring:** CSC	Every 6 months and if there is a complaint	Sampling and analysis (by accredited and competent firms) Documentation: Grievance records	The limit values specified in Annex-5, Table-2 (Quality Criteria of Inland Surface Water Resources According to Their Classes in Terms of General Chemical and Physicochemical Parameters) of the Surface Water Control Regulation along with WBG EHS Guidelines	Surface Water Quality Regulation Pollution Prevention Plan prepared by the Contractor ESS3: Resource Efficiency and Pollution Prevention and Management WBG EHS Guidelines	Compliance with the surface water quality standards Number of surface water quality related grievances	Monthly	Included in Construction Cost Additional cost on Water Quality Measurement and Analysis: USD 5,000 / Year
Groundwater Quality	Parameters given in Annex-1 of the Regulation on Water Intended for	Baseline measurement point (GW-1)	**Implementation:** Contractor **Supervision/**	Every 6 months and if there is a complaint or in case of soil	Sampling and analysis (by accredited and	The limit values specified in Regulation on	Regulation on Water Intended for Human Consumption	Compliance with the groundwater quality standards Number of groundwater quality related	Monthly	Included in Construction Cost Additional cost on

Issue	Monitoring Parameter	Monitoring Location	Responsible Party for Implementation	Monitoring Frequency / Timing	Monitoring Method	Threshold Values (when available)	Management Plan detailing Monitoring Requirements / Relevant Legislation - Standard	Key Performance Indicator	Reporting Frequency	Implementation Cost
	Human Consumption (Official Gazette dated 17.02.2005 and numbered 25730)	determined within the scope of ESIA Studies	**Monitoring:** CSC	contamination	competent firms) Documentation: Grievance records	Water Intended for Human Consumption and WHO Drinking Water Guidelines	WHO Drinking Water Guidelines Pollution Prevention Plan prepared by the Contractor ESS3: Resource Efficiency and Pollution Prevention and Management WBG EHS Guidelines	grievances		Groundwater Quality Measurement and Analysis: USD 5,000 / Year
Waste Management	Excavation Waste	Project Route and Excavation Storage Areas	**Implementation:** Contractor **Supervision/ Monitoring:** CSC	Continuously during excavations	Visual observations at site Documentation: Waste records on reuse and disposal	-	Regulation on Control of Excavation Soil, Construction and Debris Wastes Pollution Prevention Plan prepared by the Contractor Waste Management Plan prepared by the Contractor ESS3: Resource Efficiency and Pollution Prevention and Management WBG EHS Guidelines	The amount of excavation material and amount of excavated material reused	Monthly	Included in Construction Cost
Soil Management	Topsoil	Project Route and Excavation Storage Areas	**Implementation:** Contractor **Supervision/ Monitoring:** CSC	Continuously during excavations	Documentation and visual observations at site	-	Regulation on Control of Excavation Soil, Construction and Debris Wastes ESS3: Resource Efficiency and Pollution Prevention and Management WBG EHS Guidelines Pollution Prevention Plan prepared by the Contractor Waste Management Plan prepared by the Contractor	Topsoil adequately stripped, temporarily stored in designated areas and appropriately reused	Monthly	Included in Construction Cost
Waste Management	Solid Waste and Packaging Waste	Project working areas during construction work	**Implementation:** Contractor **Supervision/ Monitoring:** CSC	Daily	Visual observations at site Documentation: Waste generation and disposal records, notifications on Integrated Environment Information System/Waste Management Application (Waste Declaration System), training records, contracts/protocols regarding waste shipment	-	Waste Management Regulation Regulation on Control of Packaging Wastes ESS3: Resource Efficiency and Pollution Prevention and Management WBG EHS Guidelines Pollution Prevention Plan prepared by the Contractor Waste Management Plan prepared by the Contractor	Ratio of reused/recycled/recovered wastes to total wastes generated All types of wastes transferred to the relevant recycling/disposal facilities Number of incidents related to soil contamination due to improper waste management Number and percent of the personnel trained on waste management	Monthly	Included in Construction Cost
Waste Management	Non-Hazardous and Inert Wastes	Project working areas during construction work	**Implementation:** Contractor **Supervision/ Monitoring:** CSC	Daily	Visual observations at site Documentation: Waste generation and disposal records,	-	Waste Management Regulation ESS3: Resource Efficiency and Pollution Prevention and Management	Ratio of reused/recycled/recovered wastes to total wastes generated All types of wastes transferred to the relevant recycling/disposal facilities Number and percent of the personnel trained on waste management	Monthly	Included in Construction Cost

Issue	Monitoring Parameter	Monitoring Location	Responsible Party for Implementation	Monitoring Frequency / Timing	Monitoring Method	Threshold Values (when available)	Management Plan detailing Monitoring Requirements / Relevant Legislation - Standard	Key Performance Indicator	Reporting Frequency	Implementation Cost
					notifications on Integrated Environment Information System/Waste Management Application (Waste Declaration System), training records, contracts/protocols regarding waste shipment		WBG EHS Guidelines Pollution Prevention Plan prepared by the Contractor Waste Management Plan prepared by the Contractor			
Waste Management	Hazardous Wastes	Project working areas during construction work	**Implementation:** Contractor **Supervision/ Monitoring:** CSC	Daily	Visual observations at site Documentation: Waste generation and disposal records, notifications on Integrated Environment Information System/Waste Management Application (Waste Declaration System), training records, contracts/protocols regarding waste shipment	-	Waste Management Regulation ESS3: Resource Efficiency and Pollution Prevention and Management WBG EHS Guidelines Pollution Prevention Plan prepared by the Contractor Waste Management Plan prepared by the Contractor	Ratio of reused/recycled/recovered wastes to total wastes generated Wastes separately stored depending on their hazardous class and type of the waste All types of wastes transferred to the relevant recycling/disposal facilities Number of incidents related to soil contamination due to improper waste management Number and percent of the personnel trained on waste management	Monthly	Included in Construction Cost
Waste Management	Medical Wastes	Infirmary	**Implementation:** Contractor **Supervision/ Monitoring:** CSC	Daily	Visual observations at site Documentation: Waste generation and disposal records, notifications on Integrated Environment Information System/Waste Management Application (Waste Declaration System), training records, contracts/protocols regarding waste shipment	-	Medical Waste Control Regulation ESS3: Resource Efficiency and Pollution Prevention and Management WBG EHS Guidelines Pollution Prevention Plan prepared by the Contractor Waste Management Plan prepared by the Contractor	Wastes separately stored depending on their hazardous class and type of the waste All types of wastes transferred to the relevant recycling/disposal facilities Number and percent of the personnel trained on waste management	Monthly	Included in Construction Cost
Waste Management	Vegetable Oils	Camp Site (Kitchen)	**Implementation:** Contractor **Supervision/ Monitoring:** CSC	Daily	Visual observations at site Documentation: Waste generation and disposal records, notifications on Integrated Environment Information System/Waste Management Application (Waste Declaration System), training records,	-	Regulation on Control of Vegetable Waste Oils ESS3: Resource Efficiency and Pollution Prevention and Management WBG EHS Guidelines Pollution Prevention Plan prepared by the Contractor Waste Management Plan prepared by the Contractor	Wastes separately stored depending on their hazardous class and type of the waste All types of wastes transferred to the relevant recycling/disposal facilities Number and percent of the personnel trained on waste management	Monthly	Included in Construction Cost

Issue	Monitoring Parameter	Monitoring Location	Responsible Party for Implementation	Monitoring Frequency / Timing	Monitoring Method	Threshold Values (when available)	Management Plan detailing Monitoring Requirements / Relevant Legislation - Standard	Key Performance Indicator	Reporting Frequency	Implementation Cost
					contracts/protocols regarding waste shipment					
Waste Management	Waste Batteries and Accumulators	Construction Site	**Implementation:** Contractor **Supervision/ Monitoring:** CSC	Daily	Visual observations at site Documentation: Waste generation and disposal records, notifications on Integrated Environment Information System/Waste Management Application (Waste Declaration System), training records, contracts/protocols regarding waste shipment	-	Regulation on Control of Waste Batteries ESS3: Resource Efficiency and Pollution Prevention and Management WBG EHS Guidelines Pollution Prevention Plan prepared by the Contractor Waste Management Plan prepared by the Contractor	Wastes separately stored depending on their hazardous class and type of the waste All types of wastes transferred to the relevant recycling/disposal facilities Number and percent of the personnel trained on waste management	Monthly	Included in Construction Cost
Waste Management	End of Life Tires	Construction Site	**Implementation:** Contractor **Supervision/ Monitoring:** CSC	Daily	Visual observations at site Documentation: Waste generation and disposal records, notifications on Integrated Environment Information System/Waste Management Application (Waste Declaration System), training records, contracts/protocols regarding waste shipment	-	Regulation on Control of End-of-Life Tires WBG EHS Guidelines ESS3: Resource Efficiency and Pollution Prevention and Management Pollution Prevention Plan prepared by the Contractor Waste Management Plan prepared by the Contractor	Wastes separately stored depending on their hazardous class and type of the waste All types of wastes transferred to the relevant recycling/disposal facilities Number and percent of the personnel trained on waste management	Monthly	Included in Construction Cost
Biodiversity / Habitat loss	Area of cleared natural vegetation	Project area and AoI	**Implementation:** Contractor **Supervision/ Monitoring:** CSC	Monthly	GIS mapping, site inspection	No unauthorized clearing	Biodiversity Management Plan prepared by Contractor	No habitat loss beyond designated work area	Monthly	Included in Construction Cost
Biodiversity / Habitat Offset	Area reforested and number of trees planted	Project area / designated offset sites	Implementation: Contractor / Supervision & Monitoring: CSC	Monthly	GIS mapping, on-site inspection, planting logs	Reforested area and number of planted trees meet target plan	Biodiversity Management Plan prepared by Contractor	- Total number of trees planted - Total area (m²) reforested	Monthly	Included in Construction Cost
Biodiversity / Seed collection of critical species	Timing and completion of seed/bulb collection for: *Centaurea hermannii*, *Cirsium polycephalum*, *Ferulago confusa*, *Symphytum tuberosum* subsp. *nodosum*, *Lilium martagon*, *Leucojum aestivum*	Within affected natural habitats	**Implementation:** Contractor **Supervision/ Monitoring:** CSC	During species-specific periods: June–August	Botanical field survey; seed collection logs	Collection completed before site clearance	Biodiversity Management Plan prepared by Contractor	Seeds/bulbs collected and delivered to gene bank before disturbance	During seed season	Included in Construction Cost
Biodiversity / Species re-location	Implementation of in-situ translocation for: *Centaurea hermannii*, *Cirsium polycephalum*, *Ferulago confusa*, *Symphytum tuberosum* subsp. *nodosum*, *Lilium martagon*, *Leucojum*	Designated re-location sites	**Implementation:** Contractor **Supervision/ Monitoring:** CSC	October–November (after collection, before site works)	Visual inspection, planting records	All targeted individuals re-located	Biodiversity Management Plan prepared by Contractor	All target individuals successfully re-located	End of season	Included in Construction Cost Relocation cost

Issue	Monitoring Parameter	Monitoring Location	Responsible Party for Implementation	Monitoring Frequency / Timing	Monitoring Method	Threshold Values (when available)	Management Plan detailing Monitoring Requirements / Relevant Legislation - Standard	Key Performance Indicator	Reporting Frequency	Implementation Cost
	aestivum									
Biodiversity / Geophyte survey	Presence of early-flowering geophytes (*e.g. Ornithogalum pascheanum*, *Galanthus plicatus* subsp. *byzantinus*, *Crocus pestalozzae Boiss*)	Areas not surveyed during previous season	**Implementation:** Contractor **Supervision/ Monitoring:** CSC	February (before construction mobilization)	Targeted field survey	All relevant species identified	Biodiversity Management Plan prepared by Contractor ESS6: Biodiversity Conservation and Sustainable Management of Living Natural Resources	All relevant species identified	Once (February)	Included in Construction Cost
Biodiversity / Spread of invasive species	Presence of invasive alien plant species	Reinstated and disturbed areas	**Implementation:** Contractor **Supervision/ Monitoring:** CSC	Monthly	Visual inspection, invasive species checklist	No invasive species allowed	Biodiversity Management Plan prepared by Contractor ESS6: Biodiversity Conservation and Sustainable Management of Living Natural Resources	Immediate removal or control measures applied	Monthly	Included in Construction Cost
Community Health and Safety	Training records Grievance records Information gathered through Public Consultation	Project working areas during construction work	**Implementation:** Contractor **Supervision/ Monitoring:** CSC	Monthly	Monitoring at site, Training Records Grievance Records	-	ESS4: Community Health and Safety Emergency Preparedness and Response Plan prepared by the Contractor Community Health and Safety Management Plan prepared by the Contractor SEP including GM	Number of community safety activities implemented, Number of community safety trainings and GBVH&SEA/SH performed Number of grievance recorded Project health and safety information provided to the local PAPs and vulnerable groups	Monthly	Included in Construction Cost
Traffic (Transportation) Management	Training records Grievance records Information gathered through Public Consultation	Office, project working areas during construction work	**Implementation:** Contractor **Supervision/ Monitoring:** CSC	Monthly	Documentation	-	ESS4: Community Health and Safety Community Health and Safety Management Plan prepared by the Contractor Traffic (Transportation) Management Plan prepared by the Contractor SEP including GM	Number of complaints about traffic problems, Number of traffic training provided to workers Road safety and traffic measures information provided to the local PAPs and vulnerable groups	Monthly	Included in Construction Cost
Occupational Health and Safety	Employment of Occupational Health and Safety (OHS) Specialists, Occupational Physicians, and Occupational Nurses/First-Aiders	Project working areas during construction work	**Implementation:** Contractor **Supervision/ Monitoring:** CSC	Monthly	Document control Visual observations at site	-	ESS2: Labor and Working Conditions WBG EHS Guidelines Occupational Health and Safety Management Plan prepared by the Contractor	Availability of OHS Specialists, Occupational Physicians, and Occupational Nurses/First-Aiders in adequate numbers as required by national legislation and international standards for each contractor and subcontractor. Records of Workers' grievances	Monthly	Included in Construction Cost
Occupational Health and Safety	Completion and implementation of key OHS documentation (including Health and Safety Plan, Risk Assessments, Emergency Preparedness and Response Plan, Work Plan, Training Plan)	Project working areas during construction work	**Implementation:** Contractor **Supervision/ Monitoring:** CSC	Monthly	Document control Visual observations at site	-	ESS2: Labor and Working Conditions WBG EHS Guidelines Occupational Health and Safety Management Plan prepared by the Contractor	Development and 100% implementation of the Construction Phase Health and Safety Plan (including procedures and instructions) Completion and regular update of Risk Assessments Completion and regular update of the Emergency Preparedness and Response Plan (EPRP) 100% compliance with the approved Work Plan and Training Plan Availability of completed and properly	Monthly	Included in Construction Cost

