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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)

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TABLE OF CONTENT

TABLE OF CONTENT ..... **i**
LIST OF TABLES ..... **ii**
APPENDICES ..... Hata! Yer işareti tanımlanmamış.
ABBREVATIONS ..... **iii**
1 INTRODUCTION **1**
1.1 Purpose and Scope 1
2 IMPLEMENTATION OF THE ENVIRONMENTAL & SOCIAL MANAGEMENT PLAN **4**
2.1 Organizational Structure 4
2.2 Roles and Responsibilities 5
2.3 Guidance for Contractor's Sub-Management Plans 9
3 MITIGATION **12**
3.1 Mitigation Measures for Pre-Construction and Construction Phase 13
3.2 Mitigation Measures for Operation Phase 30
4 MONITORING AND REPORTING **37**
4.1 Monitoring Plan for Construction Phase 39
4.2 Monitoring Plan for Operation Period 56
5 CAPACITY DEVOLOPMENT AND TRAINING **62**
6 SUMMARY OF BUDGET ESTIMATES FOR ESMP IMPLEMENTATION **65**
APPENDICES **69**

LIST OF TABLES

Table 2-1 Roles and Responsibilities Regarding the Implementation of the ESMP 5
Table 3-1 Mitigation Measures for Pre-Construction and Construction Phase 13
Table 3-2 Mitigation Measures for Operation Phase 30
Table 4-1 Monitoring Plan for Construction Phase 39
Table 4-2 Monitoring Plan for Operation Period 56
Table 5-1 Training Program 63
Table 6-1 Estimated Cost Categories for ESMP Implementation 67
Table 1-1: Impact Significance and Mitigation Measures regarding Cultural Heritage **Hata! Yer işareti tanımlanmamış.**
Table 1-2: Sources of Impacts on Cultural Heritage Receptors during Project **Hata! Yer işareti tanımlanmamış.**
Table 3-1: Law on the Conservation of Cultural and Natural Property (Law No: 2863,1983) **Hata! Yer işareti tanımlanmamış.**
Table 4-1: Responsible Regional Council for the Conservation of Cultural Property **Hata! Yer işareti tanımlanmamış.**
Table 4-2: Responsible Regional Museum Directorate ..... **Hata! Yer işareti tanımlanmamış.**
Table 4-3: Responsible Provincial Directorate of Culture and Tourism **Hata! Yer işareti tanımlanmamış.**
Table 5-1: Construction Activities Impact on Tangible Cultural Heritage Features **Hata! Yer işareti tanımlanmamış.**
Table 6-1: Cultural Heritage Control Measures ..... **Hata! Yer işareti tanımlanmamış.**
Table 7-1: KPIs and Measures for Management Plan ..... **Hata! Yer işareti tanımlanmamış.**

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
PIOC	Project Implementation Oversight Consultant
PIU	Project Implementation Unit
PMC	Project Management Consultant
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 Project Management Consultant (PMC), the Construction Supervision Consultant/Engineer (CSC/Engineer), the Project Implementation and Oversight Consultant (PIOC), and the D+B Contractors and their subcontractors involved in the Project. The ESMP will be finalized and updated by the D+B Contractors, as applicable, based on the final detailed design, construction methodology, sequencing, Project Facilities and implementation arrangements, and will be implemented through the Contractor's ESMP (C-ESMP) and applicable sub-management plans..

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 and to provide appropriate cross-references to the applicable RP/LRP and other standalone E&S instruments.
- 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.
- To ensure that E&S approvals, permits, studies, consultations, RP/LRP processes, land-access clearances and applicable World Bank No-Objections are incorporated into the Contractor's Work Program as binding milestones and hold points.
- To ensure that material changes to the design, construction methodology, sequencing, Project Facilities, Associated Facilities or implementation arrangements are screened and managed through the E&S Change Management Procedure before implementation.
- To apply the mitigation hierarchy to biodiversity impacts and to achieve No Net Loss for Priority Biodiversity Features and Net Gain for Critical Habitat features, where applicable.

In this context, the following Environmental and Social Standards (ESSs) 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 and Sustainable Management of Living Natural Resources), ESS8 (Cultural Heritage), and ESS10 (Stakeholder Engagement and Information Disclosure). 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.

This ESMP translates the ESIA mitigation hierarchy into clear and implementable design, construction and, where applicable, operation-phase obligations.

For the purposes of this ESMP, Project Facilities include the Works and all permanent or temporary facilities selected, established, used, operated or controlled by the D+B Contractors for Project implementation, including, as applicable, construction camps, batching and crushing plants, laydown and storage areas, spoil disposal or reuse areas, temporary access roads, workshops, borrow areas and other support facilities. The D+B Contractors shall identify and assess all proposed Project Facilities, conduct an alternatives analysis, obtain the required permits, approvals and land-access arrangements, and include the relevant E&S risks and mitigation measures in the finalized ESIA, ESMP, SEP, C-ESMP, RP/LRP and applicable sub-management plans.

The location and design of Project Facilities shall prioritise previously disturbed or modified areas and avoid, to the extent feasible, Critical Habitat, Key Biodiversity Areas, natural habitats, sensitive aquatic or riparian habitats and important ecological-connectivity areas

Associated Facilities shall be identified and assessed in accordance with ESS1 and the applicable Project E&S instruments. Where an Associated Facility is outside the control of the D+B Contractor or AYGM, the associated E&S risks and impacts shall be assessed to the extent reasonably known or foreseeable, and reasonable efforts shall be made to influence the responsible third party, proportionate to the Project's level of control or influence. Identification of a facility as an Associated Facility shall be based on the applicable ESS1 criteria and shall not be determined solely by whether the facility is financed by the Project.

The ESMP applies to the entire Project Area of Influence (AoI), defined as a 500 m corridor on both sides of the overground 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.

For biodiversity, the spatial scope shall be determined separately for each receptor and impact pathway and shall include wider areas where required to assess migratory birds, bats, terrestrial fauna, aquatic habitats, ecological connectivity, Key Biodiversity Areas, indirect impacts and cumulative effects.

Where Project-related activities, facilities or impacts extend beyond this corridor, the AoI shall also include the relevant additional areas, environmental and social receptors, affected communities, access and transport routes, material-sourcing areas, spoil-management areas and reasonably known or foreseeable Associated Facilities. The AoI shall be reviewed and updated by the D+B Contractors during final design and preparation of the finalized ESIA, ESMP, SEP and C-ESMP.

The D+B Contractors shall not commence mobilization, establish any Project Facility or undertake any physical works until the finalized ESIA, ESMP and SEP, and the C-ESMP and applicable sub-management plans, have been reviewed and approved and the required World Bank No-Objections have been obtained. The ESMP shall remain a living document and shall be updated where required to reflect the final design, changes in construction methodology, newly identified Project Facilities or Associated Facilities, monitoring results, incidents, stakeholder feedback and other material changes identified during Project implementation.

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. Each D+B Contractor shall also prepare and implement the applicable lot-specific biodiversity management and action plans based on the final design, updated field conditions and pre-construction survey findings.

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 suitably qualified and experienced experts in the relevant E&S fields, as necessary, for the effective implementation of the management measures and controls within the scope of the ESMP.

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 for finalizing the detailed design of the Project including the engineering structures, conducting necessary additional E&S studies, in line with both national and WB ESF requirements. The D+B Contractors will identify and assess all Project Facilities selected, established, used or controlled by them and will identify and assess reasonably known or foreseeable Associated Facilities in accordance with ESS1 and the applicable Project E&S instruments. 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 support AYGM in Project-level E&S coordination, monitoring, consolidation and reporting concerning the Project's E&S performance. A Project Implementation and Oversight Consultant (PIOC) will provide independent advisory and assurance services, including independent monitoring, audits and verification of compliance.

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

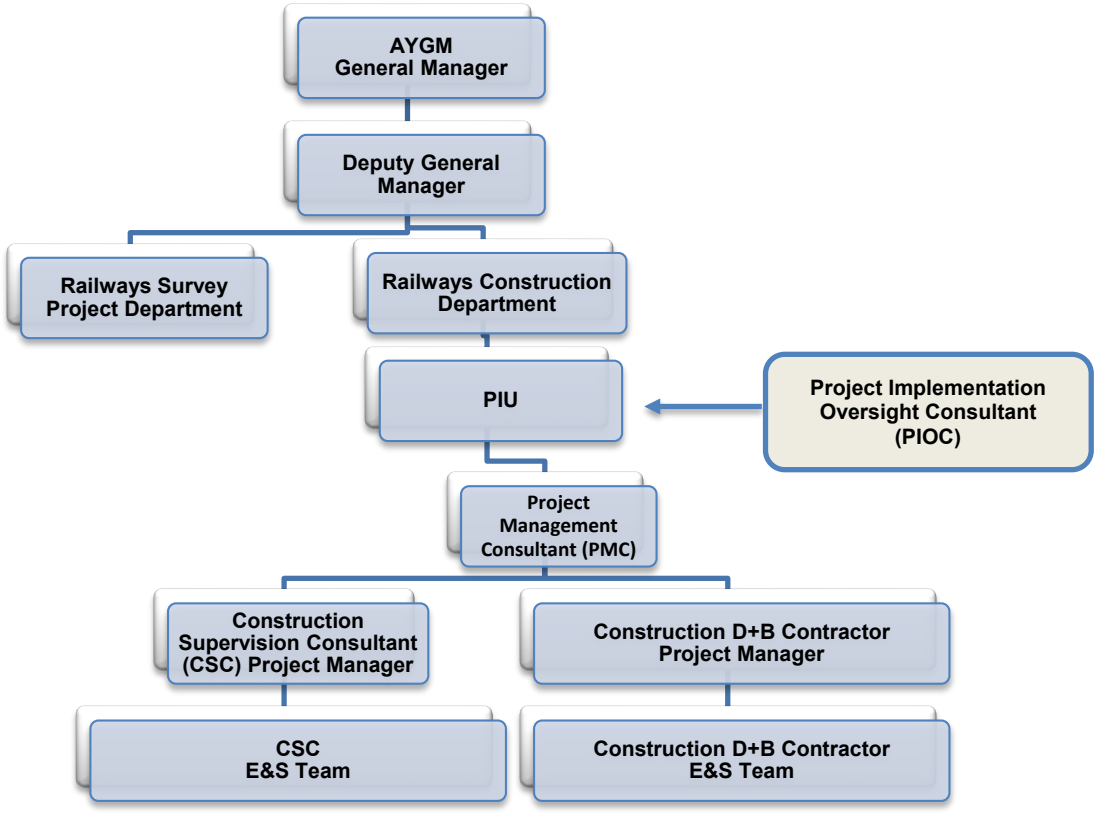


Figure 2-1 ESMS Organizational Structure

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 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. ▪ Oversee and review the environmental and social monitoring undertaken by the D+B Contractors and verified by the CSC/Engineer, including air quality, noise, vibration, soil and water monitoring, and ensure that 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 implementation of lot-specific biodiversity mitigation, restoration, monitoring and, where required, compensation measures, including achievement of the applicable No Net Loss and Net Gain objectives.
- 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.
- Remain responsible for the preparation and implementation of the lot-/section-based RP/LRP in accordance with the RF, national law and ESS5. The RP/LRP will be prepared by the PMC on behalf of AYGM based on the final detailed design provided by the D+B Contractor.
- Prepare, update and oversee implementation of the SEA/SH Prevention and Response Action Plan and the Accountability and Response Framework, with support from the PMC, and submit them to the World Bank for review/No-Objection, where required.
- 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.
- Ensure that no construction activities commence in any relevant section or sub-section until the applicable RP/LRP has been fully implemented, the CSC has prepared the Sectional RP Completion Report, the report has been reviewed by AYGM and PIOC, the World Bank has issued its No-Objection, and AYGM has issued formal land-access clearance.
- Apply Employer-level contractual remedies in cases of serious or persistent E&S non-compliance. Contractual instructions, NCRs and stop-work requirements shall be issued through the CSC/Engineer, as applicable.

Project Management Consultant (PMC)

- Provide technical and advisory support to AYGM PIU on all environmental and social matters throughout the Project lifecycle.
- Prepare and update the relevant lot-/section-based RP/LRP on behalf of AYGM based on the final detailed design, including the required social, legal, livelihood and valuation inputs, and support AYGM in RP/LRP implementation, budgeting and land-access clearance processes.
- Support AYGM in the preparation and updating of the SEA/SH Prevention and Response Action Plan and the Accountability and Response Framework and in monitoring their implementation.
- Review the finalized ESIA, ESMP, SEP, C-ESMP and applicable sub-management plans and support AYGM during the approval and World Bank No-Objection processes, while the CSC/Engineer reviews the documents and recommends their approval from the construction-supervision perspective.
- Prepare and submit Monthly and Biannual E&S Monitoring Reports to AYGM PIU.
- 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, update and implement the C-ESMP, method statements and applicable sub-management plans in line with the finalized ESIA, ESMP and SEP and based on the final detailed design, construction methodology, sequencing, Project Facilities and site conditions.
- 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.

