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Report No: PAD00196

INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT

PROJECT APPRAISAL DOCUMENT
ON A
PROPOSED LOAN

IN THE AMOUNT OF EUR 607.4 MILLION
(US$660.0 MILLION EQUIVALENT)

TO THE

REPUBLIC OF TÜRKİYE

FOR THE

EASTERN TÜRKIYE MIDDLE CORRIDOR RAILWAY DEVELOPMENT PROJECT
(P179128)

November 7, 2024

Transport
Europe And Central Asia

CURRENCY EQUIVALENTS

(Exchange Rate Effective October 31, 2024)

Currency Unit =	Turkish Lira (TRY)
EUR 0.92017 =	US$1
TRY 34.25 =	US$1
US$0.03 =	TRY 1

FISCAL YEAR
January 1 - December 31

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ABBREVIATIONS AND ACRONYMS

AIIB	Asian Infrastructure Investment Bank	**IBRD**	International Bank for Reconstruction and Development
AYGM	Directorate-General of Infrastructure Investments	**IFR**	Interim Un-audited Financial Report
BCA	Benefit-Cost Analysis	**IPF**	Investment Project Financing
BTK	Baku-Tbilisi-Kars	**IsDB**	Islamic Development Bank
C-ESMP	Contractor-specific Environmental and Social Management Plan	**KBA**	Key Biodiversity Area
CBAM	Carbon Border Adjustment Mechanism	**LMC**	Last-mile Connection
CCDR	Country Climate and Development Report	**LMP**	Labor Management Procedure
CDS	Credit Default Swap	**M&E**	Monitoring and Evaluation
COVID-19	Coronavirus Disease 2019	**MC**	Middle Corridor
CO_2	Carbon Dioxide	**MDB**	Multilateral Development Bank
CPF	Country Partnership Framework	**MoTI**	Ministry of Transport and Infrastructure
CTC	Central Traffic Control	**MoTF**	Ministry of Treasury and Finance
DA	Designated Account	**MTR**	Mid-Term Review
DAS	Distributed Acoustic Sensing	**NC**	Northern Corridor
DFIL	Disbursement and Financial Information Letter	**NDC**	Nationally Determined Contribution
EIRR	Economic Internal Rate of Return	**OECD**	Organization for Economic Co-operation and Development
ENPV	Economic Net Present Value	**OHS**	Occupational Health and Safety
E&S	Environmental and Social	**O&M**	Operations and Maintenance
ERTMS	European Rail Traffic Management System	**PAP**	Project Affected Person
ESF	Environmental and Social Framework	**PDO**	Project Development Objective
ESIA	Environmental and Social Impact Assessment	**PIU**	Project Implementation Unit
ESMP	Environmental and Social Management Plan	**POM**	Project Operations Manual
ESRS	Environmental and Social Review Summary	**PPSD**	Project Procurement Strategy for Development
ESS	Environmental and Social Standard	**QCBS**	Quality and Cost Based Selection
ETCS	European Train Control System	**RAP**	Resettlement Action Plan
ETMIC	Eastern Türkiye Middle Corridor Railway Development Project	**RFB**	Request for Bid
EU	European Union	**RLIP**	Rail Logistics Improvement Project
FIDIC	International Federation of Consulting Engineers	**SBO**	Strategy and Budget Office
FM	Financial Management	**SEA/SH**	Sexual Exploitation and Abuse and Sexual Harassment
GDP	Gross Domestic Product	**SEP**	Stakeholder Engagement Plan
GHG	Greenhouse Gas	**SOE**	Statement of Expenditures
GoT	Government of Türkiye	**STEP**	Systematic Tracking of Exchanges in Procurement
GPN	General Procurement Notice	**TCDD**	State Railways of the Republic of Türkiye
GRM	Grievance Redress Mechanism	**TEN-T**	Trans-European Transport Network
GRS	Grievance Redress Service	**TMI**	Central Administration by Telephone
GVCs	Global Value Chains	**U2053**	Transport and Logistics Master Plan 2053
HK	Halkali-Kapikule	**VAT**	Value Added Tax
HLO	High Level Outcome	**WBG**	World Bank Group
HSR	High Speed Rail	**WEF**	World Economic Forum

TABLE OF CONTENTS

DATASHEET ..... **i**

I. STRATEGIC CONTEXT **1**

A. Country Context 1

B. Sectoral and Institutional Context 2

C. Relevance to Higher Level Objectives 6

II. PROJECT DESCRIPTION **8**

A. Project Development Objective 8

B. Project Components 8

C. Project Beneficiaries 11

D. Results Chain 12

E. Rationale for Bank Involvement and Role of Partners 13

F. Lessons Learned and Reflected in the Project Design 13

III. IMPLEMENTATION ARRANGEMENTS **14**

A. Institutional and Implementation Arrangements 14

B. Results Monitoring and Evaluation Arrangements 15

C. Sustainability 15

IV. PROJECT APPRAISAL SUMMARY **15**

A. Technical and Economic Analysis 15

B. Fiduciary 19

C. Legal Operational Policies 20

D. Environmental and Social 20

E. Other Corporate Mandates 22

V. GRIEVANCE REDRESS SERVICES **24**

VI. KEY RISKS **24**

VII. RESULTS FRAMEWORK AND MONITORING **26**

ANNEX 1: Implementation Arrangements and Support Plan **32**

ANNEX 2: Detailed Description of Project Interventions **43**

ANNEX 3: Economic Geography of the Project Area **53**

ANNEX 4: Türkiye's Railway Sector Reform Experience and Sectoral Expansion Plans **56**

ANNEX 5: Economic Analysis **60**

ANNEX 6: Maps **72**

DATASHEET

BASIC INFORMATION

Project Beneficiary(ies)	Operation Name		
Turkiye	Eastern Türkiye Middle Corridor Railway Development Project		
Operation ID	Financing Instrument	Environmental and Social Risk Classification	
P179128	Investment Project Financing (IPF)	Substantial	

Financing & Implementation Modalities

[ ] Multiphase Programmatic Approach (MPA)	[ ] Contingent Emergency Response Component (CERC)
[ ] Series of Projects (SOP)	[ ] Fragile State(s)
[ ] Performance-Based Conditions (PBCs)	[ ] Small State(s)
[ ] Financial Intermediaries (FI)	[ ] Fragile within a non-fragile Country
[ ] Project-Based Guarantee	[ ] Conflict
[ ] Deferred Drawdown	[ ] Responding to Natural or Man-made Disaster
[ ] Alternative Procurement Arrangements (APA)	[ ] Hands-on Expanded Implementation Support (HEIS)

Expected Approval Date	Expected Closing Date
05-Dec-2024	31-Dec-2030
Bank/IFC Collaboration	
No	

Proposed Development Objective(s)

The Project Development Objective is to improve the rail connectivity of eastern Türkiye along the Divriği-Kars-Georgia border railway section of the Trans-Caspian Middle Corridor.

Components

Component Name	Cost (US$)
Rehabilitation and Modernization of the Divriği-Kars-Georgia Border Railway Line	1,607,022,731.00
Project Management	6,540,000.00

Organizations

Borrower:	Republic of Türkiye		
Contact	Title	Telephone No.	Email
Kerem Dönmez	Director General of Foreign Economic Relations, Ministry of Treasury and Finance	+90 (312) 415 29 00	kerem.donmez@hmb.gov.tr
Implementing Agency:	Ministry of Transport and Infrastructure		
Contact	Title	Telephone No.	Email
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PROJECT FINANCING DATA (US$, Millions)

Maximizing Finance for Development

Is this an MFD-Enabling Project (MFD-EP)? No

Is this project Private Capital Enabling (PCE)? No

SUMMARY

Total Operation Cost	**1,615.21**
Total Financing	**1,615.21**
of which IBRD/IDA	**660.00**
Financing Gap	**0.00**

DETAILS

World Bank Group Financing	
International Bank for Reconstruction and Development (IBRD)	660.00
Non-World Bank Group Financing	
Counterpart Funding	454.51
National Government	454.51
Other Sources	500.70
Asian Infrastructure Investment Bank	250.00
Islamic Development Bank	250.70

Expected Disbursements (US$, Millions)

WB Fiscal Year	2025	2026	2027	2028	2029	2030	2031
Annual	1.33	12.50	50.00	62.50	200.00	200.00	133.67
Cumulative	1.33	13.83	63.83	126.33	326.33	526.33	660.00

PRACTICE AREA(S)

Practice Area (Lead)

Transport

Contributing Practice Areas

CLIMATE

Climate Change and Disaster Screening

Yes, it has been screened and the results are discussed in the Operation Document

SYSTEMATIC OPERATIONS RISK- RATING TOOL (SORT)

Risk Category	Rating
1. Political and Governance	Low

2. Macroeconomic	Substantial
3. Sector Strategies and Policies	Low
4. Technical Design of Project or Program	Low
5. Institutional Capacity for Implementation and Sustainability	Substantial
6. Fiduciary	Substantial
7. Environment and Social	Substantial
8. Stakeholders	Low
9. Other	Moderate
10. Overall	Substantial

POLICY COMPLIANCE

Policy

Does the project depart from the CPF in content or in other significant respects?

[ ] Yes [✓] No

Does the project require any waivers of Bank policies?

[ ] Yes [✓] No

ENVIRONMENTAL AND SOCIAL

Environmental and Social Standards Relevance Given its Context at the Time of Appraisal

E & S Standards	Relevance
ESS 1: Assessment and Management of Environmental and Social Risks and Impacts	Relevant
ESS 10: Stakeholder Engagement and Information Disclosure	Relevant
ESS 2: Labor and Working Conditions	Relevant
ESS 3: Resource Efficiency and Pollution Prevention and Management	Relevant
ESS 4: Community Health and Safety	Relevant
ESS 5: Land Acquisition, Restrictions on Land Use and Involuntary Resettlement	Relevant
ESS 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources	Relevant

ESS 7: Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities	Not Currently Relevant
ESS 8: Cultural Heritage	Relevant
ESS 9: Financial Intermediaries	Not Currently Relevant

NOTE: For further information regarding the World Bank's due diligence assessment of the Project's potential environmental and social risks and impacts, please refer to the Project's Appraisal Environmental and Social Review Summary (ESRS).

LEGAL

Legal Covenants

Sections and Description
Section I. of Schedule 2 to the Loan Agreement. The Borrower shall carry out the Project in accordance with the Implementation Arrangements set out in Section I, Schedule 2 of the Loan Agreement.
Section I.A.(c) of Schedule 2 to the Loan Agreement. The Borrower, through MoTI, shall no later than six (6) months after the Effective Date, hire the following specialists to staff the PIU referred to in (b) above, with terms of reference and qualifications acceptable to the Bank: a sub-unit leader; an engineering and construction specialist; a procurement specialist; a financial management specialist; an environmental, social, health and safety manager; an environmental specialist; a social development specialist; an occupational health and safety specialist; and two community liaison officers all with terms of reference and qualifications acceptable to the Bank.
Section I.A.(d) of Schedule 2 to the Loan Agreement. The Borrower, through MoTI. Shall, no later than three (3) years after the Effective Date, the Borrower, through MoTI, shall furnish satisfactory evidence to the Bank, confirming that a contractor to carry out Part 1.2. of the Project has been retained and that works for Part 1.2 of the Project have initiated.
Section I.E.1.(a) of Schedule 2 to the Loan Agreement. The Borrower, through MoTI, shall prepare and furnish to the Bank not later than thirty (30) days after the Effective Date in the first year of implementation, and thereafter, November 15 of each year during the implementation of the Project, a proposed Annual Work Plan and Budget containing: (i) all activities to be carried out under the Project during the following year; (ii) a proposed financing plan for expenditures required for such activities, setting forth the proposed amounts and sources of financing, including evidence satisfactory to the Bank confirming that the corresponding budgetary allocation to cover for counterpart financing and VAT expected for the following year, as per the Annual Procurement Plan, has been made; (iii) any training activities that may be required under the Project including (A) the type of training, (B) the purpose of the training, and (C) the cost of the training; and an Annual Procurement Plan setting out the packaging, estimated cost, applicable procurement method and market approach, Bank's review requirements, and timeline for each procurement package expected to be launched the following year.

Conditions

Type	Citation	Description	Financing Source
Effectiveness	Article 4.01(a)	The AIIB Co-financing Agreement has been	IBRD/IDA

		executed and delivered and all conditions precedent to its effectiveness or to the right of the Borrower to make withdrawals under it (other than the effectiveness of this Agreement) have been fulfilled.	
Effectiveness	Article 4.01(b)	The Borrower, through MoTI, has prepared and adopted the Project Operations Manual referred to in Section I.B. of Schedule 2, in form and substance acceptable to the Bank.	IBRD/IDA
Effectiveness	Article 4.01(c)	The Borrower, through MoTI, has established the grievance redress mechanism referred to in Section I.D.5, as further set forth in the ESCP, in a manner acceptable to the Bank.	IBRD/IDA
Disbursement	Section III.B.1.(b) of Schedule 2	For payments under Categories (1) and (2), unless and until the TCDD Collaboration Agreement referred to in Section I.A.(e) of Schedule 2 to this Agreement has been entered into in form and substance acceptable to the Bank.	IBRD/IDA

I. STRATEGIC CONTEXT

A. Country Context

1. **Türkiye's development achievements over the past two decades have been remarkable.** Real gross domestic product (GDP) growth averaged 5.4% between 2002 and 2022, resulting in income per capita (in real terms) that was more than doubled over the same period. Moreover, growth was accompanied by rapid poverty reduction, with the poverty rate (US$6.85 2017 PPP poverty line) halving from above 20% in 2007 to less than 10% in 2021. As in other countries, the COVID-19 pandemic had a negative impact on growth in 2020, but the country was one of the few globally that did not register a GDP contraction that year, instead growing 1.9%. This performance was due, to a large extent, to the government's economic policy response to the pandemic, which focused on loosening monetary policy and rapid credit expansion. Türkiye then achieved double-digit GDP growth in 2021 (11.4%) and maintained significant momentum in 2022 (5.5%) and 2023 (4.5%). Yet, the policy framework that helped the country navigate the COVID-19 shock also heightened macroeconomic risks created by high inflation (annual inflation reached 52% in August 2024, after having peaked at 85.5% in October 2022), currency depreciation (77% against the US$ between January 2020 and January 2024), and declines in reserve buffers.

2. **Following the May 2023 Presidential elections, a new economic team took over and started implementing a program to normalize the economy.** This includes monetary policy tightening, with interest rates increasing from 8.5% in May 2023 to 50% in October 2024, the unwinding of financial regulations, and fiscal revenue measures to curtail the fiscal deficit. Markets are reacting positively, with 5-year Credit Default Swaps (CDSs) declining from above 500 basis points in May 2023 to around 270 in September 2024. All major rating agencies have upgraded Türkiye's sovereign credit rating and upgraded the country's outlook to positive. In the context of the disinflationary program, the Government of Türkiye (GoT) projects the end-2024 inflation at 41.5%, and the end-2025 inflation at 17.5%, whereas GDP growth is projected to decelerate to 3.2% in 2024 and to 2.6% in 2025.

3. **The authorities are considering how to complement macroeconomic adjustment measures with structural reforms that may improve growth prospects going forward.** One area of attention in this regard is the need to increase productivity, whose contribution to growth during 2016-2021 was only half of that during 2010-2015. Outside of a few standout industries such as automotive, basic metals, wearing apparel, and textiles, Türkiye's firm-level productivity has stagnated (manufacturing) or declined (construction and services) since the 2009 global economic crisis. This includes large manufacturing subsectors in terms of value-added and employment share, like electrical and electronic products, machinery and equipment, food, fabricated metals, and furniture, which suffer from lower-than-average productivity levels and are highly transport and logistics intensive.[1] Furthermore, Türkiye's participation in global value chains (GVCs), which has strong productivity spillovers yet depends on reliable international transport connectivity and cost-effective logistics, remains below that of other upper middle-income countries like Malaysia and Mexico.[2]

4. **Higher productivity growth needs to be accompanied by improvements in subnational economic convergence.** Despite a sustained reduction in regional inequities, in 2019 Türkiye had the third widest spatial disparity in income per capita in the OECD, measured as the ratio of the top 20% richest regions to the bottom 20% poorest regions.[3] Reducing this gap matters, because lower levels of subnational income inequality are associated with stronger and more sustained growth. Policies to reduce inequality should be pursued not only to improve social cohesion

[1] World Bank (2019), *Türkiye Productivity Report 2019: Firm Productivity and Economic Growth in Türkiye.*
[2] Asian Development Bank et al. (2021), *Global Value Chain Development Report 2021: Beyond Production.*
[3] OECD (2022), *OECD Regions and Cities at a Glance 2022*, OECD Publishing, Paris.

outcomes, but as drivers of long-term growth in their own right.[4] World Bank research shows that a particularly effective way of stimulating economic activity in lagging regions is by providing them with improved basic transport connectivity to/from leading regions.[5] In particular, Türkiye has the opportunity to better connect its eastern provinces with (a) neighboring trade partners, and (b) Türkiye's leading regions in the western half of the country (Map A6.1 in Annex 6).

5. **Türkiye is highly exposed to the impacts of climate change and has placed climate change mitigation and adaptation at the top of its development agenda.** The country ratified the Paris Agreement in October 2021, updated its first Nationally Determined Contribution (NDC) in 2023, and committed to achieving a net-zero economy by 2053. According to the World Bank's Türkiye Country Climate and Development Report (CCDR),[6] Türkiye's transport system—and in particular its national railway network—is more vulnerable to climate hazards than that of comparable countries. Moreover, the EU Green Deal and its potential economic implications for Türkiye, such as a need to reduce the carbon footprint of Turkish supply chains under the forthcoming Carbon Border Adjustment Mechanism (CBAM)—including a possible CBAM scope extension into the transportation and logistics component of these chains—further contributes to the urgency for Türkiye to reduce emissions across its main energy-consuming sectors, including transportation.

6. **The proposed operation will support Türkiye's development efforts to advance its (i) growth, (ii) spatial convergence, and (iii) climate change agenda, through improvements in railway infrastructure.** The operation will not only contribute to reducing logistics costs but also open the door to new economic opportunities. It will contribute to regional convergence by investing in select provinces of eastern Türkiye. And by promoting the transportation of freight by rail, it will help decarbonize the transport sector—a priority identified in the CCDR.

7. **The operation also has a global public good angle, as it will contribute to developing the Trans-Caspian Middle Corridor (the "Middle Corridor").** The Middle Corridor (MC) is a multimodal, intercontinental trade corridor linking China, Central Asia, the South Caucasus, Türkiye, and the European Union through rail and short sea shipping connections (Map A6.2 in Annex 6). The development of the MC will require a multiyear/multi-country/multisectoral effort, and the World Bank plans to accompany Türkiye—and other countries—with analytical work, convening power aimed at facilitating coordination efforts, and potential financing of key transport investments. In this regard, this operation is expected to (i) create incentives for other countries to address existing bottlenecks within their territories, by increasing the corridor's cargo capture potential and thus the viability of complementary investments elsewhere in the corridor, and by reducing uncertainty as to the alleviation of MC bottlenecks within Türkiye; and (ii) result in further collaboration among countries in the region towards integrated infrastructure provision and improved service delivery outcomes. Other ongoing initiatives in Türkiye in support of the MC include World Bank financial support to prepare preliminary documentation to develop a high-capacity overland railway crossing across the Bosphorus Strait via Istanbul's Yavuz Sultan Selim Bridge, known as the Third Bridge concept. Beyond the MC, construction of the Third Bridge railway crossing could facilitate the development of other intercontinental corridors via Türkiye, such as the proposed Iraq-Türkiye-Europe Development Road project.

B. Sectoral and Institutional Context

8. **Türkiye relies heavily on its transportation and logistics system as a facilitator of economic growth.** In 2022 Türkiye was among the world's 10 largest automotive industry exporters, with total sectoral exports of US$25.1 billion. This accounted for 1.7% of global automotive industry exports that year, including 11% of global exports of buses, 4%

[4] Cingano, F. (2014), "Trends in Income Inequality and its Impact on Economic Growth", *OECD Social, Employment and Migration Working Papers*, No. 163, OECD Publishing, Paris.
[5] World Bank (2009), *World Development Report 2009: Reshaping Economic Geography*, World Bank, Washington DC.
[6] World Bank Group (2022), *Türkiye Country Climate and Development Report*, Washington DC.

of commercial trucks, 3% of tractors, 2% of autoparts, and 1.3% of passenger cars. Of the 988,358 vehicle units Türkiye exported in 2022, 63% were destined to the EU alone. In 2022 Türkiye also accounted, in value terms, for 45% of the global exports of woven carpets, 38% of marble and travertine, 24% of wheat flour, 14% of cement, 12% of steel bars and rods, 10% of building stone, 7% of washing machines, 7% of pasta, 4% of kitchen stoves, and 4% of dish washers, to name but a few bulk and non-bulk commodities for which Türkiye's exporters are of systemic importance to the rest of the world—and which are routinely transported by rail and rail intermodal itineraries in the international experience. Domestically, Türkiye is a market of 85 million people, with a GDP of US$1.1 trillion in 2023. Given Türkiye's territorial size, serving its domestic and import-export markets often involves the transportation of freight over long distances, making Turkish logistics both transport intensive and in-principle compatible with multimodality. For example, the average truck trip distance in Türkiye—354 km—is more than double that of the EU (141 km), where multimodality in freight logistics is a major policy goal. Many of Türkiye's most heavily used domestic trade lanes are long-haul routes, including Istanbul-Mersin (939 km), Istanbul-Adana (930 km), Istanbul-Konya (720 km), Ankara-Adana (500 km), and Istanbul-Ankara (448 km). The diversified nature of Türkiye's commodity mix, including significant production of bulk commodities, as well as its length-of-haul profile, suggest the potential for a relatively balanced freight transport task across modes and a cost-efficient logistics system that is intense in rail and rail intermodal operations.