Issue	Monitoring Parameter	Monitoring Location	Responsible Party for Implementation	Monitoring Frequency / Timing	Monitoring Method	Threshold Values (when available)	Management Plan detailing Monitoring Requirements / Relevant Legislation - Standard	Key Performance Indicator	Reporting Frequency	Implementation Cost
								archived work permit forms for all high-risk activities, including hot works, confined space entry, electrical works, and work at height, in accordance with the Permit-to-Work system.		
Occupational Health and Safety	Implementation of construction-phase OHS trainingsand	Project working areas during construction work	**Implementation:** Contractor **Supervision/ Monitoring:** CSC	Monthly	Document control	-	ESS2: Labor and Working Conditions WBG EHS Guidelines Occupational Health and Safety Management Plan prepared by the Contractor	100% completion of site-specific induction and orientation trainings for all personnel prior to site entry 100% completion of Basic Occupational Health and Safety (OHS) trainings 100% completion of role-based professional qualification trainings Completion of toolbox talks and daily safety briefings prior to high-risk activities Number of refresher trainings conducted during the construction phase	Monthly	Included in Construction Cost
Occupational Health and Safety	Implementation of all prescribed OHS measures	Project working areas during construction work	**Implementation: Contractor / Supervision: CSC Monitoring: CSC**	Monthly	Document control Visual observations at site		ESS2 – Labor and Working Conditions WBG EHS Guidelines Occupational Health and Safety Management Plan prepared by the Contractor	Zero non-compliances recorded Monthly compliance reports prepared and submitted	Monthly	Included in Construction Costs
Occupational Health and Safety	Ensuring the timely provision and correct use of PPE by all personnel and visitors in accordance with occupational health and safety requirements	Project working areas during construction work	**Implementation:** Contractor **Supervision/ Monitoring:** CSC	Monthly	Document control Visual observations at site	-	ESS2: Labor and Working Conditions WBG EHS Guidelines Occupational Health and Safety Management Plan prepared by the Contractor	Availability of task-appropriate PPE for all workers and site visitors prior to site entry. Availability of full compliance with PPE usage during all relevant site activities through routine supervision. Availability of 100% compliance with PPE usage requirements across all contractors and subcontractors. Availability of sufficient and continuous PPE stock by each contractor and subcontractor throughout the construction phase. Availability of completed training records confirming 100% of workers are trained in correct PPE use and inspection prior to task assignment.	Monthly	Included in Construction Cost
Occupational Health and Safety	Tracking and reporting of occupational accidents, near misses, and overall OHS performance across all construction activities	Project working areas during construction work	**Implementation:** Contractor **Supervision/ Monitoring:** CSC	Monthly	Document control	-	ESS2: Labor and Working Conditions WBG EHS Guidelines Occupational Health and Safety Management Plan prepared by the Contractor	Availability of a zero-accident target and implementation of proactive safety culture across all contractors Availability of recorded and followed-up near-miss incidents with appropriate corrective actions Availability of root cause analysis (RCA) reports for all recordable accidents and incidents Availability of monthly OHS performance reports submitted by contractors, including frequency and severity metrics Availability of Accident Frequency Rate (AFR) maintained below 1.0 Availability of Lost Time Injury Frequency Rate (LTIFR) maintained below 0.5	Monthly	Included in Construction Cost
Occupational Health and Safety	Deployment and visibility of occupational health and safety signage, emergency direction signs, and site-	Project working areas during construction work	**Implementation:** Contractor **Supervision/ Monitoring:** CSC	Monthly	Visual observations at site	-	ESS2: Labor and Working Conditions WBG EHS Guidelines Occupational Health	Availability of complete and clearly visible OHS warning signs across the construction site, including hazard-specific, PPE-required, and restricted-	Monthly	Included in Construction Cost

Issue	Monitoring Parameter	Monitoring Location	Responsible Party for Implementation	Monitoring Frequency / Timing	Monitoring Method	Threshold Values (when available)	Management Plan detailing Monitoring Requirements / Relevant Legislation - Standard	Key Performance Indicator	Reporting Frequency	Implementation Cost
	specific information board						and Safety Management Plan prepared by the Contractor	area signage; emergency direction signs and assembly point boards positioned in line with site layout plans; and updated information posters placed in welfare facilities and site access points, in Turkish, English, Arabic, and other relevant languages (German, French, Spanish, Portuguese, Russian, Kurdish, Zazaki, Persian, Bosnian, Pomak, Pashto, Turkmen, etc.) as required.		
Occupational Health and Safety	Timely implementation and documentation of periodic inspections and maintenance for all fire protection, construction, and electrical safety equipment	Project working areas during construction work	**Implementation:** Contractor **Supervision/ Monitoring:** CSC	Monthly	Document control	-	ESS2: Labor and Working Conditions WBG EHS Guidelines Occupational Health and Safety Management Plan prepared by the Contractor	Availability of adequate fire extinguishers, fire hose reels, and fire blankets across the site, with 100% completion of routine inspection and maintenance schedules Availability of 100% completed periodic maintenance records for all construction machinery and equipment Availability of 100% completed periodic inspection and grounding test records for all electrical panels, distribution boards, and earthing systems in compliance with national regulations and site safety standards	Monthly	Included in Construction Cost
Occupational Health and Safety	Implementation and enforcement of site-specific traffic safety measures, including speed limits, signage, vehicle separation, and pedestrian safety controls	Project working areas during construction work	**Implementation:** Contractor **Supervision/ Monitoring:** CSC	Monthly	Document control Visual observations at site	-	ESS2: Labor and Working Conditions WBG EHS Guidelines Occupational Health and Safety Management Plan prepared by the Contractor	Availability of 100% compliance with designated speed limits, one-way systems, and traffic rules within the construction site; full implementation of traffic signage, physical barriers, and pedestrian walkways; and maintenance of a zero-incident target related to vehicle–personnel interactions.	Monthly	Included in Construction Cost
Occupational Health and Safety	Deployment and distribution of certified first-aid personnel across all work zones in accordance with legal requirements and site-specific risk levels	Project working areas during construction work	**Implementation:** Contractor **Supervision/ Monitoring:** CSC	Monthly	Document control Visual observations at site	-	ESS2: Labor and Working Conditions WBG EHS Guidelines Occupational Health and Safety Management Plan prepared by the Contractor	Availability of sufficient number of first-aid personnel holding valid Basic First Aid Training certificates, in accordance with the legal requirements based on the hazard classification of construction activities, and their balanced distribution across all work areas.	Monthly	Included in Construction Cost
Occupational Health and Safety	Planning, execution, and documentation of emergency response drills in line with the EPRP	Project working areas during construction work	**Implementation:** Contractor **Supervision/ Monitoring:** CSC	Monthly	Document control	-	ESS2: Labor and Working Conditions WBG EHS Guidelines Occupational Health and Safety Management Plan prepared by the Contractor	Availability of at least two emergency response drills per year, fully completed and documented by each contractor, covering site-specific scenarios such as fire, explosion, and worker evacuation	Monthly	Included in Construction Cost
Cultural Heritage	Chance finds	Project area	**Implementation:** Contractor **Supervision/ Monitoring:** CSC	Daily	On-site visual observations / inspections Documentation: Chance find records, correspondence with relevant institutions, records on stakeholder engagement	-	Law on Preservation of Cultural and Natural Assets Convention on the Protection of the World Cultural and Natural Heritage UNESCO Convention for the Safeguarding of the Intangible Cultural Heritage ESS1: Assessment and Management of Environmental and	Number of chance finds Number of personnel trained on chance find	Monthly	Included in Construction Cost

Issue	Monitoring Parameter	Monitoring Location	Responsible Party for Implementation	Monitoring Frequency / Timing	Monitoring Method	Threshold Values (when available)	Management Plan detailing Monitoring Requirements / Relevant Legislation - Standard	Key Performance Indicator	Reporting Frequency	Implementation Cost
							Social Risks and Impacts ESS8: Cultural Heritage Cultural Heritage Management Plan and Chance Find Procedure[2] (see Appendix-2) Cultural Heritage Management Plan/Chance Finds Procedure prepared by the Contractor			

[2] In accordance with the Terms of Reference (ToR) and the requirements of the draft Environmental and Social Management Plan (ESMP), a Cultural Heritage Management Plan including Chance Find Procedure has been developed to ensure the protection and management of previously unknown cultural heritage that may be encountered during project implementation. This procedure outlines the necessary steps to be taken in the event of an unexpected chance find, including immediate cessation of works, notification protocols, site protection measures, and coordination with relevant authorities. The Cultural Heritage Management Plan including Chance Find Procedure has been included as Appendix-2 to the draft ESMP.

4.2 Monitoring Plan for Operation Period

Table 4-2 Monitoring Plan for Operation Period

Issue	Monitoring Parameter	Monitoring Location	Responsible Party for Implementation	Monitoring Frequency / Timing	Monitoring Method	Threshold Values (when available)	Management Plan detailing Monitoring Requirements / Relevant Legislation - Standard	Key Performance Indicator	Reporting Frequency	Implementation Cost
Increase in Noise Levels and Vibration	Noise and Vibration	Baseline measurement points determined within the scope of ESIA Studies / Closest settlement in case of complaint	TCDD	Quarterly for the first year of operation, every 2 years afterwards or in case of a complaint	Noise level measurements (by accredited and competent firms) Documentation: Grievance records, measurement reports	Baseline measurement results specified in the ESIA Report	Regulation on Environmental Noise Control Site specific Pollution Prevention Plan to be prepared ESS1: Assessment and Management of Environmental and Social Risks and Impacts SEP including GM	No exceedance of noise/vibration limit values observed in noise/vibration measurements Number of noise related community grievances	Quarterly for the first year & Annually after	Additional cost on Noise Measurement and Analysis
Quality of the engineering structures considering the occurrence of natural disasters	Maintenance records Incident records	Project route and all engineering structures	TCDD	After an earthquake or other natural disasters	Visually in all routes and engineering structures Documentation: Maintenance records, incident records	-	Regulation on Structures to be Built in Disaster Areas Türkiye Building Earthquake Regulation Emergency Preparedness and Response Plan to be prepared ESS1: Assessment and Management of Environmental and Social Risks and Impacts	Number of related incidents/accidents recorded Number of maintenance and repairs performed per year No significant damage observed situation after an earthquake or other natural disasters	Annually	No additional cost Included in the operation costs
Waste Management	Solid Waste and Packaging Waste	Stations	TCDD	Daily	Visual monitoring at site Documentation: Waste generation and disposal records, notifications on Integrated Environment Information System/Waste Management Application (Waste Declaration System), training records, contracts/protocols regarding waste shipment	-	Waste Management Regulation Regulation on Control of Packaging Wastes Site specific Pollution Prevention Plan to be prepared Site specific Waste Management Plan to be prepared ESS3: Resource Efficiency and Pollution Prevention and Management WBG EHS Guidelines	Ratio of reused/recycled/recovered wastes to total wastes generated All types of wastes transferred to the relevant recycling/disposal facilities Number of incidents related to soil contamination due to improper waste management Number and percent of the personnel trained on waste management	Quarterly	Included in the operation costs
Waste Management	Non-Hazardous and Inert Wastes	Stations	TCDD	Daily	Visual monitoring at site Visual control of waste and garbage spilled along the railway route and periodic collection of these garbage, separation Documentation: Waste generation and disposal records, notifications on Integrated Environment Information System/Waste Management Application (Waste Declaration System), training records, contracts/protocols regarding waste shipment	-	Waste Management Regulation Site specific Pollution Prevention Plan to be prepared Site specific Waste Management Plan to be prepared ESS3: Resource Efficiency and Pollution Prevention and Management WBG EHS Guidelines	Ratio of reused/recycled/recovered wastes to total wastes generated All types of wastes transferred to the relevant recycling/disposal facilities	Quarterly	Included in the operation costs
Waste Management	Waste Batteries and Accumulators	Stations	TCDD	Daily	Monitoring at site\ Documentation: Waste generation and disposal records, notifications on Integrated Environment Information System/Waste Management Application (Waste Declaration System), training records, contracts/protocols regarding waste shipment	-	Regulation on Control of Waste Batteries Site specific Pollution Prevention Plan to be prepared Site specific Waste Management Plan to be prepared ESS3: Resource Efficiency and Pollution Prevention and Management WBG EHS Guidelines	Wastes separately stored depending on their hazardous class and type of the waste All types of wastes transferred to the relevant recycling/disposal facilities	Quarterly	Included in the operation costs

Biodiversity	Presence and abundance of target species (e.g., endemic/rare flora)	Along project corridor	TCDD	First 2 years after construction	Field survey, vegetation mapping	No significant decline	Biodiversity Management Plan for Operation Phase ESS6: Biodiversity Conservation and Sustainable Management of Living Natural Resources	Target species continue to persist	Bi-annually	Included in the operation costs
Biodiversity	Vegetation cover and habitat structure in reinstated areas	Reinstated zones and buffer areas	TCDD	Once per year	Visual inspection, drone imagery	≥70% vegetation recovery	Biodiversity Management Plan for Operation Phase ESS6: Biodiversity Conservation and Sustainable Management of Living Natural Resources	Minimum 70% vegetation cover restored	Annually	Included in the operation costs
Biodiversity	Occurrence of unanticipated adverse effects (e.g., pollution, encroachment)	Sensitive habitats	TCDD	As needed / annually	Incident tracking, community feedback	No major unmitigated incident	Biodiversity Management Plan for Operation Phase ESS6: Biodiversity Conservation and Sustainable Management of Living Natural Resources	Immediate corrective action taken if impact observed	As needed / Annually	Included in the operation costs
Biodiversity	Continuity of key species and habitat quality indicators	Critical habitats along the project corridor	TCDD	First 2 years after construction	Botanical survey, floristic comparison, habitat quality scoring	-	Biodiversity Management Plan for Operation Phase ESS6: Biodiversity Conservation and Sustainable Management of Living Natural Resources	No significant reduction in species presence or habitat quality	Bi-annually	Included in the operation costs
Occupational Health and Safety	Employment and continuity of OHS Specialists and Occupational Physicians during operation and maintenance activities	Stations	TCDD	Monthly	Document control Visual observations at site	-	ESS2: Labor and Working Conditions WBG EHS Guidelines	Availability of OHS Specialists and Occupational Physicians, in adequate numbers and on a continuous basis, as required by national legislation and international standards, to cover all operational facilities and contractor staff during the operation phase.	Quarterly	Included in the operation costs.
Occupational Health and Safety	Completion and implementation of key operation phase OHS documentation	Stations	TCDD	Monthly	Document control Visual observations at site	-	ESS2: Labor and Working Conditions WBG EHS Guidelines	Development and 100% implementation of the Operation Phase Health and Safety Management System, including procedures, instructions, and facility-specific risk controls Completion and periodic update of site-specific Risk Assessments covering operational hazards Completion and regular revision of the Emergency Preparedness and Response Plan (EPRP), including coordination with local emergency services 100% compliance with the approved operational Work Plan and OHS Training Plan for all staff Availability of completed and properly archived work permit forms for all high-risk operational tasks, including hot works, confined space entry, electrical interventions, and work at height, in line with the Permit-to-Work procedure	Quarterly	Included in the operation costs.