- Not commence mobilization, establish any Project Facility or undertake any physical works until the finalized ESIA, ESMP and SEP, and the C-ESMP and applicable sub-management plans, have received the required approvals and World Bank No-Objections.
- Prepare and implement an E&S Change Management Procedure to ensure that changes to the design, construction methodology, sequencing, Project Facilities, Associated Facilities or implementation arrangements are screened, documented and approved before implementation, including World Bank No-Objection for material changes, where applicable.
- 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. Prepare, update and implement the lot-specific Biodiversity Management Plan and, where required, Biodiversity Action Plan, including Critical Habitat and Natural Habitat management, seasonal restrictions, species protection, habitat restoration, biodiversity monitoring and adaptive management measures.
- 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.
- Not enter, use or commence works in any relevant section or sub-section until the applicable RP/LRP requirements have been completed, the World Bank has issued its No-Objection to the Sectional RP Completion Report, and AYGM has issued formal land-access clearance.
- 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 and submit monthly E&S reports to the CSC, with copies to the relevant Project entities, within 15 days following each reporting period.
- Promptly implement all corrective measures and corrective-action requirements formally issued by AYGM or through the CSC/Engineer. Recommendations made by the PMC or PIOC shall be communicated and administered through AYGM and/or the CSC/Engineer, as applicable.
- Ensure full E&S compliance of all Subcontractors and remain fully responsible for their performance.
- Prepare, update and implement a Contractor's Labor Management Plan (C-LMP) in accordance with the Project LMP and 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.
- Identify and assess all Project Facilities selected, established, used or controlled by the Contractor and identify and assess reasonably known or foreseeable Associated Facilities in accordance with ESS1 and the applicable Project E&S instruments. No Contractor-controlled Project Facility shall be established, accessed or used until the required assessments, management measures, permits, land-access arrangements, approvals and applicable World Bank No-Objections have been obtained.
- Complete the required pre-construction and pre-clearance biodiversity surveys before vegetation clearance or other biodiversity-sensitive works and incorporate the findings into the final design, method statements and applicable ecological hold points.
- 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.
- Review the finalized ESIA, ESMP, SEP, C-ESMP and applicable sub-management plans, recommend approval where appropriate, and monitor and verify their implementation.
- Review the Contractor's monthly E&S reports and prepare and submit Monthly E&S Monitoring Reports to AYGM PIU and PMC, summarizing site observations, compliance status, NCRs, corrective actions 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.
- Verify that all applicable E&S approvals, permits, land-access clearances and World Bank No-Objections have been obtained before the relevant works or Project Facilities commence, and enforce the applicable contractual hold points through the Engineer.
- Prepare the Sectional RP Completion Report confirming full implementation of the applicable RP/LRP requirements before formal land-access clearance is issued.

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 identifying compliance levels, gaps, emerging risks and proposed corrective actions and submit them directly to AYGM PIU and the World Bank, as applicable.
- 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 External Resettlement Monitoring in accordance with ESS5 and the approved RP/LRP, including verification of eligibility and entitlements, compensation and assistance delivery, informal users and vulnerable groups, resettlement-related grievances and livelihood-restoration outcomes.
- Review the RP/LRP and provide its recommendation directly to the World Bank for No-Objection; independently review the Sectional RP Completion Report and provide its opinion/recommendation directly to the World Bank before formal land-access clearance is issued.
- Conduct semi-annual external labor audits in accordance with ESS2, covering Contractors and Subcontractors, including working conditions, wages, working hours, worker accommodation, worker grievance mechanisms, labor influx, SEA/SH measures 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.
- Periodically review the quality and inclusiveness of stakeholder engagement, information disclosure, CLO performance and the functionality of the community grievance mechanism and recommend improvements to AYGM.
- Prepare and submit Monthly Site Visit Reports and Quarterly Progress Reports to AYGM PIU and the World Bank.
- Independently identify non-compliance and emerging risks, recommend corrective actions or escalation to AYGM and track closure, without issuing contractual instructions directly to the D+B Contractors.

2.3 Environmental & Social Coordination and Interface Management

Given the scale and multi-lot nature of the Project, effective Environmental and Social (E&S) coordination and interface management will be essential to ensure consistent implementation of the ESMP, compliance with national legislation, World Bank ESSs and other applicable lender requirements. AYGM PIU will establish and maintain a Project-wide E&S coordination mechanism involving the D+B Contractors, CSC, PMC, PIOC and other relevant parties. Regular E&S coordination meetings will be held at both Project and Lot levels to review compliance status, monitoring results, stakeholder issues, grievances, incidents, non-conformities, and the progress of corrective actions. Minutes of meetings, action trackers and follow-up requirements will be documented and shared with all relevant parties.

To ensure consistency across all Lots, AYGM PIU will establish standardized formats for E&S reporting, monitoring records, incident reporting, grievance tracking, corrective action plans, and non-conformity registers. All Contractors will be required to use these standardized templates when submitting monthly and ad-hoc E&S reports to the PIU. Project-wide E&S performance indicators and reporting requirements will be applied uniformly to facilitate consolidated reporting, performance evaluation and compliance verification.

All key E&S personnel proposed by D+B Contractors, including Environmental, Social, OHS, Biodiversity, Cultural Heritage, Community Liaison, SEA/SH and other specialist positions, shall be subject to review and approval by the CSC and approval by AYGM PIU prior to deployment. Any subsequent changes to approved E&S personnel shall also be communicated to by the CSC to the PIU for approval to ensure that adequate qualifications, experience and staffing levels are maintained throughout Project implementation.

A unified non-conformity management system will be implemented across the Project. All E&S non-conformities, observations, incidents, audit findings and corrective actions will be recorded, tracked and closed using standardized procedures and registers. Corrective actions shall include clear responsibilities, deadlines and verification requirements. Repeated or significant non-conformities, unresolved interface issues, or persistent non-compliance shall be escalated to the PIU for resolution and may result in suspension of activities until satisfactory corrective measures have been implemented and verified. All records related to E&S coordination, interface management, corrective actions and compliance verification shall be maintained as part of the Project's Environmental and Social Management System (ESMS) and made available for review by AYGM, lenders and independent auditors.

2.4 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 based on the final detailed design and before commencement of the relevant construction activities of the Project. For biodiversity-related plans, each D+B Contractor shall incorporate the findings of the required lot-specific and pre-construction surveys before vegetation clearance or other

biodiversity-sensitive activities. These sub-management plans are required to ensure that all potential E&S impacts identified in the disclosed ESIA and any additional E&S assessments undertaken during detailed design 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, construction traffic and transportation management, emergency response, contractor and supply chain management, and community health and safety. Land acquisition, resettlement assistance and livelihood restoration will be managed through the applicable RP/LRP prepared under AYGM's responsibility.

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. The applicable plans shall be reviewed and approved through the contractual review process and shall receive World Bank No-Objection where required before commencement of the relevant activities.

In addition, the Contractor shall prepare and implement an "E&S Change Management Procedure" as part of the C-ESMP. This procedure will ensure that any proposed design change — including alignment modifications, construction methods, materials, sequencing, Project Facilities, Associated Facilities or implementation arrangements— 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 AYGM through the CSC/Engineer and, for material changes or changes involving material E&S risks, World Bank No-Objection, where applicable, before implementation. All such changes and related approvals shall be documented and maintained as part of the project's E&S management records.

The D+B Contractors shall not commence mobilization, establish any Project Facility or undertake any physical works until the finalized ESIA, ESMP and SEP, and the C-ESMP and applicable sub-management plans, have received the required approvals and World Bank No-Objections.

The list of sub-management plans as follows:

Prepared by AYGM PIU:

- Sexual Exploitation and Abuse /Sexual Harassment Action Plan and the Accountability Response Framework
- Cultural Heritage Management Plan / Chance Finds Procedure
- Lot-/section-based Resettlement Plans / Livelihood Restoration Plans, to be prepared by the PMC on behalf of AYGM based on the final detailed design provided by the D+B Contractors.

To be prepared by the D+B Contractors (lot-specific basis):

- Contractor Environmental and Social Management Plan (C-ESMP),
- Biodiversity Management Plan/ Biodiversity Action Plans (as needed for critical habitat) including measures to achieve No Net Loss for Priority Biodiversity Features and Net Gain for Critical Habitat features, where applicable,
- Occupational Health & Safety Plan and Procedures
- Emergency Preparedness and Response Plan
- Traffic and Transportation Management Plan

- Community Health and Safety Management Plan
- Sexual Exploitation, Abuse and Sexual Harassment (SEA/SH) Prevention and Response Action Plan
- Cultural Heritage Management Plan and Chance Find Procedure
- Contractor's Labor Management Plan (C-LMP) (including Labor Influx Management and Workers' Camp Management)
- Security Management Plan
- E&S Change Management 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. Where a measure in this Chapter derives from the ESIA (ÇINAR Mühendislik, January 2026) and is elaborated or refined in this ESMP, the two are read together and the more detailed requirement governs. Where a Turkish regulatory requirement and an applicable international standard (the World Bank ESSs and the World Bank Group EHS Guidelines) differ, the more stringent requirement applies.

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 based on the final detailed design and before commencement of the relevant activities,
- 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. -All structures and tunnels within the Project will be designed in accordance with Türkiye Bina Deprem Yönetmeliği (Turkey Building Earthquake Regulation, TBER) 2018 and, for transportation structures, Türkiye Deprem Yönetmeliği (2020) – Principles for the Design of Highway and Railway Bridges and Viaducts Under Seismic Effect, and Türkiye Deprem Yönetmeliği (2020) – Principles for the Design of Highway and Railway Tunnels and Other Buried Structures Under Seismic Effect, together with the Disaster Areas Building Regulation and relevant national standards, using site-specific seismic hazard parameters. System-level seismic performance objectives will be defined within the detailed design documentation. A site-specific seismic hazard evaluation study will be undertaken at detailed design stage in accordance with the Specification of Seismic Design for Transportation Structures (2020), and the early earthquake warning system provided within the signalling and electromechanical auxiliary systems will be integrated with the operational safety arrangements of the Railway Safety Plan. -Pre-construction building condition surveys will be undertaken; predicted settlement contours and trigger/limit values will be defined; and real-time monitoring, including precise levelling, in-place inclinometers and building monitoring, will be implemented. In soft ground, Earth Pressure Balance (EPB)/slurry TBM pressure control will be applied to minimize settlement risks.	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.	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
			- 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 (Impact on Surface Water) of the 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. - Prepare and implement an Erosion and Sediment Control Plan, including silt fences, sediment retention ponds, stabilized construction entrances and wet-season stockpile covering - Establish exclusion buffers around reservoir inflows and restrict construction plant access within drinking water protection zones. These zones are those defined by the Regulation on the Protection of Drinking and Utility Water Basins (Official Gazette 28.10.2017 No. 30224, as amended by Official Gazette 27.08.2020 No. 31226) and, within the İSKİ jurisdiction, by the İSKİ Drinking Water Basins Regulation: absolute protection zone 0–300 m; short-distance protection zone 300–1,000 m; medium-distance protection zone 1,000–2,000 m; and long-distance protection zone from 2,000 m to the catchment boundary, measured horizontally from the maximum water-level shoreline. Before mobilisation the D+B Contractor will obtain the mapped zone boundaries and the registered water-supply well and intake locations from the competent authority (İSKİ, DSİ or the relevant municipality), transfer them to the Project GIS and to the C-ESMP site layouts as no-go and restricted-access areas, and demarcate them on the ground. Activities within the Ömerli, Büyükçekmece, Alibey and Sazlıdere basins will comply with Articles 9 to 12 of that Regulation. - Provide enhanced secondary containment in drinking water protection zones; prohibit above-ground fuel storage greater than 5,000 L within 100 m of watercourses. - Prepare and implement a Tunnel Dewatering Management Plan, including pre-dewatering piezometer baseline surveys and agreed drawdown thresholds. - Treat and discharge tunnel dewatering water in compliance with the Water Pollution Control Regulation.			
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. Permitted dewatering abstraction and discharge rates and the maximum permissible groundwater drawdown will be agreed with DSİ before dewatering commences. For structures above or adjacent to tunnelling and deep excavation works, the C-ESMP will define receptor-specific settlement trigger and action values, together with the instrumented monitoring, notification, response and work-suspension procedures that apply when those values are reached, in place of generic references to good practice. - Prepare a Ground Investigation and Geotechnical Baseline Report based on comprehensive boreholes, in-situ and laboratory testing, and rock-mass classification along the alignment; use the GBR to inform design and construction. - Implement settlement-controlled tunnelling and excavation, including pre-construction building condition surveys, predicted settlement contours, trigger/limiting values, and EPB/slurry TBM pressure control in soft ground. - Prepare and implement a Dewatering Management Plan, including pre-dewatering piezometer baseline, predicted drawdown and settlement, controlled dewatering with recharge where required, and agreed drawdown limits with İSKİ/DSİ.	Moderate	AYGM PIU	**Implementing:** D+B Contractor **Supervising:** Supervision Consultant **Monitoring:** AYGM and 3rd Party E&S Consultant
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 -Treat worker camp wastewater through package biological treatment units or municipal sewerage connection; ensure effluent complies with the Urban Wastewater Treatment Regulation and dispose of sludge through licensed facilities.	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 on inert spoil stockpiles; chemical dust-binding agents will not be applied to topsoil stockpiles intended for reuse, for which the dust-control measure is the temporary vegetation or geotextile cover required under the soil measures - 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, being the air quality monitoring receptors established for the Project together with any further sensitive receptors (dwellings, schools, health facilities and places of worship) confirmed in the Lot-Specific ESIA - 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