9. **Yet, rather than balanced, Türkiye's freight transport task is lopsided, with a dominant trucking share and scant participation of rail.** This generates avoidable transport costs, increases the logistics costs of some—especially bulk commodity—supply chains, and is inconsistent with the country's climate aspirations. Of the 340 billion non-pipeline inland ton-km transported in Türkiye in 2022, 95% took place by truck and only 5% by rail.[7] That is well below the rail freight market share of other upper middle-income countries of similar commodity mix and length-of-haul profile as Türkiye, such as South Africa (37%), China (29%), Mexico (25%), and Brazil (20%). It is also less than a third of that of the EU (17%), and one-seventh that of the U.S. (34%). A similar imbalance applies to the way Türkiye's foreign trade flows are transported: in 2022 56% of its trade by value used maritime ports as entry-exit gateways, yet only 16 of 71 main ports (and 210 total ports) are rail-enabled; 34% used road border crossings; 10% used airports; and less than 1% used railway border crossings. This is economically costly in terms of shipper out-of-pocket transport costs, as trucking in Türkiye is 2.8x more expensive per ton-km than rail freight; as well as in terms of the economic value of greenhouse gas (GHG) emissions, as Turkish heavy-duty trucks generate 2.6x more well-to-wheel carbon dioxide (CO_2) emissions per ton-km transported than diesel rail freight and 6.3x more well-to-wheel CO_2 emissions per ton-km transported than electric rail freight. Türkiye therefore has an opportunity, unique in magnitude among most upper middle-income countries, to reduce transport costs and mitigate the impacts of climate change by promoting rail freight adoption and shifting freight from trucks to rail.

10. **Rail freight has a critical role to play—particularly in the short to medium term—towards meeting Türkiye's net-zero economy target.** In Türkiye, as in much of the rest of the world, it is not possible to decarbonize the economy without decarbonizing the transport sector, which in 2019 was responsible for 23% of the country's energy-related GHG emissions. In turn, Türkiye's transport sector cannot be decarbonized without decarbonizing the transportation of freight, as the latter accounts for half of transportation emissions. For Türkiye, decarbonizing freight transport means, above all, reducing emissions from the transportation of goods by trucks, particularly heavy-duty trucks. In 2019, 95% of Türkiye's GHG emissions from freight transport originated from trucks. More than two-thirds of this (68%) was generated by heavy-duty trucks, which are comparatively more difficult to decarbonize than light-duty commercial vehicles, with a technology trajectory that is likely to take longer to reach widespread adoption than that of low- and zero-carbon small, short-haul trucks and vans. During the early period in the runup to the 2053 net zero target—e.g., over the next 10-15 years—facilitating the use of rail freight, and shifting long-haul truck freight to rail, are among the

[7] Non-pipeline inland freight refers to all freight transported by trucks, rail, or inland waterways. It is a standard definition of the national freight transport task that is commonly used to assess modal choice and benchmark freight modal split across countries.

most effective ways to decarbonize freight transport, while also reducing local pollution, road accidents, and road infrastructure wear and tear by taking trucks off the roads.

11. **However, shortcomings in Türkiye's railway infrastructure, both at the last mile and, increasingly, in the main line network, pose significant challenges towards realizing modal shift in practice.** Surveys of Türkiye-based shippers and logistics service providers show that a root cause of the country's low incidence of rail adoption is a generalized lack of access to the railway network at the last mile to/from cargo nodes like maritime ports, organized industrial zones, and large manufacturing facilities.[8] To help address this binding constraint, in June 2020 the World Bank Board of Executive Directors approved the Türkiye Rail Logistics Improvement Project (RLIP) (P170532, IBRD US$350 million), which aims to provide last-mile rail connectivity at priority sites disconnected from the national railway network, including Filyos port on the Black Sea coast and the industrial zones and maritime ports of the Çukurova region in southeastern Türkiye. But to fully service rail freight shippers end-to-end, investments in the main line portion of the network are also needed. And to better connect to cross-border supply chains in particular, there is a need for improvements to main lines along international corridors.

12. **In recognition of this, the GoT is in the process of rebalancing its transport investments towards rail freight.** Over the last two decades Türkiye focused extensively on the construction of dual-carriage highways, motorways, and, most recently, (passenger-oriented) High-Speed Rail (HSR) projects. This left the rest of the main railway network at a relative investment disadvantage. For example, only 48% of the Turkish network is electrified, compared to 56% in the EU, while only about 55% of the main line portion of the network (higher in the western and central provinces) is signalized. However, evidence of the significance of last-mile connections (LMCs) and the need for rehabilitation of rail corridors with high freight capture potential has resulted in a partial shift away from HSR projects and enabled greater focus on rail logistics. The Ministry of Transport and Infrastructure's (MoTI) *Transport and Logistics Master Plan 2053* (U2053), adopted in 2022, calls for the railway network to be modernized (e.g., fully signalized and electrified), as well as expanded by more than 8,550 km of mostly non-HSR lines—nearly doubling the current main line network—by 2053. The GoT's aspiration under this plan is for the modernized network, combined with complementary measures like the development of rail-enabled logistics centers and dry ports, to lead to a more than fourfold increase in rail freight modal share—to 22%—by 2053.[9]

13. **Key portions of Türkiye's main railway lines, particularly on the eastern half of the country, are technically obsolete and in need of modernization; the most strategic of these is the 660km Divriği-Kars-Georgia border line (Map A6.3 in Annex 6).** This is an international access line, linking Türkiye with the South Caucasus via the Baku-Tbilisi-Kars (BTK) railway line and, via the Caspian Sea, onwards with Central and East Asia. It is also intended as a vital domestic link, connecting the four provinces of eastern Türkiye that host the line—Sivas, Erzincan, Erzurum, and Kars—with the country's main economic poles to the west. One of the oldest sections in the network, with portions that predate the founding of the Turkish Republic, this line is operated with an outdated, manual traffic control system of line dispatchers, paper-based train orders, and telephone communication known as Central Administration by Telephone, or TMI in the Turkish acronym. This decreases the line's freight carrying capacity, makes it more prone to delays and less safe, and generates avoidable costs in infrastructure maintenance and service provision. Moreover, the line is not electrified and relies solely on diesel-powered equipment, is constrained in terms of train speeds and station lengths, and is in urgent need of rehabilitation after decades of deferred maintenance. As a result, Türkiye's railway network suffers from limited domestic and international accessibility on its eastern end.

14. **The development relevance of the Divriği-Kars-Georgia border railway line goes beyond its technical obsolescence and need for rehabilitation: it is an integral part—and major bottleneck—of the Middle Corridor (Map**

[8] World Bank (2019), *Last Mile Connectivity: Options to Improve Freight Rail Logistics in Türkiye*, Washington DC.
[9] Republic of Türkiye, Ministry of Transport and Infrastructure (2022), *Transport and Logistics Masterplan 2053*.

A6.2 in Annex 6). In recent years the MC has emerged as (a) one of the lifeline connections between Central Asia and the rest of the world; (b) one of the discretionary overland connection between China and Europe; (c) one of the connections between Türkiye and Central and East Asia; and (d) a driver of operational resilience, including climate resilience, for Asia-Europe supply chains.

15. **The MC has attractive growth and performance improvement prospects.** According to World Bank (2023),[10] non-oil freight volumes on the MC have the potential to triple, and freight travel times to reduce by half, over the medium term—provided that investments are made to address key capacity and service delivery bottlenecks. And, according to the same source,[11] the Divriği-Kars-Georgia border railway line is *the single most capacity-constrained section of the entire MC railway route, from the China-Kazakhstan border to the Türkiye-Bulgaria border, at present*. This limits the freight capture and logistics efficiency potential of the Türkiye branch of the MC (Map A6.2 in Annex 6). The corridor's Türkiye connection can in principle offer significant logistics performance potential—e.g., fast and reliable services—compared to existing alternatives. As World Bank (2023)[12] notes, "the greatest delays in the [MC] are associated with intermodal transfers of goods in ports and insufficient capacity on specific railway sections; the transportation time via Türkiye is significantly lower, but due to the lack of capacity this route is not that attractive to shippers." A more modern, less capacity-constrained Divriği-Kars-Georgia border line would make the BTK line more attractive, and by extension the Türkiye branch of the MC more accessible. This would allow the MC to not only increase its cargo capture, but to capture greater volumes of higher value-added containerized shipments in particular—thus contributing to exports diversification by host countries—due to the operational advantage of the Türkiye connection compared to Black Sea routes.

16. **The GoT has made it a policy priority to develop the railway component of the MC within its territory.** For example, the U2053 plan includes, under its "main sectoral targets," for Türkiye to "become a logistics base in the Middle Corridor."[13] Accordingly, the GoT is considering several MC-focused railway infrastructure investments that are expected to transform the corridor in the long-term, including the rehabilitation and modernization of the Divriği-Kars-Georgia border railway line and the Third Bridge railway crossing in Istanbul. The economic rationale for this ambitious investment program is at least threefold:

- **First, Türkiye aspires to increase its volume of trade, and to deepen its economic integration, with Turkic-speaking countries in the South Caucasus and Central Asia.** The MC directly connects these countries. Rail services on this infrastructure would be compatible with the long distances involved and the commodity profile of this trade, which is geared towards bulk commodities that are most economically transported by rail. For example, 96% of the exports of Kazakhstan, 84% of Uzbekistan, and 75% of the Kyrgyz Republic (all members of the Organization of Turkic States, along with Türkiye and Azerbaijan) are bulk products. This connection will also facilitate Turkish exports to Central Asia, including of containerized goods, which remain untapped. For example, in 2022 only 0.7% of Türkiye's exports of passenger cars by volume and 1.0% by value were destined to Central Asia.
- **Second, investing in the MC would facilitate Türkiye's trade with China**; and over time, a more competitive Türkiye branch can capture greater volumes of the China-Europe rail freight landbridge market for containerized freight.
- **And third, investing in the Divriği-Kars-Georgia border line would open several options to route MC cargo via Türkiye's rail-enabled maritime gateways on the Mediterranean coast**, such as Mersin and Izmir, further boosting operational resilience through redundancy and supporting low-carbon multimodal logistics within Türkiye.

[10] World Bank (2023), *Middle Trade and Transport Corridor: Policies and Investments to Triple Freight Volumes and Halve Travel Time by 2030*.
[11] Ibid.
[12] Ibid.
[13] Republic of Türkiye, Ministry of Transport and Infrastructure (2022), *Transport and Logistics Masterplan 2053*.

17. **Upgrading the Divriği-Kars-Georgia border railway line would facilitate local economic activity, create jobs in its immediate catchment, and help alleviate Türkiye's spatial economic disparities.** Like eastern Türkiye as a whole, the four provinces that host the line lag the rest of the country across several indicators of economic well-being. In 2022 all four provinces had a GDP per capita below the national average, with deviation levels ranging from moderate (84% of the national average for Erzincan) to staggering (44% of the national average for Kars). The GDP per capita of the richest province within the corridor—Erzincan—was less than half (49%) that of the richest province in the country (Kocaeli). A similar picture emerges when looking at multidimensional measures of well-being, with the corridor provinces of Erzurum and Kars ranking only 52nd and 70th, respectively, out of 81 provinces, on the 'well-being index', a GoT metric that considers aspects like housing, income, health, education, environment, safety, life satisfaction, and civic engagement. The economies of all four provinces are intense in primary sector activity. Industrial production is also common, particularly in Erzincan, where industry accounted for 31% of its GDP in 2022. The industrial and agriculture sectors of these provinces would benefit from improved rail freight connectivity for both domestic distribution and exports. This includes more intense use of rail-enabled logistics clusters in the region, such as the Kars Logistics Center. Located at the end of the BTK line, the Kars Logistics Center has remained underutilized since the BTK line's inception in 2017.

18. **While the main economic rationale for investing in the Divriği-Kars-Georgia border line is to increase rail freight traffic, the line also serves domestic passenger trains; its modernization would strengthen socioeconomic outcomes in the host provinces through improved domestic and international connectivity for passenger trips.** Whereas Türkiye's population grew by a third between 2000 and 2023, the population of the provinces that host the Divriği-Kars-Georgia border line either grew at only a fraction of the national expansion rate (Erzincan, +18%) or decreased in absolute terms (Sivas, -0.2%; Erzurum, -6.4%; Kars -14.7%) over the same period, with the bulk of this outcome due to domestic economic migration to more prosperous areas, such as the western Marmara region. The relative isolation of these provinces, where air travel is unaffordable to many given the prevailing income levels, and available train connections are limited to one service per day with a 26.5-hour Kars-Ankara transit time, compounds the economic challenges of the subregion. Safer, faster, and more frequent passenger connections between the host provinces and points west (as well as with international destinations to the east) would strengthen national social cohesion and help better allocate capital and labor across the economy. Furthermore, improved technical conditions on the line would allow for the expansion and upgrading of the current offering of premium, tourism-dedicated trains between Ankara and the host provinces, a major tourism attraction in eastern Türkiye. This will further help bring economic activity to the subregion.

19. **The provinces that host the Divriği-Kars-Georgia border railway line are highly exposed to extreme weather events and natural hazards.** Specifically, there is a high risk of urban floods, landslides, and wildfires in all four provinces, as well as a medium to high risk of earthquakes.[14] This underscores the need for Türkiye to invest in connectivity infrastructure in the subregion that can withstand the impact of these hazards and provide higher levels of operational continuity as a matter of improved service delivery.

C. Relevance to Higher Level Objectives

20. **The Eastern Türkiye Middle Corridor Railway Development Project (ETMIC) is aligned with the World Bank's Country Partnership Framework (CPF) for Türkiye for the FY24-28 period (Report No. CPF0000004, April 9, 2024).** Specifically, it supports the CPF's High Level Outcome (HLO) of *high and sustainable productivity growth*, and within it the CPF objective of *promoting logistics and connective infrastructure*. ETMIC will do this by providing *improved connective infrastructure*—a rehabilitated and modernized Divriği-Kars-Georgia border railway line—with multilayered

[14] GFDRR ThinkHazard! database.

connectivity impacts at the local (intra-provincial), regional (inter-provincial), and intercontinental (Middle Corridor) levels. It will also *promote efficient logistics* by (a) reducing freight transport costs and GHG emissions through truck-to-rail modal shift and the electrification of the current diesel locomotive-based railway line; and (b) reducing in-transit inventory carrying costs in intercontinental itineraries, through shorter and more predictable transit times along the MC. These outcomes are expected to *increase firm-level productivity* by enabling freight to be transported with fewer individual trips, and by allowing firms to hold lower levels of capital tied up in inventory per unit of revenue, thus freeing up resources towards more productive uses. The expected reductions in GHG emissions will help mitigate the impacts of climate change. ETMIC further supports the CPF's HLO of *strengthened resilience*, by delivering modern railway infrastructure with fit-for-purpose design parameters to better withstand extreme weather events like floods and landslides. Through its gender intervention, intended to contribute towards reducing Türkiye's labor market gender gaps, ETMC will support the CPF's HLO of *inclusive services and jobs*, and within it the CPF objective of *improving jobs for women, youth, and vulnerable groups*, by offering hands-on internships at MoTI to last-year female university students in the Ankara area, followed by mentorship and support post-internship to help participants find permanent employment in transport, logistics, and similar male-dominated sectors within 18 months of graduation.

21. **ETMIC is consistent with Türkiye's updated NDC and national climate change adaptation plans.** Türkiye's updated NDC seeks to reduce GHG emissions by 41% by 2030 compared to 2012 levels. It is considered an interim goal towards the long-term objective of reaching a net-zero target by 2053. The updated NDC filing further specifies that to meet the target, the main mitigation policies to be supported in the transport sector through 2030—roughly coinciding with ETMIC's implementation period—include (i) ensuring a balanced utilization of modes in freight transport, (ii) expanding freight transport by rail for international and inter-city itineraries, and (iii) increasing the efficiency and coverage of the intercity railway network and its electrification.[15] ETMIC operationalizes all 3 of these stated policies. With regard to adaptation, the project is in line with Türkiye's National Climate Change Adaptation Strategy and Action Plan 2011-2023,[16] which calls, inter alia, for a "more strategic and long-term approach" to transportation planning in the face of "extreme climate events [that] cause considerable economic and social impacts."[17]

22. **Several other policy documents support the GoT's decision to champion rail freight as a pillar of trade competitiveness and sustainability**. Under Türkiye's 12th National Development Plan (NDP) 2024-2028, the primary objective of the transport and logistics sector is "to develop intermodal and multimodal transportation practices; to establish a safe, accessible, holistic, environment-friendly, and cost-effective transportation system; and to maximize [Türkiye's] potential to become a regional hub in transportation and logistics by creating an infrastructure that supports competitive production and exports".[18] The NDP aspires to increase rail freight's ton-km market share to 9% by 2028, from 5% today. While this timeframe falls relatively early in ETMIC's implementation period, the project will contribute to either achieving or further adding to this vision over time. ETMIC is also aligned with MoTI's U2053 plan. The plan aims to stimulate higher value-added production and support export volumes by developing logistics corridors and improving transport and logistics services in an environmentally sustainable manner. It also calls for achieving a more even balance across transport modes in the freight transport task, specifically by increasing rail freight market share through prioritization of railway infrastructure investments and investments in multimodal freight transfer facilities.

23. **By crowding-in two additional Multilateral Development Banks (MDBs), ETMIC contributes to the World Bank Group's (WBG) objective of strengthening partnerships for better development outcomes under its Evolution**

[15] Republic of Türkiye (2023), *Updated First Nationally Determined Contribution*.
[16] A new National Adaptation Strategy for the period 2024-2030 is under preparation by the GoT, with support of the United Nations Development Program (UNDP). The GoT has also committed to preparing a 2023-2030 Climate Change Action Plan and a 2050 Climate Change Strategy.
[17] Ministry of Environment and Urbanization of the Government of Türkiye (2012), *Türkiye's National Climate Change Adaptation Strategy and Action Plan 2011-2023*.
[18] Presidency of the Republic of Türkiye (2023), *Twelfth Development Plan (2024-2028)*.

Roadmap.[19] ETMIC will mobilize development finance by the World Bank (IBRD US$660.0 million), the Asian Infrastructure Investment Bank (AIIB) (US$250.0 million joint co-financing), and the Islamic Development Bank (IsDB) (US$250.7 million parallel financing), to be complemented by counterpart funds from the GoT (US$183.9 million, excluding VAT[20]), thus making this sizable public investment possible. Importantly, ETMIC benefits from the combined experience, expertise, and integrated preparation and implementation support of the 3 financial institutions, in partnership with MoTI and the GoT. This is expected to result in stronger development outcomes.

II. PROJECT DESCRIPTION

A. Project Development Objective

PDO Statement

24. The Project Development Objective (PDO) is to improve the rail connectivity of eastern Türkiye along the Divriği-Kars-Georgia border railway section of the Trans-Caspian Middle Corridor.

PDO Level Indicators

25. Progress towards the PDO will be tracked based on the following 5 outcome indicators:

- Rail freight travel time between Divriği and the Türkiye-Georgia border (hours);
- Predictability of rail freight travel time between Divriği and the Türkiye-Georgia border (text: coefficient of variation of rail freight travel time);
- Well-to-wheel GHG emissions per ton-km transported on the Divriği-Kars-Georgia border railway line (text: grams of CO_2 per ton-km transported) (climate indicator); and
- Maximum freight carrying capacity of the Divriği-Kars-Georgia border railway line (metric tons per year);
- People benefiting from improved access to sustainable transport infrastructure and services (number of people), of which female and youth (corporate results indicator).

B. Project Components

26. The project comprises 2 components, as follows:

- **Component 1. Rehabilitation and Modernization of the Divriği-Kars-Georgia Border Railway Line (US$1,339.2 million, including contingencies and excluding VAT; IBRD US$656.0 million, AIIB US$248.5 million, IsDB US$250.7 million, GoT US$183.9 million)**

  Component 1 entails the brownfield rehabilitation and modernization of the Divriği-Kars-Georgia border railway line—an existing, outdated, and capacity-constrained international railway link in eastern Türkiye, 660km in length (Map A6.4 in Annex 6). The target line connects Türkiye with Georgia and the rest of the MC to the east; provides basic connectivity between eastern and western provinces of Türkiye; and is a section of the MC within Türkiye.

  Component 1 activities comprise engineering design services, civil works, and construction supervision services, to support the construction/rehabilitation of main tracks and sidings, bridges, terminals, stations, drainage structures, protective structures, and other facilities. These interventions will increase the line's cargo carrying capacity from an estimated current maximum effective capacity of 750,000 tons per year to 20 million tons per year.

[19] World Bank Group (2023), *Ending Poverty on a Livable Planet: Report to Governors on World Bank Evolution*.
[20] All VAT due from project activities will be covered by GoT counterpart funds.