Occupational Health and Safety	Implementation of OHS training during the operational phase	Stations	TCDD	Monthly	Document control Visual observations at site	-	ESS2: Labor and Working Conditions WBG EHS Guidelines	Availability of 100% completion of site-specific induction and orientation trainings for all operational personnel and maintenance staff prior to site access Availability of 100% completion of Basic Occupational Health and Safety (OHS) trainings for all operation-phase workers and contractors Availability of 100% completion of role-based technical and professional competency trainings (e.g. electrical works, signaling, tunnel maintenance, emergency response) Availability of toolbox talks and daily safety briefings conducted prior to high-risk operation and maintenance activities Availability of refresher trainings organized regularly and recorded throughout the operation phase	Quarterly	Included in the operation costs.
Occupational Health and Safety	Ensuring the timely provision and correct use of PPE by all operational personnel, maintenance staff, and visitors in accordance with occupational health and safety requirements	Stations	TCDD	Monthly	Document control Visual observations at site	-	ESS2: Labor and Working Conditions WBG EHS Guidelines	Availability of task-appropriate PPE for all operational staff, maintenance workers, and visitors prior to site or facility entry Availability of full compliance with PPE usage during all relevant operational activities through routine inspections and supervision Availability of 100% compliance with PPE usage requirements across all contractors and subcontractors involved in operation and maintenance Availability of completed training records confirming 100% of personnel are trained in proper PPE selection, usage, and inspection before task assignment	Quarterly	Included in the operation costs.
Occupational Health and Safety	Tracking and reporting of occupational accidents, near misses, and overall OHS performance during operation and maintenance activities	Stations	TCDD	Monthly	Document control Visual observations at site	-	ESS2: Labor and Working Conditions WBG EHS Guidelines	Availability of a zero-accident target and implementation of a proactive safety culture across all operational teams, contractors, and facility operators Availability of recorded and followed-up near-miss events with timely corrective and preventive action Availability of RCA reports for all recordable occupational accidents and incidents in operational areas Availability of monthly OHS performance reports from operational contractors, including frequency,	Quarterly	Included in the operation costs.

								severity, and lost time indicators Availability of AFR maintained below 1.0 across operational sites Availability of LTIFR maintained below 0.5 throughout the operation phase		
Occupational Health and Safety	Deployment and visibility of occupational health and safety signage, emergency direction signs, and facility-specific information boards across operational areas	Stations	TCDD	Monthly	Document control Visual observations at site	-	ESS2: Labor and Working Conditions WBG EHS Guidelines	Availability of complete and clearly visible OHS signage across all operational areas and facilities, including hazard-specific warnings, PPE requirements, restricted-access indicators, emergency evacuation signs, and assembly point boards installed in accordance with site layout and evacuation plans; and updated bilingual (Turkish-English) safety information posters displayed in staff facilities, passenger-accessible areas, and control rooms.	Quarterly	Included in the operation costs.
Occupational Health and Safety	Timely implementation and documentation of periodic inspections and maintenance for all fire protection, operational machinery, and electrical safety equipment	Stations	TCDD	Monthly	Document control Visual observations at site	-	ESS2: Labor and Working Conditions WBG EHS Guidelines	Availability of adequate and operational fire extinguishers, fire hose reels, fire blankets, and other firefighting equipment throughout all operational facilities, with 100% completion of scheduled inspections and maintenance activities Availability of 100% completed periodic maintenance records for all operational machinery, systems, and technical equipment used in train operations, infrastructure, and maintenance depots Availability of 100% completed inspection and grounding test records for electrical panels, distribution boards, catenary systems, and earthing infrastructure, in full compliance with national electrical safety regulations and operational standards	Quarterly	Included in the operation costs.
Occupational Health and Safety	Implementation and enforcement of site-specific traffic safety measures, including speed limits, signage, vehicle pedestrian separation, and access control systems in operational areas	Stations	TCDD	Monthly	Document control Visual observations at site	-	ESS2: Labor and Working Conditions WBG EHS Guidelines	Availability of 100% compliance with designated speed limits, one-way traffic systems, and internal traffic rules across all operational sites; full implementation of traffic signage, physical barriers, and dedicated pedestrian walkways within stations, yards, and maintenance areas; and maintenance of a zero-incident target for vehicle personnel and vehicle passenger interactions.	Quarterly	Included in the operation costs.

Occupational Health and Safety	Deployment and distribution of certified first-aid personnel across all operational facilities and risk-prone areas, in accordance with legal requirements and site-specific risk assessments	Stations	TCDD	Monthly	Document control Visual observations at site	-	ESS2: Labor and Working Conditions WBG EHS Guidelines	Availability of sufficient number of certified first-aid personnel holding valid Basic First Aid Training certificates, in accordance with legal requirements applicable to the operational phase and based on the hazard classification of each facility, with balanced distribution across all stations, control centers, maintenance yards, and other operational zones.	Quarterly	Included in the operation costs.
Occupational Health and Safety	Planning, execution, and documentation of emergency response drills in line with the EPRP	Stations	TCDD	Monthly	Document control Visual observations at site	-	ESS2: Labor and Working Conditions WBG EHS Guidelines	Availability of at least one full-scale emergency response drill per year	Quarterly	Included in the operation costs.

5 CAPACITY DEVOLOPMENT AND TRAINING

The Contractor is set to implement an ESMP training and awareness program that will focus on the identified social and environmental risks, along with measures in place to prevent, minimize, and mitigate any adverse impacts.

Before finalizing the development and implementation of the Capacity Development and Training Program, an assessment of the existing experience, institutional capacity, and competencies of the implementing agencies (including AYGM PIU, D+B Contractors, and CSC) will be conducted. The outcomes of this assessment will guide the design of the training modules to ensure they are tailored to the specific needs and capacity gaps identified.

The training program/modules for the Project will encompass a comprehensive range of topics to ensure that all project participants are well-informed and equipped to handle their roles effectively and responsibly. The curriculum will include, but is not limited to, the following subjects:

Purpose of the ESMP and Sub-Plans: Understanding the role and importance of the ESMP and related sub-plans (Waste Management, Biodiversity, Cultural Heritage, Labor Influx, Emergency Preparedness, etc.) in relation to the project activities. ESIA emphasized that integrated application of these plans is critical given the project's complexity and multi-stakeholder context.

- **Management Plan Requirements and Monitoring Activities:** Practical guidance on the monitoring requirements for dust, noise, vibration, surface water quality, biodiversity protection, and occupational health and safety as highlighted in the ESIA.
- **Environmental and Social Sensitivities:** Awareness of sensitive receptors identified in the ESIA, such as nearby settlements, schools, cultural heritage sites, and ecologically valuable habitats along the railway alignment.
- **Awareness of Potential Risks and Impacts:** Raising awareness of project-specific risks, including construction-related noise and dust, community health and safety issues, traffic disruptions, and risks associated with labor influx.
- **Grievance Mechanism:** Training on the grievance redress process tailored for affected communities in the project's area of influence.
- **Occupational Health and Safety, First Aid, and Emergency Preparedness:** With particular emphasis on tunneling works, viaduct construction, and confined space operations identified as higher risk in the ESIA.
- **Code of Conduct:** Instructions on the professional code of conduct.
- **Community Communication:** Engagement techniques for effective dialogue with local communities potentially impacted by project construction activities.
- **Training on SEA/SH risks management and prevention:** Addressing labor influx–related risks highlighted in the ESIA and LMP, with emphasis on preventive measures and reporting mechanisms.
- **Traffic and Road Safety Principles:** Training tailored to construction traffic impacts identified in the ESIA, including measures for pedestrian safety around stations, construction sites, and access roads.
- **Waste Management Training:** Practical instruction on hazardous and non-hazardous waste segregation, storage, and disposal practices relevant to the construction footprint.
- **Training on Pollution Prevention and Resource Efficiency:** Focused on dust suppression, wastewater management, and material/resource optimization measures identified for this Project.
- **Biodiversity and Habitat Protection:** With reference to sensitive habitats and seasonal restrictions described in the Biodiversity Management Plan.
- **Cultural Heritage Protection:** Awareness of the Chance Find Procedure and responsibilities when encountering cultural artifacts during excavation works.

This training program is designed to cover a wide array of critical topics, ensuring that all project participants are well-prepared to contribute to the project's success while adhering to the highest standards of safety, ethics, and environmental stewardship. Details of the trainings prepared for the Contractor within the scope of requirements of the ESMP are also presented in Table 5-1.

Table 5-1 Training Program

Training Items	Specific Training Topics	Responsible Party	Target Group	Period	Cost
Induction Training	▪ Introduction to the organization ▪ Workplace Culture and Environment ▪ Role specific training ▪ Compliance and legal requirements ▪ Introduction to teams and departments	Contractor	Newly recruited Personnel Personnel of newly contracted subcontractor-service provider	Whenever needed	No additional cost
Environmental Management	▪ Pollution Prevention and Resource Efficiency ▪ Waste Management (Waste segregation, storage, disposal, hazardous waste handling etc.) ▪ Requirements of the National Legislation and Project Standards along with the ESMP	Contractor	All project personnel	Once before the commencement of construction activities and quarterly throughout the lifecycle of the sub-project	No additional cost
Occupational Health and Safety[3]	▪ General principles of health and safety ▪ Working procedures, equipment, machinery, and manual and instructions for the use and repair of work equipment ▪ Emergencies and evacuation plans, and their implementation activities ▪ Existing threats and risks and on measures to be taken with regards to overcoming such situations ▪ Personal Protective Equipment (PPE) ▪ Incident Reporting, Root Cause Analysis and Investigation	Contractor	All project personnel	Once before the commencement of construction activities and whenever needed	No additional cost
Scenario-Based Emergency Drills	▪ Reservoir spill or turbidity breach management; TBM evacuation procedures; mass-casualty response; proportional use of force and security incidents; SEA/SH case response and referral pathways	D+B Contractor in coordination with AYGM / PIU / CSC and local emergency services	All site personnel, emergency response teams, security staff, and supervisory personnel	Semi-annually and prior to commencement of critical construction stages	No additional cost
Certification and Competency Training for Critical Lifting	▪ Safe lifting operations, heavy equipment handling, and operation of cranes, TBM, and other	D+B Contractor (with accredited third-party training	Crane operators, TBM operators,	Prior to mobilization and renewed periodically in	No additional cost

[3]*Contractors will control the access to the construction site only to authorized people and verify if workers are meeting training and accreditation requirements in accordance with the set training standards and applicable regulatory requirements (i.e., in many countries truck drivers, crane and derrick operators must be accredited, as well as electricians. Workers must be trained to perform hazardous works such as working at heights, confined spaces, welding etc.). All workers must complete at minimum an OHS induction to have access to the construction site.*

Training Items	Specific Training Topics	Responsible Party	Target Group	Period	Cost
and Plant Operators	plant under valid third-party certification	provider)	heavy equipment drivers, and lifting supervisors	accordance with national legislation	
Biodiversity Management	▪ Introduction to biodiversity ▪ Threats to Biodiversity ▪ Sustainable Practices	Contractor	All project personnel	Once before the commencement of construction activities and quarterly throughout the lifecycle of the sub-project	No additional cost
Labor Management	▪ Code of Conduct ▪ Human Rights ▪ Gender Equality, Gender-based Violence (GBV), Sexual Exploitation and Abuse/Sexual Harassment (SEA/SH) ▪ Worker's GM ▪ Stakeholder Engagement Plan (SEP) requirements	Contractor	All project personnel	Once before the commencement of construction activities and quarterly throughout the lifecycle of the sub-project	No additional cost
Community Health, Safety Management	▪ Traffic and Road Safety Principles ▪ Environmental and Social Sensitivities ▪ SEP and GM ▪ Community Communication	Contractor	All project personnel	Once before the commencement of construction activities and quarterly throughout the lifecycle of the sub-project	No additional cost
Cultural Heritage	▪ Introduction to cultural heritage ▪ Conservation/preservation techniques for tangible and intangible cultural heritage ▪ Chance Find Procedures for effective on-site implementation	Contractor	All project personnel	Once before the commencement of construction activities and quarterly throughout the lifecycle of the sub-project	No additional cost

6 SUMMARY OF BUDGET ESTIMATES FOR ESMP IMPLEMENTATION

This section summarizes the primary cost categories required for the effective implementation of the ESMP for the INRAIL Project. Budget needs have been defined in line with the construction methodologies, environmental and social baseline conditions, and the mitigation and monitoring requirements identified in the ESIA and ESMP. Final numerical cost estimates will be prepared by the D+B Contractor during C-ESMP preparation; however, the following project-specific budget components must be fully reflected in Contractor pricing and AYGM oversight.

Monitoring Activities Required for INRAIL Alignment

Monitoring requirements reflect sensitivities identified in the ESIA, especially near residential clusters, forested areas, ecological corridors and water bodies:

- Baseline and periodic monitoring at ESIA-identified receptors, including:
  - Noise & vibration monitoring at residential areas located within 50–250 m of the alignment
  - Air quality monitoring (PM_{10} and $PM_{2.5}$) near haul roads and construction camps
  - Water quality monitoring near streams, culverts, and areas intersecting drainage systems
  - Monitoring at the ecological crossing near 2 km (Cut&Cover-7)
- Monitoring of spoil transport, including truck movements along designated haul routes
- Contractor-operated environmental measurement equipment and calibration costs
- Accredited third-party laboratory analysis of environmental samples

Archaeological, Cultural Heritage and Chance Finds Management

- Implementation of the Cultural Heritage Management Plan and the Chance Find Procedure, including:
  - On-call archaeologist services for tunnel excavation, shaft construction, and cut-and-cover works
  - Securing and documentation of chance find locations
  - Reporting to the Regional Cultural Heritage Board
- Training for construction teams on site-specific CH risks (e.g., at portal areas)

Biodiversity and Ecological Crossing Requirements

Mitigation measures specific to INRAIL include:

- Temporary wildlife passage during construction at the ecological overpass location
- Vegetation restoration and habitat continuity measures after Cut&Cover works
- Monitoring of raptor movement and species of concern identified in the ESIA
- Dark-sky compliant lighting in ecologically sensitive areas
- Invasive species prevention (vehicle/equipment wash-down)
- Post-construction biodiversity monitoring

Waste, Excavated Material & Land Management

Aligned with the Excavated Material & Land Management Plan:

- Handling, loading, and transport of excavation material from tunnel portals and shaft areas

- Temporary stockpile management and dust suppression
- Approved disposal site fees and transport
- Rehabilitation of temporary laydown areas and spoil zones
- Contingency budget for disposal-site unavailability or closure

Community Health and Safety & Traffic Management

- Implementation of work front-specific Traffic and Community Safety Plans
- Signage, pedestrian detours, and temporary barriers
- Traffic marshals and community safety officers
- Public information materials and weekly haulage route updates
- Emergency response equipment and spill kits at all construction sites

Worker Health, Safety, Labor Management & Camp Operation

- Establishment and operation of labor camps in compliance with IFC/EBRD standards
- Worker transportation, camp inspections and medical facilities
- Implementation of LMP requirements (worker GM, CoC induction, SEA/SH training)
- Third-party training for critical operations (lifting, tunnel safety, confined spaces)

ESMP Training Requirements

Based on Table 5-1, including:

- Environmental awareness, waste management and biodiversity training
- SEA/SH prevention, Code of Conduct and grievance procedures
- Driver training on traffic and community safety
- Emergency drills (tunnel evacuation, turbidity exceedance near reservoir zones, mass-casualty)
- Security personnel training on human rights and proportional use of force

Staffing, Supervision and Reporting

- Contractor's full-time E&S team
- AYGM and CSC supervision site visits (weekly/monthly as required)
- Preparation of monthly, quarterly and annual E&S performance reports
- Development of the monthly public E&S dashboard (air/noise exceedances, GM statistics, non-compliances, etc.)

Project-Specific Note

The D+B Contractor shall prepare a detailed ESMP Budget Plan as part of the finalized ESMP. AYGM will ensure that all cost items listed in this section are incorporated into contract documents and financial proposals so that adequate resources for ESMP implementation are secured.

Table 6-1 Estimated Cost Categories for ESMP Implementation

Cost Category	Description (Project-Specific)	Responsible Party for Budgeting	Provisional Estimated Cost (USD/Year)
PIU Environmental & Social Team	- Environmental Specialist - Social Specialist - OHS Specialist	AYGM	**200,000**

Cost Category	Description (Project-Specific)	Responsible Party for Budgeting	Provisional Estimated Cost (USD/Year)
Supervision Consultant (CSC) E&S Team	- CSC E&S Personnel	CSC	**250,000**
Contractor E&S Staffing	- Contractor E&S Personnel	D+B Contractor	**450,000**
Environmental Monitoring & Laboratory Costs	- Noise/vibration - $PM_{10}/PM_{2.5}$ - Water quality - biodiversity monitoring - Equipment rental/purchase - Accredited lab analysis	D+B Contractor	**50,000**
Biodiversity & Ecological Mitigation Costs	- Wildlife passage - Vegetation restoration - Dark-sky lighting - Invasive species control - Post-construction monitoring	D+B Contractor	**200,000**
Cultural Heritage & Chance Finds Management	- On-call archaeologist - Securing finds - CH training - Board coordination	D+B Contractor	**100,000**
Training & Capacity Building	- ESMP training - OHS safety - Biodiversity training - GM, CoC induction, SEA/SH training - Security personnel training on human rights	D+B Contractor + CSC	**50,000**
Reporting & Audit Costs	- Monthly/quarterly E&S reports - Compliance audits - Corrective actions	D+B Contractor + CSC	**20,000**
TOTAL			**1,320,000.00**

APPENDICES

APPENDIX-1 - Guidance for Contractor's Management Plans

Contractor Environmental and Social Management Plan (C-ESMP)

Introduction

- Defines the purpose and scope of the CESMP as the key instrument for managing environmental and social risks during the construction phase.
- Explains the relationship between CESMP, ESIA, ESMP, and thematic sub-plans (e.g., Waste Management Plan, Traffic Management Plan, Occupational Health and Safety Plan, Community Health and Safety Plan).
- References relevant national legislation, World Bank ESS, IFC PS, and other applicable international standards.