Subject	E&S Risks	Description of Risk/Expected Impact	Mitigation Measures	Final Impact Significance	Responsibility	
					Development / Definition	Implementation
			- Prepare a site-specific Dust Suppression Plan for each Lot as part of the C-ESMP before any vegetation clearance. - Enforce speed limits of 15 km/h on unpaved internal site roads. - Apply enhanced dust control measures at construction zones within 500 m of residential areas, schools and hospitals, including the Uskumruköy Sarıyer zone. - Prepare a Blasting Management Plan with a certified explosives engineer if blasting is required. - Notify communities at least 48 hours before any blasting activity.			
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. - Use construction equipment suitable for high-temperature conditions. - Implement heat stress management measures, including adjusted working hours, shaded rest areas and worker awareness programmes. - Use water efficiently and apply controlled dust suppression measures. - Plan water sourcing to avoid pressure on local water resources. - Install temporary drainage systems and manage site runoff. - Protect stockpiles and exposed surfaces from erosion and sediment mobilisation. - Develop flood emergency response procedures and alternative site access arrangements. - Apply slope stabilisation measures and proper excavation practices.	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. This threshold is the temporary-storage permitting threshold of the Waste Management Regulation and is not a Project generation estimate; the ESIA does not quantify hazardous waste generation, stating that the quantities of chemicals and hazardous substances used are anticipated to be limited. Lot-specific hazardous waste streams and quantities will be quantified in the Lot-Specific ESIA and the Lot Waste Management Plan, and the storage, permitting and disposal arrangements set accordingly. - 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. - Avoid and minimize waste generation through efficient design, material planning, accurate quantity estimation and careful material handling. - Investigate off-site beneficial reuse opportunities before disposal, including supply of suitable excavated material to other infrastructure projects or approved beneficial use schemes. - Characterize and classify excavated material before reuse, temporary storage, transport or disposal. - Undertake immediate segregation and assessment of potentially contaminated materials, particularly in brownfield and industrial sections of Lot 1, before any movement off site. - Undertake representative sampling and accredited laboratory analysis of excavated material before it is stockpiled, reused or removed from site, covering pH, total petroleum hydrocarbons (TPH), heavy metals and other Lot-specific parameters, and use the results to classify the material and to determine its reuse or disposal route, as defined in the Waste Management Plan. The sampling programme is informed by the baseline soil-contamination survey required for brownfield, urban and industrial sections before excavation commences. - Prohibit transport of contaminated material to İSTAÇ candidate disposal sites; use separate licensed hazardous waste disposal routes where required. - Re-confirm Environmental Permit status at least 3 months before haulage commences to each site and annually thereafter. - Report any change in disposal site licensing status to the CSC and AYGM PIU immediately and identify an alternative disposal route. - Confirm spoil haul routes in the Lot-specific Construction Traffic Management Plan. - Load and sheet spoil transport vehicles to prevent spillage and dust. - Dispose of contaminated soils only at licensed hazardous waste facilities and not at confirmed spoil disposal sites. - Manage concrete and cement waste through impermeable bunded washout areas at batching plants. - Prohibit discharge of concrete washout water to soil or watercourses. - Collect New Austrian Tunnelling Method (NATM) shotcrete rebound and dispose of it as construction waste.	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
			- Characterize and classify spoil before transport to disposal sites. - Take representative spoil samples, including one composite sample per 5,000 m³ for pH, TPH and heavy metals. - Apply enhanced controls within drinking water protection zones of Ömerli, Büyükçekmece, Sazlıdere and Alibey Dams.			
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. - A Topsoil Management Plan as part of the C-ESMP before vegetation clearance or topsoil stripping will be prepared. - Pre-stripping topsoil depth surveys at all surface works areas will be conducted. - Appropriate topsoil stripping methods and segregate topsoil from subsoil, spoil and construction waste will be applied. - Temporary vegetation or geotextile cover will be provided for topsoil stockpiles stored for more than 6 months. Chemical dust-binding agents will not be applied to these stockpiles; dust control on topsoil intended for reuse is achieved by this cover, supplemented by water spraying where required. - Stormwater protection around topsoil stockpiles, including bunding and diversion drains will be provided. - Post-construction decompaction, including subsoiling to a minimum depth of 400 mm before topsoil replacement will be applied. - Temporarily disturbed areas within 6 months of section completion will be reinstated. - Construction waste will be removed, topsoil will be replaced to original depth and disturbed areas with locally appropriate native species will be revegetated. - Calcicole species or lime-tolerant ecotypes will be used in calcareous Rendzina zones. - Invasive species will be prohibited in revegetation, including Ailanthus altissima, Robinia pseudoacacia, Buddleja japonica, Phytolacca americana and Xanthium strumarium.	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. - 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. - An Erosion and Sediment Control Plan will be prepared and implemented for all surface construction works. - Apply erosion controls including silt fences, sediment traps, straw wattles and retention of vegetated buffer strips above stream crossings. - Un-revegetated slope length will be limited to 15 m before a sediment break in steep Rendzina terrain. - Conduct targeted baseline soil contamination surveys for brownfield, urban and industrial sections of the alignment, particularly the Kocaeli industrial corridor and urban İstanbul sections. - Include historical land use review, visual inspection and soil sampling for TPH, BTEX, heavy metals and pH in baseline contamination surveys.	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
			- Prepare and implement a Contaminated Land Management Protocol based on baseline survey findings. - Define classification criteria for contaminated soils with reference to Turkish Soil Contamination Regulation and WBG EHS Guidelines. - Segregate contaminated soils and apply sampling, analysis and disposal procedures.			
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	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 - Optimize working routines and site conditions at construction sites. - Implement periodic maintenance of construction machinery and equipment. - Limit truck routes and speeds where trucks operate close to sensitive receptors. - Spread vibration-generating activities over time to avoid simultaneous operation of multiple vibration sources. - Install solid site hoarding or temporary acoustic barriers of 3–4 m height between active works and nearest façades where receptors are within direct line of sight. - Specify and prioritize low-noise plant, equipment and vehicles with the lowest practicable sound power levels. - Sequence construction works to avoid simultaneous operation of multiple high-noise equipment at the same location. - Prohibit unnecessary vehicle idling and enforce on-site speed limits. - Route construction traffic away from settlements where alternative routes or service roads are available. - Prefer bored piles or Continuous Flight Auger piling over impact-driven piling where ground conditions and structural requirements permit. This preference applies in particular where noise- or vibration-sensitive receptors are identified within the zone of influence established by the Lot-Specific ESIA noise and vibration assessment; where impact-driven piling is unavoidable at such locations, its use will be justified in the C-ESMP and accompanied by receptor-specific attenuation, real-time monitoring and working-hour controls. - Use variable-energy hydraulic impact hammers with adjustable force where driven piling is unavoidable. - Select smaller and lighter equipment where it is feasible to reduce vibration generation. - Sequence piling and high-vibration works to start furthest from the most sensitive receptors and progress towards more critical areas as site-specific experience is gained.	Negligible	AYGM PIU	**Implementing:** D+B Contractor **Supervising:** Supervision Consultant **Monitoring:** AYGM and 3rd Party E&S Consultant
Biodiversity	Population of endemic and rare species decrease	Moderate	Implement the Biodiversity Management Plan (ESMP Appendix-2) 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: • Lot-specific pre-construction and pre-clearance flora surveys shall confirm the location and extent of affected populations before vegetation clearance or topsoil stripping. • 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. • No vegetation clearance shall commence at confirmed locations until the required seed, bulb or other plant-material collection and protection measures have been completed. • 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

Subject	E&S Risks	Description of Risk/Expected Impact	Mitigation Measures	Final Impact Significance	Responsibility	
					Development / Definition	Implementation
Biodiversity	Habitat loss and endemic\rare species population decrease Trend and population decrease of threatened species	Moderate	Implement the Biodiversity Management Plan (ESMP Appendix-2) and the applicable lot-specific Biodiversity Action Plan. Significant residual impacts and any required compensation or offset measures shall be addressed through the applicable BAP. 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 based on lot-specific survey results, recipient-site suitability and competent-authority requirements. - 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 unless different habitat-specific restoration or compensatory requirements are established through permits, detailed assessment or the applicable BAP.	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	Implement the Biodiversity Management Plan (ESMP Appendix-2) Since the field surveys along the project corridor were conducted in June, some early spring geophyte species could not be detected. Therefore, lot-specific surveys shall be conducted during the appropriate species-specific detection periods before vegetation clearance including Ornithogalum pascheanum, Galanthus plicatus subsp. byzantinus and Crocus pestalozzae. The survey timing shall be adjusted according to phenology and seasonal conditions and shall not be limited to February. Where target species are identified, the relevant avoidance, collection, translocation and ecological hold-point requirements shall be completed before works commence.	Minor	AYGM PIU	**Implementing:** D+B Contractor **Supervising:** Supervision Consultant **Monitoring:** AYGM and 3rd Party E&S Consultant
Biodiversity	Habitat loss Trend and population decrease of threatened species	Moderate	Implement the Biodiversity Management Plan (ESMP Appendix-2) 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. The key ecological corridors and crossing locations, and the related mitigation and monitoring requirements, are identified in the Biodiversity Management Plan (ESMP Appendix-2): - 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 lot specific 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. - Support will be provided for the insulation of hazardous power lines and installation of bird diverters along key migratory routes. - Post-construction monitoring shall continue for the period defined in the lot-specific BMP/BAP and shall be extended until the applicable habitat-recovery and crossing-functionality criteria are achieved. - 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.	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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			- Lot- and receptor-specific indicators, baselines, success criteria and action thresholds shall be used to assess effectiveness. - Monitoring shall also cover the effectiveness of crossing structures, fencing and guide features and shall trigger corrective design or management measures where wildlife movement remains restricted.			
Biodiversity	Insufficient wildlife connectivity / lack of fauna crossings	Moderate	- Incorporation of additional underground passages for small animals as a separate biodiversity mitigation measure, in accordance with the corresponding measures of the Biodiversity Management Plan (ESMP Appendix-2). - The number, location, spacing and design of fauna passages shall be determined through the lot-specific ecological-connectivity assessment and final design, considering target species, habitat continuity, topography, drainage structures and adjacent infrastructure. - 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. - Fencing and guide structures shall direct fauna toward crossing structures and prevent access to unsafe railway areas.	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, using the information and measures of the Biodiversity Management Plan (ESMP Appendix-2). - 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. - Coordinate ecological-connectivity measures across adjoining lots and with existing transport infrastructure, including crossing locations, fencing tie-ins and maintenance responsibilities. - Existing functional wildlife corridors shall not be severed or obstructed unless an ecologically equivalent or improved alternative has been designed and approved.	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 identified through the lot-specific seasonal restriction schedule. - Use blasting mats and controlled blasting methods. - Establish receptor-specific vibration action and limit values based on the sensitivity of identified habitats, nests, roosts or fauna receptors - Post-blast: stabilize slopes and revegetate disturbed surfaces. - Undertake pre-blast ecological inspections where sensitive fauna may be present and apply species-appropriate exclusion or disturbance measures under the direction of the Biodiversity and Ecology Specialist. - Suspend or modify blasting where monitoring identifies significant disturbance, injury, mortality or habitat damage.	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	- Prepare and implement Invasive Species Management Procedure - Clean machinery before site entry. - Inspect fill and plant material sources. - Promptly control or remove detected invasive alien species using species-appropriate methods and legally acceptable disposal arrangements. - Conduct risk-based and seasonally appropriate IAS inspections and maintain records. - Prevent contaminated soil or plant material from being transferred to restoration, spoil-storage or unaffected areas. - Monitor treated areas for regrowth and repeat control measures where required.	Minor	E&S Specialist	**Implementing:** D+B Contractor **Supervising:** Supervision Consultant **Monitoring:** AYGM and 3rd Party E&S Consultant
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. - Resume works only after ornithologist approval. - Apply the lot-specific breeding-season restriction schedule. Vegetation clearance outside the preferred period may proceed only where pre-clearance surveys confirm the absence of active nests and the activity is approved through the applicable ecological hold point. - Undertake targeted monitoring and adaptive mitigation at identified high-risk breeding and migratory-bird locations.	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. - Ensure no ground-disturbing works commence in areas with known or suspected cultural heritage sensitivity until required cultural heritage screening, clearance or authority approval is obtained.	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
			- Undertake cultural heritage screening and clearance for all auxiliary and associated facilities, including disposal sites, camps, access roads, laydown areas and borrow areas, before establishment. - Update Lot-specific Cultural Heritage Management Plans where cultural heritage assets are identified during screening or construction activities. - Incorporate Conservation Council decisions, protection requirements and restrictions into Lot-specific Cultural Heritage Management Plans prior to ground-disturbing activities. - Establish receptor-specific peak particle velocity (PPV) trigger and action levels for vibration-sensitive cultural heritage structures, considering receptor type, structural condition and applicable standards. - Obtain required approvals or no-objections for proposed vibration thresholds before works generating significant vibration commence. - Undertake structural-condition surveys at vibration-sensitive cultural heritage receptors within the defined zone of influence. - Document existing structural conditions through photographic records, written descriptions and baseline vibration measurements. - Make the Chance Find Procedure contractually binding and ensure it is flowed down to all subcontractors. - Stop works immediately in the event of a chance find, protect the area and notify the competent authority. - Undertake archaeological monitoring or watching brief during ground-disturbing works in areas of known or potential archaeological sensitivity.			
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." AYGM will engage with the planning departments of the affected municipalities, share the alignment and the location of Project facilities, and seek their reflection in municipal development plans so that future land-use conflicts are avoided or minimised; these engagements will be recorded in the SEP. - PIU will establish a monitoring mechanism (quarterly reports) on in-migration trends, housing rental price fluctuations, and community concerns. - Labour influx through workforce planning, accommodation arrangements and codes of conduct will be managed to reduce pressure on local communities and infrastructure. - Worker-community interactions and associated risks, including GBVH and SEA/SH, in line with ESMP and LMP provisions will be addressed. - Training, supervision and compliance mechanisms for contractor personnel and subcontractors, with emphasis on appropriate behaviour standards and community interaction protocols will be implemented.	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 updated Labour Management Procedure (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 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.	Minor	AYGM (in cooperation with TOKİ, municipalities, provincial administrations, NGOs)	**Implementing:** AYGM **Supervising:** Supervision Consultant **Monitoring:** 3rd Party E&S Consultant
Stakeholder Engagement Land acquisition-	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	Major	- Involuntary physical resettlement impacts will be avoided. - In cases where avoidance is not possible, an 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	Moderate	AYGM PIU	**Implementing:** AYGM **Supervising:** Supervision Consultant **Monitoring:**