The technical works under this component will include the following:

- Preparation of detailed engineering designs for all construction and installation works within the scope of the project; this will be conducted under a design-build implementation approach, which international experience has shown to improve infrastructure quality outcomes, including climate and natural hazard resilience, due to the integration of these interdependent functions under the same provider;
- Construction of 143km of standard gauge or dual gauge railway line, including 67km of infrastructure and superstructure, and 76km of superstructure only—to be built to Türkiye's national standards of structure integrity, which have been recently revamped to better withstand natural hazards, including climate-related hazards;
- Installation of European Rail Traffic Management System (ERTMS)/European Train Control System (ETCS) Level 1 signaling and telecommunication systems along the entire 660km alignment; this train control technology is compliant with EU Trans-European Transport Network (TEN-T) standards and is expected to (a) significantly increase the line's train carrying capacity and average train speeds, (b) make the line safer, and (c) make train maneuvers more responsive to climate and other disruptions, thus contributing to strengthening the climate resilience of line operations;
- Construction of 10 new sidings and extension of the length of sidings at 30 existing railway stations; this will increase the line's capacity at a fraction of the cost of double-tracking solutions, while minimizing environmental and social impacts by keeping to the existing alignment;
- Full electrification of the target line, which is currently operated solely with diesel-powered trains, including establishment of electric power installation systems with 16 substations, 16 neutral zones, and 154kV power transmission lines; this will eliminate tank-to-wheel GHG emissions from train operations on the line and significantly reduce well-to-wheel GHG emissions—by an average factor of 5.2x—over the life of the infrastructure (through 2060);
- Implementation of a track monitoring system, in the form of a 320 km-long 4-zone Distributed Acoustic Sensing (DAS) early-warning and detection system, and deployment of a Central Traffic Control (CTC) facility; this will reduce the line's vulnerability to disruption, including from climate hazards such as floods and landslides, enable preventive maintenance in anticipation of major disruption, and improve safety, thus increasing resilience and contributing to Türkiye's transport sector climate adaptation goals;
- Tunnel clearance works for electrification covering 86 tunnels with aggregate length of 18.7 km, which will enable the line's full electrification; tunnel works will also include tunnel maintenance, repair, and improvements in tunnel drainage, which will contribute to boosting the line's climate resilience;
- Construction of 120 controlled level crossings, which will increase the line's operational safety;
- Widening of 4 rail bridges (144m in aggregate span) to allow for additional sidings; this will increase operational efficiency and make the line less vulnerable to climate hazards like flooding and landslides;
- Renewal of 2 passenger platforms;
- Construction of a 1,050m retaining wall and a 10km snow barrier, for protection against climate hazards;
- Renewal of 77 culverts and reconstruction of 7 overpasses, all for protection against climate hazards and improvements in operational efficiency, including through improved vehicle and rolling stock clearance;

- Construction of select station buildings, facilities, and signaling, telecommunications, and electrification systems, including civil works at Canbaz Station and construction of 20.8 km of signaling/telecommunication and 15.3 km of electrification systems at the Kars Logistics Center; and
- Provision of design and construction supervision consulting services for the full length of the target line.

Component 1 will be subdivided into 3 Sub-components, as follows:

i. **Sub-component 1.1: Design and infrastructure and superstructure works for the Divriği-Kars section of the target line, plus electrification and signalization of the entire Divriği-Kars-Georgia border line (US$1,066.7 million, including contingencies and excluding VAT; IBRD US$640.2 million, AIIB US$242.5 million, and GoT US$183.9 million).** On a joint co-financing basis, the IBRD and AIIB contributions, complemented by the GoT's counterpart financing contributions, will be used to undertake (i) design and infrastructure and superstructure works for the Divriği-Kars section of the target line; and (ii) electrification and signalization of the entire Divriği-Kars-Georgia border railway line (see Annex 2 for details).

ii. **Subcomponent 1.2: Design and infrastructure and superstructure works for the Kars-Georgia border section of the target line (US$250.7m, including contingencies and excluding VAT; IsDB US$250.7m).** On a parallel financing basis, IsDB's contribution will be used to undertake design and infrastructure and superstructure works for the Kars-Georgia border section of the target line (see Annex 2 for details). This will be the only activity for which IsDB financing will be used under the project.

iii. **Sub-component 1.3. Design supervision and construction supervision services for the rehabilitation and modernization of the Divriği-Kars-Georgia border railway line (US$21.8 million, excluding VAT; IBRD US$15.8 million, AIIB US$6.0 million).** Sub-component 1.3 comprises the provision of consulting services to supervise all design and construction/installation works under Sub-components 1.1 and 1.2, including supervision of the procurement process for design-build civil works contracts. These services, to be financed (pre-VAT) solely by IBRD and AIIB contributions on a joint co-financing basis, will supervise design and construction works across the full length of the target line, including the design and superstructure works along the Kars-Georgia border section that will be financed (pre-VAT) solely by IsDB on a parallel financing basis. This integrated approach to design and construction supervision is expected to result in more robust construction outcomes.

- **Component 2. Project Management (US$5.5 million, excluding VAT; IBRD US$4.0 million, AIIB US$1.5 million)**

  This component will finance the mobilization of a specialized firm with expertise in project management, engineering design and construction (including climate resilience), social and environmental monitoring, citizen engagement, results monitoring and evaluation, and other aspects of project implementation oversight, to staff the Project Implementation Unit (PIU) (see Institutional and Implementation Arrangements section). Component 2 further comprises the implementation of an *Enhanced Internship Program* at MoTI for last-year female university students in transportation, logistics, and related fields in the Ankara area, which will be overseen by the PIU (see Gender section). A portion of proceeds under Component 2 will be used to cover operational expenses of the PIU. Component 2 will be solely financed (pre-VAT) by IBRD and AIIB on a joint co-financing basis.

Table 1 summarizes the size and distribution of project costs by financing source, and by component and sub-component.

Table 1. ETMIC: Project Costs Breakdown by Financing Source and by Component
US$ millions, including contingencies and excluding VAT[\1]

	IBRD	AIIB	IsDB	GoT	Total
Component 1	**656.0**	**248.5**	**250.7**	**183.9**	**1,339.2**
Sub-component 1.1[\2]	640.2	242.5	-	183.9	1,066.7
Sub-component 1.2	-	-	250.7	-	250.7
Sub-component 1.3	15.8	6.0	-	-	21.8
Component 2	4.0	1.5	-	-	**5.5**
Total	**660.0**	**250.0**	**250.7**	**183.9**	**1,344.6**

1\ Total project costs including VAT and excluding the IBRD front-end fee (US$1.65 million) are US$1,613.6 million. Total project costs including VAT and the IBRD front-end fee are US$1,615.2 million. All VAT payments will be financed by GoT counterpart funds.
2\ GoT counterpart funds for Sub-component 1.1 will be utilized as needed only after IBRD/AIIB co-financing is fully committed.
Source: AYGM.

C. Project Beneficiaries

27. The **main project beneficiaries** are (i) the national railway infrastructure manager State Railways of the Republic of Türkiye (TCDD); (ii) cargo owners and transport and logistics service providers moving freight to/from the provinces that host the Divriği-Kars-Georgia border railway line, including Türkiye's incumbent railway undertaking TCCD Transport; (iii) cargo owners and transport and logistics service providers moving freight along the MC, mainly in the Central Asia-Europe, China-Europe, Türkiye-Central Asia, and Türkiye-China bidirectional trade lanes; and (iv) the communities in and around the main centers of economic activity in the provinces that host the target railway line.

28. In its role as manager of the national railway network, and thus responsible for its utilization, TCDD will benefit by receiving form the project an improved infrastructure asset that will reduce the company's maintenance expenses and backlog. The project will facilitate TCDD operations through a more resilient, better equipped, and higher-capacity railway line in a portion of the network that suffers from obsolescence and constraints TCDD's ability to form long-haul domestic and cross-border train service pathways. As the project is expected to help attract both domestic and international tonnage to Türkiye's railway network, including by helping position Türkiye as a significant transit country and logistics services base along the MC, it will increase TCDD's revenues from track access charges, thus allowing it to provide better network management services.

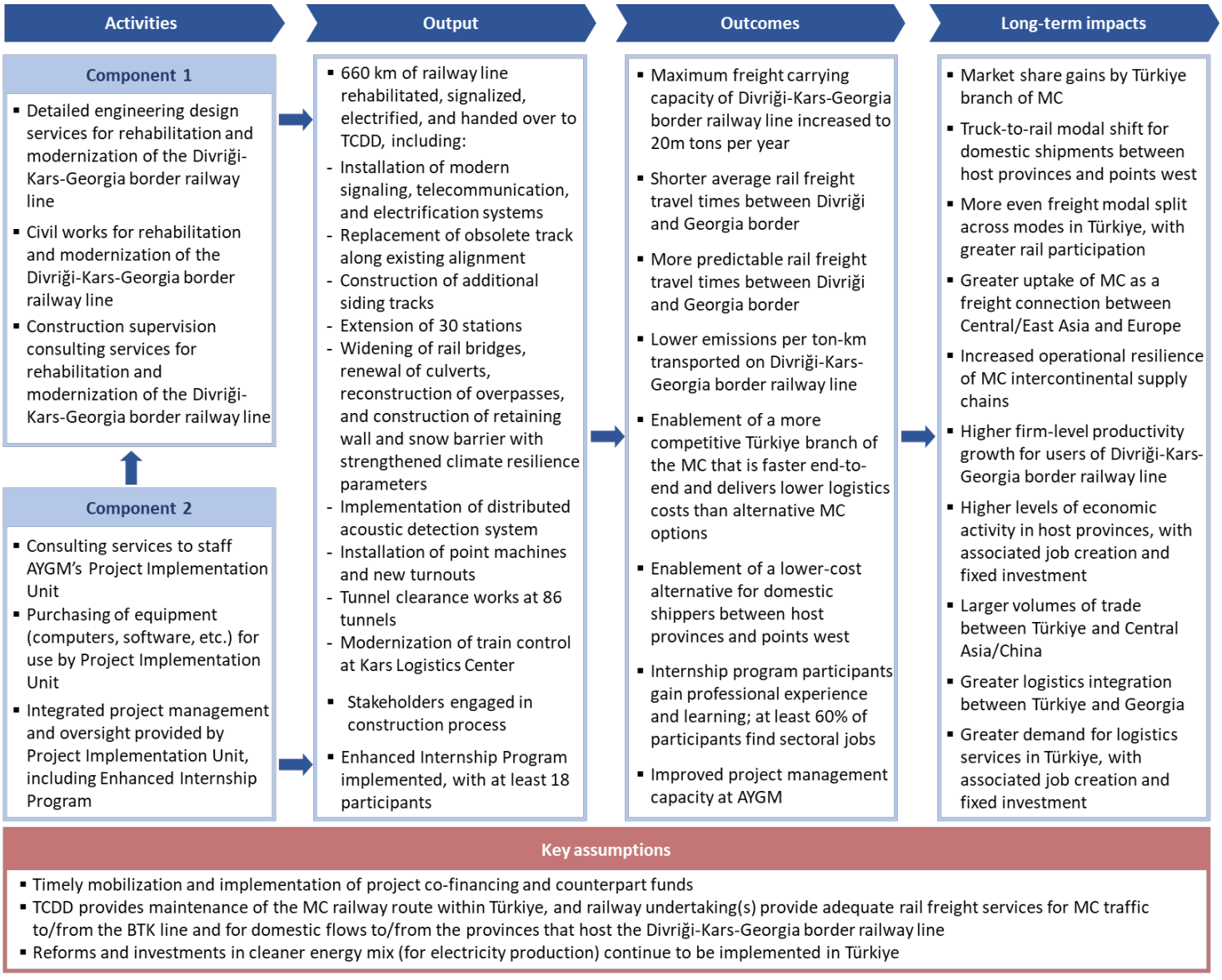
29. The project will benefit domestic shippers by reducing transport costs through truck-to-rail modal shift. It will benefit domestic and international shippers on the MC by enabling a faster and more predictable route that available alternatives, which can reduce logistics costs through lower levels of inventory carrying costs. Moreover, it will benefit domestic and international railway undertakings and non-asset-based logistics operators by opening up new connections that can increase customer acquisition and top-line growth.

30. Local communities in the project area (with an estimated 590,000 beneficiaries), particularly those in main regional economic centers such as Erzurum city, and within the economic catchment of train stations and logistics centers linked to the target railway line, such as Kars city, will benefit from project-induced economic activity, including construction works, higher demand for multimodal logistics services, and higher levels of commercial activity by businesses relying on project-improved railway connectivity to access markets (see Annex 3 for a summary assessment of the economic geography of these provinces and how they are likely to benefit from improved rail freight access).

D. Results Chain

31. ETMIC's **Results Chain** (Figure 1) links discrete project-financed civil works, consulting services, and project management activities with the project's **intended outputs**: a rehabilitated, modernized, and more capable Divriği-Kars-Georgia border railway line, handed over to TCDD for railway infrastructure operations; and the implementation of an Enhanced Internship Program at MoTI for last-year female university students in the Ankara area. These outputs are expected to result in desirable **short- and medium-term outcomes**, including increased cargo carrying capacity of the target line; shorter and more predictable transit times along the target line; a more efficient (i.e., lower logistics costs-enabling) Türkiye branch of the MC; improved domestic rail freight (and passenger) connectivity; and lower GHG emissions per ton-km transported along the target line. These short- and medium-term outcomes, in turn, are expected to contribute towards **long-term impacts**, including a more balanced freight modal split in Türkiye and gains in productivity by firms benefitting from improved railway connectivity.

Figure 1. Results Chain of the Eastern Türkiye Middle Corridor Railway Development Project



Source: World Bank analysis.

E. Rationale for Bank Involvement and Role of Partners

32. The **rationale for World Bank involvement** in the rehabilitation and modernization of the Divriği-Kars-Georgia border railway line is as follows:

- As in most of the rest of Europe, and consistent with Türkiye's reform of the railway sector in accordance with the EU *acquis communautaire*, the target line is (a) a public asset, and (b) a component of a national railway network that is entirely state-owned, managed by a national state-owned entity—TCDD—with no private sector participation in the provision and maintenance of railway infrastructure. As such, the overdue modernization of this line requires the mobilization of public resources towards the provision of a public good under the remit of the GoT. The involvement of the World Bank, which in turn facilitates the involvement of AIIB and IsDB, enables significant MDB long-tenor concessional financing to bridge a financing gap and address a public infrastructure bottleneck of national and international importance.
- Public investment in railway infrastructure such as the target line will lead to the alleviation of several non-market externalities, such as emissions of greenhouse gases and local pollutants, highway infrastructure wear and tear, over-the-road accidents involving heavy-duty trucks, and highway and rail main line congestion. These outcomes represent market failures that are well suited for public policy intervention. The proposed investment in particular is aligned with the World Bank's objectives for Türkiye's transport and logistics sector, and with the GoT's stated policy goals.
- The alignment of the project's target line is entirely located within economically lagging regions of Türkiye. In these contexts, the public provision of basic transport connectivity—as a matter of policy—has proven effective in the international experience to promote economic activity, improve access to markets and opportunities, and reduce economic disparities between leading and lagging regions. The current status of the target line shows that without public investment, and without the support of multilateral financiers like the World Bank to mobilize sufficient resources at scale, the proposed intervention may not or may take longer to materialize.
- The project is consistent with the goals, intended policy direction, and ongoing investments in the Middle Corridor, in Türkiye and elsewhere, of other development partners—most notably the EU. In 2019 the EU provided a EUR275 million grant to the GoT to support the (ongoing) construction of the Halkali-Kapikule (HK) railway line under the Instrument for Pre-Accession Assistance (IPA) for the period 2014-2020; loan financing was further provided by the European Bank for Reconstruction and Development (EBRD) and AIIB. The HK line, which links Istanbul with the Türkiye-Bulgaria border and the EU's Trans-European Transport Network (TEN-T), is part of the Middle Corridor. Just as the Divriği-Kars-Georgia border line sits at the eastern end of the MC within Türkiye, the HK line sits at the western end. The HK line's economic potential depends in part on the removal of bottlenecks in other sections of the corridor, especially if this is done in a manner operationally commensurate and technically compatible with the HK line—which is what ETMIC intends to deliver. Furthermore, in January 2024 the European Commission announced, under its Global Gateway initiative, that it intends to provide and crowd-in EUR10 billion in MC-linked investments in Central Asia in the short term, including through Memoranda of Understanding (MoU) with Central Asian governments for nearly EUR3 billion in investment support by the European Investment Bank (EIB) and EBRD. Like that of the HK line, the viability of these Central Asia investments will depend in part on the well-prioritized removal of logistics bottlenecks elsewhere along the corridor, which is at the core of ETMIC's development objective.

F. Lessons Learned and Reflected in the Project Design

33. **Project design has been informed by the World Bank's experience supporting the implementation of the ongoing RLIP by MoTI's Directorate-General of Infrastructure Investments (AYGM), which will remain as implementing agency under ETMIC.** Effective since November 2020, RLIP has shown the importance of adopting

procurement approaches that can reduce implementation delays by consolidating the procurement requirements into fewer procurement packages that are larger in value yet consistent with market capacity. RLIP has also shown the importance of ensuring that sufficient funding resources are devoted to staffing and equipping the PIU. Based on these lessons, ETMIC is expected to rely on a limited number of design-build contracts for civil works, which integrate both engineering design and construction activities under a single tender procedure. In addition to reducing the number of bidding processes under the project and accelerating disbursements, this approach is expected to facilitate engineering innovation and a better integration between design and final construction, leading to more robust infrastructure development results. Project design is also based on careful procurement packaging to (a) accommodate the financing envelopes of the co-financiers, and (b) adapt contracts to implementation complexity levels that the domestic and international markets are likely to be responsive to. Furthermore, ETMIC allocates more significant financing resources to staffing and equipping AYGM's PIU compared to RLIP and will pioneer at MoTI the organizational approach of engaging integrated consulting services to staff the PIU. This will allow AYGM to mobilize seasoned expertise for those positions where qualified government staff are not readily available in-house. This staffing approach is expected to complement AYGM's core engineering and construction expertise and generate knowledge spillovers for existing AYGM staff. ETMIC's brownfield approach, compared to RLIP's greenfield interventions, is further expected to result in fewer implementation delays, particularly during the engineering design phase.

34. **Project design is further informed by best international practice in railway infrastructure development.** International experience shows that fragmentation in the provision of signalization and telecommunication systems in railways can create compatibility risks, leading to higher vulnerability to system failures. To mitigate this risk, ETMIC's design calls for the provision of electrification, signalization, and telecommunication systems by the same provider along the entire length of the target line. It also mitigates construction quality and civil works contract linkage risks by engaging a single construction supervision consultant (CSC) for all works along the line, and by ensuring that the CSC is mobilized first, so that it can provide early inputs into the tender documentation for the design-build contracts it will eventually supervise.

III. IMPLEMENTATION ARRANGEMENTS

A. Institutional and Implementation Arrangements

35. **ETMIC will be implemented by AYGM as the lead agency for rail infrastructure development under MoTI.** An ETMIC-dedicated PIU sub-unit will be established within AYGM's existing PIU responsible for the implementation of RLIP. The PIU, including its ETMIC-dedicated sub-unit, will continue to be led by AYGM's Deputy Director General as PIU Director, and by the Director of AYGM's Railway Construction Department as Deputy PIU Director. The PIU's ETMIC sub-unit will be staffed by at least 10 members, including a sub-unit leader, an engineering and construction specialist, a procurement specialist, a financial management specialist, an Environmental, Social, Health and Safety (ESHS) manager, an environmental specialist, a social development specialist, an occupational health and safety (OHS) specialist, and two community liaison officers. These roles, which will supplement staff from AYGM's own expert personnel in railway engineering and construction, will be recruited through a consulting services contract with a firm. Terms of Reference (ToR) for these services, which will span the duration of the project, have been prepared by AYGM and confirmed by the World Bank as responsive to the Bank's Procurement Framework, Financial Management requirements, and Environmental and Social Framework (ESF) principles.

36. **AYGM will collaborate closely with TCDD during implementation.** To minimize operational disruptions to the target line during construction, and to ensure the project's civil works interventions are fit for purpose, AYGM and TCDD will enter into a Collaboration Agreement specific to ETMIC. This agreement is mandated under Turkish legislation per the respective roles given to these institutions under the structure of Türkiye's railway industry (construction of infrastructure, and management of infrastructure, respectively). This collaboration is expected to

include joint preparation of construction work plans, use of phased construction approaches, a coordination mechanism to gather comments on key documentation like bidding documents and engineering designs, and regular progress updates.

37. **A Project Operations Manual (POM) will be prepared for the project.** The POM will outline the PIU procedures to ensure compliance with World Bank policy regarding procurement, financial management, social and environmental standards (including workplace and community safety), monitoring and evaluation (M&E), and citizen engagement. Periodic Bank-led training, regular implementation support missions, and close communication between AYGM/PIU and the World Bank Task Team will supplement the POM.

B. Results Monitoring and Evaluation Arrangements

38. The project's outcome and intermediate performance indicators, including their definition, baseline, and target values, are shown in the **M&E framework** presented in Section VII. AYGM's PIU will be responsible for tracking these indicators over time and measuring their values against the set targets. The measurement of some of these indicators will require market research and/or consultations with other government agencies, whether within or outside MoTI.

39. Formal **implementation support missions** will be conducted jointly by the project's co-financiers twice per year. **Just-in-time implementation support** by the co-financiers will be provided as needed, and in a variety of formats, throughout the project period. A **Mid-term Review (MTR)** will be conducted to assess progress, take stock of lessons learned, identify key issues, and agree on a time-bound action plan to address them. It is expected that the MTR will be held in or around December 2027. The **closing date** of the project is December 31, 2030.

C. Sustainability

40. **The GoT is committed to this project and its long-term sustainability.** Several government documents give the project long-term policy backing, including the 12th National Development Plan 2024-2028, the Türkiye Updated First Nationally Determined Contribution under the Paris Agreement, the Transport and Logistics Master Plan 2053, and the GoT's stated goal of achieving a net-zero economy by 2053. The project's long-term policy visibility is further strengthened by Türkiye's intention of expanding trade volumes with Central Asia and China while positioning itself as a transit hub for the Middle Corridor, including via potential future MC branches through the South Caucasus, which could connect to the project's target line at Kars. The Strategy and Budget Office (SBO) of the Office of the President of Türkiye has included ETMIC in its 2024 Investment Program, and future SBO decisions on allocation of budgetary resources to support maintenance of the national railway network, including the target line, are expected to be consistent with its capital investment program. Upon completion of civil works, AYGM will hand over the project-financed infrastructure to TCDD as infrastructure manager. TCDD has a mandate to maintain and maximize the utilization of all public railway infrastructure. The MC's growth prospects, the international nature of the target line as a component of the BTK line—an infrastructure joint venture between Türkiye, Georgia, and Azerbaijan—and the fact that the target line is a branch of the MC where alternatives are available, will further create policy, corridor coordination, and market incentives to ensure that the asset is used to its fullest market extent and regularly maintained consistent with MC operational needs.