Project Description and Construction Activities

- Summarizes the project components relevant to construction (railway alignment, stations, bridges/viaducts, tunnels, access roads, camps, storage areas, etc.).
- Defines the construction footprint, sequencing, and anticipated schedule.
- Identifies associated facilities and ancillary works (borrow pits, laydown areas, batching plants).
- Defines the Area of Influence (AoI) for construction-related impacts.

Summary of Baseline Environmental and Social Conditions

- Briefly describes key environmental receptors (air quality, surface water, soil, biodiversity, land use) and social receptors (settlements, infrastructure, cultural heritage) within the AoI.
- Identifies sensitive areas requiring special management measures (e.g., watercourses, schools, protected habitats).

Impact Identification and Risk Assessment

- Summarizes potential construction-phase impacts, both environmental (dust, noise, water pollution, soil erosion, biodiversity disturbance) and social (traffic disruption, community safety, labor influx).
- Classifies risks according to likelihood and consequence, identifying high-priority issues requiring targeted controls.

Mitigation and Management Measures

- Presents a consolidated table of all mitigation measures to avoid, minimize, and manage impacts, in line with the mitigation hierarchy.
- Specifies differentiated measures for vulnerable or disadvantaged groups to prevent disproportionate impacts.
- Provides activity-specific control measures (e.g., dust suppression, silt fencing, noise barriers, timing restrictions for works near schools or sensitive habitats).
- Integrates biodiversity protection, cultural heritage safeguarding, and community liaison requirements.

Monitoring and Evaluation

- Defines monitoring indicators, frequency, and methods for environmental and social parameters (e.g., noise levels, turbidity, air particulates, traffic incidents).
- Establishes performance criteria and thresholds for corrective actions.
- Links monitoring to compliance with regulatory permits and lender requirements.

Roles, Responsibilities, and Resources

- Assigns responsibilities for CESMP implementation across the project owner, EPC contractor, subcontractors, and specialist consultants.
- Defines reporting lines and authority for decision-making.
- Estimates staffing, equipment, and budget resources for environmental and social management.

Training and Capacity Building

- Details induction training for all workers on CESMP requirements, environmental protection, social conduct, and emergency procedures.
- Identifies specialized training needs for specific teams (e.g., spill response, heritage management, biodiversity monitoring).

Reporting and Documentation

- Specifies internal and external reporting requirements (frequency, format, content).
- Details documentation protocols, data storage, and evidence management (including GIS).
- Includes incident reporting and root cause analysis requirements.

Implementation Schedule

- Presents a construction-phase Gantt chart showing the timing of mitigation, monitoring, and engagement actions.
- Links key environmental and social management milestones to construction activities.

Annexes

Checklists, method statements, emergency response plans, monitoring forms, legal references, and contact lists for relevant authorities.

APPENDIX-2 Biodiversity Management Plan [4]

Introduction

- Defines the scope and purpose of the Biodiversity Management Plan (BMP) in the context of the overall environmental and social framework.
- Outlines how the BMP integrates with the ESIA, Environmental and Social Management Plan (ESMP), and related sub-plans (e.g., Invasive Species Management Plan, Habitat Restoration Plan).
- Summarizes applicable national biodiversity legislation, international conventions (e.g., Bern, CITES), and World Bank ESS6 requirements.

Project Description

- Provides a detailed description of the project footprint, and lifecycle.
- Identifies associated facilities (access roads, borrow pits, substations, etc.) and defines the Area of Influence (AoI) relevant to biodiversity.
- Notes any planned or future expansions with potential ecological implications.

Summary of Biodiversity Baseline

- Synthesizes key findings from field surveys and secondary data: habitat types (using standard classification codes, e.g., EUNIS), species inventories, and ecosystem functions.
- Highlights the presence of threatened (IUCN-listed), endemic, migratory, or range-restricted species, as well as legally protected taxa.
- Evaluates ecosystem services linked to biodiversity features (e.g., pollination, soil retention).
- Emphasizes methods used in baseline assessment, such as transects, point counts, camera traps, mist netting, pitfall traps, etc.

Impact Assessment Summary

- Summarizes potential adverse impacts (direct, indirect, cumulative) on key biodiversity components, including seasonal sensitivities and habitat fragmentation.
- Identifies activities likely to cause significant disturbance (e.g., vegetation clearance, blasting, noise, light pollution).
- Confirms whether project activities trigger Critical Habitat or Natural Habitat criteria under ESS6, based on quantitative thresholds and expert judgment.

Biodiversity Management Objectives and Targets

- States clear biodiversity conservation objectives aligned with the mitigation hierarchy: avoid, minimize, restore, offset.
- Sets measurable and realistic targets (e.g., no net loss of priority grassland habitat, species-specific encounter rates) where feasible.
- Aligns objectives with national biodiversity strategies, Key Biodiversity Area designations, or local conservation planning tools.

[4] *Although it has been determined that a BMP is not necessary at this stage, it may become necessary as a result of the D+B Contractor's work. If it is determined that the development of a BMP is necessary, the main features and scope of the BMP are presented in this section.*

Mitigation and Management Measures

- Provides detailed measures tailored to project-specific risks, such as spatial avoidance of breeding sites, micro-siting of infrastructure, or seasonal work restrictions.
- Includes measures to control spread of invasive alien species (IAS), with reference to pathway analysis and quarantine protocols.
- Describes planned habitat restoration or enhancement works, including species selection, sourcing of native plant material, and soil preparation.
- Integrates ecosystem services considerations (e.g., maintaining buffer zones to protect pollinator habitats).
- Specifies how biodiversity measures will be embedded in contractor method statements and worksite protocols.

Monitoring and Evaluation

- Establishes biodiversity monitoring indicators, such as species presence/absence, abundance indices, vegetation cover, or habitat quality scores.
- Links monitoring parameters to baseline conditions to track effectiveness of mitigation.
- Provides survey frequencies, responsible teams, and methodologies (e.g., line transects, fixed-point photography, acoustic monitoring).
- Outlines adaptive management mechanisms to update measures in response to unexpected biodiversity responses or external drivers.

Roles, Responsibilities, and Resources

- Maps institutional responsibilities across the project owner, contractor, ecological consultants, and third-party monitors.
- Defines internal reporting lines, biodiversity focal points, and necessary competencies for implementation.
- Provides an estimate of required resources, including staffing, budget allocations, field logistics, and long-term commitments.

Training and Capacity Building

- Details biodiversity induction content for construction and O&M personnel, with emphasis on species ID, worksite protocols, and incident response.
- Identifies technical training needs (e.g., restoration techniques, IAS identification, use of monitoring tools).
- Encourages community involvement in biodiversity initiatives (e.g., participatory monitoring, native plant nurseries) where relevant.

Stakeholder Engagement and Disclosure

- Describes stakeholder engagement conducted during biodiversity baseline and impact assessment phases.
- Plans for ongoing consultation with local communities, academic institutions, NGOs, and government agencies on biodiversity matters.
- Includes mechanisms for incorporating Indigenous/local ecological knowledge into management decisions.
- Describes how biodiversity performance and adaptive actions will be communicated.

Reporting and Documentation

- Outlines internal (contractor to project owner) and external (project to World Bank, authorities) reporting requirements.
- Specifies documentation protocols, data storage formats, GIS requirements, and metadata standards.
- Includes procedures for recording incidents (e.g., wildlife mortality) and actions taken.

Action Plan and Implementation Schedule

- Presents a Gantt-style schedule showing timing of biodiversity actions (e.g., pre-construction surveys, planting windows, seasonal constraints).
- Highlights the dependencies between construction milestones and biodiversity measures.
- Assigns responsibilities to project actors for each action and ensures integration with the overall project construction schedule.

Annexes

- Comprehensive species lists with conservation status, endemism, and legal protection codes.
- Habitat maps based on field surveys and remote sensing (GeoTIFF or shapefile formats).
- Monitoring data sheets, mitigation protocols, and standard operating procedures.
- Copies of agreements with local conservation groups, herbaria, universities, or research institutions.

APPENDIX-3 Waste Management Plan

Introduction

This section defines the purpose and scope of the Waste Management Plan (WMP), aimed at ensuring environmentally sound handling of all waste streams during the construction of the INRAIL Project. The plan is aligned with national legislation, WB ESSs, the World Bank's General Environmental, Health and Safety (EHS) Guidelines.

In parallel, a separate Excavated Material and Land Management Plan (See Appendix-24) has been prepared. This plan consolidates excavation waste management and preliminary land management into a single framework, given the scale of excavation works under the INRAIL Project.

Legal Framework

This section outlines the national legal framework governing waste management, including applicable Turkish legislation and regulations related to both hazardous and non-hazardous waste. Additionally, it incorporates relevant principles and recommendations from the World Bank's General Environmental, Health, and Safety (EHS) Guidelines, which provide internationally recognized standards for waste minimization, storage, transportation, and disposal. The section also details the institutional responsibilities of local municipalities, licensed waste operators, and project contractors in implementing the legal requirements in line with best international practices.

Roles and Responsibilities

Clarifies the responsibilities of the D+B Contractor, site Environmental Officer, subcontractors, and waste transporters in implementing the WMP and ensuring regulatory compliance.

Waste Management

Types and Sources of Waste

Identifies the main waste streams expected during construction, such as excavation waste, packaging, domestic waste, and hazardous waste. Describes the activities that will generate each type of waste.

Waste Segregation, Collection, and Temporary Storage

Outlines on-site waste segregation practices, use of color-coded and clearly labeled containers, and design of temporary storage areas to prevent spills, cross-contamination, or fire hazards.

Waste Transportation and Disposal

Describes procedures for the secure transport of waste by licensed contractors to authorized disposal or recovery facilities. Includes documentation requirements for traceability and proof of legal disposal.

Hazardous and Non-Hazardous Waste Management

Provides specific measures for the safe handling, temporary storage, labeling, and emergency response related to hazardous materials (e.g., waste oils, chemicals, batteries) and non-hazardous waste. Emphasizes compliance with best practices from the WB General EHS Guidelines.

Monitoring and Reporting

Defines monitoring parameters and indicators (e.g., amount of waste generated, percentage of waste segregated, number of disposal certificates). Also includes requirements for maintaining waste registers and reporting.

Training

Describes training needs for site personnel and subcontractors on waste handling, spill prevention, hazardous waste procedures, and emergency actions. Includes toolbox talks and induction programs.

APPENDIX-4 Chemical and Hazardous Material Management Plan (CHMMP)

Introduction

This section explains the purpose of the CHMMP in controlling the risks associated with hazardous and chemical substances, including explosives that may be used during tunnel or hard rock excavation works within the INRAIL railway project. It outlines the need to prevent soil and water contamination, fire, explosion, or harm to workers and communities.

Legal Framework

Relevant Turkish legislation, such as the Regulation on the Control of Hazardous Chemicals, Explosives and Firearms Law (Law No. 6136), and related directives on the transportation and storage of explosives, are referenced. This section also incorporates the World Bank EHS General Guidelines and Good International Industry Practice (GIIP) regarding the handling of explosives.

Roles and Responsibilities

Defines responsibilities for handling explosives, including appointment of a certified Explosives Expert/Blasting Supervisor. Roles of Environmental Manager, HSE Officers, Logistics Coordinators, and security personnel are also outlined with clear delegation for authorizations, inspections, and reporting.

Description of Hazardous and Explosive Materials to be Used

Details of the types and estimated quantities of hazardous materials and explosives (e.g., ANFO, detonators, boosters) expected during construction. Each substance must be supported by a Safety Data Sheet (SDS) and an inventory control list, including hazard classification.

Procurement, Transport and Handling

Specifies that all explosives must be procured from licensed suppliers. Transport must be carried out using authorized, GPS-tracked vehicles in accordance with ADR principles and national regulations. Explosives must be accompanied by valid permits, waybills, and a manifest. This section outlines driver qualifications and secure loading/unloading procedures, including escort requirements.

Storage and Inventory Management

Explosives must be stored in approved, storage areas constructed in compliance with national explosive storage guidelines. The storage areas must be located at a safe distance from worker accommodations, community areas, and critical infrastructure. Access control, temperature monitoring, signage, and blast-proof containment are mandatory. Inventory logs must be maintained daily and be available for inspection.

Use and Application of Chemicals and Explosives

Covers standard operating procedures for safe usage of hazardous chemicals and explosives on site. For explosives, site-specific blast designs must be prepared by certified professionals. This section includes requirements for personal protective equipment, exclusion zones, pre-blast warning systems, vibration monitoring, and post-blast inspections.

Spill, Leak, and Explosion Prevention and Emergency Response

Explains preventive measures against chemical and explosive leakage, loss, or unintended detonation. Emergency response plans must include evacuation routes, firefighting equipment suited for explosive incidents, and coordination with local emergency services. Incident reporting and investigation protocols are also detailed.

Waste Management and Disposal

Explains the segregation, temporary storage, and licensed disposal of hazardous waste including chemical containers and explosive remnants. Expired or misfired explosives must be disposed of according to the national guidelines and under supervision of authorized personnel. Waste documentation and chain-of-custody tracking are required.

Training and Capacity Building

All personnel involved in the handling of hazardous materials or explosives must receive certified training, including safe handling procedures, storage protocols, spill response, and emergency drills. Additional explosive-specific training includes blast safety, detonation timing, and vibration control. Training records are to be retained and periodically updated.

Monitoring and Reporting

Establishes monitoring indicators such as: quantity of explosives used and stored, frequency of inventory checks, number of incidents, and security inspection results. Reports are to be submitted to project management and relevant authorities on a regular basis.

Outlines required documentation including SDS, explosive delivery notes, storage permits, blast records, inventory logs, inspection checklists, and incident reports. These must be stored securely and accessible for audits.

APPENDIX-5 Air Quality Management Plan

Introduction

This section outlines the purpose and scope of the Air Quality Management Plan, developed to manage and minimize air quality impacts during the construction phase of the INRAIL Project. The plan is aligned with national legislation and World Bank Environmental and Social Standards (ESSs).

Legal Framework

Provides an overview of applicable Turkish air quality regulations and relevant international standards, including WB General EHS Guidelines and WHO guidelines. This section defines the limit values and thresholds for key pollutants such as PM10 and PM2.5.

Roles and Responsibilities

Defines the responsibilities of the D+B Contractor, Environmental Officer, and subcontractors in implementing and overseeing the mitigation measures. Also establishes lines of communication with the Environmental and Social (E&S) Team.

Air Emission Sources

Identifies primary emission sources including excavation and earthworks, vehicle traffic, material storage, and machinery operation. Both fugitive dust and exhaust emissions are considered in relation to project activities.

Mitigation Measures

Describes the dust and emission control strategies to be applied throughout construction. Measures include regular water spraying on exposed surfaces, covering of transported materials, proper equipment maintenance, and minimizing idling time of machinery.

Monitoring and Reporting

Details the monitoring approach for assessing air quality performance, including parameters (e.g., PM10, PM2.5), methods, frequency, and locations. It also outlines evaluation methods and actions to be taken if limits are exceeded. Specifies the documentation requirements, including air quality monitoring results, visual inspection logs, equipment maintenance records, and complaints received. These records will support reporting to relevant authorities and the WB.

Training

Outlines the training program to raise awareness among site workers and contractors about air quality risks and control measures. Includes induction training and periodic toolbox talks.

APPENDIX-6 Noise Management Plan

Introduction

This section introduces the purpose of the Noise Management Plan, which is to identify, assess, and manage noise-related risks during the construction phase of the INRAIL Project. It defines the scope and rationale of the plan, emphasizing the need to minimize noise exposure to workers and nearby communities, especially sensitive receptors such as residential areas, schools, and hospitals along the project corridor.