Subject	E&S Risks	Description of Risk/Expected Impact	Mitigation Measures	Final Impact Significance	Responsibility	
					Development / Definition	Implementation
Residential areas	this impact as much as possible. Involuntary physical resettlement caused by other projects overlapping with the AoI may exacerbate the overall effect.		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. - Avoidance of densely populated areas (where feasible) will be prioritized. - Compensation at full replacement cost for affected land, structures and other eligible assets in accordance with updated RF and ESS5 requirements will be provided. - Compliance with land access procedures through documented processes and monitoring will be verified.			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. - Compensation at replacement cost for affected commercial structures, income-generating assets and other eligible losses will be provided. - Livelihood restoration support for commercial and industrial activities, particularly in areas such as Tuzla and Kocaeli will be provided. - Compensation and assistance will be completed before contractor land access. - Access to commercial premises and services where feasible through alternative access routes, local crossings or site-specific arrangements will be maintained.	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. - Acquisition of high-value agricultural land will be avoided or minimised (where feasible). - Compensation at replacement cost for affected agricultural land, crops, trees and income-generating assets will be provided. - Remaining agricultural land will be maintained or restored. - Alternative access routes, local crossings and design adjustments in areas with fragmented parcels or shared ownership structures will be provided. - Livelihood restoration measures for agricultural livelihoods, including land-based compensation, cash assistance, transitional support and targeted livelihood programmes will be implemented.	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. - Livestock-dependent households and livelihood systems will be identified through socio-economic surveys and census activities. - Access to remaining land and services and markets where livestock activities may be affected will be maintained or restored.	Moderate	AYGM PIU	**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	
					Development / Definition	Implementation
			- Livelihood restoration support will be provided to livestock-dependent households where access to land, facilities or income sources is disrupted.			
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. - Access to remaining grazing areas will be maintained and restored where feasible. - Alternative access arrangements will be provided to grazing access which is disrupted by construction activities. - Loss of access to grazing land and natural resources will not result in exclusion from livelihood restoration support.	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-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.	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 - 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. - Identify and support vulnerable workers, including women, migrant and subcontracted workers, through inclusive labour management practices and targeted monitoring. - Ensure Contractors' and sub-contractors' worker accommodation facilities meet IFC/EBRD guidelines for worker accommodation (2009). - Contractors and sub-contractors should maintain records for its entire workforce subject to the annual external labour audits - Ensure that reporting templates for workforce composition, key labour issues/risks, and labour focused reportable events are agreed before the E&S reporting by CSC commences.	Minor	AYGM PIU (based on ESIA/ESMP and LMP)	**Implementing:** D+B Contractor (to develop Labour Management 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. - Address GBVH and SEA/SH risks through labor influx management, worker codes of conduct, training, supervision and monitoring mechanisms.	Minor	AYGM PIU	**Implementing:** D+B Contractor **Supervising:** Supervision Consultant **Monitoring:** AYGM and 3lrd 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. - 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.	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
			- 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			
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. - Site-specific Emergency Response Plans for construction scenarios will be developed and implemented. - Procedures to respond to accidents, spills and other emergencies will be developed. - Emergency preparedness and response arrangements with local authorities and emergency response services will be coordinated. - Location-specific emergency access plans will be prepared to ensure construction activities do not delay emergency response times. - Emergency access route management and communication protocols will be established for affected communities. - Emergency response training and drills will be implemented. - Incident reporting and emergency response systems will be maintained.	Minor	AYGM PIU	**Implementing:** D+B Contractor **Supervising:** Supervision Consultant **Monitoring:** AYGM and 3rd Party E&S Consultant
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.	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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			- 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.			
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
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.	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
			- 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.			
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
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

Subject	E&S Risks	Description of Risk/Expected Impact	Mitigation Measures	Final Impact Significance	Responsibility	
					Development / Definition	Implementation
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 technical failure, which may result in unexpected system behavior and accidents affecting technical personnel.	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 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.	Minor	AYGM PIU	**Implementing:** D+B Contractor **Supervising:** Supervision Consultant **Monitoring:** 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

Subject	E&S Risks	Description of Risk/Expected Impact	Mitigation Measures	Final Impact Significance	Responsibility	
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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. -Establishment of ad-hoc or unauthorized worker camps will be strictly prohibited, and compliance will be monitored by the Contractor and E&S Consultant.	Minor	AYGM PIU	**Implementing:** D+B Contractor **Supervising:** Supervision Consultant **Monitoring:** AYGM and 3rd Party 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.	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
			- 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. ***Traffic and Transport Management:*** - Prepare and implement Lot-specific Traffic Management Plans, including haul route optimization, traffic controls, driver training, pedestrian protection, emergency access planning and measures for constrained roads. - Identify and optimize haulage routes in coordination with relevant authorities, including UKOME, municipalities, KGM and İBB where relevant. - Collect missing baseline traffic data prior to construction to refine haul route selection, traffic risk management and peak-period controls. - Obtain all required haulage permits and route approvals before haulage commences. - Schedule heavy vehicle movements to reduce peak-time community exposure, including restrictions during morning and evening peak hours where required. - Restrict haulage to approved working hours and prohibit night-time HGV movements except in exceptional circumstances with written approval. - Implement traffic control measures, including speed limits, driver training, traffic marshals, route restrictions and restrictions for unsuitable roads. - Limit vehicle speeds to 30 km/h through residential areas and community junctions. - Implement temporary pedestrian protection measures, including segregated walkways, crossings, warning signage and school-zone safety measures in densely populated or sensitive areas. - Establish alternative access routes and emergency vehicle access protocols where construction affects existing road capacity. - Prohibit HGV from parking on carriageways and ensure any obstruction blocking emergency access is cleared within 15 minutes. - Require all HGVs using project haul routes to carry registered vehicle passes and prohibit unregistered vehicles from project haul routes. - Ensure all haulage vehicles comply with applicable axle load requirements, including GVW ≤40 t and net payload ≤25 t. - Remove non-compliant vehicles from service pending investigation. - Install wheel-wash facilities at all construction sites and compound exits. - Ensure all spoil loads are sheeted or enclosed before leaving the site boundary. - Deploy dedicated road sweepers on haul routes during working hours where dust or mud tracking may occur. - Conduct pre-construction pavement condition surveys on all haul routes, including video records and Pavement Condition Index surveys, and repeat surveys after construction completion. - Prioritize pavement condition surveys on D-020 Çatalca (Lot 4) and the Beykoz secondary road network (Lot 2) due to narrower road geometry and lower design standards. - Ensure the Contractor is responsible for attributable pavement deterioration caused by construction traffic. - Implement a community road safety programme and agree relevant measures with municipalities. - Implement road safety audit recommendations before haulage commences, including junction visibility improvements, pedestrian crossings, warning signage near schools and speed enforcement near vulnerable receptors. ***Disposal Site Access and Vehicle Booking*** - Confirm valid Environmental Permits for all disposal sites at least 3 months before haulage commences and re-confirm permit status periodically. - Implement a contingency disposal plan and notify CSC and AYGM PIU if any disposal site permit lapses. - Pre-agree material acceptance protocols with all disposal site operators. - Implement an electronic vehicle booking system to ensure no vehicle is dispatched without a confirmed site acceptance slot. - Use the vehicle booking system to prevent queuing at disposal site entrances or on public roads. - Maintain documented delivery records for all loads, including vehicle ID, volume, date, time and receiving site. ***Beykoz Special Haul Strategy (Lots 2)*** - Prepare and obtain approval for a Beykoz Special Haul Strategy before Lot 2 haulage commences. - Conduct 24-hour classified traffic counts and vehicle compatibility assessments for 40 t articulated HGVs on all secondary roads in the Beykoz egress corridor.			

Subject	E&S Risks	Description of Risk/Expected Impact	Mitigation Measures	Final Impact Significance	Responsibility	
					Development / Definition	Implementation
			- Undertake geometric surveys covering carriageway width, gradient, sight distance, turning radii, and bridge or culvert load and clearance ratings. - Provide passing places at maximum 200 m intervals on secondary haul roads in the Beykoz egress corridor. - Deploy dedicated traffic management staff at road junctions and school zones during haulage hours. - Design and construct temporary HGV-compatible access roads where existing roads are not suitable for 40 t articulated vehicles. ***O-7 / YSS Bridge and Peak Loading Management*** - Obtain formal HGV haulage routing authorisation from KGM and İBB for O-7 / YSS Bridge use. - Agree vehicle booking protocols at S-2 Çiftalan entrance to prevent vehicle queuing on O-2 or public roads. - Avoid Istanbul peak traffic periods for convoys using O-7 / YSS Bridge, including 06:30–09:30 and 16:30–19:30. - Manage peak concurrent haulage during the 2029–2031 overlap period through haul scheduling reviews and volume reallocation where required. - Reallocate haul volumes where O-7 West loading exceeds defined thresholds, including restricting haulage to off-peak hours, adjusting disposal site operating hours or temporarily reassigning volumes to alternative disposal sites. ***Community Exposure to Construction Activities:*** - Prepare and implement a Community Health and Safety Plan to manage community exposure risks. - Delineate and secure construction areas through fencing, signage and controlled access. - Implement hazard signage, safe mobility routes and site safety procedures to reduce community exposure to hazards. - Appoint Community Liaison Officers to maintain continuous communication and rapid response to community health and safety concerns. - Conduct communication and awareness activities for local communities, including railway safety awareness where relevant. - Provide advance notification of works and maintain accessible grievance mechanisms for rapid response to community health and safety concerns. - Install adequate lighting around construction areas and access routes, particularly in urban sections. - Implement specific measures for vulnerable groups, including safe access arrangements for elderly persons and persons with disabilities. - Coordinate with local authorities where works interact with public spaces or infrastructure. ***Spoil Stockpile and Site Appearance Management*** - Design and manage waste and spoil stockpiles to minimise visual intrusion. - Control stockpile height, footprint and slope angle. - Manage waste and spoil storage areas with dust suppression, drainage control, erosion prevention, perimeter fencing and access control. - Maintain construction sites in an orderly condition and avoid uncontrolled material storage, unmanaged waste accumulation, damaged fencing and unnecessary vehicle movements beyond approved areas. ***Night-time Lighting Management*** - Limit temporary construction lighting to areas where it is required for safety, security or operational purposes. - Direct lighting downward and inward, and use shielding to prevent unnecessary light spill towards residential receptors and the wider landscape. - Apply additional lighting controls at construction compounds, worker camps, access roads and storage areas, particularly in rural and forested areas. ***Temporary Access and Haul Route Visual Management*** - Plan temporary access roads and haul routes to minimise unnecessary vegetation removal, visual disturbance and landform alteration. - Limit haul route and access road impacts to the minimum area required for safe construction access. ***Reinstatement and Revegetation*** - Reinstate areas disturbed by temporary works progressively during and after construction. - Reinstate camps, laydown areas, batching plants, temporary access roads and spoil storage areas once they are no longer required. - Return affected areas to their previous land use or to an agreed condition compatible with the surrounding landscape character. - Strip, store separately and reuse topsoil where practicable. - Use native or locally appropriate species for revegetation where practicable, considering ecological suitability, landscape character and North Marmara Forest requirements.			

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. - Maintain routine track drainage systems to prevent uncontrolled runoff and water quality impacts. - Maintain oil-water separators in operational areas. - Maintain drainage and water management systems to prevent contamination of surface water and groundwater resources. - Monitor water quality where operational activities may affect sensitive water resources. - Coordinate with relevant authorities in case of operational impacts on water resources or community water supply.	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). - Ensure operational maintenance depots comply with the national Regulation on Air Quality Assessment and Management. - Prohibit open burning of waste at all operational facilities. - Ensure station and depot vehicle fleets comply with minimum Euro 6 emission standards. - Manage vegetation in the track corridor through mechanical clearing only and prohibit open burning.	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. - Use materials and components with appropriate thermal tolerance. - Install monitoring systems to detect overheating and thermal stress. - Apply vegetation management and soil stabilisation measures to maintain embankment stability. - Design drainage systems to accommodate extreme rainfall events. - Protect critical infrastructure from water ingress and flooding. - Maintain emergency response procedures for flood events. - Conduct regular inspection and maintenance of slopes, drainage systems and infrastructure. - Implement vegetation management along the corridor to reduce wildfire risk. - Maintain fuel load control in areas with wildfire exposure. - Monitor energy consumption and address operational inefficiencies. - Maintain infrastructure and systems to ensure reliable rail services. - Minimise service disruptions through regular maintenance and asset management. - Protect and maintain the modal shift from road and air transport to rail to secure long-term GHG reductions.	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