IV. PROJECT APPRAISAL SUMMARY

A. Technical and Economic Analysis

Technical Analysis

41. **The project's main technical aim is to increase the transport efficiency and freight carrying capacity of the target railway line, while reducing its vulnerability to climate and non-climate hazards.** The project will rehabilitate

and modernize the physical condition, operational standards, and linehaul and last-mile connectivity of the existing Divriği-Kars-Georgia border line without significantly altering its alignment. In so doing, it will make it more resilient to natural hazards, as well as safer to operate.[21] As a brownfield investment, the project will entail lower levels of technical, environmental, and social complexity, at lower cost, compared to a greenfield development.

42. The project will achieve these results through the following **engineering solutions and principles**:

- Doubling of the length of existing stations along the Divriği-Kars sub-section—to between 700m and 1,050m—and construction of new and more frequent sidings. The addition of sidings, combined with the ability to run longer trains and the provision of modern signalization, electrification, and telecommunication, will increase the line's annual freight carrying capacity, from an estimated maximum effective capacity of 750,000 tons today to 20 million tons post-project, at a fraction of the cost of what a greenfield approach, based on double-tracking, would cost, while still providing sufficient capacity relative to the corridor's freight capture prospects long-term;
- Construction of new railway infrastructure to improve horizontal geometry along the Divriği-Kars section, widening of select bridges, and replacement of certain obsolete bridges and culverts to both repair existing structural damage from climate impacts and increase the line's resilience to future climate and non-climate hazards; these interventions will further contribute to increasing the operational speed of the overall line, to a maximum speed of 70-120 km/h, compared to current actual speeds of 12 km/h for freight trains;
- Construction of a dual-gauge line for the Kars-Georgia border section (part of the BTK line), which can enable—if a similar investment is made in Georgia—break-of-gauge operations on the BTK line to be conducted at the Kars Logistics Center, thus providing a complementary alternative to the Akhalkalaki facility where gauge-change operations are currently conducted; this is expected to strengthen the operational flexibility of the BTK line and alleviate a potential bottleneck along the MC;
- Installation of electrification, signaling, and telecommunication across the full length of the line, and construction of controlled at-grade crossings and avalanche tunnels; these interventions will make train operations more resilient to climate and non-climate hazards, safer, and subject to less speed restrictions;
- Installation of a Distributed Acoustic Sensing (DAS) detection system along the line's 320km of track most vulnerable to climate and non-climate hazards, coupled with Central Traffic Control (CTC) for the entire line, to detect trespassing, loose fastenings, flat wheels, loose ballast, and climate-change aggravated natural disasters such as flooding, landslides, tree/stone/rock debris, and avalanches.

43. The project's focus on infrastructure development is justified by Türkiye's significant railway sector reform progress in recent years, aligned with best European practice. Elements of this reform process have also strengthened Türkiye's ability to deliver transportation services on this line after project completion (see Annex 4 for details).

44. **The project will be implemented using 'Yellow FIDIC' design-build principles.** Detailed engineering designs will be prepared by the contractor under the monitoring and review of the supervision consultant, and particular attention will be given to addressing climate-change related risks to deliver resilient infrastructure consistent with both recently revamped national standards and good European/TEN-T practice. As most of the railway line was completed at least 55 years ago, and any rehabilitated or newly constructed parts were last completed around 10 years ago, there are infrastructure and drainage vulnerability spots all along the line, especially due to changing meteorological conditions due to climate change. To address these, hydraulic analyses of drainage system and flooding effects on all culverts and bridges along the line, based on up-to-date climatic conditions data, will be carried out at detailed design stage. All

[21] Available data shows that railway accidents in Türkiye, which have been on a long-term declining trend, are increasingly caused by climate hazards, such as flooding, landslides, and heatwaves.

drainage system, culverts, and bridge renovation or reconstruction works will be defined within the technical specification, design documentation, and Bill-of-Quantities (BOQ) accordingly. To address the seismicity-related issues in the project corridor, site specific seismic surveys, engineering studies and solutions, and renovation or reconstruction works will also be developed. The detailed design will address leakage prevention as well as control and provision of required clearance in existing tunnels.

45. **Project interventions are expected to generate four main impacts.** They will (i) **reduce logistics costs** for domestic and MC rail freight shipments, by removing capacity constraints at the target line, reducing rail freight travel times, and making rail freight itineraries in these markets more predictable (see Annex 5 for details); (ii) **mitigate the impacts of climate change**, by reducing GHG emissions from the movement of freight in domestic and intercontinental rail freight shipments serviced by the target line through its electrification, and by eliciting truck-to-rail modal shift (in domestic shipments) and vessel- and truck-to-rail modal shift (in Türkiye's own and third-country MC shipments) (see Annex 5 for details); (iii) **help Türkiye adapt to climate change**, by making the target line more resilient to climate and other natural hazards (see Annex 2 for details); and (iv) **make the target line safer to operate**, by providing modern train control, telecommunication, and early-warning systems technology, and **contribute towards better road safety outcomes,** by taking heavy-duty trucks off highways (see Annex 5 for details).

Assessment of Alignment with the Paris Agreement

46. **ETMIC is aligned with the goals of the Paris Agreement on both adaptation and mitigation.** The project is consistent with and will contribute to attaining Türkiye's NDC emissions reduction target under the Paris Agreement, as well as the country's longer-term national goal of achieving a net-zero economy by 2053. It is also consistent with national adaptation goals also adopted through NDC objectives. All ETMIC-financed interventions under Component 1, supported by the project management and oversight activities of Component 2, are universally aligned with the Paris Agreement: they will deliver modern and more efficient railway infrastructure, and will enable electric freight transportation while reducing the vulnerability of the target line to extreme weather events and other impacts of climate change. As the project's interventions are expected to reduce GHG emissions (see GHG Emissions Accounting section), ETMIC will contribute to Türkiye's transition to its intended low GHG emissions development pathway.

47. **The target line will not be utilized primarily for the transportation of fossil fuels.** In 2030, the first year in which project-financed investments are expected to be operational, 25.5% of the line's volumes and 2.6% of the target line's maximum freight carrying capacity are expected to be accounted for by fossil fuels—specifically, coal, with no other fossil fuels (e.g., liquid fuels) expected to be transported on the target line over its economic life. The remaining 74.5% of volumes in 2030 will comprise essential commodities like grain and other agricultural products, foodstuffs, minerals, fertilizers, metal products, and miscellaneous containerized goods, including consumer and industrial products. Considering the policy landscape of the destination markets of the coal expected to be carried by the target line (all in Europe), where most countries have committed to decarbonizing their economies by either 2050 (EU member states) or 2053 (Türkiye), the share of the target line's volumes and capacity accounted for by coal in the with-project scenario is expected to reduce significantly over time. Specifically, coal is expected to account for 10.0% of volumes (2.5% of capacity) by 2040, 3.0% of volumes (1.3% of capacity) by 2050, and 0.3% of volumes (0.1% of capacity) by 2060, **for a weighted average fossil fuel share of volumes over the economic life of the project-financed investments (2030-2060) of 4.98% (1.65% of capacity)**. Furthermore, the target line does not directly link to or directly support upstream or midstream activities in coal power generation and/or the fossil fuel industry, nor is it expected to do so during the economic life of the ETMIC-financed investments.

48. The main *logistics* drivers of the diminishing coal incidence in the target line's volumes over time are that the project is expected to (i) elicit truck-to-rail modal shift in domestic markets that are not coal intensive, and (ii) capture MC traffic with a higher incidence of containerized freight, by providing improved logistics efficiency compared to

alternative MC routing options. As such, the project-financed investments intend to support the diversification of exports across the MC region, and facilitate Türkiye's own exports of higher-value commodities to Central and East Asia, resulting in a declining incidence of fossil fuels (and other bulk products) in the commodity mix of the target line over time. Furthermore, due to the project's full electrification of the target line, the use of trains with fossil fuel powered traction will be phased out; and the Türkiye-generated electricity used to power trains along the target line is expected to be produced with lower emissions per kwh over time, as the country advances in its energy transition. As a result, the project is not expected to introduce barriers to Türkiye's energy transition plans. **Based on World Bank guidance on Paris Alignment assessment,[22] the project's Paris Alignment mitigation risk is rated Low.**

49. **The Divriği-Kars-Georgia border railway line is exposed to the impacts of climate change, particularly flooding and landslide risks.** To mitigate these risks, several measures have been incorporated into project design, as well as into the preliminary engineering design of the target line itself. Project design features that are expected to contribute to the delivery of climate-resilient infrastructure include the use of design-build procurement approaches, the use of rated criteria in procurement to incentivize innovation and stronger climate and social and environmental outcomes, and the engagement of key stakeholders at the local and national level during the design and construction phases. Engineering design features that are expected to make the target line more climate resilient include deploying modern signaling and telecommunication across the full length of the line and an early warning system along its most vulnerable 320km of track; significantly improving drainage solutions; enhancing vulnerable structures like bridges and tunnels; and building additional protecting structures like retaining walls and snow barriers. **Based on World Bank guidance on Paris Alignment assessment,[23] the project's Paris Alignment adaptation risk is rated Low.**

Economic Analysis

50. A standard cost-benefit analysis was conducted to assess the project's economic viability across Component 1 and Component 2. This assessment indicates that investing in the rehabilitation and modernization of the Divriği-Kars-Georgia border railway line is economically viable and therefore justified as a matter of policy. Specifically, the project is expected to yield an Economic Internal Rate of Return (EIRR) of 11.7%, nearly double the World Bank-recommended[24] benchmark economic discount rate of 6.0% (Table 2; see Annex 5 for details). At the latter discount rate, the project is expected to yield an Economic Net Present Value (ENPV) of US$1.19 billion in 2024 prices. Sensitivity analysis shows that the economic viability of these investments is robust to a simultaneous increase in costs and decrease in benefits of up to 38.5% each, relative to base-case assumptions.

GHG Emissions Accounting

51. A GHG emissions accounting and valuation exercise was conducted as part of the economic analysis of project investments (see Annex 5 for details). Based on World Bank standard guidance on the shadow price of carbon,[25] the economic value of a ton of CO_2 is assumed to be US$124 in 2030 (the first year the project-financed facilities are expected to become operational), and to grow gradually in real terms to reach US$139 in 2035, US$155 in 2040, US$193 in 2050, and US$241 in 2060. It is estimated that in 2030 the project will result in the avoidance of 72,332 tons of CO_2, and that the annual volume of avoided emissions due to the project will grow to 245,835 tons by 2060. In aggregate, over the 31-year period of analysis (2030-2060), it is estimated that the project will result in the cumulative avoidance of 5.0 million tons of CO_2, with an estimated present economic value of US$236 million.

[22] World Bank (2023), "Transport Sector Note on Applying the World Bank Group Paris Alignment Assessment Methods".
[23] Ibid.
[24] World Bank (2016), "Discounting Costs and Benefits in Economic Analysis of World Bank Projects".
[25] World Bank (2024), "Guidance Note on the Shadow Price of Carbon in Economic Analysis".

Table 2. Economic Evaluation of Project Investments
Millions of 2024 US$

Present value of economic costs		Present value of economic benefits				Economic Evaluation	
Capital[\1]	O&M	Transport costs	In-transit inventory carrying costs	GHG emissions	Transport safety	ENPV	EIRR
(880.4)	(69.5)	770.5	1,127.8	235.7	7.0	**1,191.0**	**11.7%**

O&M = Operations and maintenance. GHG = Greenhouse gas. ENPV = Economic net present value.
EIRR = Economic internal rate of return.
1\ Including the offsetting residual value of the infrastructure at the end of the analysis period (2060).
Source: World Bank analysis and estimates.

B. Fiduciary

(i) Financial Management

52. Project Financial management (FM) arrangements are assessed as Satisfactory at entry, subject to completion of the action plan items presented in Annex 1. AYGM's current PIU has an FM specialist overseeing this function under the ongoing RLIP, which has highly satisfactory financial management arrangements. Considering AYGM's decision to establish a dedicated PIU sub-unit for ETMIC by hiring a firm to provide project implementation support, one important consideration during implementation will be to ensure FM experience sharing and knowledge transfer across the FM functions for RLIP and ETMIC. For this purpose, the systems and procedures that have already been established for RLIP can be replicated by the new PIU sub-unit.

53. The general FM requirements for MoTI throughout implementation will be to:

- Maintain an adequate project financial management system;
- Maintain at least one dedicated financial management consultant paired with a DG staff assigned for financial management throughout the project implementation period;
- Prepare interim unaudited financial reports for the project on a quarterly basis and submit these to the Bank no later than 45 days after the end of each quarter;
- Have the project financial statements audited by the Treasury Controllers based on terms of reference acceptable to the Bank;
- Submit the annual audited statements of the project, and the Management Letter, to the World Bank within six months of the end of each fiscal year; and
- Make the project audit reports publicly available on AYGM's website.

(ii) Procurement

54. **World Bank Procurement Regulations for IPF Borrowers, dated September 2023 (Procurement Regulations) will apply to all activities co-financed by IBRD and AIIB under the project.** The Bank's 'Guidelines on Preventing and Combating Fraud and Corruption in Projects Financed by IBRD Loans and IDA Credits and Grants,' (revised July 1, 2016) ('Anticorruption Guidelines') will also apply.

55. **Procurement under the project is expected to include large-value works contracts**, such as for construction of new standard- and dual-gauge railway tracks, including infrastructure and superstructure; electrification of the target railway line; construction of station buildings and train and cargo handling facilities; and signaling, telecommunication, and electrification systems. This will represent the bulk of the project's procurement activities, expected to be procured through the Request for Proposal (RFP) method with an open, competitive, international market approach, and following Design-and-Build procurement structures with rated criteria. **Consulting services contracts** are expected to include hiring of consulting firms for (i) construction supervision (including design supervision) services, and (ii) integrated implementation support services for AYGM's PIU. These contracts are expected to be procured mostly through the Quality and Cost Based Selection (QCBS) method under open, competitive, international market bidding. There may also be competitive hiring of individual consultants for technical support. A **Project Procurement Strategy for Development (PPSD)** has been prepared by AYGM. The project's initial Procurement Plan sets out the packaging, estimated cost, applicable procurement method and market approach, World Bank review requirements, and timeline for each procurement package. The procurement plan will be uploaded to the Systematic Tracking of Exchanges in Procurement (STEP) system, and updated at least annually or sooner as needed. In addition, an annual procurement plan (based on a template to be provided by the World Bank) will be prepared by AYGM in November of each calendar year, to provide a holistic view of all the procurement packages planned for the following calendar the year.

C. Legal Operational Policies

Legal Operational Policies	Triggered?
Projects on International Waterways OP 7.50	No
Projects in Disputed Area OP 7.60	No

D. Environmental and Social

56. **Both the environmental and social (E&S) risks for the project are rated Substantial.** The relevant Environmental and Social Standards (ESSs) applicable to the project under the ESF are ESS1, 2, 3, 4, 5, 6, 8 and 10. The project's expected environmental impacts include: (i) air pollution and noise from construction machinery and quarries, and operation-phase noise and vibration impacts; (ii) soil disturbance and loss during earth-moving works; (iii) loss of vegetation; (iv) impacts related to improper waste management; (v) impacts related to improper construction camp management; (vi) risks to community health and safety (traffic safety, earthquakes, avalanches etc.); (vii) risks associated with improper occupational health and safety (OHS); and (viii) potential impacts on culturally and naturally protected areas (such as habitat loss/fragmentation and/or displacement, invasive alien species, and damage to registered cultural or archaeological sites and/or assets) due to the presence of several Key Biodiversity Areas (KBAs), national parks, lakes, rivers/streams, and critical habitats in the vicinity of the railway alignment. Expected social impacts include: (i) potential land acquisition beyond the existing right-of-way; (ii) physical relocation and livelihood impacts; (iii) labor conditions and labor influx; (iv) potential impacts on community health and safety; and (v) risk of sexual exploitation and abuse and sexual harassment (SEA/SH) due to the project being implemented across several provinces, including in hard-to-reach areas. Additional land will not be required to rehabilitate the railway line itself or for the civil works to be conducted at railway stations. However, additional land may be required for sub-projects like bridge rehabilitation, construction of culverts, installation of sub-stations, etc., which are small, fixed structures. Animal husbandry, agriculture, and apiculture are among the main economic activities of the communities that may be

affected, potentially causing adverse livelihood impacts. With adequate mitigation and management measures (see below), these impacts are assessed to be mostly temporary, predictable, and/or reversible.

57. To mitigate these risks, AYGM has prepared a **project-level Environmental and Social Impact Assessment (ESIA)**, including an Environmental and Social Management Plan (ESMP) and sub-management plans, a Resettlement Framework (RF), a Stakeholder Engagement Plan (SEP), Labor Management Procedure (LMP), and a Biodiversity Management Plan (BMP). These documents outline how the identified E&S risks will be avoided, minimized, and/or mitigated. The BMP outlines mitigation measures to address potential adverse impacts on biologically- and ecologically-important sites and habitats, and avoid risks and impacts to critical habitats identified in the vicinity of the railway alignment. Additional biodiversity/critical habitat studies, which were not possible within the scope of the ESIA due to seasonal limitations, will be undertaken by the PIU during project implementation. The findings will inform further identification and demarcation of critical habitats, to avoid encroachment and impacts due to project activities. They will also result in updates to the project-level ESIA/ESMP and BMP, and inform contractor-specific ESMPs (C-ESMPs) to be prepared by engaged contractors prior to commencement of civil works.

58. During the construction phase labor influx is not expected to be significant. To address potential land-related impacts, the project has prepared an RF that includes information on the regulatory framework on resettlement and provides means and actions to bridge the gaps between national law and World Bank standards. An entitlement matrix, which covers physical displacement actions and compensation measure, has been included in the RF. The PIU will prepare and implement Resettlement Plans (RPs) and Livelihood Restoration Plans (LRPs) as required during the implementation phase, once the sub-projects' designs are finalized by contractors (per the project's Design-Build contracting modality). Any costs associated with land acquisition and resettlement will be financed by the GoT from its own resources.

59. All draft E&S documents were disclosed by AYGM on September 11, 2024, prior to project appraisal. Based on stakeholder consultations, the documents will be revised and re-disclosed by AYGM within two weeks of project Negotiations. The documents to be updated based on the findings of the additional biodiversity studies will be redisclosed prior to the start of civil works. The project will implement SEA/SH mitigation measures, including a SEA/SH response mechanism utilizing the survivor-centric approach; a Code of Conduct for workers; a mechanism to report SEA/SH grievances; and training and awareness sessions for project workers and affected communities. Other community health and safety risks (e.g., temporary dust, noise, traffic congestion and localized exposure to construction site accidents, and potential damage to crops) are expected to be mitigated through good construction and engineering practices. AYGM/PIU will establish a project-level grievance redress mechanism (GRM), housed within their existing Environmental and Social Management System (ESMS).

60. AYGM, the project implementing agency, will establish a PIU sub-unit dedicated to the project. This sub-unit will be staffed by (a) existing MoTI/AYGM personnel, and (b) experienced E&S specialists to be mobilized, among other experts, through a consulting firm contract. These E&S specialists will be responsible for overseeing and managing the project's E&S risks, under the overall guidance of AYGM. MoTI has extensive experience with large-scale government-financed civil works. In addition, MoTI has gained considerable experience with World Bank operational policies, including the ESF, through its implementation of the ongoing Bank-financed RLIP. On this basis, it is expected that the identified impacts and related instruments, mechanisms, and risk-mitigation measures will be managed in a satisfactory manner, with further support to be provided by the World Bank task team throughout.

61. The project will utilize design-build procurement contracts. Contractors awarded under the project will finalize the design of project activities and may make further modifications that differ from those outlined in the existing ESIA report. Therefore, to be aligned with the final design, contractors will carry out additional E&S assessments and update

the E&S management plans and C-ESMP as needed. The PIU will ensure contractor compliance with this requirement by including a clause accordingly in the contract between AYGM and the contractor, and through subsequent E&S management supervision, monitoring, and reporting.

E. Other Corporate Mandates

Gender Gap Analysis

62. **Türkiye suffers from significant labor market gender gaps, which stand out both in absolute terms and relative to countries with similar levels of income.** In 2022, Türkiye's labor force participation gender gap for people aged 15-64—38.2 percentage points—was the highest in the OECD. Türkiye's gender gap in the percentage of the population that was employed—34.6 percentage points—was also the highest in the OECD that year.[26] Türkiye's unemployment rate for women in 2022 was 13.4%, compared to 8.9% for men. The World Economic Forum (WEF) Global Gender Gap Index for 2024 ranked Türkiye 127th out of 146 countries (i.e., in the bottom 14% globally) on the prevalence of gender gaps across the dimensions of educational attainment, political empowerment, health and survival outcomes, and economic participation and opportunity.[27] Among these dimensions, it is the latter—economic participation and opportunity—where Türkiye's relative gender gaps are the widest, ranking 133rd overall. The WEF estimates that the average earned income differential between men and women in Türkiye in 2023 was approximately US$24,930 in purchasing power parity terms, higher than what it was in 2019 (US$17,600). And according to official data, in 2023 women were 40% more likely than men to be engaged in unregistered employment.[28]

63. **Several root causes explain these unequal outcomes, among them a gap in labor market skillsets that is exacerbated by the prevalence of male-dominated sectors, including transportation and logistics.[29]** According to the United Nations, while nearly half of Türkiye's recipients of undergraduate and doctoral degrees are women, only 23% of the country's engineers are women.[30] Considering that engineering (and similar) roles are common in Türkiye's transportation and logistics labor market, it is not surprising that this sector, as a profession, is disproportionately dominated by men. For example, in 2014 84.2% of employees in the "transportation and storage" sector nationwide were men,[31] higher than the share of male employees in the economy as a whole that year (74.0%) and higher than the current average employment share of men in the transport sector in the Europe and Central Asia region (77%[32]). In the Ankara area specifically, 75.6% of all employees in the sector were men in 2014.[33] The fact that the limited participation of women in engineering roles persists in Türkiye even though the labor force participation gender gap is significantly lower among people with higher education than among those with intermediate or basic education[34] suggests that female professionals with university degrees in engineering or similar fields and interested in finding employment in the transportation sector are likely to benefit from support in their job search and labor force preparation process, particularly early in their careers. In addition to improving the likelihood of finding jobs, targeted support can help challenge perceptions among female young professionals that a male-dominated sector like transportation and logistics is not for women, or that sectoral job prospects for them are so low that investing time and effort in seeking those jobs is pointless.