Objectives and Scope

The primary objectives of this plan are to: (i) ensure compliance with national regulations and World Bank Group EHS Guidelines for noise; (ii) reduce noise emissions from construction equipment and activities; and (iii) safeguard sensitive receptors by implementing appropriate mitigation and monitoring measures. The scope of the plan includes all construction activities associated with the INRAIL Project, including site clearing, excavation, heavy equipment operation, haulage, temporary installations, and auxiliary works.

Legal and Regulatory Framework

This section outlines the applicable national legislation and international guidance relevant to environmental noise. It references the Environmental Noise Control Regulation (published on 30.11.2022 in Official Gazette No. 32029), which replaced the earlier 2010 regulation, as well as the World Bank Group's General EHS Guidelines (Noise Section). Acceptable noise level thresholds for both daytime and nighttime periods are specified in accordance with these standards.

Roles and Responsibilities

Clear roles are assigned to project actors for the implementation and oversight of the Noise Management Plan. The D+B Contractor's Environmental Manager is responsible for plan execution, including supervision of subcontractors. Site supervisors ensure day-to-day compliance, while the Project Implementation Unit (PIU) verify adherence through regular audits.

Potential Noise Sources

All major sources of construction-related noise are identified and described. These include the use of excavators, bulldozers, rock breakers, generators, batching plants, trucks, and nighttime works. The contribution of each activity or equipment type to overall noise levels is discussed, along with temporal variations and peak exposure periods.

Impact Assessment and Mitigation Measures

This section details how construction noise may impact identified receptors and proposes mitigation strategies to control such impacts. Measures include: use of quieter equipment models, installation of noise barriers near sensitive areas, maintenance of machinery to reduce emissions, restricted working hours (avoiding night-time operations where feasible), and strategic scheduling of high-noise activities. The applicability and effectiveness of each measure are explained in relation to receptor proximity and local conditions.

Monitoring and Reporting

A structured noise monitoring program is presented, detailing the frequency, methodology, equipment specifications, and locations for noise measurements. KPIs are defined to assess the effectiveness of noise management efforts. These include: number of noise-related grievances received and resolved; percentage of monitored locations within acceptable limits; number of equipment maintenance logs completed; number of trained personnel; and duration of compliance per quarter.

Procedures for recording, storing, and reporting noise monitoring data are established. Monthly reports, including summary tables, exceedance records, and corrective measures taken, will be submitted to the PIU and relevant authorities. Records will be maintained for audit purposes and community disclosure when applicable.

Training

This section outlines the training program to ensure that construction personnel understand noise control requirements. Topics include proper equipment use, importance of timely maintenance, correct operation near sensitive receptors, and community sensitivity. Tailored induction training will be provided to all workers, with periodic refreshers as needed.

APPENDIX-7 Water and Wastewater Management Plan

Introduction

This section introduces the purpose and scope of the Water and Wastewater Management Plan (WWMP), which is developed to guide contractors in managing water use and wastewater during construction activities. The plan aligns with national regulations and the World Bank General EHS Guidelines.

Legal Framework

Outlines relevant Turkish legislation, such as the Water Pollution Control Regulation and Groundwater Law, and identifies institutional responsibilities The section also highlights key requirements from the World Bank General EHS Guidelines concerning water conservation and domestic wastewater management.

Roles and Responsibilities

Defines the responsibilities of the main contractor, subcontractors, environmental specialists, and relevant municipal entities. A matrix may be included to clarify oversight and implementation duties.

Water Supply and Consumption

Describes the sources of water to be used during construction (e.g., municipal network, licensed tankers), estimated volumes, and on-site storage practices. It emphasizes efficient water use and outlines the need for daily tracking of water consumption by subcontractors.

Wastewater Generation and Management

Covers types of wastewater likely to be generated (e.g., domestic, greywater, runoff from washing areas), their expected volumes, and management methods. Septic tanks should be used where no sewer network is available, and their maintenance, impermeability, and emptying frequency must be documented.

Details procedures in case of leaks, overflows, or illegal discharges. The section includes actions to be taken, notification procedures, and responsibilities for mitigation and cleanup.

Monitoring and Reporting

Provides requirements for regular monitoring of water usage and wastewater quantities, integrity checks of septic tanks, and documentation of vacuum truck services. Contractors are required to maintain logs and disposal receipts to ensure traceability and regulatory compliance.

Explains internal and external reporting requirements, including incident reporting, monitoring logs, and communication with regulatory authorities. Compliance with World Bank EHS Guidelines and national discharge standards is mandatory.

Training

Specifies training topics for contractor staff including water conservation practices, septic tank maintenance, wastewater handling, and environmental reporting. Emphasizes that all personnel must be aware of spill prevention and proper disposal protocols.

APPENDIX-8 Pollution Prevention and Control Plan

Introduction

Provides an overview of the plan's purpose within the project, highlighting its role in minimizing environmental impacts during construction through preventive actions and compliance with applicable standards.

Defines the spatial, temporal, and thematic boundaries of the plan, covering construction and early operational activities with a focus on pollution-sensitive receptors such as soil, water, air, and community areas.

Explains the goals of the plan, such as ensuring pollution control, promoting resource efficiency, and safeguarding environmental quality through structured mitigation measures and performance monitoring.

Legal Framework

Presents an overview of applicable environmental legislation in Türkiye and relevant World Bank Environmental and Social Standards. Emphasis is placed on compliance with the World Bank General Environmental, Health, and Safety Guidelines, alongside national regulatory requirements.

Roles and Responsibilities

Outlines the institutional responsibilities for pollution prevention, including the obligations of the project owner, contractors, and subcontractors. Also includes coordination with regulatory agencies and oversight by the supervising authority.

Pollution Management and Mitigation Measures

Details specific actions to prevent and control pollution from various sources:

Soil and Groundwater: Describes bunding, containment, and spill control measures for fuels and chemicals.

Surface Water and Wastewater: Addresses stormwater management, proper wastewater discharge, and permits for water use.

Noise and Vibration: Includes baseline monitoring, use of quieter machinery, and restrictions on nighttime work.

Air Emissions and Dust Control: Outlines dust suppression, emissions monitoring, and use of low-emission vehicles.

Hazardous Materials: Covers safe storage, labeling, emergency response procedures, and employee awareness.

Training, Reporting and Monitoring

Explains the requirements for capacity-building activities, ongoing environmental inspections, incident documentation, and compliance reporting, aligned with the overarching ESMP Monitoring Plan.

Lists measurable indicators (e.g., noise levels, dust measurements, number of spill incidents) that will be tracked to assess implementation success and environmental performance.

APPENDIX-9 Occupational Health and Safety Plan and Procedures

Introduction

This section briefly introduces the project, including the entity responsible for its implementation and the planned activities within the project scope. It explains that the purpose of this plan is to protect the health and safety of workers during the construction phase, establish a safe working environment, and ensure compliance with applicable legal requirements.

Purpose and Scope

This section describes the main objective and scope of the Occupational Health and Safety Management Plan.

Legal Framework

This section summarizes the applicable occupational health and safety legislation in Türkiye. It includes national legal references such as the Occupational Health and Safety Law No. 6331 and related regulations. It also refers to international standards such as the World Bank ESSs and Guidelines. The section emphasizes that project implementation will comply with both national and international regulatory frameworks.

Roles and Responsibilities

This section defines the duties and responsibilities of all actors involved in implementing occupational health and safety measures. It describes the roles of the project owner, contractor, subcontractors, OHS experts, occupational physicians, workers, and emergency teams. The organizational chart is also included in this section.

OHS Management

This section explains how occupational health and safety processes will be managed. It outlines key steps such as risk identification, risk assessment, implementation of preventive measures, incident reporting, and the execution of corrective actions.

OHS Management Principles

This section presents the core principles of occupational health and safety management to be applied in the project. It defines the hierarchy of risk control measures, including elimination, substitution, engineering controls, administrative controls, and personal protective equipment. The section also emphasizes employee involvement, safety culture, and attention to gender-sensitive considerations where applicable.

Potential Impacts and Associated Mitigation Measures

This section identifies potential occupational health and safety risks that may arise during the project and outlines the corresponding mitigation measures. Risks such as physical, chemical, biological, ergonomic, psychosocial, and environmental hazards are addressed. Each risk is linked to relevant mitigation actions and responsible parties. Risks, mitigation actions, and responsible entities can be presented in a tabular format.

Training

This section describes the planning and implementation of occupational health and safety trainings. A training plan is developed, specifying the training topics, durations, and frequencies.

Monitoring and Reporting

This section explains the approach to monitoring and reporting occupational health and safety performance. Key monitoring parameters and KPIs are identified. Responsibilities, monitoring frequency, and reporting methods are defined. Monitoring activities and results can be presented in a structured table.

Review and Update

This section outlines when and under which circumstances the plan will be reviewed and updated.

APPENDIX-10 Emergency Preparedness and Response Plan (EPRP)

Introduction

This section should provide a general overview of the plan, explaining the importance of being prepared for emergencies. It should briefly introduce the nature of the project and explain why such a plan is necessary based on the type of activities involved.

Purpose and Scope

The purpose and scope of the plan should be clearly defined. It should explain which types of emergencies the plan covers and identify the areas and activities within the project where the plan will be applicable.

Legal Framework

This section should list the applicable national legislation, regulations, and international standards related to emergency preparedness and response.

Roles and Responsibilities

This section should define the responsibilities of all relevant parties in the event of an emergency. It should describe the roles of the project owner, contractor, subcontractors, OHS personnel, emergency teams, and all other relevant staff. An organizational chart may also be included.

Emergency Management

The procedures for managing emergencies should be explained here. This includes incident notification, plan activation, evacuation procedures, and coordination with external support units such as fire departments or medical teams. Information on hospitals in close proximity to the project site and the emergency response teams' contact list should be identified and included as annexes to the report.

Emergency Response Teams

The emergency response teams to be established should be identified in this section (e.g., fire response, first aid, rescue, protection teams). Their responsibilities, team leaders, alternates, and areas of operation should be clearly stated.

Emergencies

This section should list and describe the types of emergencies addressed by the plan. Examples may include fire, explosion, chemical spills, natural disasters, electric shock, occupational accidents, and security threats.

Training

Details of the training to be provided on emergency preparedness should be included. The scope, content, and frequency of training should be defined, including who will receive the training and how it will be documented.

Drills and Exercises

This section should explain how emergency drills and exercises will be planned and conducted. The frequency, type (e.g., tabletop or field drills), evaluation methods, and follow-up actions should be clearly described.

Monitoring and Reporting

This section should outline how the implementation of the plan will be monitored and how findings will be reported. Observations, non-conformities, corrective actions, and improvement measures should be documented. Monitoring parameters and KPIs can be summarized in a structured table, along with assigned responsibilities and reporting intervals.

Review and Update

This section should describe when and under what conditions the plan will be reviewed and updated. Situations such as legal changes, organizational restructuring, or the emergence of new risks should trigger a revision of the plan.

APPENDIX-11 Blasting Management Plan

Introduction

This section defines the purpose of the Blasting Management Plan, which is to ensure that all blasting operations within the project area are carried out in a controlled, safe, and environmentally responsible manner. It outlines the importance of planning and managing blasting activities to mitigate risks to workers, communities, and the natural environment.

Additionally, this section introduces the Blasting Management Plan as part of the overall Environmental and Social Management Plan (ESMP) and explains its alignment with national regulations and international standards, including the World Bank Environmental and Social Framework (ESF) and particularly ESS4 (Community Health and Safety).

Plan Objectives and Implementation Principles

This section identifies the main objectives of the plan, such as preventing accidents, minimizing environmental impacts (noise, vibration, dust), and ensuring public and worker safety during blasting operations. It emphasizes the need to maintain regulatory compliance, promote proactive risk management, and safeguard surrounding communities and infrastructure.

It also outlines the key implementation principles that guide the execution of the Blasting Management Plan, including transparency, precaution, clear communication, and continuous monitoring. These principles ensure that all blasting activities are performed responsibly, and any deviations or incidents are promptly addressed and documented.

Project Context and Scope of Blasting Activities

This part describes the specific components of the project that require blasting, such as excavation for tunnels, rock cuts for roads, or quarry operations. It defines the geographic boundaries where blasting will occur and provides an overview of the timing and duration of these activities within the project schedule.

It also clarifies whether blasting is temporary or recurring, the type of geological conditions involved, and whether any sensitive receptors (e.g., residential areas, schools, hospitals, natural habitats) are located nearby. This context helps in identifying the level of risk and the need for more stringent control measures.

Legal Framework

This section summarizes all relevant national and local legislation that governs the use of explosives and blasting activities, including regulations under the Mining Law, Occupational Health and Safety Law, and Environmental Law. It specifies the permits required and the responsible authorities.

It also references international standards and good practices that the project commits to, such as the World Bank ESS, WB General EHS Guidelines, and international explosive handling protocols. This section ensures that blasting operations are carried out in full legal compliance and in line with lender requirements.

Institutional Arrangements and Responsibility Assignments

This section identifies the key roles and responsibilities of project staff, subcontractors, and specialized blasting personnel. It specifies who will be in charge of blast design, execution, monitoring, and incident response, and ensures that responsibilities are clearly assigned to competent and authorized individuals.

It may also include an organizational chart showing reporting lines, coordination with the environmental and safety teams, and subcontractor management mechanisms. Clear institutional arrangements are critical for accountability and effective plan implementation.

Technical Description of Blasting Operations

This section provides a general description of the blasting operations to be undertaken. It includes details such as the type of blasting (e.g., trench, bench, tunnel), the physical and chemical properties of the explosives to be used, and the expected size and frequency of blasts.

It also explains site preparation activities, such as drilling patterns, loading procedures, stemming, and detonation sequencing. This technical description helps stakeholders understand the nature and complexity of the work and informs the selection of appropriate mitigation and safety measures.

Blasting Design Parameters and Execution Methodology

This part outlines the engineering design behind each blast, including burden, spacing, subdrilling, maximum instantaneous charge, and delay timing. These parameters are tailored to the geology and proximity of sensitive receptors.

The methodology section details each step of blast preparation and execution, including layout, marking, hole drilling, charging, stemming, blast initiation, and post-blast inspection. Adhering to a systematic execution process helps prevent misfires, flyrock, and other safety incidents.

Blasting Impact Assessment and Mitigation Measures

This section discusses the anticipated environmental and safety impacts of blasting, such as ground vibrations, air overpressure, noise, dust, and risks to nearby communities or structures. The risk assessment should be based on predictive modeling and historical data if available.

It also outlines the specific mitigation measures to reduce these impacts, including restricted blasting hours, use of blast mats, pre-condition surveys of buildings, and safe blasting distances. Mitigation should be site-specific and adjusted as needed based on monitoring results.

Ground Vibration and Flyrock Management

This section focuses on the risks associated with ground vibration and flyrock, which are two of the most critical hazards in blasting. It defines acceptable vibration thresholds and outlines the methodology used to predict, monitor, and control vibrations.

It also describes the measures taken to prevent flyrock, such as controlling charge per delay, using protective coverings, and restricting access to a defined safety radius. Pre-blast warnings and signage are essential to ensure personnel and community safety.

Airblast, Noise, and Dust Control Strategies

This section outlines how noise and airblast (pressure waves caused by explosions) will be controlled to avoid damage to structures and disturbance to communities. Strategies include blast design optimization, limiting charge weight, and scheduling blasts during low-activity hours.

Dust suppression methods, such as water spraying and immediate post-blast site stabilization, should also be detailed here. The plan should also mention how noise and dust levels will be monitored and reported in compliance with applicable limits.

Explosives Storage, Handling, and Transportation Procedures

This section provides detailed guidance on how explosives will be securely stored in licensed magazines, with proper labeling, ventilation, and access control. It includes handling procedures that reduce risks during charging and transfer.

Transportation protocols for moving explosives to the blast site are also explained, including vehicle requirements, escort procedures, and security checks. This section must comply strictly with national explosive handling laws and international safety codes.