Subject	E&S Risks	Description of Risk/Expected Impact	Mitigation Measures	Final Impact Significance	Responsibility	
					Development / Definition	Implementation
			- Ensure compliance with applicable regulations and safety procedures for the transport of goods, including hazardous materials. - Develop route-specific risk management measures for hazardous materials transport. - Coordinate hazardous materials emergency preparedness arrangements with emergency responders and relevant authorities.			**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. - Install operational noise mitigation measures at receptors where moderate noise impacts are predicted, including purpose-built noise barriers, noise berms or other feasible screening measures. These operational noise mitigation measures will be designed, constructed and installed by the D+B Contractors as part of the Works, on the basis of the operational noise modelling undertaken at detailed design stage, and will be in place before commencement of commercial operation. Where, in either the construction or the operation phase, predicted or monitored noise or vibration levels would render a residential or other sensitive property unfit for its current use and no feasible technical mitigation can achieve compliance, compensation or relocation will be provided in accordance with the Resettlement Framework and the Lot Noise and Vibration Management Plan. - Design noise barriers considering receptor distance, railway and receptor levels, terrain conditions, barrier height, constructability and social acceptance; barrier height should generally not exceed approximately 4 m. - Use noise berms where space, terrain conditions and material availability allow, particularly where they provide better visual integration and acoustic performance. - Use vegetation screening where appropriate to improve visual amenity and community acceptance, noting that vegetation is not relied upon as a primary acoustic mitigation measure. - Implement proposed 3 m high noise barriers at locations where moderate operational noise impacts are predicted, with final dimensions and locations confirmed during detailed design. - Consider reduced train speed profiles in sections close to residential or other sensitive receptors where operational noise or vibration risks are identified. - Incorporate low-noise and low-vibration rail technologies where required, including rail pads, ballast mats, high-resilience fasteners, floating slab track beds and resilient-supported ties. - Undertake detailed operational vibration assessment during detailed design, considering final track form, support system, ground conditions, rolling stock characteristics, axle loads and operating speed profiles. - Apply vibration-reducing track components where detailed design-stage assessment identifies potential exceedances at sensitive receptors. - Conduct commissioning-stage noise and vibration measurements to verify operational performance and confirm the effectiveness of mitigation measures. - Carry out periodic operational noise and vibration monitoring at sensitive receptors and adjust operational controls where thresholds are exceeded. - Maintain tracks, rail joints and rolling stock regularly to minimise operational noise and vibration generation.	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	Implement the Biodiversity Management Plan (ESMP Appendix-2) and the applicable Biodiversity Action Plan. 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 operation phase and during the appropriate phenological periods. 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 Biodiversity Management Plan - 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
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. - Record and georeference wildlife mortality incidents and implement corrective measures where recurring mortality is identified.	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. - Implement technically feasible mitigation measures if significant disturbance is detected, while maintaining railway-safety requirements.	Negligible	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	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. - Use downward-directed, shielded and low-intensity lighting where operationally feasible. - Adjust lighting direction, intensity or duration where monitoring identifies significant disturbance.	Negligible	AYGM PIU	**Implementation:** TCDD **Monitoring:** 3rd Party E&S Consultant
Biodiversity	Invasive Alien Species (IAS) spread	Minor	- Conduct risk-based and seasonally appropriate 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. - Monitor treated areas for regrowth and repeat control measures where necessary.	Minor	E&S	**Implementation:** TCDD **Monitoring:** 3rd Party E&S Consultant
Biodiversity	Biodiversity Monitoring of sensitive and protected species	Moderate	- Implement Biodiversity Management Plan - Continue Critical Habitat Monitoring Program (fauna and flora). - Conduct seasonal surveys by qualified ecologists. -Review and update the Biodiversity Action Plan where monitoring identifies declining trends, ineffective mitigation, unforeseen impacts or failure to achieve established biodiversity targets. - 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. - Corrective actions where livelihood restoration monitoring identifies incomplete recovery of agricultural income or land usability should be implemented.	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. - 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.	Negligible	AYGM PIU	**Implementing:** TCDD **Supervising:** Supervision Consultant **Monitoring:** 3rd Party E&S Consultant
Gender and Vulnerable Groups (Community	- 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.	Minor	AYGM PIU	**Implementing:** TCDD **Supervising:** Supervision Consultant

Subject	E&S Risks	Description of Risk/Expected Impact	Mitigation Measures	Final Impact Significance	Responsibility	
					Development / Definition	Implementation
access and mobility)			- Provide adequate lighting, CCTV, and security presence to enhance safety. - Include women and vulnerable groups in monitoring and feedback processes during operation. - Implement corrective actions where monitoring or stakeholder feedback identifies barriers faced by vulnerable groups in accessing project benefits or mitigation measures.			**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 movements, and accidents involving both personnel and passengers.	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. - 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.	Minor	AYGM PIU	**Implementing:** TCDD **Supervising:** Supervision 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	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.	Minor	AYGM PIU	**Implementing:** TCDD **Supervising:** Supervision Consultant

Subject	E&S Risks	Description of Risk/Expected Impact	Mitigation Measures	Final Impact Significance	Responsibility	
					Development / Definition	Implementation
	include being struck by moving trains, slipping on tracks, or falling from structures especially in poor weather or low visibility conditions.		- 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.			**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 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.	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
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 controls further raises the risk of exposure, evacuation challenges, and cascading disruptions in case of an incident.	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. - 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. - Emergency response procedures for operational scenarios will be developed and implemented. - Operational emergency preparedness and response with local authorities and emergency response services will be coordinated.	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
			- Tunnel-specific emergency procedures, including evacuation, fire response and communication systems will be prepared and implemented. - Emergency access routes and communication protocols for affected communities will be maintained. - Periodic emergency response drills will be conducted where required. - Incident reporting and response systems during operation will be maintained.			
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. These measures will be implemented in accordance with the INRAIL Railway Safety Plan (AYGM, March 2026). - Implement railway corridor safety measures, including fencing, signalling, access control and signage, to reduce trespassing and accidental access risks. - Conduct regular inspection and maintenance of fencing, signage, access control infrastructure and safety systems to ensure continued effectiveness. - Apply station and public area safety design measures, including adequate lighting, CCTV, visibility, accessibility and gender-sensitive safety considerations. - Ensure safe and accessible station design, including provisions for persons with reduced mobility and vulnerable users. - Develop and implement Railway Safety Awareness Programmes for communities along the corridor, covering trespassing risks, electrification hazards and safe behaviour around rail infrastructure. - Coordinate with local authorities where operational activities interact with public roads, access points, community infrastructure or emergency response systems. - Monitor operational conditions around key access points to verify assumptions and refine mitigation measures where required. - Prepare and implement tunnel-specific emergency procedures, including evacuation, fire response and communication systems in line with applicable standards. - Implement incident reporting and public communication systems to rapidly inform communities in case of operational incidents. - Ensure compliance with applicable regulations and safety procedures for the transport of goods, including hazardous materials. - Develop route-specific risk management measures for hazardous materials transport, including coordination with emergency responders and appropriate emergency preparedness arrangements. - Monitor and manage operational noise and vibration in areas with sensitive receptors, and apply mitigation measures where required. - Maintain community communication mechanisms to address operational health and safety concerns. - Implement accessible grievance mechanisms for operation-related community health and safety issues. - Maintain incident reporting and public communication systems to rapidly inform communities in case of operational incidents. - Ensure stations and public areas are operated with adequate lighting, visibility, accessibility and gender-sensitive safety considerations.	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. The baseline monitoring will be undertaken by the D+B Contractors and reviewed and verified by the CSC/Engineer before commencement of the relevant works.

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.

Biodiversity monitoring shall be implemented on a lot-specific basis using measurable habitat- and species-level indicators. Monitoring shall assess the effectiveness of avoidance, minimization, restoration and, where applicable, compensation measures, including progress toward the applicable No Net Loss and Net Gain objectives. Where monitoring identifies unexpected impacts, underperformance or failure to meet the defined ecological targets, the D+B Contractor shall revise the relevant mitigation and monitoring measures through documented adaptive management, subject to review by the CSC/Engineer.

The CSC will conduct routine supervision and inspections of the D+B Contractors' environmental, social and OHS performance throughout construction. 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 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.

The D+B Contractors will submit monthly E&S reports to the CSC within 15 days following each reporting period. The CSC will review the Contractor reports and prepare Monthly E&S Monitoring Reports for submission to AYGM PIU and the PMC. The PMC will prepare and submit consolidated Monthly and Biannual E&S Monitoring Reports to AYGM PIU. AYGM PIU will prepare and submit six-monthly E&S monitoring and ESCP compliance reports to the World Bank.

In addition, D+B Contractors shall report to the CSC and AYGM about any inspections and audits carried out by the respective ministries such as the Labor Inspection. The PIOC will also conduct semi-annual external labor audits in accordance with ESS2, and the findings and corrective actions will be reported to AYGM PIU and the World Bank, as applicable.

To strengthen environmental and social governance and ensure transparent compliance with national regulations and lender requirements, the Project will be subject to independent E&S advisory, assurance, monitoring and audits conducted by the PIOC, which will operate independently from the D+B Contractors, the CSC/Engineer and the PMC.

The scope of the PIOC's independent monitoring and audits 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 World Bank ESF and GIIP. The PIOC will conduct regular site inspections, review documentation, interview relevant stakeholders and prepare independent monitoring reports, which will be shared with the AYGM and the World Bank. Corrective actions identified through the PIOC's monitoring and audits will be tracked and addressed through the Project's environmental and social management system..

The PIOC will prepare and submit Monthly Site Visit Reports and Quarterly Progress Reports to AYGM PIU and the World Bank, together with independent audit, External Resettlement Monitoring, external labor audit and other thematic monitoring reports, as applicable. The PIOC will track the closure of corrective actions but will not issue contractual instructions directly to the D+B Contractors.

The D+B Contractor shall immediately notify the CSC and AYGM PIU of any environmental, social, labor, health, safety or security incident or accident and, in all cases, provide the initial notification no later than 24 hours after becoming aware of the event. The D+B Contractor shall also notify the competent national authorities within the timelines required under applicable national legislation.

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), in accordance with the ESCP and ESIRT requirements. 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 submit the required follow-up information to the World Bank. The D+B Contractor shall prepare and submit a detailed incident report, root-cause analysis and Corrective Action Plan within 10 days, where required, unless otherwise agreed, for review by the CSC and onward submission by AYGM PIU and follow the ESIRT process as requested.

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
Stakeholder Engagement and Grievance Mechanism	GM implementation status, grievance registration/resolution and sensitive grievance handling	All project areas and AoI	Implementation: AYGM PIU and Contractor/CLOs Supervision/ Monitoring: CSC	Before construction starts and throughout project lifecycle	Documentation review; grievance database; stakeholder feedback	Timeframes defined in GM procedure; confidential handling for GBVH/SEA/SH	SEP including GM;	% grievances resolved within timeframe; GM operational at all entry points	Monthly	Included in Stakeholder Engagement Budget
Stakeholder Engagement and Grievance Mechanism	Quality, quantity and effectiveness of engagement; vulnerable group outreach	Affected settlements, vulnerable groups, PAPs and community interfaces	Implementation: AYGM PIU / CLOs / Contractor E&S Teams Supervision/ Monitoring: CSC	Pre-construction and throughout implementation	Engagement records; meeting minutes; disclosure logs; feedback analysis	No numeric threshold; engagement to follow SEP commitments	SEP; Disclosure and Consultation requirements	Stakeholder list updated; engagement activities completed; feedback integrated	Monthly/quarterly	Included in Stakeholder Engagement Budget
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	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	% of project workforce hired locally % of female workers among total workforce % of project procurement sourced from local suppliers	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
	- Number of engagement activities with vulnerable groups						Procedures Labour Influx Management Plan prepared by Contractor	Number of information/engagement sessions conducted for vulnerable groups		
Employment Opportunities and Labour Management	Total workforce, local hires, female workers and vulnerable worker groups	All project working areas and contractor/subcontractor workforce records	Implementation: Contractor HR/E&S Team Supervision/ Monitoring: CSC / PIU	Monthly	Payroll/staff records; workforce database; audits	No numeric threshold unless defined in LMP; equal opportunity and non-discrimination requirements	LMP; Labour Law No. 4857; ILO Core Conventions	% local hires; % female workers; vulnerable workers identified and supported	Monthly	Included in Construction Cost
Worker Grievance Mechanism	Worker grievances, acknowledgement/resolution timelines, anonymous/sensitive channels	All work sites, camps and subcontractor workplaces	Implementation: Contractor Supervision/ Monitoring: PIU / CSC	Continuous; monthly review	Grievance register; physical boxes/digital tools; interviews; toolbox talk records	Complaints logged within 24 hours; resolution timeframe per Worker GM procedure	LMP; Worker GM;	% worker grievances resolved within timeframe; all channels operational	Monthly	Included in Construction Cost
Child Labour and Forced Labour	Age verification, document retention, coercion and movement restrictions	All contractor/subcontractor workforce records and sites	Implementation: Contractor Supervision/ Monitoring: CSC / PIU	Monthly file reviews; spot checks	Personnel file review; ID verification; worker interviews; audits	Zero tolerance for child/forced labour; minimum working age per national law	LMP; Labour Law No. 4857; ILO conventions	100% age verification; zero child/forced labour cases	Monthly	Included in Construction Cost
SEA/SH risk management and Prevention (Ch.15)	Training, Code of Conduct, sensitive grievances and support to vulnerable workers	All workforce groups and worker accommodation areas	Implementation: Contractor HR/E&S/GBVH Specialist Supervision/ Monitoring: PIU / CSC	Monthly review; induction and refresher training	Training records; signed CoC; grievance records; worker interviews	Zero tolerance for GBVH/SEA/SH; confidential handling required	LMP; Code of Conduct; GBVH Procedure;	% workers trained; CoC signed; sensitive grievances confidentially managed	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 Workers GM	□ % of workers trained on SEA/SH □ Number of SEA/SH grievances reported and resolved	Monthly	Included in Construction Cost
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	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	- 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