[26] OECD.Stat.
[27] World Economic Forum (2024), *Global Gender Gap 2024 Insight Report*, Geneva.
[28] Turkish Statistical Institute; BBVA Research (2022), "Drivers of Low Female Labor Participation in Türkiye," Working Paper No. 22/13.
[29] Other root causes include social norms as to the allocation of responsibilities between men and women in household work and in the rearing of children, coupled with insufficient availability of affordable childcare services and pre-primary education.
[30] https://www.undp.org/turkiye/projects/engineer-girls-turkiye-project-phase-ii#_ftn3.
[31] Memiş, Emel (2016), "Analysis of Ankara Labor Market From a Gender Equality Perspective," International Labor Organization.
[32] Dominguez Gonzalez, K. et al. (2023), "Closing Gender Gaps in Transport," World Bank Gender Thematic Policy Notes Series.
[33] Memiş, Emel (2016), "Analysis of Ankara Labor Market From a Gender Equality Perspective," International Labor Organization.
[34] Domit, Silvia and Damla Kesimal (2024), "Labor Market Gender Gaps in Turkiye: A Bird's Eye View," IMF Working Papers, WP/24/171.

Gender Intervention and Indicators

64. To help address this labor market skillset gender gap and challenge conventional job prospect perceptions about the male-dominated transport and logistics sector in Türkiye, the project will introduce an **Enhanced Internship Program at MoTI** for female last-year university students in the Ankara area, majoring in the fields of transportation engineering, transportation economics, supply chain management and logistics, civil engineering, business administration, finance, and related fields, that will prioritize access to permanent employment in the transportation, logistics, and adjacent sectors. The program builds on MoTI's/AYGM's experience providing internships to last-year female university students in transport and related fields in the Ankara area under RLIP, while introducing key enhancements to boost its impact on formal employment prospects. Specifically, under ETMIC AYGM will cover fewer students than under RLIP (e.g., 2-3 students per year), but will provide greater focus on preparing interns for the workforce, for example through on-the-job learning or by customizing their internship activities to their employment interests or to particular requirements for obtaining their degrees. Importantly, it will also provide support to interns as they search for, apply to, and ultimately access, jobs, such as through mentoring and follow-up conversations post-internship, building on the gender and labor market expertise expected to be mobilized as part of the PIU staffing consulting services. The implementation of this program will continue to use the proven coordination practices championed under RLIP, such as formal MoTI-led collaboration with Ankara-area universities to share information about the program and recruit interested candidates. As under RLIP, the program's limited costs will be covered by MoTI's budget, but will benefit from oversight, management, and support services provided by the AYGM PIU.

65. Progress on this intervention will be tracked by the project's M&E framework, through two indicators: (i) "number of female last-year university students in the Ankara area that participate in MoTI's Enhanced Internship Program," with a target of 20 by the end of the project; and "share of participants in MoTI's Enhanced Internship Program finding full-time employment within 18 months of receiving their undergraduate degree," with a target of 60% by the end of the project.

Citizen Engagement

66. Citizens and project beneficiaries—such as shippers and logistics service providers; members of the communities hosting the infrastructure developments, including women, youth, and vulnerable groups; and observers of Türkiye's rail and logistics sector at large, e.g. academics, research institutions, and non-governmental organizations (NGOs)—will be engaged to inform engineering designs, improve quality of implementation, and ensure that project outputs address stakeholder needs. This will include the following mechanisms:

- First, **annual consultations** will be conducted by AYGM and the PIU during the design and construction phase (a) locally, with local authorities, shippers, and logistics service providers; (b) nationally (e.g., in Ankara or other major economic and logistics hubs), with shippers and logistics service providers elsewhere in Türkiye who are current or prospective users of the target line; and (c) internationally, with relevant government officials from the countries that host the Middle Corridor (in particular, among the three BTK line partners) and corridor users. These consultations, which are in addition to site-specific consultations with local communities, will be held in a variety of formats as appropriate, including workshops and consultative meetings, virtual or in person. Feedback from a representative cross-section of end-users, including SMEs and women-headed businesses, will be encouraged.
- Second, and building on the RLIP implementation experience, **"Open Door Days"** will be conducted by the PIU with host communities at least once a year (these events may be more frequent during construction) to ensure that community members are aware of and are offered a forum to weigh-in on project goals, approaches, and risk mitigation measures. The PIU will invite local citizens to provide information on the progress of infrastructure developments and to seek their inputs. The Open Door Days will aim to also involve vulnerable local citizens and ensure that dialogue is established to assess needs and gaps, and further improve project interventions.

- Third, **roundtables** with national and international rail freight and logistics experts, including Middle Corridor stakeholders such as investors, host governments, and international development partners, will be conducted by the PIU every other year, to gather feedback on Middle Corridor requirements and Turkish logistics.

- And fourth, the **project-level grievance redress mechanism (GRM)**, to be launched via AYGM's existing Environmental and Social Management System, will include an online stakeholder engagement and management database used, in addition to receiving and responding to complaints and grievances, to gather feedback, questions, requests, and comments from the general public.

Climate Co-Benefits

67. The proposed project mitigates the impacts of climate change, by reducing GHG emissions from the movement of freight in domestic and intercontinental rail freight itineraries serviced by the target line. It will do so by electrifying the line, by eliciting truck-to-rail modal shift in domestic trips, and by eliciting and vessel-to-rail and truck-to-rail modal shift in Türkiye's own and third-country (i.e., transit) MC trips. The project targets the full electrification of the target line, which is currently operated with diesel-powered trains, including establishment of electric power installation systems, thus eliminating tank-to-wheel GHG emissions from train operations on the line. Furthermore, it will significantly reduce well-to-wheel GHG emissions—by an average factor of 5.2x—over the life of the infrastructure (through 2060). The project also contributes to adaptation to climate change, by making the target line more resilient to climate and other natural hazards. The implementation of a Distributed Acoustic Sensing (DAS) early-warning and detection system, and deployment of a Central Traffic Control facility, will reduce vulnerabilities from climate hazards such as floods and landslides, enabling preventive maintenance in anticipation of major disruption, and improving safety. Retaining walls, snow barriers, renewal of culverts and reconstruction of overpasses, and strengthening of bridges will help protect the line against climate hazards. Tunnel works will include improvements in tunnel drainage for climate resilience. In addition, the installation of European Rail Traffic Management System/European Train Control System Level 1 signaling and telecommunication systems technology along the entire 660km alignment will make train maneuvers more responsive to climate and other disruptions, strengthening the climate resilience of line operations.

V. GRIEVANCE REDRESS SERVICES

68. Communities and individuals who believe that they are adversely affected by a project supported by the World Bank may submit complaints to existing project-level grievance mechanisms or the Bank's Grievance Redress Service (GRS). The GRS ensures that complaints received are promptly reviewed in order to address project-related concerns. Project affected communities and individuals may submit their complaint to the Bank's independent Accountability Mechanism (AM). The AM houses the Inspection Panel, which determines whether harm occurred, or could occur, as a result of Bank non-compliance with its policies and procedures, and the Dispute Resolution Service, which provides communities and borrowers with the opportunity to address complaints through dispute resolution. Complaints may be submitted to the AM at any time after concerns have been brought directly to the attention of Bank Management and after Management has been given an opportunity to respond. For information on how to submit complaints to the Bank's Grievance Redress Service (GRS), visit http://www.worldbank.org/GRS. For information on how to submit complaints to the Bank's Accountability Mechanism, visit https://accountability.worldbank.org.

VI. KEY RISKS

69. **The overall risk to achieving the development objective is rated Substantial.** This stems from the project's exposure to substantial macroeconomic, institutional capacity, fiduciary, and environmental and social risks.

70. **Macroeconomic risk is rated Substantial.** The project faces the residual risk that further currency depreciation or elevated inflation may lead to cost overruns. This risk will be partially mitigated through procurement approaches that incentivize competition, are conducive to construction innovation, and can accelerate disbursements. Furthermore, potential macroeconomic risks realized through the government budget could impact the government's ability to provide timely and sufficient counterpart funding.

71. **Institutional Capacity risk is rated Substantial.** MoTI/AYGM and its PIU have been implementing RLIP since the summer of 2020, with significant institutional capacity generated in the process. This includes familiarity with the World Bank's ESF, Procurement Regulations, and financial management requirements, as well as with the implementation of rated criteria in procurement, citizen engagement, gender initiatives, and the deployment of an environmental and social management system, including a stakeholder engagement database and a grievance redress mechanism. ETMIC will build on this experience. However, residual institutional capacity risk remains Substantial, at least at entry, as the project will need to engage newly-recruited PIU members to expand AYGM's ability to implement not one but now two World Bank-financed projects. ETMIC's larger size and specific subject matter content compared to RLIP also change somewhat AYGM's institutional capacity needs. Lastly, there is a risk of staffing turnover at AYGM's PIU, including its ETMIC-dedicated sub-unit, which preserves the need for the World Bank and the project's co-financiers to continue to provide training, capacity building, and targeted support during implementation. The magnitude of this risk is expected to reduce overtime with experience gathering and learning-by-doing, and the risk rating will be monitored and adjusted accordingly.

72. **Fiduciary risks are rated Substantial because of residual procurement risk.** Procurement risk is rated Substantial due to (a) implementation delays experienced under RLIP, resulting from delays in completion of technical pre-requisites (e.g., E&S studies, technical designs, land acquisition, etc.); (b) larger contract values and different contract types under ETMIC; and (c) the need for coordination among the co-financiers. To avoid procurement delays, all pre-requisite preparatory activities, such as preliminary designs, cost estimates, E&S studies, and bidding documents are either in place or expected to be completed promptly following loan effectiveness. Systematic monitoring, close follow-up, and effective coordination with the co-financiers by AYGM, as well as quarterly reporting of technical preparation, procurement, and contract implementation progress, will be adopted as additional mitigation measures.

73. **Environmental and Social risks are both rated Substantial.** The project will support large-scale, though exclusively brownfield, civil works for the rehabilitation and modernization of an existing railway corridor with a total length of 660km, including infrastructure and superstructure works, installation of state-of-the-art equipment, including signalization and electrification systems, and improvement of selected railway stations. While the scope of the anticipated civil works is significant, works are expected to be conducted within the footprint of the existing railway corridor. It is expected that the potential environemtal and social impacts will be mitigated through good construction and engineering practices as well as implementation of E&S management plans and mitigation measures.

VII. RESULTS FRAMEWORK AND MONITORING

PDO Indicators by PDO Outcomes

Baseline	Closing Period
Improved Rail Connectivity	
Rail freight travel time between Divriği and the Türkiye-Georgia border (Hours)	
Sep/2024	Dec/2030
55	22
Predictability of rail freight travel time between Divriği and the Türkiye-Georgia border (Text)	
Sep/2024	Dec/2030
35% coefficient of variation of rail freight travel time	18% coefficient of variation of rail freight travel time
Well-to-wheel GHG emissions per ton-km transported on the Divriği-Kars-Georgia border railway line (Text)	
Sep/2024	Dec/2030
45 grams of CO2 per ton-km transported	18 grams of CO2 per ton-km transported
Maximum freight carrying capacity of the Divriği-Kars-Georgia border railway line (Metric tons/year)	
Sep/2024	Dec/2030
750,000	20,000,000
Inferred beneficiaries of improved access to sustainable transport infrastructure and services (Number of people) CRI	
Sep/2024	Dec/2030
0	590,000
➢Inferred beneficiaries of that benefit from improved access to sustainable transport infrastructure and services - Female (Number of people) CRI	
Sep/2024	Dec/2030
0	300,000
➢Inferred beneficiaries of improved access to sustainable transport infrastructure and services - Youth (Number of people) CRI	
Sep/2024	Dec/2030
0	120,000

Intermediate Indicators by Components

Baseline	Period 1	Closing Period
Rehabilitation and Modernization of the Divriği-Kars-Georgia Border Railway Line		
Length of railway line rehabilitated, electrified, and modernized to a higher climate resilience standard (Kilometers)		
Sep/2024		Dec/2030
0		660
Project Management		
Number of participants in MoTI's Enhanced Internship Program (Number)		
Sep/2024		Dec/2030
0		20
Share of participants in MoTI's Enhanced Internship Program finding full-time employment within 18 months of receiving their undergraduate degree (Percentage)		
Sep/2024		Dec/2030
0		60
Freight stakeholders consulted during project implementation on design and operational aspects of target line (Number)		
Sep/2024		Dec/2030
0		60
Percentage of grievances responded and resolved within an agreed time frame (Percentage)		
Sep/2024	May/2027	Dec/2030
0	80	85
Percentage of stakeholders who report that their engagement (i.e., in consultations, Open Door Days, and roundtables) was effective (Percentage)		
Sep/2024		Dec/2030
0		75

Monitoring & Evaluation Plan: PDO Indicators by PDO Outcomes

Improved Rail Connectivity	
Rail freight travel time between Divriği and the Türkiye-Georgia border (Hours)	
Description	Average travel time by freight trains, of any commodity, length, and equipment configuration, between Divriği and the Türkiye-Georgia border – specifically for trains traveling the entire length between these two points (i.e., the entire length of the target line). The sample size should be of at least 10 train movements and taken during a consistent time period for every measurement (e.g., within the same week/month/quarter each year).
Frequency	Annual
Data source	TCDD, AYGM
Methodology for Data Collection	TCDD will provide systems data on train movements and time of departures and arrivals. Should systems data not be available, AYGM, in collaboration with TCDD, may gather data from train station managers or other direct sources.
Responsibility for Data Collection	AYGM

Improved Rail Connectivity	
Predictability of rail freight travel time between Divriği and the Türkiye-Georgia border (Coefficient of variation of rail freight travel time)	
Description	Coefficient of variation of freight train travel time, for trains of any commodity, length, and equipment configuration, between Divriği and the Türkiye-Georgia border. Only trains traveling the entire length between these two points can be considered. The sample size should be at least 10 train movements, and be the same sample as that used for the indicator on average rail freight travel times.
Frequency	Annual
Data source	TCDD, AYGM
Methodology for Data Collection	Coefficient of variation is defined as the sample standard deviation divided by the sample mean, and is expressed as a percentage. TCDD systems data or field reports from train station managers will be used.
Responsibility for Data Collection	AYGM

Improved Rail Connectivity	
Well-to-wheel GHG emissions per ton-km transported on the Divriği-Kars-Georgia border railway line (Grams of CO2 per ton-km transported)	
Description	Average GHG emissions per ton-km transported by freight trains along the target line.
Frequency	Annual
Data source	TCDD, AYGM
Methodology for Data Collection	Two methodologies may be used: (i) emissions factor method: calculated based on energy source and emissions factors appropriate for Türkiye; (ii) direct measurement method: calculated based on systems data from TCDD.
Responsibility for Data Collection	AYGM

Improved Rail Connectivity	
Maximum freight carrying capacity of the Divriği-Kars-Georgia border railway line (Metric tons/year)	
Description	Maximum amount of freight that can be transported over the target railway line in a 1-year period.
Frequency	Annual
Data source	TCDD, AYGM
Methodology for Data Collection	Infrastructure configuration method. The target line's maximum freight carrying capacity is not expected to change until completion of project-financed rehabilitation and modernization works. TCDD and AYGM will confirm the new maximum capacity metric at project completion.
Responsibility for Data Collection	AYGM

Improved Rail Connectivity	
Inferred beneficiaries of improved access to sustainable transport infrastructure and services (Number of people)	
Description	Estimate of the number of people benefitting from improved transport infrastructure and services by virtue of living within the catchment area of the project's target line
Frequency	Annual
Data source	AYGM and World Bank
Methodology for Data Collection	Standard methodology developed by the World Bank to measure inferred project beneficiaries based on geospatial and demographic data. This will be informed by data provided by AYGM on construction investment progress. Beneficiaries will only receive the full benefit of the project-financed infrastructure upon completion of project-financed improvements across the full length of the target line.
Responsibility for Data Collection	AYGM

Improved Rail Connectivity	
Inferred beneficiaries of improved access to sustainable transport infrastructure and services – Female (Number of people)	
Description	Estimate of the number of women benefitting from improved transport infrastructure and services by virtue of living within the catchment area of the project's target line
Frequency	Annual
Data source	AYGM and World Bank
Methodology for Data Collection	Standard methodology developed by the World Bank to measure inferred project beneficiaries based on geospatial and demographic data. This will be informed by data provided by AYGM on construction investment progress. Beneficiaries will only receive the full benefit of the project-financed infrastructure upon completion of project-financed improvements across the full length of the target line.
Responsibility for Data Collection	AYGM

Improved Rail Connectivity	
Inferred beneficiaries of improved access to sustainable transport infrastructure and services – Youth (Number of people)	
Description	Estimate of the number of young people benefitting from improved transport infrastructure and services by virtue of living within the catchment area of the project's target line
Frequency	Annual
Data source	AYGM and World Bank
Methodology for Data Collection	Standard methodology developed by the World Bank to measure inferred project beneficiaries based on geospatial and demographic data. This will be informed by data provided by AYGM on construction investment progress. Beneficiaries will only receive the full benefit of the project-financed infrastructure upon completion of project-financed improvements across the full length of the target line.
Responsibility for Data Collection	AYGM

Monitoring & Evaluation Plan: Intermediate Results Indicators by Components

Rehabilitation and Modernization of the Divriği-Kars-Georgia Border Railway Line	
Length of railway line rehabilitated, electrified, and modernized to a higher climate resilience standard (Kilometers)	
Description	Length of railway line fully rehabilitated, including electrification and signalization, with resilient infrastructure
Frequency	Annual
Data source	AYGM
Methodology for Data Collection	The description of this indicator as length of railway line "rehabilitated, electrified, and modernized" means that rehabilitation, electrification, and signalization must have been completed. Therefore the project can only claim progress on this indicator upon completion of all typologies of works – infrastructure, superstructure, electrification, and signalization – for any given line section.
Responsibility for Data Collection	AYGM

Project Management	
Number of participants in MoTI's Enhanced Internship Program (Number)	
Description	Absolute number of interns that successfully complete their participation in MoTI's Enhanced Internship Program, inclusive of the post-internship support period
Frequency	Annual
Data source	AYGM
Methodology for Data Collection	AYGM will keep track of internship participation levels, with a target of 2-3 interns per calendar year.
Responsibility for Data Collection	AYGM

Project Management	
Share of participants in MoTI's Enhanced Internship Program finding full-time employment within 18 months of receiving their undergraduate degree (Percentage)	
Description	Interns that are offered full-time employment up to 18 months after graduation, as a percentage of total interns participating in MoTI's Enhanced Internship Program.
Frequency	Annual
Data source	AYGM
Methodology for Data Collection	After completion of their internship, participants will continue to benefit from AYGM support in the form of follow-up conversations, advice, and mentoring by a PIU specialist. AYGM's PIU will stay in contact with interns to support their job search efforts. Only students that are interested in extended support would be allowed to participate in MoTI's Enhanced Internship Program. Part-time jobs may be counted towards this indicator if this is what the beneficiary is searching for.
Responsibility for Data Collection	AYGM

Project Management	
Freight stakeholders consulted during project implementation on design and operational aspects of target line (Number)	
Description	Number of freight stakeholders consulted for inputs into project design and operational aspects.
Frequency	Annual
Data source	AYGM
Methodology for Data Collection	AYGM to develop a stakeholder engagement outreach program and keep track of the number of entities (shippers, carriers, logistics service providers, ancillary service providers, government entities, and the like) that are consulted, irrespective of consultation format.
Responsibility for Data Collection	AYGM

Project Management	
Percentage of grievances responded and resolved within an agreed time frame (Percentage)	
Description	Number of grievances submitted to the project, through any format, that are responded to and resolved on time per parameters specified in the POM and/or other official project documents.
Frequency	Annual
Data source	AYGM
Methodology for Data Collection	AYGM will maintain a Grievance Redress Mechanism (GRM) with multiple ways for stakeholders of any kind to submit grievances related to the project. AYGM will keep track of the number, content, and nature of all grievances (or comments of any nature) received through the GRM, and the timeline to response and resolution.
Responsibility for Data Collection	AYGM

Project Management	
Percentage of stakeholders who report that their engagement (i.e., in consultations, Open Door Days, and roundtables) was effective (Percentage)	
Description	Number of stakeholders engaged that, post engagement, report that the engagement effort was effective.
Frequency	Annual
Data source	AYGM
Methodology for Data Collection	AYGM will prepare short surveys to gather feedback on the effectiveness of consultations as reported by the engaged stakeholders themselves. These surveys will be distributed immediately after completion of engagement activity and results will be compiled and maintained over time by AYGM. For the purposes of this indicator, “effective” engagement will be defined as one in which stakeholders believe their views and feedback were heard, that consultations were genuine, and that the feedback loop was complete in terms of follow-up.
Responsibility for Data Collection	AYGM

ANNEX 1: Implementation Arrangements and Support Plan

Institutional and Implementation Arrangements

The Directorate-General of Infrastructure Investments (AYGM) of Türkiye's Ministry of Transport and Infrastructure (MoTI) will assume overall implementation responsibility of ETMIC and will serve as its implementing agency at the working level. AYGM has an existing Project Implementation Unit (PIU) responsible for implementing the ongoing Bank-financed Rail Logistics Improvement Project (RLIP). A new sub-unit within AYGM's PIU will be established to implement ETMIC. The ETMIC sub-unit will report to the PIU's Director and Deputy Director. It will be staffed by current MoTI/AYGM technical experts, supplemented by external experts hired through a project implementation support consulting services contract with a firm. The PIU, including its ETMIC-dedicated sub-unit, will continue to be led by the Deputy Director General of AYGM as PIU Director, and by the Director of AYGM's Railway Construction Department as Deputy PIU Director. The ETMIC sub-unit will be staffed by at least 10 members, including a sub-unit leader, engineering and construction specialist, procurement specialist, financial management specialist, Environmental, Social, Health and Safety (ESHS) manager, environmental specialist, social development specialist, occupational health and safety (OHS) specialist, and two community liaison officers (one male and one female). Existing AYGM expert personnel experienced in railway engineering, construction, and related fields will further staff the ETMIC sub-unit.