Blasting Schedule and Community Notification Protocol

Here, the schedule of blasting activities is described, including anticipated start and end dates, daily time windows, and any seasonal restrictions. Blasts should be timed to minimize nuisance and risk to communities.

The notification protocol outlines how affected parties will be informed in advance—via flyers, public meetings, mobile alerts, or signage. Communication must be timely, clear, and accessible to all stakeholders, including vulnerable groups.

Safety Zones, Access Control, and Personnel Protection Measures

This section defines exclusion zones around the blast site, which must be clearly marked and physically secured. It also describes the procedures for evacuating the area and ensuring that no unauthorized persons are present during detonation.

Personal protective equipment (PPE) requirements, roles of blast guards, and clearance procedures post-blast are also included. These measures are critical to protect workers, visitors, and the general public.

Emergency Response and Incident Management in Blasting Areas

This section provides protocols for responding to emergencies such as misfires, accidental detonations, or injuries. It outlines roles, communication lines, evacuation procedures, and coordination with emergency responders.

It should also include first-aid arrangements, fire safety measures, and reporting requirements for incidents or near-misses. Regular emergency drills must be conducted to ensure preparedness.

Monitoring of Blasting Impacts and Compliance Reporting

This part explains the monitoring plan, including what parameters will be measured (e.g., vibration, noise, airblast), what equipment will be used, and the frequency of monitoring. Monitoring ensures that impact remains within acceptable limits.

It also includes procedures for documenting results, analyzing trends, and reporting to authorities and lenders. Non-compliances must be recorded, investigated, and addressed through corrective actions.

Training and Competency Requirements for Blasting Personnel

This section describes the required qualifications and certifications for personnel involved in blasting. It covers technical training, legal knowledge, and awareness of environmental and safety risks.

Ongoing competency checks and refresher training should also be included to ensure that all blasting personnel remain qualified and up-to-date with evolving standards and practices.

Plan Revision, Audit, and Continuous Improvement Mechanisms

This section describes how the BMP will be periodically reviewed and updated based on site conditions, incidents, regulatory changes, or audit findings. A revision log should be maintained to track changes.

It also explains how performance will be evaluated, including internal audits and third-party reviews, and how feedback will be integrated to improve the plan’s effectiveness over time.

APPENDIX-12 Traffic/Transportation Management Plan (TTMP)

Introduction

This section introduces the Traffic and Transportation Management Plan as a key component of the Environmental and Social Management Plan (ESMP) for the INRAIL Project. It emphasizes the necessity of a systematic and risk-informed approach to traffic management, particularly during the construction phase, where large-scale transport of materials, equipment, and personnel will take place across multiple regions. The section outlines the intent to ensure that all transportation activities are carried out safely, efficiently, and with minimal disruption to communities and the environment.

Purpose and Scope

The purpose of this plan is to provide guidance on the identification, management, and mitigation of potential traffic-related impacts that may arise during both construction and operational phases of the project. It defines the scope of transport activities, covering on-site vehicle movement, transport of equipment and materials, use of public roads, access to construction sites, and interactions with local traffic. The plan also covers measures to address risks to worker and public safety, congestion, and increased emissions.

Legal Framework

This section describes the applicable national traffic and road safety legislation in Türkiye, including provisions under the Turkish Highway Law and Traffic Regulation. It also references relevant international best practices, particularly the World Bank Group's Environmental, Health, and Safety (EHS) General Guidelines, which set benchmarks for vehicle maintenance, road safety, and community protection during transport operations.

Roles and Responsibilities

Roles and responsibilities for implementing the TTMP are clearly defined in this section. The Design and Build (D+B) Contractor will have primary responsibility for overall plan execution, including the development of site-specific traffic procedures and coordination with local authorities. Subcontractors will be responsible for complying with traffic safety protocols and reporting incidents. The Environmental and Social team will oversee monitoring, and a designated Traffic Coordinator will ensure day-to-day implementation and corrective actions when needed.

Project-Specific Transportation Requirements

This section presents the anticipated transportation needs of the INRAIL Project. It includes details on delivery of materials to the railway corridor, internal logistics along the route, and vehicle types to be used. Transportation will be planned to avoid densely populated areas and sensitive environments, with haul routes and access points carefully designated and communicated to relevant stakeholders.

Traffic Management during Construction

This part provides a detailed description of how traffic will be managed during the construction phase. It covers vehicle movement schedules, control of entry and exit points, speed limits within work areas, use of traffic signage, and implementation of dust and noise suppression measures. Provisions for flaggers, escorts for oversized loads, and temporary traffic diversions are also included.

Mitigation Measures and Traffic Controls

The mitigation hierarchy for traffic impacts is explained here, including avoidance (e.g., route selection), minimization (e.g., scheduling, speed limits), and compensation (if needed). Control measures will include regular vehicle maintenance, signage and barriers, emergency access routes, and coordination with municipal traffic authorities to ensure public safety.

To minimize potential conflicts with local communities, this section describes how stakeholders will be engaged in discussions around haul routes, traffic schedules, and safety measures. Complaints related to transport operations will be recorded, assessed, and resolved in a timely and transparent manner.

Training and Capacity Building

The plan identifies the need for mandatory training for all drivers, flaggers, and logistics personnel. Topics will include defensive driving, accident response, community engagement during transport activities, and compliance with project-specific traffic protocols. Training will be documented and updated periodically.

Monitoring and Reporting

This section outlines procedures for monitoring traffic impacts and plan effectiveness. Daily traffic logs, vehicle condition reports, and incident records will be maintained. The contractor will submit monthly reports with traffic KPIs, and any non-compliance or near-miss incidents will be investigated and addressed. Community complaints related to transport will also be monitored under the Grievance Redress Mechanism.

To monitor implementation, the plan defines a set of KPIs such as the number of road safety incidents, percentage of vehicle inspections conducted, and number of driver training sessions held. These indicators will be tracked regularly to assess plan performance and trigger corrective actions when needed.

APPENDIX-13 Community Health and Safety Management Plan

Introduction

This section outlines the purpose of the CHSMP within the broader of the INRAIL Project. It explains the relevance of community health and safety risks associated with large-scale infrastructure works, particularly for railway construction through densely populated or sensitive areas. The plan addresses both direct and indirect risks to nearby communities during construction phase

This section defines the plan's scope, covering all activities that may impact public health and safety, including transport operations, construction site access, air quality, noise, potential disease transmission etc. It applies to all contractors and subcontractors in the project.

Legal Framework

The plan refers to Türkiye's relevant health and safety regulations, including community health and safety, occupational health and safety and environment. Construction and occupational safety legislation is also taken into account where risks may indirectly affect communities.

Also, this section outlines international benchmarks relevant to community health and safety. The World Bank Group's Environmental, Health, and Safety (EHS) General Guidelines form the core reference, particularly sections on traffic safety, communicable diseases, and infrastructure risk mitigation.

Roles and Responsibilities

This section details the organizational structure and key responsibilities for implementing community health and safety measures. It identifies the D+B Contractor's Community Liaison Officer (CLO), and the Environmental and Social (E&S) team as responsible for risk management, community outreach, monitoring, and emergency coordination. Coordination with local health authorities and schools is also emphasized.

Mitigation Measures and Management Controls

General Requirements

This subsection summarizes overarching measures to mitigate community health and safety risks, such as erecting physical barriers, posting clear signage, limiting construction near schools and healthcare facilities, and disseminating information to nearby residents.

Site-Specific Requirements

This part describes tailored actions for specific community risks along the project alignment.

Access to Health Facilities

Ensures that construction activities do not obstruct or delay access to hospitals, clinics, or pharmacies, and that alternative routes are communicated effectively.

Road Accident Risks

Details measures such as speed limits, road signage, trained drivers, and awareness campaigns to reduce accident risks in areas with heavy vehicle traffic.

Infectious Disease

Outlines strategies for monitoring and controlling potential outbreaks of communicable diseases due to labor influx, including health screening, sanitation controls, and coordination with public health authorities.

Safety and Disturbance to Schools in Surroundings of Construction Activities

Mitigation of noise, dust, traffic, and other disruptions near schools is addressed through scheduling, noise barriers, and joint planning with school management.

Level Crossing Security

Specifies the installation of warning signs, barriers, and community engagement to ensure safety at all railway-road intersections.

Pedestrian Safety

Provides for safe pedestrian access and crossing, especially in urban or peri-urban areas. Design considerations may include footbridges, lighting, and marked pedestrian zones.

Reporting and Monitoring

The Contractor will maintain a register of all community-related incidents and near misses. Monitoring will include community complaints, accident records, and site observations. Regular reporting will be submitted to the Project Owner and disclosed to stakeholders as needed.

A set of measurable indicators will be tracked to evaluate the effectiveness of the CHSMP, including the number of traffic-related community incidents, community grievances related to health and safety, and training coverage rates among site personnel and third-party service providers.

Training

Training programs will be provided to construction workers, drivers, subcontractors, and security staff on community safety awareness, engagement procedures, and emergency response. Induction sessions and refreshers will be conducted regularly.

APPENDIX-14 SEA/SH Action Plan and the Accountability Framework

The Project-level SEA/SH Action Plan and the Accountability Framework will be prepared by AYGM PIU, as described in the ESRS. This Plan establishes the overarching framework, principles and requirements for prevention, mitigation and response to SEA/SH risks under the Project.

The D+B Contractor shall not prepare a separate standalone SEA/SH Action Plan; however, the Contractor shall implement all SEA/SH-related obligations set out in the Project SEA/SH Action Plan through the C-ESMP and relevant sub-management plans, including Codes of Conduct, worker training, grievance referral pathways and site-level mitigation measures, subject to supervision by AYGM PIU.

APPENDIX-15 Cultural Heritage Management Plan/Chance Finds Procedure

A standalone Cultural Heritage Management Plan (CHMP), including the Chance Find Procedure (CFP), has been prepared and submitted as a separate document.

APPENDIX-16 Resource Efficiency Management Plan

Introduction

This section introduces the purpose of the Resource Efficiency Management Plan and its relevance to the overall environmental and social management approach of the Project. It explains how the efficient use of energy, water, raw materials, and the reduction of emissions and waste contribute to sustainable project implementation. The section also presents the plan's alignment with international standards, particularly World Bank ESS3, and national environmental regulations.

Objectives and Scope

This section defines the objectives of the plan, including the reduction of resource consumption, improvement of operational efficiency, minimization of waste, and prevention of pollution. It also outlines the scope of application, covering all phases of the Project (design, construction, operation) and all relevant project components and activities.

Legal Framework

This section describes the relevant international standards and national regulatory requirements related to resource efficiency and pollution prevention. It outlines key obligations under the World Bank Environmental and Social Framework, WB EHS Guidelines, and applicable Turkish laws and regulations, such as the Environmental Law No. 2872 and related sub-legislation. A summary table of applicable laws and standards may be included.

Roles and Responsibilities

This section defines the institutional arrangements for the implementation of the plan. It identifies the key roles involved in managing resource efficiency (e.g., environmental staff, supervisors, procurement officers) and describes their specific responsibilities related to planning, monitoring, supervision, and reporting. It also includes coordination mechanisms among project teams and subcontractors.

Resource Inventory and Baseline

This section establishes the baseline levels for resource consumption, including energy, water, and raw materials. It describes the methodology used for estimating expected quantities and outlines how baseline data will be used for performance comparison throughout the project lifecycle.

Energy Use and Efficiency Measures

This section describes all major energy uses within the project and presents measures to improve energy efficiency. It includes actions such as the selection of energy-efficient equipment, regular maintenance, reduction of idling, and optimization of work processes. Energy use monitoring procedures and performance indicators are also defined.

Water Use and Conservation

This section outlines the sources and uses of water within the project and identifies conservation measures. It includes strategies such as leak detection, the use of water-saving devices, and water reuse systems. Monitoring of water use and response actions in case of inefficiencies are also addressed.

Raw Materials and Sustainable Sourcing

This section presents the types of raw materials to be used in the project and describes procurement strategies that prioritize environmental sustainability. It encourages the use of locally

sourced, recycled, or certified materials, and outlines documentation requirements such as environmental certificates or declarations of origin.

Sustainable Procurement and Material Handling

This section describes procurement procedures that incorporate resource efficiency and environmental performance criteria. It also includes best practices for material handling, transportation, and storage to avoid waste, damage, and environmental risks.

Waste Minimization and Management

This section outlines the hierarchy for waste management, starting with prevention, followed by reduction, reuse, recycling, and disposal. It describes methods for on-site segregation, identification of recyclable materials, use of licensed facilities, and procedures for documenting and reporting waste.

Air Emissions and Greenhouse Gas Management

This section identifies sources of air emissions and greenhouse gases and presents strategies to minimize their release. It includes emission control measures (e.g., dust suppression, engine maintenance), GHG estimation methods, and mitigation actions such as fuel-efficient logistics and renewable energy use.

Pollution Prevention Measures

This section describes pollution control measures for air, water, and soil. It includes procedures for storing and handling hazardous materials, managing spills, and controlling noise and vibration. Preventive actions and emergency preparedness protocols are also explained.

Monitoring, Measurement, and Performance Evaluation

This section defines the monitoring framework for resource use, emissions, and waste. It includes indicators, data collection methods, monitoring frequency, and reporting mechanisms. The section also outlines procedures for performance analysis and corrective actions.

Training and Awareness

This section describes the training and awareness programs to be implemented for project personnel. It includes the topics to be covered (e.g., resource efficiency, waste management), training frequency, methods (e.g., toolbox talks, workshops), and documentation of attendance and outcomes.

Documentation and Reporting

This section defines the types of records to be maintained, including monitoring data, training records, inspection reports, and compliance documentation. It also outlines the reporting requirements, frequency, and reporting lines for internal and external stakeholders.

Plan Review and Update

This section explains how and when the plan will be reviewed and updated. It includes triggers for revision (e.g., legal changes, project modifications, audit findings) and describes the process for incorporating improvements and lessons learned.

APPENDIX-17 Restoration and Revegetation Plan (including Topsoil Management)

Introduction

This section explains the overall purpose of the Restoration and Revegetation Plan, emphasizing the importance of restoring disturbed areas to their natural or improved condition after project activities. It provides background information on the project's environmental commitments, references relevant environmental policies and standards, and clarifies the plan's role in mitigating long-term ecological impacts.

Objectives of the Plan

This section outlines specific goals such as stabilizing disturbed soils to prevent erosion, re-establishing native vegetation communities to support local biodiversity, preserving soil quality through careful topsoil management, and ensuring that restored areas are self-sustaining. It may also specify targets for vegetation cover, species diversity, and ecosystem function restoration.

Legal Framework

Here, all relevant laws, regulations, and standards that govern restoration and revegetation are identified. This includes Turkish legislation on soil and land use, environmental protection laws, and international guidelines such as World Bank ESS6 and WB EHS Guidelines. The roles of regulatory agencies and project authorities in overseeing compliance are also described.

Areas Requiring Restoration and Revegetation

This section identifies and maps all zones disturbed by the project that require rehabilitation. It covers not only the main construction footprints but also temporary disturbance areas such as material stockpiles, access roads, campsites, and borrow pits. The criteria for defining restoration priorities based on disturbance severity and ecological sensitivity are detailed.

Topsoil Management

This section describes best practices for stripping, stockpiling, protecting, and replacing topsoil. It details timing considerations to preserve soil biological activity, maximum allowable stockpile height and storage duration, and erosion control measures for stockpiles. The importance of preserving organic matter is emphasized, along with methods for integrating topsoil back into restoration sites to optimize revegetation success.

Revegetation Strategy and Techniques

This section provides a detailed plan for how vegetation will be re-established, including the selection of native species that are ecologically appropriate and adapted to local climate and soil conditions. It explains the methods to be used, such as direct seeding, hydroseeding, planting nursery-grown seedlings, and encouraging natural regeneration. Procedures for site preparation, planting density, timing, and weed management are also included.

Landscape Restoration and Erosion Control Measures

This section describes engineering and ecological methods to restore landform and control erosion. This may include grading and contouring earthworks to stable slopes, installing silt fences or sediment traps, applying mulch or geotextiles, and planting ground cover species that stabilize soil. Integration with drainage systems to manage surface runoff and reduce erosion risk is also discussed.