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
	Code of Conduct GM records						ESS2: Labor and Working Conditions Labour Management Procedures Labour Influx Management Plan prepared by Contractor Workers GM			
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
Impacts on Livelihoods / Land Acquisition	Compensation completion, assistance provision and land access documentation	All affected parcels and land access points	Implementation: REE / AYGM PIU Supervision/ Monitoring: CSC	Before land access and throughout RP implementation	RP database; payment records; land access permits; audit trail	No contractor access before compensation/assistance and formal notification completed	RF; RP/LRP; Expropriation Law No. 2942;	100% land access compliant; compensation completed before access	Monthly	Included in Land Acquisition/RP Budget
Impacts on Livelihoods / Land Acquisition	Livelihood restoration progress, inclusion of informal users and vulnerable group support	Affected households, agricultural/commercial/livestock/grazing users and vulnerable PAPs	Implementation: AYGM PIU / Resettlement & Livelihood Specialists Supervision/ Monitoring: CSC	During RP/LRP implementation; post-compensation follow-up	Socio-economic surveys; livelihood tracking database; consultations; grievance records	Income/livelihood restoration targets to be defined in RP/LRP	RF; RP/LRP; SEP	Eligible users identified; livelihood support delivered; vulnerable/informal users included	Monthly/quarterly	RP/LRP Implementation Budget
Permission Regarding Non-Agricultural Use of Agricultural Areas	Non-agricultural use permit	All project areas	Confirms that each D+B Contractor shall prepare and implement	Before construction starts	Documentation	-	Soil Conservation and Land Use Law	Obtaining all necessary permits before starting construction activities	Monthly	No additional 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
			a lot-specific BMP based on the final detailed design, confirmed construction footprint, Project Facilities, updated field conditions and additional biodiversity surveys. Clarifies that the BMP addresses avoidance, minimization, restoration and day-to-day biodiversity management, while significant residual impacts and related conservation actions are addressed through the separate BAP.							
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 and/or permits	All project areas	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 ESS10: Stakeholder Engagement and Information Disclosure	Obtaining all necessary permits before starting construction activities	Monthly	Included in Construction Cost
Ensuring Ground Safety	Ground settlement, building movement, inclinometers, structural response	Buildings, utilities and receptors within settlement zone of influence along tunnel/excavation sections	Implementation: Contractor Supervision/ Monitoring: CSC	Baseline before works; real-time/regular during tunnelling and excavation; until stabilisation	Precise levelling; in-place inclinometers; building monitoring; settlement contours	Trigger/limit values to be defined in design and monitoring plan	Geotechnical Monitoring Plan; Settlement Management Plan; TBER 2018;	No exceedance of settlement limits; corrective action implemented when triggers reached	Weekly/monthly; immediate if trigger exceeded	Included in Construction Cost
Ensuring Ground Safety	Slope movement, support performance and instrumentation readings	Cut slopes, temporary works and weak/swelling ground sections	Implementation: Contractor Supervision/ Monitoring: CSC	During excavation; after heavy rainfall or seismic events; until stabilisation	Geotechnical inspections; inclinometers; survey monitoring; instrumentation records	Design-specific stability criteria and trigger levels	Geotechnical Design; Slope Stability Management Plan; OHS and CHS Plans	No slope failure; inspections completed; corrective support installed where required	Monthly; event-based	Included in Construction Cost
Ensuring Ground Safety	Probe drilling results, geophysical anomalies, inflow/inrush observations	Limestone formations including Dolayoba and Gebze; tunnel face advance zones	Implementation: Contractor Supervision/ Monitoring: CSC	Ahead of tunnelling in identified karst/adverse ground sections	Probe drilling; geophysical forward-looking survey; face logs; inrush records	Trigger criteria to be defined in GBR/method statement	Ground Investigation and Geotechnical Baseline Report; Tunnelling Method Statements;	Probing completed before advance; contingency grouting implemented where required	Monthly	Included in Construction Cost
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	Number of site specific management plans and competence	-	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
							Impacts ESS3: Resource Efficiency and Pollution Prevention and Management			
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 Management	Rill/gully erosion, sediment movement and ESCP control condition	Exposed surfaces, slopes, Rendzina/Luvisol zones and watercourse approaches	Implementation: Contractor Supervision/ Monitoring: CSC	Weekly during active earthworks and after rainfall	Visual inspections; erosion checklist; water sampling if sediment reaches stream	Rill/gully erosion or sediment reaching watercourse triggers immediate control measures	Erosion and Sediment Control Plan; Soil Quality Monitoring Programme;	No uncontrolled erosion; post-rainfall inspections completed; controls repaired promptly	Monthly; immediate event reporting	Included in Construction Cost
Soil Contamination	TPH, pH, heavy metals, BTEX where relevant; contaminated material records	Fuel/maintenance areas, brownfield/industrial sections, spill locations and spoil sampling points	Implementation: Contractor / Licensed Laboratory Supervision/ Monitoring: CSC	Baseline/pre-excavation; annual at risk areas; event-based after spills; 1 composite per 5,000 m³ spoil where required	Soil sampling and accredited laboratory analysis; visual inspection; incident records	Investigation, classification, reuse and disposal decisions shall be based on applicable parameter-specific regulatory criteria, background conditions, site use, risk assessment and competent-authority requirements. Suspected contaminated material shall be segregated and shall not be reused, transported or disposed of before characterization and classification	Contaminated Land Management Protocol; Soil Pollution Regulation; Waste Management Plan;	No unclassified contaminated soil moved; contaminated soil disposed at licensed facilities	Monthly	Included in Construction Cost; laboratory cost to be confirmed
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	LAeq, Lday/Levening/Lnight and exceedance of applicable criteria	Sensitive receptors within AoI, especially 5–30 m near-field receptors and complaint locations	Implementation: Contractor Supervision/ Monitoring: CSC	Continuous/long-term during active construction near receptors; complaint-based;	Noise meters; 48-hour measurements where required; site observations; grievance records	Applicable limits under the Regulation on Environmental Noise Control, permit conditions and receptor-specific	Noise and Vibration Management Plan; Regulation on Environmental	No unaddressed exceedance; mitigation adjusted when thresholds approached/exceeded; grievances resolved	Monthly; immediate for exceedances	Included in Construction Cost; monitoring equipment/lab cost to be

[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
				baseline before works		criteria established in the approved Noise and Vibration Management Plan. WBG EHS Guideline values and cumulative-noise criteria shall be applied where relevant and technically justified.	Noise Control; IFC/WBG EHS Guidelines			confirmed
Increase in Noise Levels and Vibration	PPV, vibration dose/VDV where relevant and action-level exceedance	Closest buildings, vibration-sensitive receptors and piling/ground improvement areas	Implementation: Contractor Supervision/ Monitoring: CSC	From commencement of piling, ground improvement or high-vibration works; continuous at closest receptors	Vibration monitors; PPV measurements; automatic alerts; building condition records	Receptor-specific alert, action and stop-work levels defined in the approved Noise and Vibration Management Plan based on pre-construction condition surveys, predicted vibration levels, receptor sensitivity and applicable BS/DIN criteria. The BS 5228 perceptibility and complaint-response values shall not be treated as structural-damage limits.	Noise and Vibration Management Plan; RENC; BS 5228-2; DIN 4150-3; WBG EHS Guidelines	No damage-related exceedance; methods adjusted before limits exceeded	Monthly; immediate trigger reporting	Included in Construction Cost
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
Air Quality	Settled Dust PM10 PM2.5 NO”2 SO2	Baseline measurement points determined within the scope of ESIA Studies / Closest settlement in case of complaint Lot-specific receptors, sensitive receptors within 500 m, Uskumruköy, NATM/TBM portal areas and haul routes TBM and NATM portal exhaust points and nearby sensitive receptors	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	Daily	Documentation: Vehicle and	-	Regulation on Control of Exhaust	The ratio of maintained vehicles and equipment to	Monthly	Included in Construction

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
			Supervision/ Monitoring: CSC		equipment maintenance records On-site visual observations/ inspections		Gas Emission and Gasoline and Diesel Oil Quality Air Quality Management Plan prepared by the Contractor	the total number		Cost
Climate Change and GHG Emissions	Extreme heat, rainfall/flooding, drought, wildfire and landslide indicators; implementation of controls	Construction sites, slopes, drainage areas, worker areas and access roads	Implementation: Contractor Supervision/ Monitoring: CSC	During construction; before/after extreme weather events	Weather alerts; site inspections; drainage/slope/fire checklists; incident logs	Event-based triggers to be defined in C-ESMP and Emergency Response Plan	Climate Resilience Measures; Emergency Preparedness and Response Plan; C-ESMP;	Climate controls implemented; no unmanaged extreme-weather incidents; corrective actions closed	Monthly and event-based	Included in Construction Cost
Climate Change and GHG Emissions	Fuel use, electricity use, material quantities, transport distances and low-carbon material uptake	All Lots, construction yards, logistics records and procurement records	Implementation: Contractor Supervision/ Monitoring: CSC / AYGM PIU	Monthly during construction	Fuel/electricity invoices; material procurement records; haul logs; carbon calculation updates	No numeric threshold; track against Project GHG baseline and reduction commitments	GHG Management / Carbon Monitoring Framework; PAS 2080; RICS WLCA; GHG Protocol;	Monthly GHG data captured; reduction opportunities tracked; logistics optimised	Monthly / annual consolidated reporting	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
Wastewater Generation	Effluent quality, treatment unit performance, sludge disposal records	Worker camps, package treatment units and municipal sewer connections	Implementation: Contractor Supervision/ Monitoring: CSC	Daily operational checks; periodic laboratory testing as per permit/WQMP	Visual inspection; flow records; effluent sampling; sludge transfer receipts	Urban Wastewater Treatment Regulation and discharge permit limits	Worker Camp Wastewater Management; C-ESMP; UWWTR; Water Pollution Control Regulation	100% treated wastewater compliant; no untreated discharge; sludge transferred to licensed facilities	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 Quality Regulation Pollution Prevention Plan prepared by the Contractor ESS3: Resource Efficiency and Pollution	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 /

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
						Surface Water Control Regulation along with WBG EHS Guidelines	Prevention and Management WBG EHS Guidelines			Year
Surface Water Quality	pH, EC, DO, turbidity, nutrients, metals, microbiological parameters; receptor status	Surface water receptors, reservoirs, ponds, watercourses and marine interfaces within AoI	Implementation: Contractor / AYGM PIU Supervision/ Monitoring: CSC	Pre-construction dry and wet season campaigns; during construction as defined in WQMP	Sampling and analysis by accredited laboratories; receptor mapping; documentation review	Surface Water Quality Regulation classes; WBG/WHO where applicable	Lot-specific WQMP; Surface Water Quality Regulation; Water Pollution Control Regulation; WBG EHS Guidelines	Baseline completed before works; receptor inventory updated; no mobilisation without approved WQMP	Monthly	Included in Construction Cost; laboratory cost to be confirmed
Surface Water Quality	Turbidity / suspended sediment and effectiveness of ESCP controls	Upstream/downstream compliance points where construction crosses reservoir tributaries and watercourses	Implementation: Contractor Supervision/ Monitoring: CSC Oversight: AYGM PIU	Continuous during active works near watercourses; post-rainfall/event-based	Automated turbidity loggers; field inspection; rainfall/event records	Site-specific alert and stop-work thresholds established in the approved WQMP/ESCP based on baseline variability, receptor sensitivity, applicable legal requirements and competent-authority conditions. The background +10 NTU and +25 NTU values may be retained only where technically justified and formally approved.	Erosion and Sediment Control Plan; WQMP; Reservoir Protection Protocol; Water Pollution Control Regulation;	No uncontrolled sediment discharge; triggers responded to; stop-work at Red trigger where required	Monthly; immediate for Red trigger	Included in Construction Cost
Groundwater Quality	Parameters given in Annex-1 of the Regulation on Water Intended for Human Consumption (Official Gazette dated 17.02.2005 and numbered 25730)	Baseline measurement point (GW-1) determined within the scope of ESIA Studies	Implementation: Contractor Supervision/ Monitoring: CSC	Every 6 months and if there is a complaint or in case of soil contamination	Sampling and analysis (by accredited and competent firms) Documentation: Grievance records	The limit values specified in Regulation on Water Intended for Human Consumption and WHO Drinking Water Guidelines	Regulation on Water Intended for Human Consumption WHO Drinking Water Guidelines Pollution Prevention Plan prepared by the Contractor ESS3: Resource Efficiency and Pollution Prevention and Management WBG EHS Guidelines	Compliance with the groundwater quality standards Number of groundwater quality related grievances	Monthly	Included in Construction Cost Additional cost on Groundwater Quality Measurement and Analysis: USD 5,000 / Year
Groundwater Quality	Groundwater level, drawdown, dewatering quantity/discharge quality and settlement interface	Piezometers around tunnel drives, deep excavations and sensitive aquifers in Lots 1, 3 and 4	Implementation: Contractor Supervision/ Monitoring: CSC Coordination: İSKİ/DSİ where relevant	6-month baseline before tunnel drives; continuous/regular during dewatering; until stabilisation	Piezometer monitoring; dewatering flow records; water quality sampling; settlement review	Drawdown limits to be agreed with İSKİ/DSİ and defined in Lot-specific WQMP/Dewatering Plan	Tunnel Dewatering Management Plan; Lot-specific WQMP; Groundwater Protection Regulation;	Baseline piezometers installed; drawdown within agreed limits; treated discharge compliant	Monthly	Included in Construction Cost
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	The amount of excavation material and amount of excavated material reused	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
							Efficiency and Pollution Prevention and Management WBG EHS Guidelines			
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	pH, TPH, heavy metals, acid-generation potential and leachable metals	Excavated material prior to reuse, storage, transport or disposal; brownfield/industrial sections	Implementation: Contractor / Licensed Laboratory Supervision/ Monitoring: CSC	Before disposal/reuse; increased frequency where contamination suspected	Representative sampling; laboratory analysis; classification records	Contaminated material not sent to İSTAÇ candidate sites; thresholds per regulation/hazardous waste criteria	Waste and Spoil Management Plan; Excavation Soil Regulation; Hazardous Waste Regulations;	Spoil classified before movement; contaminated material segregated and routed to licensed facilities	Monthly	Included in Construction Cost; laboratory cost to be confirmed
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, notifications on Integrated Environment Information System/Waste	-	Waste Management Regulation 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 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
					Management Application (Waste Declaration System), training records, contracts/protocols regarding waste shipment		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, contracts/protocols regarding waste shipment	-	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
Waste Management	Waste Batteries and	Construction Site	Implementation:	Daily	Visual observations	-	Regulation on	Wastes separately stored	Monthly	Included in