Implementation support will be provided by the 3 co-financiers in the form of (i) joint formal implementation support missions to be conducted biannually, including site visits and meetings with all relevant stakeholders, including GoT agencies within and outside MoTI; (ii) provision of just-in-time implementation guidance, through meetings, discussions, site visits, Bank-led training, and technical support; and (iii) collaboration among the co-financiers, to ensure that all applicable regulations, for example with regard to the World Bank's ESF, are complied with throughout.

Procurement

All procurement financed by the project shall be carried out in accordance with the World Bank's Procurement Regulations dated September 2023 (Procurement Regulations) and consistent with the applicable procurement methods specified in procurement plan approved by the Bank.

Procurement under the project is expected to include Works and Consultant Services. Works are expected to include civil works to rehabilitate and modernize the 660-km target line, including (i) construction and/or rehabilitation of main tracks and sidings, bridges, terminals, stations, and other facilities; and (ii) electrification, signalization, and telecommunication works. Consulting services are expected to include construction supervision services for the works, including the review of the designs to be prepared by the civil works contractors, and recruitment of consultants to help staff the ETMIC-dedicated PIU sub-unit.

Procurement Methods and Market Approaches. The appropriate procurement methods and approaches for each procurement activity will be specified in the procurement plan. For Works this will mostly include open international market approach based on Design and Build to speed up the preparation. For open international market approach, Request for Proposals (RFP) for Design and Build, or Request for Bids (RFB) document, both with rated criteria will be used for the construction works. Consulting services for construction supervision and implementation support activities are expected to be selected through the Quality and Cost Based Selection (QCBS) method, for which the Bank's agreed

RFP documents will be used. Other procurement approaches for the selection of consulting firms could also be utilized, as reflected in the PPSD. Any individual consultants that may be hired under the project, for example for project management and monitoring and evaluation, will be selected through open competition, or through direct contracting of individuals already involved in (and competitively hired under) the ongoing RLIP, and the form of contract agreed by the Bank will be used.

Procurement Risk Assessment. The procurement risk assessment for the project is conducted with a focus on: (i) procurement regulatory framework and management capability; (ii) integrity and oversight; (iii) procurement process and market readiness; and (iv) procurement complexity. The project's procurement risk is assessed as Substantial, given the complexity of the project, the large contract sizes, and AYGM's procurement performance and delays under the ongoing RLIP project.

AYGM is a public entity subject to the Public Procurement Law under its regular operations. AYGM is subject to external audit by the Court of Accounts. Even though the proposed project procurements will follow the procedures specified in the Bank's Procurement Regulations, findings in the assessment concluded that: (i) applicable procurement policies and the regulatory system are designed broadly to meet the Bank's Core Procurement Principles of value for money, economy, efficiency, effectiveness, integrity, transparency and fairness, and accountability; (ii) AYGM has a clear system of accountability on who has control of procurement decisions, with clearly defined responsibilities and delegations of authority; (iii) there is a clearly identified target market for all procurements; and (iv) In general AYGM effectively manages contracts to ensure delivery as per the contract conditions.

AYGM has strong experience of public procurement rules, and their staff have solid technical qualifications for the national procedures. The procurement function is well organized within AYGM with clearly defined responsibilities. Procurement is conducted by tender committees established in accordance with the Public Procurement Law, and no procurement is commenced until a budget is provided. The budgeting and internal financial controllers are involved from the outset and, where possible, technical specialists are used from relevant departments to prepare the technical specifications. AYGM's technical personnel are experienced in terms of preparation of documents in English language, as they were involved in several foreign-financed projects. Consultants have also been used when necessary. AYGM's experience with the procurement of Bank-financed projects has been built and solidified under the ongoing RLIP, in which rated criteria is being applied for the first time.

Procurement processes under the project will be conducted by the PIU sub-unit dedicated to ETMIC. The sub-unit is comprised of professional staff from AYGM's Railways Construction Department and the Railways Survey Project Department, as well as other relevant AYGM departments, to be supplemented by external staff to be mobilized through the competitive selection of a consulting firm that will provide project implementation support services. The PIU sub-unit will be headed by AYGM's Deputy General Director, who will take on the role of Project Director. In order to support AYGM in the preparation of bidding documents for ETMIC's first works package and consulting services contract, one procurement specialist experienced in the procurement of international financial institutions will be hired as individual consultant immediately after project effectiveness.

The key risks that need to be mitigated are the upstream activities required to proceed with bidding and awarding the civil work contracts. The associated risk mitigation measures are listed below. These will be reviewed during project implementation, as part of the Bank's supervision, and updated as appropriate.

Key Procurement Risks and Agreed Action Plan for Mitigation

Action No.	Key Risk	Mitigation Measure	Responsible Party	Time Frame
1.	Delay in start of procurement processes due to lack of completion of technical pre-requisites (technical designs, employer requirements, geotechnical studies, E&S and ESMP requirements, land expropriation, stakeholder engagement, obtaining necessary permits, etc.) for the relevant procurement method.	Close coordination by AYGM with relevant departments in the technical preparation activities. Holistic annual procurement plan (using template provided by the Bank) to include key milestone dates for completion of technical pre-requisites preceding the procurement process. Quarterly monitoring reports on the progress of technical preparation activities. Undertake advance procurement actions (except contract signing) during project preparation phase.	AYGM	During Project preparation and throughout implementation
2.	Inefficiency and lack of coordination of procurement among the financing parties	Clear identification of the sections/packages to be procured by the IBRD-AIIB co-financing and IsDB parallel financing. Regular progress meetings conducted jointly with IBRD, AIIB, and IsDB Quarterly monitoring reports on procurement progress and performance against the approved procurement plan. Annual procurement plan to include key milestone dates for completion of technical pre-requisites preceding the procurement process and initiation of the procurement(s) to be carried out by IsDB to ensure the correct sequencing of the critical procurements.	AYGM	Throughout project implementation
3.	AYGM capacity constraints to manage the technical preparation, procurement, and contract supervision of high-value works packages in parallel to the ongoing RLIP project	Enhancement of AYGM's procurement function capacity by hiring a consulting firm to provide implementation support to technical and procurement government staff assigned to the project, with additional support, if required, provided by the recruitment of individual consultants.	AYGM	In the first 12 months of the implementation

Action No.	Key Risk	Mitigation Measure	Responsible Party	Time Frame
3.	Low competition and fluctuations in local market prices/currency	Conducting market sounding before initiating the procurement. Allowing price adjustment for payments in foreign currencies and foreign currency bid prices even in open-national procurement.	AYGM	At project preparation and throughout implementation
4.	Delays in the procurement process and contract signing leading to slow disbursement	Specifying in the textual part of the project procurement plan and in the POM time standards for completion of key stages of the procurement process, including bid evaluation and contract signing. Submission of Quarterly Monitoring Reports on procurement progress and performance against the approved procurement plan.	AYGM	At project preparation and throughout implementation
5.	Potential wrongdoing by bidders	Highlighting the IBRD and AIIB's integrity requirements and complaints procedures in the bidding documents and through pre-proposal meetings. Carrying out due diligence during the bid evaluation process and checking the IBRD's and AIIB's and Government's debarment lists to confirm eligibility of bidders prior to awarding any contract.	AYGM	Throughout project implementation

Advance Procurement. Procurement Regulations Paragraphs 5.1 and 5.2 (Advance Contracting and Retroactive Financing) permits the Borrower to initiate and proceed with the steps in the procurement process during the project preparation phase so that the key contracts required for implementation of the project are ready for signing immediately after project Effectiveness.

Complaints Management. Procurement complaints are to be handled by AYGM in accordance with the Bank's Procurement Regulations and further elaborated in the POM. Immediately upon receipt, the complaints will be recorded by AYGM in the STEP complaint module, and addressed within a reasonable time period and not later than 15 business days from receipt of the complaint.

Procurement Supervision by the Bank. The World Bank's Task Team will supervise all procurement activities under the project and across the procurement cycle. In the **planning stage**, this will include reviewing the procurement arrangements, contract packaging, applicable procedures, and the scheduling of the procurement processes as to their conformity with the Bank's Procurement Regulations. During **implementation**, large-value, high risk, and/or critically important procurement packages will be subject to the Bank's prior review. Other procurement will be subject to post review on a sampling basis. Procurement progress and performance will be reviewed as part of the Bank's supervision

at least every six months. The Bank will carry out procurement supervision through prior-review and post-review of all procurement activity under the project, as applicable to the procurement packages in the procurement plan.

Financial Management and Disbursements

An assessment of the financial management (FM) arrangements for the project was undertaken in April 2024. The project's residual FM risk is assessed as Moderate, subject to execution of action plan items aiming to bring the FM arrangements to an acceptable level for implementation. The assessment and risk ratings will be revisited throughout project implementation.

MoTI is currently implementing the Bank-financed Rail Logistics Improvement Project (RLIP), with highly satisfactory financial management arrangements, through the PIU established by AYGM to oversee that project's implementation. AYGM will establish an ETMIC-dedicated PIU sub-unit within its existing PIU, with its own project-specific financial management arrangements and practices. However, the sub-unit is still part of the existing PIU and it is expected that there will be experience transfer across both projects. For example, RLIP's FM software and FM Operations Manual can be relatively easily adapted by the ETMIC-dedicated PIU sub-unit.

The FM risk assessment is presented in the table below:

FM Risk	Risk Rating	Risk Mitigating Measures	Residual Risk
Inherent Risk			
Country Level MoTI is a general budget ministry subject to the Public Financial Management and Control Law.	Moderate		Moderate
Entity Level MoTI has experience in implementing World Bank-funded projects.	Moderate	AYGM will contract a consulting firm to staff the ETMIC PIU with dedicated specialists, including a financial management expert with adequate qualifications and experience to implement the project in line with World Bank requirements. ETMIC's PIU will tailor the FM system that is already established by the RLIP PIU.	Moderate
Project Level The project involves co-financing and parallel financing.	Moderate	This will add to the workload for executing payments and maintaining the accounts but is not expected to increase the risk.	Moderate
Overall Inherent Risk	***Moderate***		***Moderate***
Control Risk			
Budgeting Budgeting procedures at MoTI is conducted in line with the PFMC law.	Moderate	AYGM should ensure to have sufficient allocation in the budget law for both IFI-financed and government-financed portions of the project on an annual basis throughout implementation. Considering exchange rate fluctuations, the budget figures will be monitored by the PIU to ensure smooth implementation.	Moderate

FM Risk	Risk Rating	Risk Mitigating Measures	Residual Risk
Accounting The project will be recorded in the government accounting system in Turkish Liras. The Project accounts in EUR and per components will be maintained separately by the PIU through a complementary system. The financing percentages of IBRD and AIIB need to be factored in during the payment and recording of transactions.	Substantial	The PIU at AYGM will tailor the chart of accounts for the project taking into consideration the co-financing by IBRD and AIIB as well as the government financing of the VAT. There is a software that is already procured for RLIP and the FM Manual of this latter is very detailed. AYGM should contract the PIU consultants within one month after effectiveness to complete the tailoring of the system on time for disbursements. As a temporary measure until the systems are ready, AYGM should ensure to have Excel spreadsheets for project accounting and reporting.	Moderate
Internal Controls The existing internal controls in line with the PFMC law will be used	Moderate	Project specific controls will be added to complement the internal control framework. In addition to the controls by the relevant technical team, the PIU FM will have a control responsibility before payment documents are sent to Sayman (MoTF accountant). The FM Manual will be tailored to reflect all controls specific to the project.	Moderate
Funds Flow Traditional disbursements will be used and designated account (DA) will be opened at the Central Bank of Türkiye	Substantial	Authorized responsible persons for the funds flow will be determined. Funds outflows for the project will be arranged according to the co-financing percentages. Once available, the framework agreement between IBRD and AIIB will be reviewed to see whether any additional procedures are needed.	Moderate
Financial Reporting The templates for the interim un-audited financial reports will be attached to the Minutes of Negotiation.	Substantial	Off the shelf accounting system will be adapted to maintain accounts and generate the IFRs automatically. Once available, the framework agreement between IBRD and AIIB will be reviewed to see whether any additional procedures are needed.	Moderate
Auditing The Treasury controllers will be the auditors of the project.	Moderate	The WB agrees with the Board of Controllers on an audit list at the end of each calendar year for projects implemented by ministries and special budget institutions.	Moderate
Overall Control Risk	***Substantial***		***Moderate***
Overall FM Risk	***Moderate***		***Moderate***

Implementing Entity

MoTI's Directorate-General of Infrastructure Investments (AYGM) will have overall responsibility for project implementation, coordination, and oversight. AYGM will establish a PIU sub-unit dedicated to overseeing the implementation of this project. The project will use the existing FM system of AYGM with some additional, tailored solutions to meet the requirements for an effective financial management.

Budgeting

MoTI is a general budget institution subject to the Public Financial Management and Control (PFMC) Law numbered 5018. Accordingly, the project will follow the national planning and budgeting procedures and will need to be included in the Investment Program. Project expenditures each year, regardless of the source of funding, can only made up to the budget allocation amount in the annual budget law (code 7 for foreign financed expenditures, regular codes for government financed expenditures).

The overall responsibility for budget preparation and monitoring lies with the Strategy Development Directorate (SDD) of MoTI. The investment budget of MoTI is prepared under the coordination of the SDD that is responsible for compiling the investment proposals of the spending units and preparing the final investment budget proposal of MoTI. SDD then sends the proposed MoTI budget to the Presidency's Strategy and Budget Office in the third quarter of the year. Upon agreement, the institutional budget is then included in the general budget and becomes effective upon enactment of the Budget Law by the Turkish Grand National Assembly before the start of the new fiscal year.

In line with the procedures described above, the project has been included in the 2024 investment program of the Government, and adequate budgetary allocations should be made in the 2024 Budget for 2024 expenditures of the project (if applicable). Subsequent budget laws should also provide for sufficient allocations annually throughout the project implementation period. The spending unit for this project is AYGM. AYGM should ensure that the allocations are made and reflected in the correct budget codes to prevent delays regarding expenditures: IFI-funded portions of the project should be budgeted under Budget Code 7 that indicates external/foreign resources for expenditures; the government-funded portions should be in the regular budget codes. IBRD-AIIB co-financed portions will cover the expenditures exclusive of VAT on a pro-rata basis, the rounded rates to be 73%-27%, respectively. The VAT on the expenditures will be covered by the Government.

Accounting Policies and Procedures

Staffing. AYGM will recruit a consulting firm to staff, in part, AYGM's ETMIC-dedicated PIU sub-unit, including one Financial Management Specialist with Terms of Reference acceptable to the Bank. AYGM is expected to pair this external FM Specialist with a government officer responsible for financial management, for sustainability and continuity of FM institutional capacity. The ToR of the consulting firm for project implementation support, including the ToR for the Financial Management Specialist, are subject to review by the World Bank.

Accounting Systems. MoTI is listed among Chart I institutions in the PFMC Law and thus its accounting is maintained in the Integrated Public Financial Management Information System of the Ministry of Treasury and Finance (MoTF) in Turkish lira, in accordance with the chart of accounts predetermined by MoTF. As it is not possible to maintain the accounting in foreign currency and in sufficient detail to enable detailed project reporting, the PIU, established within AYGM, will maintain a complementary accounting system to follow up the funds flows on a cash basis in foreign currency and to generate regular project reports. The PIU will tailor the accounting and reporting software procured for the active Rail Logistics Improvement Project, which can be used by purchasing additional user rights and service

contract. The system should be ready within two months after effectiveness. For the possibility of executing disbursement and payments transactions until the system is fully ready, AYGM is expected to prepare temporary Excel spreadsheets for accounting and reporting. These could later be transferred to the software.

There is a project Financial Management Manual (FM Manual) prepared for the Rail Logistics Improvement Project. The FM Manual, which is considered an integral part of the POM, includes (a) the financial and accounting policies and procedures for the project; (b) organization of the FM unit, functions, staffing, and relevant job descriptions with special emphasis on the segregation of duties; (c) the flows and templates for various transactions; (d) disbursement procedures; (e) project budgeting, planning procedures, and financial forecasting; (f) project reporting and auditing. The FM Manual for ETMIC will build on that for RLIP, while being tailored in line with the specific requirements and characteristics of the project.

Internal Controls

MoTI applies the internal control mechanisms set forth in the PFMC Law. Accordingly, AYGM will be the accountable spending unit and will utilize project funds in line with the agreed project documents. AYGM will be responsible for all stages of procurement, as well the verification of the receipt of goods and services and preparation of supporting documentation for payments. AYGM will also be responsible for submitting the payment orders with the supporting documents to the Ministry of Treasury and Finance Accounting Officer (Sayman) at MoTI. The payment orders will be signed by the authorized personnel and will submit all documentation, including authorizations, acceptances, and approvals for payment, to the FM Consultant in the PIU. The FM Consultant will verify the completeness of documentation and the accuracy of the payment orders and will prepare the payment/bank transfer orders for execution of payments. The FM Consultant, through the authorized signatories in AYGM will be responsible for the disbursement arrangements from the Loan account to the Designated Account in line with the Disbursement and Financial Information Letter. All procedures and workflows will be described in the Financial Management Manual. RLIP's FM Manual could be considered as an advanced draft for the purposes of the project. The adaptation should be finalized within two months after effectiveness.

The MoTF Sayman will execute basic controls on the payment orders and will send them to the Central Bank of the Republic of Türkiye (CBRT) for processing from the designated account. The related accounting entry to the Integrated Public Financial Management Information System will be made by the MoTF Sayman based on the approved payment order. Besides, some expenditures of the project will be subject to pre-financial control as per the pre financial control directive of MoTI. According to this directive, the expenditures exceeding certain amount are subject to the pre-financial control. All the procedures and the documentation to be provided in the control files are described in this Directive.

MoTI has an Internal Audit Department. The Internal Audit Department is responsible for auditing selected processes of the whole Ministry based on their risk analyses and annual audit plans. For that reason, the project will not rely on the internal audit function of MoTI but will organize meetings with them during implementation.

Funds Flow and Disbursement Arrangements

MoTI, through the Ministry of Treasury and Finance, will open a designated account (DA) in the currency of the loan at the Central Bank of Türkiye. Payments to the contractors, suppliers and consultants will either be made directly from the loan account or from the Designated Account with the authorization of the responsible personnel. Advances should be requested to the DA based on project needs and planned project expenditures. All movements in this account will

correspond to documented project income or expenditures. Two signatures indicated in the list of authorized signatures submitted by MoTI will be required on the withdrawal applications.

Considering the co-financing by IBRD and AIIB, it is expected that there will also be a Designated Account for the AIIB portion of the same Project. Invoices received by the PIU on co-financed contracts and expenditures will be processed by the PIU on a pro-rata basis exclusive of VAT. The exact co-financing ratios will be determined by Negotiations. It is advised to have fixed ratios for IBRD and AIIB co-financing to simplify the control and verification procedures. Once available, the framework agreement between IBRD and AIIB will also be reviewed to see whether any additional procedures are needed.

Disbursements from the Loan Account will follow the transaction-based method, i.e., traditional World Bank procedures: Advances, Direct Payments, Special Commitments and Reimbursement (with full documentation and against Statements of Expenditures [SOEs]). The withdrawal applications will be prepared and authorized by the AYGM.

A detailed Disbursement and Financial Information Letter (DFIL) will be provided to the PIU. The disbursements below specific thresholds indicated in the DFIL will be made according to certified SOEs. Full documentation in support of SOEs would be retained by MoTI for at least seven years after the Bank has received the audit report for the fiscal year in which the last withdrawal from the Loan Account was made. This information will be made available for review during supervision by World Bank staff and for annual audits which will be required to specifically comment on the propriety of SOE disbursements and the quality of the associated record-keeping.

Financial Reporting

AYGM's PIU will maintain records and will ensure appropriate accounting for the funds provided on a cash basis. The interim un-audited financial reports (IFRs) will be prepared quarterly and will be submitted to the Bank no later than 45 days after the end of the quarter. The format and the contents of the IFRs will be agreed upon with the Bank and attached to the Minutes of Negotiation.

The IFRs will include the following reports at a minimum:

- Expenditure tables per activity, including explanation of significant variances between budgeted and actual figures;
- Expenditure tables per category, including explanation of significant variances between budgeted and actual figures;
- Expenditure tables per financing source;
- Designated account statements; and
- Contract management tables.

The IFRs might also include a table showing IsDB progress for the parallel-financed portion, to provide a complete picture of overall project implementation progress.

External Audit

Annual project financial statements will be audited by the Treasury Controllers based on the International Standards on Auditing and in line with a term of reference acceptable to the World Bank. The audit reports, including a Management Letter (ML) providing recommendations for improving implementation, will be provided to the World

Bank within six months of the end of each fiscal year. The audit reports excluding the ML will be publicly disclosed by the PIU on AYGM's website, and by the World Bank.