Biodiversity Considerations

This section addresses the need to protect and enhance biodiversity in restored areas. It covers identification of sensitive habitats and species, integration of habitat connectivity principles, and

avoidance of invasive species introduction. Specific measures to support endangered or protected species and promote ecological resilience are outlined.

Implementation Schedule

Here, a detailed timeline for restoration activities is provided, with milestones for topsoil handling, site preparation, planting, and monitoring. Seasonal factors such as rainfall and temperature windows optimal for planting are considered. The schedule ensures restoration works are completed promptly and in coordination with other project activities.

Roles and Responsibilities

This section clarifies which teams and individuals are responsible for each stage of restoration, including planning, execution, supervision, and monitoring. It describes coordination mechanisms between contractors, environmental consultants, and regulatory bodies, and outlines communication protocols.

Monitoring

This section sets out the approach for ongoing assessment of restoration success, including quantitative indicators like vegetation cover percentage, species survival rates, and soil erosion status. It details maintenance activities such as supplemental planting, irrigation, pest control, and invasive species management, as well as monitoring frequency and reporting requirements.

Success Criteria and Adaptive Management

This section defines clear, measurable benchmarks that restoration efforts must meet to be considered successful. It includes provisions for adaptive management, allowing for modifications to methods or additional interventions if initial outcomes fall short of targets. Criteria may include minimum survival rates, vegetation density, and absence of erosion.

Training and Awareness

This section describes training programs to ensure personnel understand restoration objectives, topsoil handling best practices, and revegetation techniques. Training formats may include workshops, toolbox talks, and on-the-job coaching. It also highlights the importance of fostering environmental awareness among workers.

Documentation and Reporting

This section details the types of records to be maintained (e.g., topsoil logs, planting records, monitoring data, photos) and reporting formats. It outlines internal and external reporting schedules and responsibilities, ensuring transparency and regulatory compliance.

Plan Review and Update

This section explains procedures and timing for periodic review and updating of the Restoration and Revegetation Plan. It considers triggers such as changes in site conditions, new regulatory requirements, or monitoring outcomes, ensuring continuous improvement.

APPENDIX-18 Environmental, Social, Health and Safety (ESHS) Training Management Plan

Introduction

This section defines the purpose and importance of the ESHS Training Management Plan in ensuring that all project personnel understand and comply with environmental, social, health, and safety requirements. It outlines the plan's role in supporting safe and sustainable project execution in line with international standards, including World Bank Environmental and Social Standards (ESS) and national legislation.

Objectives of the Training Plan

This section describes the key objectives of the training program, such as increasing awareness of ESHS risks and responsibilities, promoting a safety culture, ensuring compliance with legal and contractual obligations, and enhancing the capacity of all personnel to implement ESHS controls effectively.

Scope and Applicability

This section outlines the range of personnel covered by the training plan, including permanent employees, contractors, subcontractors, visitors, and any other stakeholders who may be present on or involved with the project site. It defines which phases of the project (e.g., mobilization, construction, operation, demobilization) the training applies to.

Legal Framework

This section identifies the relevant international standards and national regulations governing ESHS training requirements. It references World Bank ESS, national occupational health and safety laws, environmental legislation, and social responsibility standards applicable to the project.

Roles and Responsibilities

This section defines the roles and responsibilities of project management, ESHS officers, supervisors, human resources, and other relevant parties in planning, delivering, monitoring, and updating the training program. It also explains coordination with subcontractors and suppliers to ensure their personnel receive appropriate training.

Training Needs Assessment

This section describes the process for identifying training requirements based on job roles, risk assessments, legal obligations, and past incident analysis. It outlines how specific training needs are determined and prioritized to address key EHS risks and compliance areas.

Training Program Design

This section details the structure of the training program, including the types of training to be delivered (e.g., induction, refresher, toolbox talks, specialized technical training), delivery methods (classroom, online, practical exercises), and language considerations. It also includes frequency and duration of training sessions.

Training Content

This section outlines the core topics covered by the training, which typically include environmental protection measures, social impact mitigation, health and hygiene, hazard recognition, emergency response, personal protective equipment (PPE) use, and relevant legal and contractual requirements. It may also address community engagement and cultural sensitivity.

Training Delivery and Implementation

This section explains the logistics of training delivery, such as scheduling, venue selection, trainer qualifications, participant registration, and use of training materials. It also describes the inclusion of subcontractors and third-party workers and how their training is managed.

Monitoring and Evaluation of Training Effectiveness

This section defines mechanisms for assessing the effectiveness of training activities, such as participant feedback, knowledge tests, practical demonstrations, and behavior observation. It outlines how training outcomes are documented and used to improve future sessions.

Recordkeeping and Reporting

This section describes the system for maintaining comprehensive training records, including attendance sheets, training materials, evaluation results, and certificates. It defines reporting procedures to management and stakeholders, ensuring transparency and regulatory compliance.

Continuous Improvement

This section describes processes for regularly reviewing and updating the training plan based on monitoring data, incident investigations, feedback, and evolving project needs. It highlights the importance of adapting training content and delivery methods to maintain relevance and effectiveness.

Communication and Awareness

This section outlines how training efforts are complemented by ongoing communication and awareness campaigns, such as safety posters, toolbox talks, newsletters, and signage, to reinforce key messages and encourage a positive ESHS culture.

Plan Review and Update

This section explains the schedule and criteria for periodic review of the Training Management Plan. It includes triggers for revision such as legislative changes, project phase transitions, audit findings, or stakeholder feedback.

APPENDIX-19 Labor Influx Management Plan

1. Purpose and Scope

This Plan establishes measures to prevent, minimize, and manage potential adverse impacts related to the influx of non-local labor during the construction of the INRAIL Project. It is tailored to the specific socio-environmental context of İstanbul and Kocaeli provinces, where the project corridor passes through both densely urbanized and semi-rural communities.

2. Project-Specific Context

- Workforce Size & Profile:
  - Approx. 1,500–2,000 contracted workers at peak construction, in addition to 250–300 primary supply workers (LMP, Section 1.1).
  - Predominantly male, with a mix of skilled/semi-skilled Turkish workers and migrant labor (Syrian, Afghan, Iraqi nationals noted in LMP).
  - Workforce concentrated at tunneling and viaduct construction sites, plus worker camps.
- Geographical Setting:
  - Alignment crosses İstanbul's northern periphery (Arnavutköy, Eyüpsultan, Çatalca) and semi-rural parts of Kocaeli (Çayırova).
  - Sensitive receptors identified in ESIA: schools, health facilities, agricultural land, and cultural heritage sites.
- Identified Social Risks (ESIA & LMP):
  - Community tensions due to large male-dominated workforce.
  - Gender-based violence / SEA/SH risk in rural/urban fringe communities.
  - Pressure on local services (housing, water, sanitation, health).
  - Informal employment & worker welfare risks.
  - Traffic safety risks linked to worker transport vehicles.

3. Objectives

- To avoid or minimize negative social impacts of labor influx on local communities.
- To ensure equitable opportunities for local hiring where feasible.
- To safeguard workers' rights and welfare in line with WB ESS2 and ESS4.
- To prevent SEA/SH, child labor, and forced labor.
- To integrate influx management with stakeholder engagement and grievance redress mechanisms.

4. Management Measures

4.1 Workforce Planning & Local Hiring

- Prioritize hiring of local unskilled/semi-skilled labor where possible, in accordance with the requirements to be specified in the bidding documents.
- Maintain records of workforce origin to track influx levels.
- Coordinate with İŞKUR and local municipalities for local recruitment.

4.2 Worker Accommodation & Camps

- Camps to comply with IFC EHS Guidelines on Workers' Accommodation and, where applicable, relevant EBRD requirements.

- Camps located away from sensitive receptors (schools, residential clusters).
- Adequate sanitation, potable water, medical facilities, and recreation areas to prevent reliance on local community infrastructure.
- Further details are provided in the Worker's Camp Management Plan, which forms part of the ESMP framework.

4.3 Code of Conduct (CoC) & Behavioral Expectations

- Mandatory CoC for all workers (aligned with LMP Annex-2).
- Prohibition of harassment, intimidation, SEA/SH, and child labor.
- Enforcement through induction training, periodic refreshers, and disciplinary action.
- A sample Code of Conduct is provided in Annex of this Plan, aligned with Annex 2 of the Labour Management Procedures (LMP).

4.4 Community Relations

- Appoint Community Liaison Officers (CLOs).
- Continuous communication with mukhtars, local NGOs, and municipal authorities.
- Awareness sessions for workers on local customs, cultural sensitivities, and community engagement protocols.

4.5 SEA/SH Risk Mitigation

- Separate confidential grievance channels for SEA/SH complaints (aligned with LMP and ESMP SEA/SH Action Plan).
- Regular training on GBV/SEA/SH prevention.
- Partnerships with local service providers (healthcare, psychosocial support).

4.6 Pressure on Local Infrastructure & Services

- Contractor to provide transport, medical support, and catering for workers to avoid strain on local services.
- Monitoring of water and energy consumption at camps.

4.7 Health, Safety, and Security

- Mandatory OHS induction before mobilization.
- Coordination with local hospitals and emergency services.
- Traffic and transport safety training for drivers (as ESIA flagged increased road accident risks).

5. Monitoring and Reporting

Indicators:

- Ratio of local vs. non-local workers.
- Number of SEA/SH trainings delivered and attendance rates.
- Worker camp inspection results (sanitation, health, security).
- Number and type of grievances received/resolved.

Reporting:

- Contractors submit monthly reports to PIU.
- Independent audits by Construction Supervision Consultant.

6. Roles and Responsibilities

- AYGM PIU: Oversight, coordination with municipalities, grievance oversight.
- D+B Contractor(s): Day-to-day implementation, camp management, CoC enforcement.
- CSC: Verification, community feedback, compliance monitoring.
- Local Authorities: Support on local hiring, policing, and dispute mediation.

7. Integration with Other Plans

- SEA/SH Action Plan: Cross-referenced for GBV/SEA/SH prevention measures.
- Waste & Excavated Material Plan: To ensure worker-related waste is properly managed at camps and construction sites.
- Stakeholder Engagement Plan (SEP): Coordination with affected communities.
- **Worker's Camp Management Plan:** Cross-referenced for detailed standards on worker accommodation, health and safety provisions, sanitation, and camp-specific grievance procedures.

Annex – Sample Code of Conduct Project Workers[5]

We are the Contractor, [*enter name of Contractor*]. We have signed a contract with [*enter name of Employer*] for [*enter description of the Works*]. These Works will be carried out at [*enter the Site and other locations where the Works will be carried out*]. Our contract requires us to implement measures to address environmental and social risks related to the Works, including the risks of sexual exploitation and abuse and sexual harassment.

This Code of Conduct is part of our measures to deal with environmental and social risks related to the Works. It applies to all our staff, laborers and other employees at the Works Site or other places where the Works are being carried out. It also applies to the personnel of each subcontractor and any other personnel assisting us in the execution of the Works. All such persons are referred to as "Contractor's Personnel" and are subject to this Code of Conduct.

This Code of Conduct identifies the behavior that we require from all Contractor's Personnel.

Our workplace is an environment where unsafe, offensive, abusive, or violent behavior will not be tolerated and where all persons should feel comfortable raising issues or concerns without fear of retaliation.

Required Conduct

Contractor's Personnel shall:

1) carry out his/her duties competently and diligently,
2) comply with this Code of Conduct and all applicable laws, regulations, and other requirements, including requirements to protect the health, safety and well-being of other Contractor's Personnel and any other person,
3) maintain a safe working environment including by:
    a. ensuring that workplaces, machinery, equipment, and processes under each person's control are safe and without risk to health,
    b. wearing required personal protective equipment,

[5] This Code of Conduct (CoC) is adopted from the World Bank Standard Procurement Document, Request for Bids Small Works, March 2017. This CoC will be included by the bidder to the bidding documents and the awarded Construction Contractor will use the version she or he presented in the bidding document and will include this CoC to contracts with its subcontractors.

c. using appropriate measures relating to chemical, physical and biological substances, and agents, and
d. following applicable emergency operating procedures,

4) report work situations that he/she believes are not safe or healthy and remove himself/herself from a work situation which he/she reasonably believes presents an imminent and danger to his/her life or health,

5) treat other people with respect, and not discriminate against specific groups such as women, people with disabilities, migrant workers or children,

6) not engage in any form of sexual harassment including unwelcome sexual advances, requests for sexual favors, and other unwanted verbal or physical conduct of a sexual nature with other Contractor's or Employer's Personnel or members of communities located around work places,

7) not engage in sexual exploitation which means any actual or attempted abuse of position of vulnerability, differential power or trust, for sexual purposes, including, but not limited to, profiting monetarily, socially or politically from the sexual exploitation of another. In World Bank financed projects/operations, sexual exploitation occurs when access to or benefit from Bank financed Goods, Works, Consulting or Non-consulting services is used to extract sexual gain.

8) not engage in rape, which means physically forced or otherwise coerced penetration—even if slight—of the vagina, anus or mouth with a penis or other body part. It also includes penetration of the vagina or anus with an object. Rape includes marital rape and anal rape/sodomy. The attempt to do so is known as attempted rape. Rape of a person by two or more perpetrators is known as gang rape.

9) not engage of sexual assault, which means any form of non-consensual sexual contact that does not result in or include penetration. Examples include attempted rape, as well as unwanted kissing, fondling, or touching of genitalia and buttocks, do not engage in any form of sexual activity with individuals under the age of 18, except in case of pre-existing marriage

10) complete relevant training courses that will be provided related to the environmental and social aspects of the Contract, including on health and safety matters, and sexual exploitation and abuse (SEA),

11) report violations of this Code of Conduct; and

12) not retaliate against any person who reports violations of this Code of Conduct, whether to us or the Employer, or who makes use of the [Project's Grievance Mechanism].

Raising Concerns

If any person observes behavior that he/she believes may represent a violation of this Code of Conduct, or that otherwise concerns him/her, he/she should raise the issue promptly. This can be done in either of the following ways:

1. Contact [*enter name of the Contractor's Social Expert with relevant experience in handling gender-based violence, or if such person is not required under the Contract, another individual designated by the Contractor to handle these matters*] in writing at this address [] or by telephone at or in person at []; or
2. [] Call [] to reach the Contractor's hotline *(if any)* and leave a message.

The person's identity will be kept confidential, unless reporting of allegations is mandated by the country 's law. Anonymous complaints or allegations may also be submitted and will be given all

due and appropriate consideration. We take seriously all reports of possible misconduct and will investigate and take appropriate action. We will provide warm referrals to service providers that may help support the person who experienced the alleged incident, as appropriate.

There will be no retaliation against any person who raises a concern in good faith about any behavior prohibited by this Code of Conduct. Such retaliation would be a violation of this Code of Conduct.

Consequences of Violating the Code of Conduct

Any violation of this Code of Conduct by Contractor's Personnel may result in serious consequences, up to and including termination and possible referral to legal authorities.

For Contractor's Personnel

I have received a copy of this Code of Conduct written in a language that I comprehend. I understand that if I have any questions about this Code of Conduct, I can contact [*enter name of Contractor's contact person with relevant experience in handling gender-based violence*] requesting an explanation.

Name of Contractor's Personnel: [*insert name*]

Signature : _____

Date : [*day/month/year*] _____

Countersignature of authorized representative of the Contractor

Signature : _____

Date : [*day/month/year*] _____

APPENDIX-20 E&S Contractor Management Framework (Guidance to ensure adequate E&S management by sub-contractors)

Introduction

This section defines the purpose of the framework, which is to establish a standardized approach to managing the environmental and social (E&S) performance of subcontractors. It explains the need for aligning subcontractor activities with the overarching project commitments, the ESMP, and World Bank Environmental and Social Standards (ESSs). The section also introduces the framework's applicability to all tiers of subcontractors.