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
	Accumulators		Contractor Supervision/ Monitoring: CSC		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		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	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		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 / Reinstatement and Vegetation Management	Vegetation cover, invasive species presence and planting success	Reinstated areas and disturbed land	Implementation: Contractor Supervision/ Monitoring: CSC	During 1–3 growing seasons after reinstatement	Quadrat surveys; planting logs; invasive species checklist	<50% vegetation cover or >10% invasive cover triggers reseeding/control	Revegetation Specification; Biodiversity/Soil Management Plans;	Revegetation target achieved; invasive species controlled	Seasonal/annual	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	Lot specific 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	Approved compensation/offset targets and implementation milestones are achieved	Lot specific 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	Applicable lot-specific Biodiversity Action Plan and, where required, Biodiversity Offset Management Plan	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,	Designated re-location sites	Implementation: Contractor Supervision/ Monitoring: CSC	October–November (after collection, before site works)	Visual inspection, planting records	Translocation completed and survival and establishment monitored against approved success criteria	Lot specific 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
	Lilium martagon, Leucojum 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	During the appropriate species-specific detection periods before vegetation clearance	Targeted field survey	All relevant species identified	Lot specific Biodiversity Management Plan prepared by Contractor ESS6: Biodiversity Conservation and Sustainable Management of Living Natural Resources	All relevant species identified	Once during the applicable seasonal survey window, with repeat survey where detection conditions are unsuitable	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 uncontrolled establishment or spread of invasive alien species	Lot specific Biodiversity Management Plan and Invasive Species Management Procedure prepared by Contractor ESS6: Biodiversity Conservation and Sustainable Management of Living Natural Resources	Control measures applied and treated areas monitored for regrowth	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
Community Health and Safety	Fencing, signage, access control, lighting and safe mobility routes	Construction sites, public interfaces, urban sections and sensitive receptors	Implementation: Contractor Supervision/ Monitoring: CSC / PIU	Daily/routine during construction	Site inspections; CHSP checklist; grievance records	No uncontrolled public access to work areas	Community Health and Safety Plan;; WBG EHS Guidelines	Fencing/signage maintained; zero unauthorised public access incidents	Monthly	Included in Construction Cost
Community Health and Safety	Advance notices, CLO activities, awareness sessions and CHS grievances	Affected communities, schools, vulnerable groups and settlement interfaces	Implementation: Contractor / CLOs Supervision/ Monitoring: PIU / CSC	Before high-risk works and monthly during construction	Engagement records; public notices; grievance register; training/awareness records	GM timeframe; advance notification requirements in SEP/CHSP	SEP; CHSP;	Notices issued; CHS grievances resolved; awareness sessions delivered	Monthly	Included in Stakeholder Engagement Budget
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

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
Traffic (Transportation) Management	Video survey and Pavement Condition Index; attributable deterioration	All haul routes, priority D-020 Çatalca and Beykoz secondary roads	Implementation: Contractor Supervision/ Monitoring: CSC	Before construction and after completion; periodic where deterioration reported	Video survey; PCI survey; inspection reports	No attributable deterioration left unrepaired	Lot-specific CTMP; Road Safety Programme; Highway Traffic Law No. 2918	Baseline and completion surveys completed; reinstatement obligations fulfilled	Monthly during active haulage; completion report	Included in Construction Cost
Traffic (Transportation) Management	O-7 West loading, YSS Bridge approach traffic and trigger events	O-7 Western section and YSS Bridge approach	Implementation: Contractor Supervision/ Monitoring: CSC Oversight: PIU; Coordination: KGM/İBB	Monthly during peak/concurrent haulage, in accordance with the approved construction and haulage programme	KGM automated counter data; supplementary spot counts; haulage records	Trigger and action levels shall be established in the approved lot-specific CTMP based on updated baseline traffic data, road capacity, safety conditions and KGM/İBB requirements. Where an approved threshold is exceeded, haulage scheduling, routing or other controls shall be reviewed and revised subject to the required authority approvals.	CTMP-12/CTMP-14; Lot-specific CTMP; KGM/İBB authorisations	Trigger events identified and reported; scheduling/reallocation implemented when required	Monthly; trigger events within 2 working days	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 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.	Monthly	Included in Construction Cost
Occupational Health and Safety	Implementation of construction-phase OHS trainings and	Project working areas during construction work	Implementation: Contractor Supervision/ Monitoring: CSC	Monthly	Document control	-	ESS2: Labor and Working Conditions WBG EHS	100% completion of site-specific induction and orientation trainings for all personnel prior to site	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
							Guidelines Occupational Health and Safety Management Plan prepared by the Contractor	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		
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 up	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,	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
								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		
Occupational Health and Safety	Deployment and visibility of occupational health and safety signage, emergency direction signs, and site-specific information board	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 and Safety Management Plan prepared by the Contractor	Availability of complete and clearly visible OHS warning signs across the construction site, including hazard-specific, PPE-required, and restricted-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.	Monthly	Included in Construction Cost
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	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
								related to vehicle–personnel interactions.		
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
Emergency Preparedness and Response	Emergency access, response drills, incident reporting and authority coordination	Construction sites, tunnels, access roads and affected communities	Implementation: Contractor Coordination: Authorities Supervision/ Monitoring: CSC / PIU	Before works; periodic drills; event-based	ERP review; drill records; incident logs; authority meeting records	Emergency access not delayed; obstruction cleared within defined protocol where applicable	Emergency Preparedness and Response Plan; CHSP;	Drills completed; emergency routes maintained; incidents reported and closed	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 Social Risks and Impacts ESS8: Cultural Heritage Cultural Heritage Management Plan and Chance Find Procedure[2] (see Appendix-2) Cultural Heritage Management Plan/Chance	Number of chance finds Number of personnel trained on chance find	Monthly	Included in Construction Cost

[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.*

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
							Finds Procedure prepared by the Contractor			
Cultural Heritage	PPV, vibration dose where relevant and automatic trigger alerts	Vibration-sensitive cultural heritage receptors within tunnelling/piling/blasting/heavy equipment zone of influence	Implementation: Contractor Supervision/ Monitoring: CSC Oversight: AYGM / Authorities	Baseline before works; continuous real-time during vibration-generating works	Instrumental vibration monitoring; automatic alerts; structural condition surveys	Receptor-specific PPV and action levels established through pre-construction structural condition surveys, detailed vibration assessment, applicable authority requirements and relevant standards. An approximate value of 0.3 mm/s may be used only as a conservative preliminary reference or alert level where justified, and not as a universal compliance threshold.	CHMP; Vibration Monitoring Plan; BS 7385-2; DIN 4150-3; Law No. 2863;	No threshold exceedance without response; methods/equipment adjusted; auditable baseline maintained	Monthly and immediate trigger reporting	Included in Construction Cost

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	Applicable national noise limits and receptor-specific vibration limits established through detailed assessment and relevant standards. ESIA baseline measurements shall be used as reference conditions, not as compliance thresholds.	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 Condition of structures/tunnels, settlement, groundwater, seismic/extreme-weather damage	Project route and all engineering structures Project route, all engineering structures, tunnels, slopes and geohazard-prone sections	TCDD / Railway Operator	After an earthquake or other natural disasters Periodic during operation; immediately after significant earthquake, heavy rainfall, wildfire, landslide or other natural disaster	Visually in all routes and engineering structures Documentation: Maintenance records, incident records Visual inspections; deformation surveys; groundwater monitoring; structural inspection reports; SCADA/incident records	- No structural safety issue; design/serviceability limits; post-event criteria in Emergency Plan	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 Operational Geohazard Monitoring Plan; Türkiye Building Earthquake Regulation; Climate Resilience/O&M Plan; Emergency Preparedness and Response Plan; ESS1/ESS4	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 Post-event inspections completed; no unresolved damage; monitoring demonstrates stabilisation	Annually After event and annual routine reporting	No additional cost Included in the operation costs Included in operation costs
Surface Water Quality	Track drainage condition, oil-water separator performance and workshop effluent quality	Track drainage, stations, depots, workshops and water-sensitive operational areas	TCDD / Railway Operator	Routine during operation; annual water quality reporting	Drainage inspections; separator maintenance records; effluent sampling	Applicable Water Pollution Control Regulation / discharge permit limits	Operational Water Quality Monitoring Plan; Water Pollution Control Regulation;	No non-compliant discharge; separators maintained; annual report submitted	Annual	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,	-	Waste Management Regulation Site specific Pollution Prevention Plan to be prepared Site specific Waste Management Plan to be prepared	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

					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		ESS3: Resource Efficiency and Pollution Prevention and Management WBG EHS Guidelines			
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
Climate Change and GHG Emissions	Track buckling risk, OLE sagging, drainage performance, slope stability, wildfire risk and SCADA/system stress	Operational railway alignment, substations, drainage, slopes and forest/interface zones	TCDD / Railway Operator	Routine during operation; event-based after heatwaves, heavy rainfall, wildfire or landslide events	SCADA data; inspections; drainage checks; slope inspections; incident logs	Operational thresholds to be defined in design, O&M manuals and emergency plans	Climate Resilience/O&M Plan; Emergency Preparedness Plan; TCDD standards;	Climate-related risks monitored against defined operational thresholds; post-event inspections completed within the required timeframe; identified damage and safety risks addressed through documented corrective actions	Annual and event-based	Included in the operation costs
Climate Change and GHG Emissions	Electricity consumption, operational emissions and modal-shift performance where data available	Rail operations, traction power, stations and depots	TCDD / Railway Operator	Annual during operation	Energy records; emissions calculation using grid factor; traffic/activity data	No numeric threshold; monitor against projected annual emissions and net modal-shift benefit	GHG Protocol; Operational Energy Management Plan	Annual GHG emissions calculated; energy efficiency measures identified	Annual	Included in the operation costs
Biodiversity / Reinstatement and Vegetation Management	Herbicide use records and sensitive-zone compliance	Track corridor, watercourse buffers, forest/Rendzina zones	TCDD / Railway Operator	Annual review during operation	Herbicide register; site inspection; maintenance records	Herbicide use in prohibited/sensitive zones without approval triggers non-compliance notice	Operational Vegetation Management Plan; Water Pollution Control Regulation;	100% herbicide use documented; no unauthorised use in sensitive zones	Annual	Included in the operation costs
Biodiversity / Reinstatement and Vegetation Management	Condition and establishment of reinstated/revegetated areas	Reinstated zones, buffer areas and visually sensitive landscape integration areas	TCDD / Railway Operator	Annually during operation where required	Visual inspection; vegetation survey; photo records; maintenance records	Targets to be defined in Reinstatement / Biodiversity Management Plan	Operational Landscape/Revegetation Management; Biodiversity Management Plan for Operation Phase; ESS6	Reinstated areas maintained; failed planting replaced; no unmanaged invasive spread	Annually	Included in the operation costs
Biodiversity	Presence and abundance of target species (e.g., endemic/rare flora)	Along project corridor	TCDD	For the duration defined in the operation-phase BMP/BAP and until the applicable completion criteria are achieved	Field survey, vegetation mapping	No significant decline relative to the approved baseline and defined species-specific indicators	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	Habitat-specific vegetation-cover and establishment targets defined in the approved reinstatement/BMP requirements	Biodiversity Management Plan for Operation Phase ESS6: Biodiversity Conservation and Sustainable Management of Living Natural Resources	Approved vegetation-cover, species-composition and establishment criteria achieved	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	For the monitoring period defined in the applicable BMP/BAP and until the approved habitat-quality and species-performance criteria are achieved	Botanical survey, floristic comparison, habitat quality scoring	Decline below the approved baseline, action threshold or completion criterion triggers corrective and adaptive management	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	Quarterly	Included in the operation costs.

								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		
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	Quarterly	Included in the operation costs.

								contractors, including frequency, 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	Quarterly	Included in the operation costs.

								personnel and vehicle passenger interactions.		
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.
Emergency Preparedness and Response	Emergency access, tunnel emergency procedures, response drills, incident reporting and authority coordination	Operational railway, tunnels, stations, access roads and community interfaces	TCDD / Railway Operator; Coordination: Authorities	Before operation; periodic drills; event-based	ERP review; drill records; incident logs; authority coordination records	Emergency access not delayed; applicable EU TSI / national emergency procedure requirements	Emergency Preparedness and Response Plan; Tunnel Emergency Procedures; Operational Safety Plan; ESS4	At least one full-scale drill per year where required; incidents reported and closed	Annual/event-based	Included in the operation costs
Community Health and Safety	Fencing, signalling, trespass incidents, station lighting/CCTV/accessibility and public awareness	Rail corridor, stations, public areas and key access points	TCDD / Railway Operator	Routine during operation; public awareness periodically	Inspections; incident records; public communication logs; station safety audits	No unmanaged trespass/access risks; compliance with railway safety requirements	Operational Safety Plan; EU TSIs; EN 50126 RAMS;	Fencing/signage maintained; awareness delivered; incidents reported and investigated	Annual and incident-based	Included in the operation costs
Community Health and Safety / Hazardous Materials Transport	Compliance with dangerous goods procedures, route risk controls and emergency responder coordination	Operational rail freight routes and emergency response interfaces	TCDD / Railway Operator; Coordination: Emergency responders / Authorities	Before operation and periodically; event-based	Procedure review; incident drills; route risk assessment; training records	Compliance with RID/applicable hazardous materials transport regulations	Hazardous Materials Transport Procedure; Emergency Response Plan; RID;	Route-specific risk measures in place; responders coordinated; no unmanaged hazardous materials incident	Annual and incident-based	Included in the operation costs
Landscape and Visual	Operation-phase grievances related to visual intrusion, lighting, landscape character or permanent structures	Affected communities and sensitive visual receptors	TCDD / Railway Operator	Throughout operation; complaint-based	Grievance register; site verification; corrective action records	Grievances addressed within GM timeframe	SEP/GM; Operational Landscape and Visual Management Plan;	100% landscape grievances logged and closed according to GM	Annual/complaint-based	Included in Stakeholder Engagement Budget / Operation Cost
Cultural Heritage	Operational train vibration at cultural heritage receptors	Cultural heritage receptors near alignment	TCDD / Railway Operator	Commissioning or complaint-based; periodic where required by detailed assessment	Vibration measurements; track inspections; complaint review	Compliance with receptor-specific vibration limits established through detailed assessment, applicable national requirements and relevant international standards	Operational Vibration Monitoring Plan; CHMP; RENC/BS/DIN standards;	No operational vibration exceedance at heritage receptors; complaints investigated	Annual/complaint-based	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. The Contractor's program shall cover all Contractor and subcontractor personnel and shall include induction training before commencement of work, task-specific training and periodic refresher training.