The following table summarizes the audit requirements for the project:

Audit Report	Due Date
Project financial statements including IBRD and AIIB portions.	Within six months of the end of each fiscal year and at the closing of the project

Action Plan

The residual FM risk is Moderate, and the FM arrangements are assessed as acceptable at entry. The risk level and rating will be revisited throughout implementation. The following action plan is developed for MoTI to commence implementation:

Action	Indicative Deadline
MoTI to prepare accounting and reporting Excel spreadsheets	By effectiveness*
MoTI, through the MoTF to open the Designated Accounts (IBRD and AIIB) for the project	Within three weeks after signing
MoTI to contract the consultancy firm for staffing the PIU, including the FM Consultant	Within one month after effectiveness
MoTI to finalize the chart of accounts of the project and adapt the software procured for RLIP for project accounting and reporting	Within two months after effectiveness
MoTI to send an updated FM Manual including workflows, internal controls, and all FM arrangements of the project, to the World Bank.	Within two months after effectiveness

*indicative, not an effectiveness condition.

Supervision

During project implementation, the Bank will supervise the project's financial management arrangements as follows;(i) during the Bank's implementation support missions, financial management and disbursement arrangements will be reviewed to ensure compliance with the Bank's minimum requirements (ii) project's quarterly interim un-audited financial reports as well as the project's annual audited financial statements and auditor's management letter will be reviewed. As required, a Bank-accredited Financial Management Specialist will assist in the supervision process.

Environmental and Social Appraisal Summary

Both the environmental and social risks are rated Substantial. The relevant Environmental and Social Standards (ESSs) under the Environmental and Social Framework (ESF) applicable to the project are ESS1, ESS2, ESS3, ESS4, ESS5, ESS6, ESS8 and ESS10. The project's key environmental and social (E&S) risks may include: air pollution and noise from

construction machinery and quarries and operation phase noise and vibration impacts; soil disturbance and loss during earth-moving; loss of vegetation; impacts related to improper waste management; impacts related to improper construction camp management; risks to community health and safety; land acquisition; physical relocation and livelihood impacts; labor conditions and labor influx; and potential impacts on culturally and naturally protected areas, such as habitat loss, fragmentation, and/or displacement, invasive alien species, and damage to registered cultural/archaeological sites and/or assets. A project-wide Environmental and Social Impact Assessment (ESIA), including an Environmental and Social Management Plan (ESMP) and sub-management plans, as well as a Biodiversity Management Plan (BMP), were conducted during project preparation. The ESIA identified specific risks and impacts, and developed risk management/ mitigation plans. In addition, a Resettlement Framework (RF), Stakeholder Engagement Plan (SEP), and Labor Management Procedure (LMP) have been prepared. The ESIA/ESMP, BMP, and contractor-specific ESMPs (C-ESMPs) will be updated based on the findings of additional biodiversity studies to be conducted prior to start of construction works during the project's implementation phase.

Based on the sexual exploitation and abuse/sexual harassment (SEA/SH) risk screening tool for projects with major civil works, the project's SEA/SH risk is assessed as Low. However, given that the project will be implemented across four provinces, including in hard-to-reach areas, it may be challenging to monitor project activities by the PIU. In addition, in some areas along the target line's right-of-way (RoW), there may not be an adequate institutional set up to address SEA/SH-related incidents. The exact size of the labor workforce and the SEA/SH risks posed to local populations has been further assessed in the ESIA. The project will implement SEA/SH mitigation measures, including SEA/SH response mechanisms utilizing the survivor-centric approach, as part of the site-specific ESMPs; a Code of Conduct for workers; a mechanism to report SEA/SH grievances; and training and awareness sessions for project workers and affected communities.

The project will be implemented by the Ministry of Transport and Infrastructure's (MoTI) Directorate-General of Infrastructure Investments (AYGM). This is the same implementing agency as the ongoing Bank-financed Rail Logistics Improvement Project (RLIP), which is being governed by the ESF ESSs. Moreover, while AYGM does not have a long history of implementation of World Bank projects (RLIP being its first), it has significant experience with the planning, execution, and handover of large infrastructure projects in railways and other transport subsectors. The PIU set up for RLIP has accumulated over two and a half years of experience with implementation of Environmental and Social (E&S) tasks under the ESF, and ETMIC will benefit from this experience. The PIU, including its ETMIC-dedicated sub-unit, will continue to be led by the AYGM Deputy Director General as PIU Director, and by the Director of AYGM's Railway Construction Department as Deputy PIU Director. The E&S function within the PIU's ETMIC sub-unit will be staffed by one Environmental, Social, Health and Safety (ESHS) manager, one environmental specialist, one social development specialist, one occupational health and safety (OHS) specialist, and two community liaison officers (one male and one female) on a full-time basis to support management of ESHS risks and impacts of the project under the supervision of the PIU sub-unit. These professionals are expected to be recruited during project implementation through the engagement of a specialized firm with expertise in project management, construction, engineering, and monitoring, including E&S monitoring. The Terms of Reference (ToR) for the selection of these services have been prepared by AYGM and confirmed by the World Bank as responsive to the Bank's Procurement Framework, Financial Management requirements, and ESF principles.

The project will utilize the design-build procurement method (FIDIC Yellow Book) to reduce the time between project approval and the commencement of civil works. Contractors will finalize the design of project activities and may make further modifications that differ from those outlined in the ESIA report. Therefore, if needed, contractors will carry out additional E&S assessments and the results of these assessments will be reflected in the E&S management plans and C-ESMPs.

ANNEX 2: Detailed Description of Project Interventions

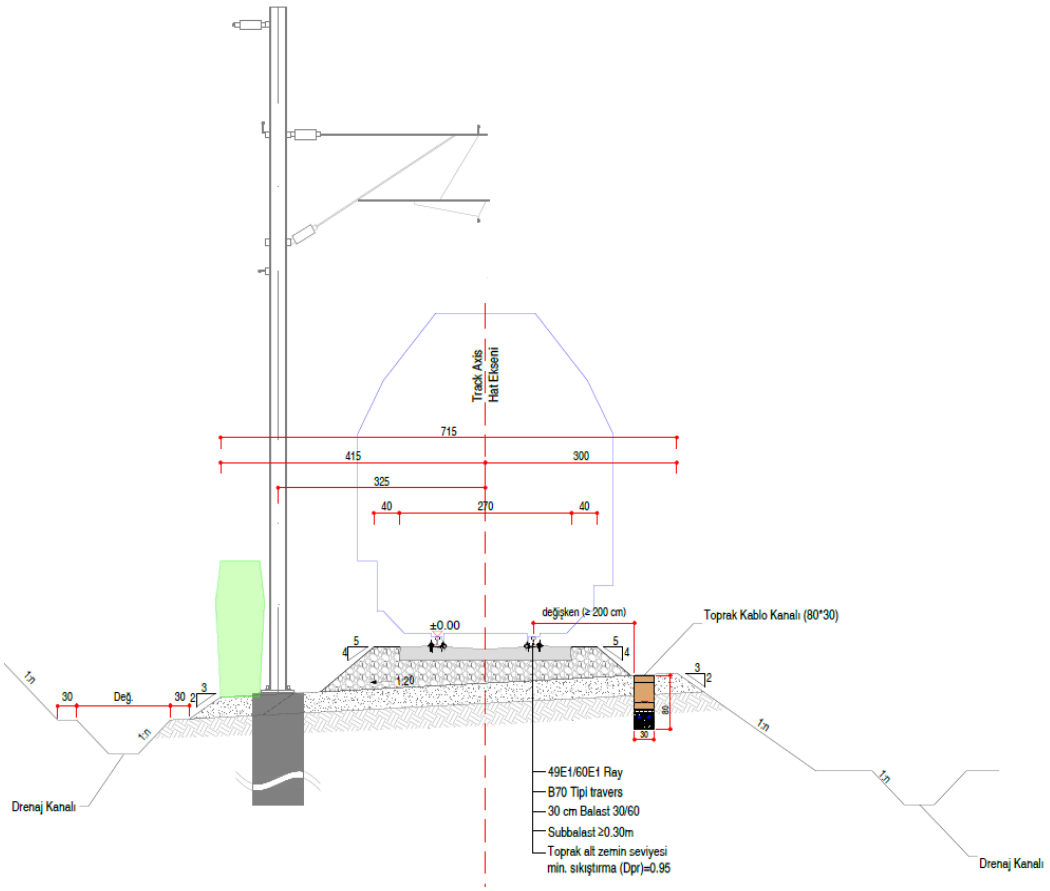
The project's scope of technical interventions includes the rehabilitation and expansion of infrastructure and superstructure, and the installation of signaling, telecommunication, and electrification systems, along the target line. The aim is to increase the line's operating capacity, enhance its resilience to natural hazards, including climate hazards, and improve its operational safety. It is estimated that the theoretical capacity of the trackway will be increased to 20 million tons per year by deploying modern signaling and telecommunications, building 10 new siding tracks, extending the length of siding tracks at 30 existing stations, and re-arranging the Kars Station tracks. The maximum train length (including the locomotive) that can be operated along the entire trackway will be increased to 700m. In addition, stations will have reservations for future extension to operate 750m or 1,050m long train sets.

Based on the existing conditions of the trackway, the project's technical scope is defined for the Divriği-Kars and the Kars-Georgia border sections separately, as follows.

1. Divriği-Kars Section

The typical cross-section to be taken as basis for at-grade trackway, new siding tracks, and platform track extensions at stations is shown below.

Figure A2.1. Divriği-Kars Typical Section for At-Grade Trackway, New Sidings, and Platform Extensions



Source: AYGM.

The UIC60E1 rail type will be used for new at-grade trackway and new siding tracks at Stations. 49E1 rail type will be used for platform track extensions at Stations to comply with the existing rails. W14 fastener system will be used. New rails to be installed will be minimum 36m long.

B58 type mono-block concrete sleepers will be used with 60cm intervals. Sleepers will have 2.4m length and rail contact surface will be in compliance with W14-type fasteners. Ballast thickness will be at least 30cm from the bottom surface of the rails. Aluminothermic welding will be applied at switches. Butt welding will be applied along the trackway. Switches will be 1:9 with R=300 preferably or R=190 if necessary, and with UIC60E1 rail preferably or 49E1 rail if necessary. New switches will be installed for new siding tracks. In addition, new 1:9 switches will be installed at Kemah, Aşkale, Erzurum, and Kars stations, and at the Kars Logistics Center. Station track layout arrangements are given in Table A2.1.

Table A2.1. Divriği-Kars Section: Planned Station Track Layout Arrangements

No.	Name	Km	Extension Track and New Siding Track Construction at Stations
-	Divriği	777+708	
1	Dazlak	793+500	Station track layout will be re-arranged as main line + 2 siding tracks in order to meet 700m trains. (Additional Siding Tracks)
2	Çaltı	804+599	Station track layout will be re-arranged as main line + 3 siding tracks to meet 750m trains. Blind track will be cancelled. (Extension of Siding Tracks)
3	Bağıştaş	821+802	Station track layout will be re-arranged as main line + 2 siding tracks in order to meet 750m trains. (Extension of Siding Tracks)
4	İliç	832+434	Station track layout will be re-arranged as main line + 2 siding tracks in order to meet 750m trains. (Extension of Siding Tracks)
5	Güllübağ	851+457	Station track layout will be re-arranged as main line + 1 siding track to meet 750m trains. Secondary siding will be canceled. (Extension of Siding Tracks)
6	Eriç	868+650	Station track layout will be re-arranged as main line + 2 siding tracks in order to meet 750m trains. (Extension of Siding Tracks)
7	Kemah	885+765	Existing siding track next to the main line will be extended to meet 750m trains. Other tracks will be kept as present. (Extension of Siding Tracks)
8	Alp	901+798	Station track layout will be re-arranged as main line + 2 siding tracks in order to meet 750m trains. (Extension of Siding Tracks)
9	Dumanlı	921+002	Station track layout will be re-arranged as main line + 2 siding tracks in order to meet 1,050m trains. (Additional Siding Tracks)
10	Erzincan	933+784	Mainline and siding track will be extended in order to meet 750m trains. Other tracks will be kept as present. (Extension of Siding Tracks)
11	Altınbaşak	951+338	Station track layout will be re-arranged as main line + 2 siding tracks in order to meet 1,050m trains. (Additional Siding Tracks)

No.	Name	Km	Extension Track and New Siding Track Construction at Stations
12	Tanyeri	966+648	Station track layout will be re-arranged as main line + 1 siding track to meet 1,050m trains. Secondary siding will be canceled. (Extension of Siding Tracks)
13	Geçit	981+650	Station track layout will be re-arranged as main line + 1 siding track to meet 750m trains. Secondary siding will be canceled. (Extension of Siding Tracks)
14	Demirkapı	998+831	Station track layout will be re-arranged as main line + 2 siding tracks in order to meet 1,050m trains. (Extension of Siding Tracks)
15	Altınkent	1011+460	Station track layout will be re-arranged as main line +1 siding track in order to meet 1,050m trains. (Additional Siding Tracks)
16	Mercan	1021+812	Station track layout will be re-arranged as main line + 3 siding tracks to meet 750m trains. Blind track will be cancelled. (Extension of Siding Tracks)
17	Çadırkaya	1033+998	Station track layout will be re-arranged as main line + 2 siding tracks to meet 750m trains. One siding will be canceled. (Extension of Siding Tracks)
18	Erbaş	1047+637	Existing siding track next to the main line will be extended to meet 750m trains. The rest will be kept as present. (Extension of Siding Tracks)
19	Karasu	1061+852	Track layout is not suitable for extension. All tracks will be kept as present.
20	Saptıran	1080+463	Station track layout will be re-arranged as main line +1 siding track in order to meet 750m trains. (Additional Siding Tracks)
21	Aşkale	1093+221	Mainline and 2 siding tracks will be extended in order to meet 700m trains. Other tracks will be kept as present. (Extension of Siding Tracks)
22	Kandilli	1108+989	Station track layout will be re-arranged as main line + 2 siding tracks to meet 750m trains. Blind track will be cancelled. (Extension of Siding Tracks)
23	Çiçekli	1124+500	Station track layout will be re-arranged as main line +1 siding track in order to meet 750m trains. (Additional Siding Tracks)
24	Kaplıca(Ilıca)	1133+496	Station track layout will be re-arranged as main line + 3 siding tracks to meet 750m trains. Blind track will be cancelled. (Extension of Siding Tracks)
25	Palandöken	1139+800	It will be kept as present.
26	Erzurum	1148+672	Station track layout will be re-arranged as main line + 2 siding tracks in order to meet 750m trains.
27	Uzun Ahmet	1167+219	Station track layout will be re-arranged as main line + 3 siding tracks to meet 750m trains. Blind track will be cancelled. (Extension of Siding Tracks)
28	Alvar	1180+762	Station track layout will be re-arranged as main line +1 siding track in order to meet 750m trains. (Additional Siding Tracks)

No.	Name	Km	Extension Track and New Siding Track Construction at Stations
29	Hasankale	1189+298	Station track layout will be re-arranged as main line + 2 siding tracks to meet 750m trains. Blind track will be cancelled. (Extension of Siding Tracks)
30	Köprüköy	1206+485	Station track layout will be re-arranged as main line + 2 siding tracks to meet 750m trains. Blind track will be cancelled. (Extension of Siding Tracks)
31	Karaçuha	1219+943	Station track layout will be re-arranged as main line +1 siding track in order to meet 1,050m trains. (Additional Siding Tracks)
32	Horasan	1233+879	Station track layout will be re-arranged as main line + 4 siding tracks to meet 750m trains. Blind track will be cancelled. (Extension of Siding Tracks)
33	Hızır İlyas	1248+408	Station track layout will be re-arranged as main line +1 siding track in order to meet 750m trains. (Additional Siding Tracks)
34	Süngütaşı	1260+280	Station track layout will be re-arranged as main line + 1 siding track to meet 750m trains. Blind track will be cancelled. (Extension of Siding Tracks)
35	Topdağı	1273+531	Track layout is not suitable for extension. All tracks will be kept as present.
36	Siding	1283+000	It will be kept as present.
37	Soğanlı	1288+850	Station track layout will be re-arranged as main line + 2 siding tracks in order to meet 700m trains. (Extension of Siding Tracks)
38	Aşit	1293+750	It will be kept as present.
39	Sarıkamış	1305+615	Station track layout will be re-arranged as main line + 5 siding tracks to meet 750m trains. Blind and connection tracks will be cancelled. (Extension of Siding Tracks)
40	Çatak	1319+875	It will be kept as present.
41	Selim	1329+945	Station track layout will be re-arranged as main line + 2 siding tracks to meet 750m trains. Third siding will be cancelled. (Extension of Siding Tracks)
42	Benli Ahmet	1340+550	Station track layout will be re-arranged as main line + 1 siding track to meet 750m trains. Second & third siding will be cancelled. (Extension of Siding Tracks)
43	Dikme	1352+150	Station track layout will be re-arranged as main line + 2 siding tracks in order to meet 700m trains. (Additional Siding Tracks)
44	Kars	1364+775	Station track layout will be re-arranged as BTK trackway will be continuation of mainline and 2 mainlines at the station. One of the mainline will be connected to Kars Logistics Centre. (Extension of Siding Tracks)

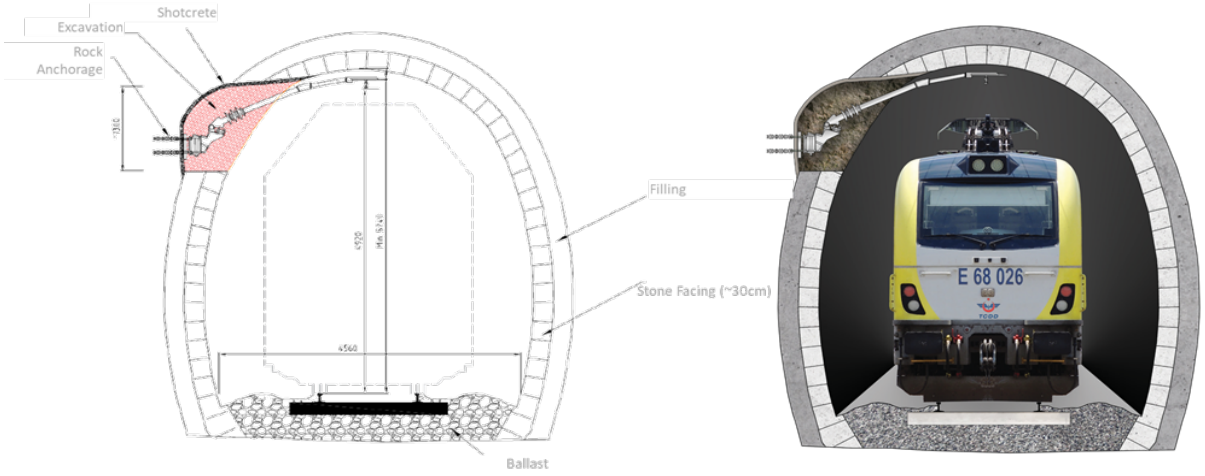
Source: AYGM.

Civil Works

Based on trackway extensions and re-arrangements at stations, the following works will be conducted:

- Construction of new trackway with infrastructure and superstructure;
- Construction of two new bridges with a total length of 130m: a new bridge parallel to the existing one at İliç Station and before Geçit Station;
- Renewal and extension of existing passenger platforms at Kemah and Demirkapı stations;
- Construction of retaining walls with a total length of 1,050m at Kemah, Güllübağ, and Erbaş stations;
- Extension or renewal of 72 culverts;
- Demolition and reconstruction of 4 overpasses:
  Erzurum: Km.1088+044 L = 20.00m; Reinforced concrete; h = 4.90m
  Erzurum: Km.1092+278 L = 20.00m; Reinforced concrete; h = 4.80m
  Kars: Km.1284+244 L = 10.00m; Reinforced concrete; Constructed in 1959; (h = 4.50m)
  Kars: Km. 1291+232 L = 16.00m; Reinforced concrete; Constructed in 1960; (Span: 2 x 8.00m; h = 4.50m)
- Construction of 10 km long snow trench;
- Renovation of the bored tunnel to expand the clearance for the installation of electrification devices;
- Renovation of tunnel ceiling in 68 tunnels with a total length of 12.5km;
- Renovation by ballast tamping in 18 tunnels with a total length of 6.2km; and
- Installation of electrification devices in all 157 tunnels with a 39.6km total length (Figure A2.2).

Figure A2.2. Installation of Catenary in Tunnels with Cantiveler Application



Source: AYGM.

Electrification Works

The railway section, which is currently operated with diesel locomotives, will be electrified to achieve fast, economical, and comfortable railway operations. For this purpose, a catenary system and traction power transformer stations will be constructed and installed. The catenary system installation works will include existing 587km standard gauge single track main railway line, existing and additional station and siding tracks, and 13 traction power transformer substations (2x25 MVA), as given in Table A2.2. Infeed lines from national power supply network to the transformer stations are not included in the scope.

Table A2.2. Divriği-Kars Section: Planned Location of Traction Power Transformer Substations

No.	Location	Km
TM1	Çaltı	805+450
TM2	İliç	834+075
TM3	Kemah	883+660
TM4	Beşsaray	929+950
TM5	Geçit	981+775
TM6	Gökçe	1027+500
TM7	Güneyçam	1077+580
TM8	Alaca	1119+750
TM9	Korucuk	1172+075
TM10	Köprüköy	1212+980
TM11	Süngütaş	1260+150
TM12	Sarıkamış	1310+550
TM13	Yolaçan	1357+700

Source: AYGM.

Signalling and Telecommunication Works

ERTMS/ETCS Level 1 signalling and telecommunication systems with a total length of 684.7km will be installed for the existing main railway (587km) and siding tracks (97.7km), including existing and new additions. An Axle Counter System will be applied for train detection in signal blocks and level crossings. LED signals will be used in signal blocks and stations. All switches along the main railway line and siding lines will be electric, motorized, with heaters, and controlled by interlocking. CTC (Central Traffic Control) for both Kars-Divriği and BTK sections will be located at Erzurum or Kars Station. 120 level crossings will be controlled and integrated to the signalling system. Required infrastructural improvements will be made based on the existing conditions of the level crossings. Network communication devices consisting of Multi-Protocol Label Switching (IP/MPLS) routers, station switches, network switches, and industrial switches will be installed. A telephone system will be established for operational communication and emergencies. A passenger information system will be installed at stations. An uninterrupted power supply (UPS) system will be installed

for signalling and telecommunication systems. Low voltage required for signalling and telecommunication systems will be supplied from stations.