Scope of Application

This section specifies the types of subcontracted services or works to which this framework applies, such as construction works, material supply, transportation, waste management, or security services. It also defines geographical scope and temporal boundaries.

Objectives of the Framework

This section describes key objectives, including ensuring consistent E&S performance across all subcontractors, preventing risks such as environmental degradation or labor violations, and improving overall project accountability.

Legal Framework

This section outlines the relevant national legislation, licensing requirements, and institutional arrangements. It also references applicable World Bank Environmental and Social Standards, particularly ESS1, ESS2, ESS4, and ESS10.

Roles and Responsibilities

This section defines the respective roles and responsibilities of the project owner, main contractor, E&S team, and subcontractors. It includes oversight mechanisms, documentation requirements, and authority for issuing instructions and sanctions.

Subcontractor Selection and Prequalification

This section outlines the minimum E&S criteria for selecting subcontractors, including prior E&S performance, availability of qualified personnel, relevant certifications (e.g., ISO 14001, OHSAS 18001), and willingness to comply with project-specific standards.

Integration of E&S Requirements into Contracts

This section provides guidance on embedding E&S obligations into subcontractor agreements, such as references to Codes of Conduct, grievance mechanisms, ESHS plans, incident reporting protocols, and environmental safeguards.

Capacity Building and Training

This section describes training obligations, including induction sessions, toolbox talks, and refresher courses covering environmental compliance, community interaction, occupational health and safety, and gender-based violence (GBV) prevention.

Supervision, Inspection, and Performance Monitoring

This section describes the monitoring framework, including frequency of inspections, performance indicators, site checklists, reporting formats, and supervision responsibilities. It may reference a "Subcontractor Performance Scorecard."

Non-Compliance Management and Corrective Actions

This section defines the process for detecting, documenting, and responding to non-compliance. It includes warning systems, time-bound corrective action plans, and escalation to contractual penalties or termination.

Grievance Management Related to Subcontractor Activities

This section explains how grievances (from workers or communities) involving subcontractors will be addressed through project-level grievance redress mechanisms (GRM).

Reporting and Documentation

This section outlines documentation responsibilities, including subcontractor monthly reports, incident logs, training records, and compliance audits.

Continuous Improvement and Framework Review

This section describes the feedback mechanisms, learning processes, and schedule for framework updates.

APPENDIX-21 Preliminary Land Management Plan (with a list of potential landfills and borrow areas)

Introduction

This section introduces the purpose of the plan: to manage the temporary and permanent use of land for construction-related activities, such as landfills, borrow areas, and laydown areas, in an environmentally and socially sound manner.

In parallel, a separate Excavated Material and Land Management Plan (See Appendix-24) has been prepared. This plan consolidates excavation waste management and preliminary land management into a single framework, given the scale of excavation works under the INRAIL Project.

Scope of the Plan

This section defines the spatial and functional boundaries of the plan, including types of land uses covered and the phases of the project during which the plan is applicable.

Objectives

This section highlights the goals of the plan, such as ensuring legal land use, minimizing impacts on ecosystems and communities, and planning for rehabilitation after use.

Legal Framework

This section outlines applicable national regulations on land use, land acquisition (if any), permitting of borrow areas, waste storage, and site rehabilitation. It also refers to World Bank standards (e.g., ESS1, ESS5, ESS6).

Methodology for Site Selection

This section explains the environmental and social screening criteria and technical criteria (e.g., proximity, access roads, geology, land ownership) used to identify candidate locations for borrow areas and landfills.

List and Description of Potential Sites

This section provides a detailed list of pre-identified or proposed sites, including maps, coordinates, ownership status, environmental constraints, and current land use.

Environmental and Social Impact Considerations

This section identifies the expected impacts of site operation, such as dust, runoff, traffic, community safety, and loss of vegetation, along with proposed mitigation measures.

Stakeholder Engagement and Approvals

This section outlines requirements for consultation with landowners, local authorities, and communities, and the steps for obtaining official approvals or permits for site use.

Site Operation and Management

This section includes operational guidance such as working hours, noise/dust control, fencing, site signage, traffic management, access restrictions, and monitoring responsibilities.

Rehabilitation and Closure Measures

This section defines post-use obligations for site restoration, including slope stabilization, topsoil replacement, reseeding, waste removal, and final inspections.

Monitoring and Reporting

This section sets out the monitoring schedule, parameters to be tracked (e.g., erosion, sedimentation), documentation required (e.g., site logs), and reporting formats.

APPENDIX-22 Security Management Plan

Introduction

This plan aims to manage project-related security risks while respecting human rights and minimizing social impacts, in line with the Voluntary Principles on Security and Human Rights and World Bank ESS4. It is based on the Project's security risk assessment presented in the ESIA, which identified potential risks such as theft, vandalism, unauthorized access, and community tensions at work sites and camps. The Plan translates those risk findings into minimum standards and management requirements to be followed by all contracted security providers.

Scope and Applicability

This section specifies which personnel, assets, locations, and phases of the project are covered by the plan, including subcontractors, visitors, and mobile teams.

Legal Framework

This section summarizes national laws on private security, firearms, and public order, as well as applicable international principles on the use of force and security governance. It also draws on international good practice, including the IFC Good Practice Handbook on the Use of Security Forces (https://www.ifc.org/en/insights-reports/2017/publications-handbook-securityforces) and the World Bank Good Practice Note on Assessing and Managing the Risks and Impacts of the Use of Security Personnel, to guide the management of security-related risks in accordance with ESS4.

Security Risk Assessment

This section details the approach to identifying and evaluating threats based on local conflict dynamics, crime rates, protests, or project-specific risks (e.g., theft, vandalism). It should include a risk matrix.

Security Strategy and Mitigation Measures

Measures include access control, fencing, liaison with law enforcement, use of trained guards, and communication systems.

In accordance with ESIA findings, the Project will require the Security Contractor to develop a site-specific plan that complies with the following minimum standards defined by the Project:

- Mandatory human rights and ethical conduct training for all security personnel.
- Background checks for all security personnel, conducted in accordance with national law and Good International Industry Practice, prior to deployment on site.
- Strict adherence to a Project-wide Code of Conduct (CoC) covering proportional use of force, SEA/SH prevention, and zero tolerance for discrimination or harassment.
- Advance notification to communities before major security operations and non-intrusive community interactions.
- A dedicated grievance channel for complaints related to security personnel, integrated within the Project Grievance Mechanism (GM).

Organizational Roles and Responsibilities

The Project Implementation Unit (PIU) and Construction Supervision Consultant (CSC) will define and monitor compliance with these minimum standards. The private security provider(s) will prepare their own operational plan consistent with this framework and submit it for PIU/CSC review prior to deployment, including confirmation that background checks for all security

personnel have been conducted in accordance with national law and ESS4 requirements prior to deployment.

Training Requirements

This section outlines training content and frequency for all security personnel and relevant staff, covering conflict de-escalation, community interaction, GBV prevention, and rules of engagement.

Code of Conduct for Security Personnel

This section describes the ethical and professional behavior standards expected of all security staff, including prohibition of excessive force, corruption, and discrimination.

Interaction with Communities

This section explains how the project will maintain respectful and non-intrusive relations with communities, including advance notification of patrols and grievance redress options.

Incident Reporting and Response

This section details protocols for incident logging, investigation, coordination with authorities, root cause analysis, and preventive measures.

Grievance Handling Related to Security Issues

This section explains how the project will receive and respond to community complaints about security practices or personnel through a transparent GRM.

Monitoring, Evaluation, and Review

The Project will monitor security effectiveness and community perception through KPIs such as number of incidents, grievances, and corrective actions taken. Regular reviews and third-party audits may be conducted to ensure continuous improvement and alignment with ESS4.

APPENDIX-23 Worker's Camp Management Plan

1. Purpose and Scope

This Plan sets out the requirements and procedures for establishing and operating worker camps for the INRAIL Project. It aims to ensure that camps are managed in a safe, healthy, and socially responsible manner, minimizing potential adverse impacts on both workers and surrounding communities.

It also recognizes that the Project workforce may include both male and female workers, as well as workers of non-Turkish origin. Camp management arrangements shall therefore ensure gender-sensitive facilities, cultural respect, and equal access to services for all workers.

2. Project-Specific Context

- Workforce Needs: At peak construction, approx. 1,500–2,000 contracted workers and 250–300 primary supply workers will be employed (ESIA, LMP).
- Geographical Distribution: Major camps are expected near tunneling and viaduct construction sites (Arnavutköy, Çatalca, Eyüpsultan in İstanbul; Çayırova in Kocaeli).
- Community Sensitivities: ESIA identified sensitive receptors including schools, semi-rural settlements, agricultural lands, and cultural heritage sites along the alignment.
- Risks Identified: Pressure on local infrastructure, sanitation challenges, community tensions, SEA/SH risks, and waste management concerns.
- Diversity Considerations: Camps shall accommodate a mixed workforce (including women and foreign workers) through separate and secure housing areas, appropriate sanitation facilities, and culturally sensitive recreational arrangements.

3. Objectives

- Provide safe and healthy living conditions for all workers.
- Avoid adverse impacts on local communities and services.
- Ensure compliance with IFC/EBRD Worker Accommodation Standards and WB ESS2.
- Integrate gender-sensitive and SEA/SH prevention measures.
- Respect diversity and inclusiveness in camp operations, ensuring fair and non-discriminatory access to facilities and services.

4. Camp Location and Design

- Camps will be sited at least 500 m away from schools, health facilities, and residential clusters (ESIA requirement).
- Sites will be selected in consultation with municipalities and mukhtars.
- Each camp will have controlled entry/exit points, security personnel trained in human rights and ESS4.

5. Facilities and Services

- Housing: Adequate space (minimum 4.5 m² per worker), proper ventilation, heating, and lighting.
- Sanitation: Sufficient toilets (1 per 10 workers), handwashing stations, wastewater treatment/discharge in compliance with Turkish regulations.
- Water Supply: Continuous access to potable water (WHO standards).
- Waste Management: Segregation of domestic waste, hazardous waste collection, and disposal through licensed contractors (linked to Waste Management Plan).
- Medical Facilities: On-site first aid posts, agreements with nearby hospitals for emergency care.
- Catering: Hygienic kitchens and dining halls, inspections by public health authorities. Meals shall be provided free of charge to all resident workers unless otherwise defined in the Contractor's LMP. The catering service shall ensure food safety, adequate nutritional

value, and menu diversity reflecting cultural and dietary preferences of both Turkish and non-Turkish workers. Regular quality control inspections and worker feedback will be used to assess catering performance.

6. Worker Welfare and Conduct

- Code of Conduct: Mandatory for all workers, covering respect for communities, prohibition of SEA/SH, child and forced labor.
- Recreation Areas: Sports and leisure facilities to reduce interaction-related tensions with local communities.
- Training: Induction sessions on camp rules, local cultural sensitivities, and SEA/SH awareness.
- Gender and Diversity Training: Specific sessions will be organized on inclusion, respectful behaviour, and prevention of harassment or discrimination.

7. Community Interaction and Security

- Community Liaison Officers (CLOs): To manage communication between camps and surrounding communities.
- Security Personnel: To be trained in human rights, proportional use of force, and grievance handling (as per Security Management Plan).
- Visitor Protocols: Controlled access for visitors, with registration and approval system.

8. Health and Safety

- Regular camp inspections for hygiene, fire safety, and structural integrity.
- Vector control measures (mosquitoes, rodents).
- COVID-19 or other infectious disease protocols (vaccination, isolation areas).

9. Monitoring and Reporting

- Focus Areas:
  - Accommodation conditions and occupancy rates.
  - Sanitation and hygiene standards.
  - Health, safety, and medical services.
  - Food and water quality.
  - Worker behaviour, SEA/SH awareness, and training coverage.
  - Grievance management related to camp operations.
- Indicators:
  - Maximum 4 workers per room.
  - Minimum 1 toilet and 1 shower per 8–10 workers.
  - At least one SEA/SH and cultural awareness training session every 3 months.
  - Food quality and hygiene inspection at least once per month.
  - Grievance resolution rate (≥90% within 30 days).
- Reporting: Monthly contractor reports to PIU; independent inspections by CSC.

10. Roles and Responsibilities

- Contractor: Establish and operate camps in compliance with this Plan.
- PIU: Oversight, approval of camp sites, periodic audits.
- CSC: Independent monitoring, verification, and grievance follow-up.

APPENDIX-24 Excavated Material & Land Management Plan (EMLMP)

2. Purpose and Scope

This plan sets out the procedures for managing the significant volume of excavated materials generated by the INRAIL Project, ensuring environmentally sound handling, reuse, disposal, and site rehabilitation. It integrates both excavation waste and land management aspects in one framework.

3. Estimated Volumes and Sources

- Excavated material generated mainly from tunneling (TBM/NATM), cut-and-cover tunnels, and viaduct foundations.
- Approximate quantities and distribution are based on ESIA Appendix-8 (Expected Amount of Excavation Material).

4. Principles of Excavated Material Management

- Reuse and recycling priority: Materials suitable for backfilling, landscaping, and construction support will be reused on-site where possible.
- Designated disposal: Non-reusable materials will be transported to licensed excavation storage areas identified by MoEUCC/municipalities.
- Segregation: Clean soil vs. contaminated material to be managed separately.

5. Transportation and Storage

- Dedicated haul routes defined in coordination with local authorities to minimize community disruption.
- Dust suppression and traffic safety measures during haulage.
- Compliance with WB ESS and national regulations.
- Only regulated and licensed disposal sites shall be used for excavated material. The use of unauthorized or informal sites is strictly prohibited.
- Disposal shall be carried out exclusively at officially approved sites identified in the ESIA (e.g., İSTAÇ – İmrahor, Atalaylar, Çiftalan, Büyükkılıçlı, and Istanbul Leather Organized Industrial Zone), unless otherwise approved in writing by the relevant authority.
- D+B Contractor shall maintain verifiable records (delivery tickets, weighbridge slips, or manifests) showing the quantities, transport dates, and destinations of all materials delivered to disposal or reuse sites. These records shall be retained for audit and submitted to AYGM PIU on a monthly basis.

6. Disposal and Storage / Land Management

Disposal of surplus excavation material will be undertaken strictly at licensed excavation waste storage areas designated by İstanbul and Kocaeli Metropolitan Municipalities under the Regulation on the Control of Excavation Soil, Construction and Demolition Waste (OG No. 25406, 2004).

According to the ESIA, approximately 30 million m³ of excavation material will be generated during construction, of which around 3 million m³ will be reused on-site for backfilling and embankment construction. The remaining material will require transportation to approved disposal/storage sites.

The largest licensed excavation waste storage areas in İstanbul;

District	Storage Site Name	Capacity (m^3)
Tuzla	Istanbul Leather Organised Industrial Zone	2,500,000
Arnavutköy	İSTAÇ – İmrahor Excavation Material Storage Area	9,761,211
Arnavutköy	İSTAÇ – Atalaylar Excavation Material Storage Area	11,770,483
Eyüpsultan	İSTAÇ – Çiftalan Excavation Material Storage Area	20,799,657
Silivri	İSTAÇ – Büyükkılıçlı Excavation Material Storage Area	2,916,925

7. Land Management and Rehabilitation

- Temporary storage sites and disposal areas will be subject to erosion control, drainage management, and topsoil protection.
- Post-construction rehabilitation of storage and borrow sites (grading, revegetation, landscape integration).
- Land use compatibility checked against ESIA land acquisition impacts.

8. Environmental and Social Considerations

- Community health and safety during material transport.
- Noise, dust, and traffic impacts on nearby settlements.
- Coordination with Resettlement and SEP processes if land take is required.

9. Monitoring and Reporting

- Monthly reporting of excavation volumes, reuse ratios, and disposal quantities.
- Periodic site inspections by PIU and CSC.
- Annual review of rehabilitation status of temporary and permanent sites.

10. Roles and Responsibilities

- AYGM PIU: oversight, approvals, and coordination with authorities.
- D+B Contractor: daily implementation, record keeping, compliance.
- CSC: independent verification.