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 institutional capacity assessment and Project-level capacity-building program will be coordinated by AYGM PIU with support from the PMC. The D+B Contractors shall assess the training needs of their own personnel and subcontractors and develop their training programs accordingly.

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 and on the worker grievance mechanism applicable to Contractor and subcontractor personnel.
- **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 confidential, survivor-centred grievance and referral arrangements.
- **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:** Including identification and protection of sensitive habitats and species, seasonal work restrictions, pre-clearance requirements, invasive-species prevention and actions to be taken upon encountering wildlife.
- **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.

The D+B Contractors shall maintain training plans, attendance records, training materials and competency records and shall report completed and planned training activities through their monthly E&S reports. The CSC/Engineer shall verify the implementation and adequacy of Contractor training, while the PMC shall support AYGM PIU in monitoring Project-level capacity-development needs and activities.

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	D+B Contractor	Newly recruited Contractor and subcontractor personnel	Before commencement of work and whenever new personnel are mobilized	Included in the Contract Price
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	D+B Contractor	All project personnel	Once before the commencement of construction activities and quarterly throughout the lifecycle of the sub-project	Included in the Contract Price
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	D+B Contractor	All project personnel	Before commencement of work, before high-risk activities, and whenever required	Included in the Contract Price

[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
	overcoming such situations ▪ Personal Protective Equipment (PPE) ▪ Incident Reporting, Root Cause Analysis and Investigation				
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, with additional drills following material changes or significant deficiencies	Included in the Contract Price
Certification and Competency Training for Critical Lifting and Plant Operators	▪ Safe lifting operations, heavy equipment handling, and operation of cranes, TBM, and other plant under valid third-party certification	D+B Contractor (with accredited third-party training provider)	Crane operators, TBM operators, heavy equipment drivers, and lifting supervisors	Before operating the relevant equipment or undertaking the relevant activity and renewed periodically in accordance with national legislation	Included in the Contract Price
Biodiversity Management	▪ Introduction to biodiversity ▪ Threats to Biodiversity ▪ Sustainable Practices ▪ Sensitive habitats and species; seasonal restrictions; vegetation-clearance and pre-clearance controls; invasive-species prevention; wildlife encounter and reporting procedures; restoration and biodiversity monitoring requirements	D+B Contractor	All project personnel	Once before the commencement of construction activities and quarterly throughout the lifecycle of the sub-project	Included in the Contract Price
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	D+B Contractor	All project personnel	Once before the commencement of construction activities and quarterly throughout the lifecycle of the sub-project	Included in the Contract Price
Community Health, Safety Management	▪ Traffic and Road Safety Principles ▪ Environmental and Social Sensitivities ▪ SEP and GM ▪ Community Communication	D+B Contractor	All project personnel	Once before the commencement of construction activities and quarterly throughout the lifecycle of the sub-project	Included in the Contract Price
Cultural Heritage	▪ Introduction to cultural heritage ▪ Conservation/preservation techniques for tangible and intangible cultural heritage ▪ Chance Find Procedures for effective on-site implementation	D+B Contractor	All project personnel	Once before the commencement of construction activities and quarterly throughout the lifecycle of the sub-project	Included in the Contract Price

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 each D+B Contractor for its respective lot during C-ESMP preparation; however, the following project-specific budget components must be fully reflected in Contractor pricing and AYGM oversight. Unless otherwise expressly stated in the Contract, the costs associated with each D+B Contractor's E&S obligations for its respective lot shall be included in the relevant Contract Price.

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

The monitoring locations, parameters and frequencies shall be reviewed and updated by each D+B Contractor for its respective lot based on the final detailed design, construction methodology, sensitive receptors, Project Facilities and the results of additional E&S studies.

Archaeological, Cultural Heritage and Chance Finds Management

- Implementation of the Cultural Heritage Management Plan and the Chance Find Procedure, including:
  - Qualified archaeological and cultural heritage personnel and archaeological monitoring, as required for tunnel excavation, shaft construction, and cut-and-cover works
  - Securing and documentation of chance find locations
  - Reporting to the Regional Cultural Heritage Board
  - Implementation of any investigation, salvage, protection or other measures required by the competent cultural heritage authorities
- 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
- Implementation, monitoring and adaptive management of habitat restoration and, where required, biodiversity compensation measures to achieve the applicable No Net Loss and Net Gain objectives
- Additional biodiversity surveys, assessments and mitigation measures identified through the applicable lot-specific BMP and, where required, BAP

Waste, Excavated Material & Land Management

Aligned with the applicable C-ESMP sub-management plans and Project Facility requirements:

- 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
- Assessment, permitting, operation, decommissioning and restoration of Contractor-controlled Project Facilities, including borrow areas, spoil disposal or reuse areas, temporary access roads and other temporary land-use areas

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 timely communication of material changes to haulage routes, construction schedules and community-safety arrangements
- 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 workers' accommodation standards, national legislation, the World Bank ESF, the World Bank Group EHS Guidelines and applicable GIIP
- Worker transportation, camp inspections and medical facilities
- Implementation of the Project LMP and Contractor's Labor Management Plan requirements (worker GM, CoC induction, SEA/SH training)
- Third-party training for critical operations (lifting, tunnel safety, confined spaces)
- PPE, emergency-response resources, medical surveillance and controls required for high-risk activities

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, major spill and pollution response, fire, collapse, mass-casualty)
- Security personnel training on human rights and proportional use of force

Staffing, Supervision and Reporting

- Contractor's full-time E&S team
- Contractor support and access required for CSC/Engineer supervision and PIOC independent monitoring, audits and site visits
- Preparation of Contractor monthly E&S reports and other reports required under the Contract

Incident investigations, root-cause analyses, corrective action plans, NCR closure and restoration measures arising from Contractor-caused non-compliance.

Project-Specific Note

Each D+B Contractor shall prepare a detailed E&S Budget Plan for its respective lot as part of the C-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**
Supervision Consultant (CSC) E&S Team	- CSC E&S Personnel	AYGM under the CSC consultancy contract	**250,000**
Contractor E&S Staffing	Contractor E&S Personnel for the relevant lot, including staffing required for active work fronts, shifts and Project Facilities	D+B Contractor for the relevant lot	**450,000 per lot**
Environmental Monitoring & Laboratory Costs	- Noise/vibration - PM_{10}/$PM_{2.5}$ - Water quality - biodiversity monitoring - Equipment rental/purchase and calibration - Accredited lab analysis	D+B Contractor for the relevant lot	**50,000 per lot**
Biodiversity & Ecological Mitigation Costs	- Wildlife passage - Vegetation restoration - Dark-sky lighting - Invasive species control - Post-construction monitoring - Additional surveys and measures identified through the BMP/BAP for the relevant lot	D+B Contractor for the relevant lot	**200,000 per lot** excluding any separately approved biodiversity compensation or offset implementation costs
Cultural Heritage & Chance Finds Management	- Qualified archaeological and cultural heritage personnel and archaeological monitoring; - Securing and documenting finds - CH training - Board coordination - Investigation, - Protection or other measures required by the competent authorities within the relevant lot	D+B Contractor for the relevant lot	**200,000 per lot**
Training & Capacity Building	- ESMP training - OHS safety and competency training - Biodiversity training - GM, CoC induction, SEA/SH training - Security personnel training on human rights	D+B Contractor (for Contractor and subcontractor personnel	**50,000 per lot**

Cost Category	Description (Project-Specific)	Responsible Party for Budgeting	Provisional Estimated Cost (USD/Year)
		within the relevant lot)	
Reporting Incident Investigation & Corrective-Action Costs	- Contractor monthly E&S reports; monitoring records; incident investigations; root-cause analyses; CAP preparation; NCR closure; and Contractor-caused corrective and restoration actions within the relevant lot	D+B Contractor for the relevent lot	**20,000 per lot**

APPENDICES

Appendix-1	Contractor's Environmental and Social Management Plan
Appendix-2	Biodiversity Management Plan / Biodiversity Action Plan
Appendix-3	Waste Management Plan within the C-ESMP
Appendix-4	Chemical and Hazardous Material Management Plan within the C-ESMP
Appendix-5	Air Quality Management Plan within the C-ESMP
Appendix-6	Noise Management Plan within the C-ESMP
Appendix-7	Water and Wastewater Management Plan within the C-ESMP
Appendix-8	Pollution Prevention and Control Plan within the C-ESMP
Appendix-9	Occupational Health & Safety Plan and Procedures
Appendix-10	Emergency Preparedness and Response Plan
Appendix-11	Blasting Management Plan within the C-ESMP
Appendix-12	Traffic/Transportation Management Plan
Appendix-13	Community Health and Safety Management Plan
Appendix-14	Sexual Exploitation Abuse and Sexual Exploitation Action Plan
Appendix-15	Cultural Heritage Management Plan and Chance Find Procedure
Appendix-16	Resource Efficiency Management Plan within the C-ESMP
Appendix-17	Restoration and Revegetation Plan within the C-ESMP
Appendix-18	Environmental, Social, Health and Safety Training Management Plan within the C-ESMP
Appendix-19	Labor Influx Management Plan within the C-LMP
Appendix-20	E&S Contractor Management Framework within the C-ESMP
Appendix-21	Preliminary Land Management Framework within the C-ESMP
Appendix-22	Security Management Plan
Appendix-23	Worker's Camp Management Plan within the C-LMP
Appendix-24	Excavated Material & Land Management Plan within the C-ESMP
Appendix-25	E&S Change Management Procedure

APPENDIX-1 - Contractor's 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 / Biodiversity Action Plan

A standalone Project-level Biodiversity Management Plan (BMP), including a Biodiversity Action Plan (BAP) Template, has been prepared by AYGM for the overall Project as a separate document. The relevant D+B Contractor shall prepare and implement a Lot-specific BMP and, where required, a Lot-specific BAP, using the Project-level BMP and BAP Template as the overarching framework and technical basis. The Lot-specific documents shall be reviewed and refined to reflect the final detailed design, confirmed Project footprint, construction methodology, site-specific biodiversity conditions, seasonal variability, and the findings of applicable Lot-specific and pre-construction biodiversity surveys.

APPENDIX-3 Waste Management Plan within C-ESMP

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) within C-ESMP

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 within C-ESMP

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 within C-ESMP

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 within C-ESMP

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 within C-ESMP

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

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 within C-ESMP

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 Plan 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 and Transportation Management Plan

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. 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 Project-level Cultural Heritage Management Plan (CHMP), including the Chance Find Procedure (CFP), has been prepared by AYGM for the overall Project as a separate document. The relevant D+B Contractor will review, update, and finalize the Cultural Heritage Management Plan/Chance Finds Procedure for relevant lot, using the Project-level CHMP/CFP as the overarching framework and technical basis. The Lot-specific CHMP/CFP shall be refined, as necessary, to reflect the final detailed design, confirmed Project footprint, construction methodology, site-specific cultural heritage conditions, and any additional findings identified through surveys, consultations or pre-construction investigations.

APPENDIX-16 Resource Efficiency Management Plan within C-ESMP

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) within C-ESMP

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 within C-ESMP

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 within Contractor's Labor 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/EBRDWorkers' Accommodation standards.

- 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[4]

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,

[4] 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) within C-ESMP

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) within C-ESMP

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 within Contractor's Labor 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 within C-ESMP

1. 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.

2. 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).

3. 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.

4. 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.

5. 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

6. 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.

7. 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.

8. 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.

9. Roles and Responsibilities

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

APPENDIX-25 E&S Change Management Procedure

Purpose and Scope

This procedure ensures that any proposed change to the Project design, construction methodology, sequencing, programme, Project Facilities, Associated Facilities or implementation arrangements is assessed for potential environmental and social risks before implementation.

It applies to all changes proposed by the D+B Contractor, its designers, subcontractors, suppliers and service providers throughout detailed design and construction.

Roles and Responsibilities

The D+B Contractor shall identify, screen and document each proposed change; assess its E&S implications; carry out any required additional studies; update the relevant E&S instruments and management plans; and obtain all required approvals before implementation.

The CSC/Engineer shall review the Contractor's screening, determine whether additional assessment or mitigation is required, verify compliance with contractual hold points and recommend approval or rejection.

AYGM PIU shall review and approve material changes, coordinate with the relevant authorities and submit changes or revised E&S instruments to the World Bank for No-Objection, where required.

The PMC shall support AYGM in reviewing Project-wide, land-access, RP/LRP, stakeholder-engagement and reporting implications.

The PIOC may independently review material changes and recommend corrective or additional measures to AYGM but shall not issue contractual instructions directly to the Contractor.

Screening and Approval

The Contractor shall submit an E&S Change Screening Note describing:

The proposed change and its justification;

Location, design and programme implications;

Potential environmental and social risks;

Effects on land requirements, communities, sensitive receptors, biodiversity or cultural heritage;

Required permits, consultations and mitigation measures;

Necessary updates to E&S instruments and sub-management plans.

A change shall be considered material where it may create new or increased E&S risks, change the Project footprint or land requirements, affect sensitive receptors, require additional RP/LRP measures, introduce new Project or Associated Facilities, or require substantial revision of approved E&S instruments.

Material changes shall not be implemented before completion of the required assessments, approvals, disclosure and World Bank No-Objection, where applicable.

Land Access and Stakeholder Engagement

Where a change creates new land requirements, the relevant RP/LRP process and formal land-access clearance shall be completed before access or construction.

Where communities or stakeholders may be affected, the SEP and related disclosure and consultation activities shall be updated as required.

Implementation, Monitoring and Records

Approved changes shall be incorporated into the detailed design, Work Programme, method statements, risk assessments, C-ESMP and applicable sub-management plans.

The Contractor shall maintain an E&S Change Register recording the change, screening outcome, required studies, approvals, World Bank No-Objection status, implementation status and closure evidence.

Any change implemented without the required E&S screening and approval shall constitute non-compliance and may result in an NCR, suspension of the relevant activity and corrective-action requirements.