Distributed Acoustic Sensing (DAS) System

The DAS system will be established in the riskiest, most vulnerable 320km of the section, to detect trespassing, loose fastenings, flat wheel, loose ballast, and natural disasters such as tree/stone/rock falls, flooding, landslides, and avalanches. The system will consist of 4 blocks having 80km detection length along the mainline and warn CTC (Central Traffic Control). Monitoring screens will be installed and integrated in CTC (Central Traffic Control).

2. BTK Section (Kars – Georgia Border and Kars Logistics Center)

Typical cross-section to be taken as basis for mainline are shown in Figures A2.3 and A2.4.

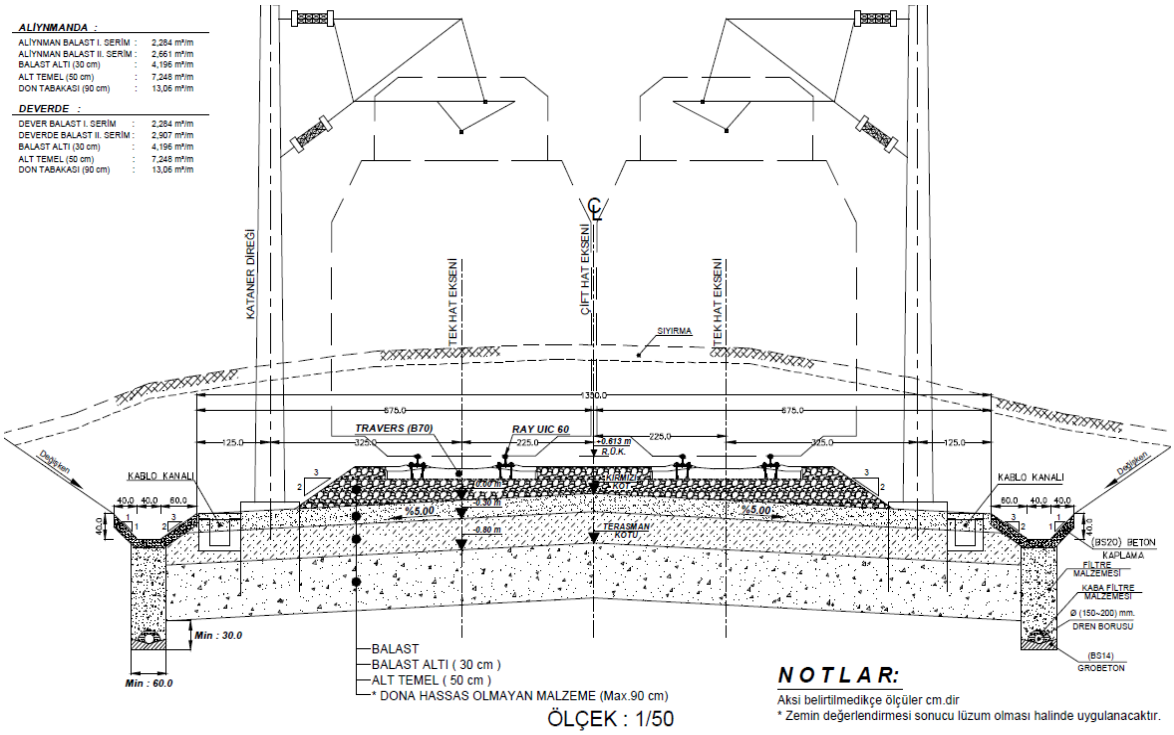
UIC60E1 rail type will be used for new trackway and new siding tracks at Stations. W14 fastener system will be used. New rails to be installed will be minimum 36m long. B70 type mono-block concrete sleepers will be used with 60cm interval. Sleepers will have 2,6m length and rail contact surface will be in comply with W14 type fasteners. Ballast thickness will be at least 30cm from the bottom surface of the rails. Aluminothermic welding will be applied at switches. Butt welding will be applied along the trackway. New 1:12 switches will be provided for new siding tracks and cross passage tracks. Station Track Layout Arrangements are given in Table A2.3.

Table A2.3. BTK Section: Planned Station Track Layout Arrangements

Name	Km	Extension Track & New Siding Track Construction at Stations
Güvercin	1397+149	Existing mainline will be doubled and 1 additional siding track will be arranged to meet 1,050m trains. 4 additional cross passage will be arranged between existing and new tracks. (Extension of Siding Tracks)
Taşbaşı	1416+349	Existing mainline will be doubled and 1 additional siding track will be arranged to meet 1,050m trains. 4 additional cross passage will be arranged between existing and new tracks. (Extension of Siding Tracks)
Canbaz	1432+349	Existing mainline will be doubled and 2 additional siding track will be arranged to meet 1,050m trains. 4 additional cross passage will be arranged between existing and new tracks. (Extension of Siding Tracks)
Border	1444+479	

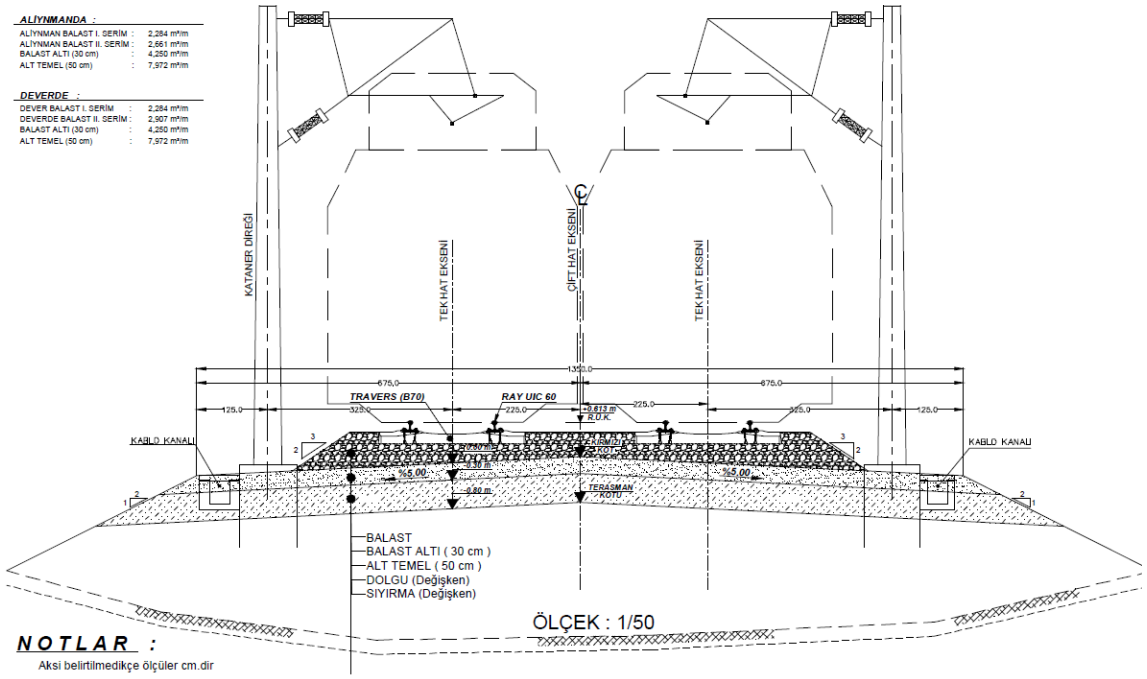
Source: AYGM.

Figure A2.3. BTK Typical Cut Section for mainline



Source: AYGM.

Figure A2.4. BTK Typical Fill Section for mainline



Source: AYGM.

Civil Works

Based on the station trackway extensions and re-arrangements at stations, the following works will be undertaken:

- Construction of 76.4km dual gauge single track new trackway with superstructure only;
- Construction of connection roads of existing underpasses and overpasses for village, river, and field transportation, and superstructure works (sub-base, foundation, and surface coating) of these roads;
- Excavation and lining construction of head and slope drainage channels in cut and fill sections;
- Construction of 140,000 meters of wire fencing for the entire route as well as stops and stations;
- Surface drainage in areas where stops and stations are located;
- Construction of earth cable channels along the route and precast concrete cable channels at the stations;
- Construction of 40cm-thick riprap in various sections (Km: 1364 – Km: 1366; Km: 1390; Km: 1442);
- Construction of 2.30-2.80m high snow trenches with a total length of 10km in various sections;
- Slope protection with shotcrete in various sections (30,000 m^3);
- Construction of 5 culverts - three culverts between Kars Station and the starting point of the BTK Section, one culvert at BTK section, and one culvert between Kars Station and the Kars Logistics Center;
- Construction of two double-track steel railway bridges with 7m span at Km 1363+345 and Km 1363+757, between Kars Station and Kars Logistics Center;
- Construction of 3 overpasses - one underpass between Kars Station and the starting point of the BTK Section, and two underpasses at BTK section; construction of cut-and-cover avalanche tunnels, with a total length of 1,000m in various sections;
- Insulation works of existing incomplete and new cut-and-cover tunnels, installation of water insulation and protection layers of existing incomplete and new cut-and-cover tunnels, and backfilling (4.5 million m^3) of existing incomplete and new cut-and-cover tunnels;
- Construction of incomplete reinforced earth retaining walls at tunnel portals;
- Construction and Installation of precast concrete cable ducts and handrails (13.7km) in tunnels;
- Installation of tunnel lighting system at 3 bored tunnels (Border, Senger-1 and Senger-2);
- Completion of shotcrete works in bored tunnel portals;
- Construction of Canbaz Station Building (4,500m^2) and Social Facility Building (1,600m^2); and
- Construction of perimeter wall (12,000m) and two platforms with passenger underpass, marquises, and ramps.

Electrification Works

This railway section, which is currently operated solely with diesel locomotives, will be electrified to achieve fast, economical, and comfortable railway operations. For this purpose, a catenary system and traction power transformer stations will be constructed and installed on existing 82.5km standard gauge double track main railway line, 9.7km existing and additional station and siding tracks, and existing 15.3km standard gauge single track at the Kars Logistics Center connection railway line, plus three traction power transformer substations (2x25 MVA) listed in Table A2.4.

Table A2.4. BTK Section: Planned Location of Traction Power Transformer Substations

No.	Location	Km
TM14	Güvercin	1384+534
TM15	Taşbaşı	1414+689
TM16	Canbaz	1445+670

Source: AYGM.

An infeed line (154kV) from national power supply network with a length of 36km, and three electrically neutral zones will be installed.

Signalling and Telecommunication Works

ERTMS/ETCS Level 1 signaling and telecommunication systems, with a total length of 113km, will be installed for the existing main railway (79.1km), siding tracks (9.7km), including existing and new additions, and Kars Logistics Center connection line (20.8km). An Axle Counter System will be applied for train detection in signal blocks and level crossings. LED signals will be used in signal blocks and stations. The system will be in accordance with 120 Km/h operating speed and 4,500 m signal block distance criterion. All switches along the main railway line and siding lines will be electric, motorized, with heaters, and controlled by interlocking. The signaling system will be fed from two different sources: catenary and network. In addition, the following works will be carried out:

- Network communication devices consisting of Multi-Protocol Label Switching (IP/MPLS) routers, station switches, network switches, and industrial switches will be installed;
- A telephone system will be established for operational communication and emergencies;
- A passenger information and announcement system will be installed at Canbaz Station;
- An uninterrupted power supply (UPS) system with 8-hour autonomy and valve regulated lead-acid (VRLA) battery system will be installed for the signaling and telecommunication systems;
- 10 ETCS train on-board units will be supplied and installed; locomotives coming from the Georgian border will have the ERTMS/ETCS on-board system; an additional Automatic Train Stop (ATS) on-board system will not be applied for these locomotives; and
- A Global System for Mobile Communications – Railway (GSM-R) mobile communication system will be installed.

ANNEX 3: Economic Geography of the Project Area

1. **Economically, northeastern Anatolia faces the need to converge with the more urbanized and prosperous western regions of the country.** Its geography is characterized by mountainous terrain, high elevation, and sparse population. Agriculture predominates economic activity, with manufacturing and mining interspersed. Below is an overview of the principal economic activities in the four provinces that host the ETMIC corridor.

2. **The population of Sivas, Erzincan, Erzurum, and Kars provinces is either growing at a fraction of the national rate (Erzincan), stagnant (Sivas), or in decline (Erzurum and Kars), signaling an opportunity to stimulate economic activity to support convergence.** The absolute value of freight volumes with origin or destination in these provinces will be only one among several measures to assess the impact of the railway line upgrade from the perspective of the host provinces. It is expected that the project will provide them with less costly logistical connections to their main markets in the western regions of Türkiye, which will benefit local businesses directly.

3. **A key strategy for lagging regions with declining population is to increase basic connectivity to larger markets as a means of enabling local value chains, growing local business, and attracting more people.** Economic activity in the provinces along the ETMIC corridor depends on access to larger markets, both domestically and internationally. Several of region's dominant value chains, such as in agricultural production, meat and dairy production, textiles, mining, and industrial production, can benefit from improved railway connectivity. Tourism activity can also benefit from improved connections by rail for passengers.

4. **Transit traffic is expected to generate additional demand at the local level.** The project will bring an increase in transit traffic along the Middle Corridor to the target region. From its current state of capacity constraints and limited connectivity, an upgraded Divriği-Kars-Georgia border railway line will become a competitive link between Türkiye and Central/East Asia for both eastbound and westbound freight. As this occurs, the host provinces will become waystations on that growing, strategic, international and intercontinental corridor, better connected both eastward and westward, with a corresponding long-term increase in transit and handling revenue accruing to local businesses. This in turn will provide development opportunities that can help stem the flow of out-migration and secure a better economic future for the people of northeastern Anatolia by making their region a link in an intercontinental chain.

5. **Already the four provinces are equipped with initial tools to capitalize economically on freight handling.** Kars and Erzurum have logistics centers, with Sivas planned to have one,[35] which can be useful for both local businesses' access to the line for their own use, and for the handling of transit traffic in either direction. This will be particularly the case for Kars, in its role as connecting point between the BTK line and the rest of Türkiye's national railway network, as well as its expected future role as a break-of-gauge facility.

6. **The main commodities produced in the host provinces, and most of those consumed in them, are in principle compatible with rail transport.** Bulk commodities especially will benefit from the decreased transport costs that the upgraded railway line can offer, but agricultural products and those requiring cold chain maintenance are also suited to railway transport in refrigerated containers. Industrial goods can move in containers or on flatcars, and consumer goods can similarly be containerized. The distances involved between the host provinces and Türkiye's main economic poles to the west lend themselves well to rail freight logistics. At present, due to the obsolescence of the Divriği-Kars-Georgia border line, nearly all freight is carried into or out of these provinces by truck. However, the upgrading of the

[35] Republic of Türkiye, Ministry of Transport and Infrastructure. (2023), *U2053: Transport and Logistic Master Plan.* Available online: http://sgb.uab.gov.tr/uploads/pages/yayin-sunum-ve-tablolar/uab-2053-master-plan.pdf.

line through this project is expected to enable truck-to-rail modal shift. This shift, while expected to be small in relative terms, can be a significant driver of cost reductions and profitability at the firm level. It will allow local firms to capture the benefit of lower logistics costs and expand their access to markets both in western Türkiye and in the Central Asian countries.

7. **Kars Province.** Most of the employment and economic generation in the region is grounded in farming or animal herding, with 60% of employment based in these sectors.[36] The region's climate makes agricultural production challenging, resulting in livestock breeding holding the main economic value. Production of food and dairy products is among the region's main sources of income. The Kars Logistics Center is operational. Although nominally connected to roads and railway, its last-mile and main line rail connectivity can be improved. As a result, it is underused, since both domestic and Middle Corridor traffic capture by this facility has been limited by capacity constraints at both the Divriği-Kars-Georgia border line and the BTK line. With this project in place, the logistics center will benefit from improved rail connectivity. This will enable local businesses to make better use of rail services for the transportation and handling of bulk and containerized goods, and to support freight handling for transit traffic.

8. **Erzurum Province.** More than 750,000 people live in Erzurum province,[37] with most of the population in the urban centers and adjacent areas.[38] Growing historically because of its important role on the silk road trade route, the province now specializes in service provision, manufacturing, and small-scale industry.[39] However, due to the scale and size of these enterprises, most industries currently only serve local markets, stifling potential for economic export, employment opportunities, and growth. For example, while there are 81 industrial plants in the province, only 40 of them are currently active due to the high cost of operations.[40] A significant portion of the economy is also driven by agricultural production. The primary crops include wheat, barley, sugar beet, potato, sunflower, forage crops, and various vegetables and fruits,[41] while summer months facilitate honey production.[42] While historic importance fell on animal husbandry and meat production, the lack of ability to process and export these products left the market under-supported. A renewed focus on meat processing and production is currently in development, with the intention of reviving this sector of the economy.[43] To recognize the scale and scope of this potential, the province will benefit from the potential of reliable and accessible rail infrastructure to deliver produce and other agricultural and agribusiness output to other provinces throughout the country. The Palandöken Erzurum Logistics Center is complete, connected to the railway and roads, and in operation. Improvements in railway logistics costs to major markets will render the use of this logistics center more economical and thus help local businesses to grow.

9. **Erzincan Province.** In keeping with its geographic proximity to the other provinces, Erzincan is economically driven by agriculture, natural resource production, and a blossoming manufacturing industry. Agriculturally, the province produces crops including wheat, barley, lentils, beans, apricots, and apples. In addition to crops, the province also has a strong livestock economy and is known for its pine honey production.[44] In order to better capitalize on its economic generation potential, the province has also developed an extensive manufacturing sector with a focus on

[36] OECD (2016), *An Introduction to the Economic Structure of Türkiye's Regions*.
[37] Turkish National Statistical Institute. https://www.tuik.gov.tr/.
[38] Kaymaz et al., (2022). https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8209776/#CR146.
[39] Altaş, N. (2015), Coğrafi çevre unsurlarıyla şehirleşme etkileşimi bakımından Erzurum şehri. *Ankara: Pegem Akademi*.
[40] Aydın et al., (2021). https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7424131/.
[41] Kaymaz et al., (2022). https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8209776/#CR146.
[42] Bulut, İ., & Zaman, M. (2003), Erzurum'da Arıcılığın Coğrafi Esasları ve Türkiye Arıcılığındaki Yeri. *Atatürk üniversitesi Fen Edebiyat Fakültesi, Sosyal Bilimler Dergisi, 3 (31): 141, 157*.
[43] Kaymaz et al., (2022). https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8209776/.
[44] Aşkan (2023). https://www.mdpi.com/2071-1050/15/9/7524.

food processing, textile production, and construction materials manufacturing. Erzincan's industrial zones, such as the Erzincan Organized Industrial Zone, support the growth of small and medium-sized enterprises (SMEs) and contribute to employment generation. Such SMEs will benefit from the ability to bring their product externally to other domestic markets, as well as to serve international markets for export. Erzincan is not equipped with a logistics center at present.

10. **Sivas Province.** As with the other host provinces, agriculture drives a significant component of Sivas's economy, including production of wheat, barley, legumes, and potatoes. Livestock farming, particularly sheep and cattle rearing, is also prevalent in the region. However, in comparison to the other three provinces, Sivas has a stronger industrialized base, with manufacturing sectors such as automotive, machinery, textiles, and food processing playing a significant role in the local economy. The province is home to organized industrial zones that support the growth of small and medium-sized enterprises (SMEs) and contribute to employment generation. In light of this, while all three provinces stand to benefit from improved connectivity, Sivas specifically stands to benefit significantly from better connectivity to the Middle Corridor both in terms of access to those markets for goods produced in the province and those in transit. This is aided by the fact that Sivas serves as a transportation hub in central Türkiye, with major road and rail connections passing through the province. The Ankara-Sivas high-speed railway line, inaugurated in 2020, has further enhanced the region's connectivity and transportation infrastructure. Sivas's strategic location along important transport corridors facilitates the movement of goods and people between different regions of Türkiye.

ANNEX 4: Türkiye's Railway Sector Reform Experience and Sectoral Expansion Plans

Railway Sector Restructuring

1. Over the past 15 years the Government of Türkiye (GoT) embarked on a legal and market reform process to align the structure of its railway sector with best European practice and EU *acquis communautaire* directives. These reforms aim to capture productivity improvements and gains in market share through sector liberalization, openness to competition, and a more transparent environment for public, private, and public-private investment.

2. The first step in this process was Türkiye's 2013 adoption of the *Law on Liberalization of Turkish Railway Transportation*.[45] This legislation established the basic principles for railway sector restructuring, by separating it into two components: (i) infrastructure provision and management, which would remain in the public domain; and (ii) railway service delivery and operations, which would be open to participation by, and competition among, public and private licensed railway undertakings.

3. In 2015 and 2016 the GoT adopted secondary legislation to introduce the key definitions, technical substance, and regulatory provisions necessary for the 2013 law to become operational. The secondary legislation set forth, inter alia, processes to (i) issue a network statement, (ii) license railway undertakings, (iii) provide track access rights to licensed railway undertakings on a non-discriminatory basis, (iv) register rolling stock, (v) enhance railway safety in an unbundled market environment with open access and competition, and (vi) provide public service obligation (PSO) services.

4. With this legal structure in place, in 2016 the State Railways of the Republic of Türkiye (TCDD), the former vertically integrated, incumbent, state-owned, single-provider railway company, was unbundled into several legal entities with separate financial accounts under a holding structure, similar to that of the incumbent public railway undertakings of Germany and Italy. Specifically, TCDD was established as a 100% government-owned holding company under the Ministry of Transport and Infrastructure (MoTI). As the national railway infrastructure manager, TCDD is responsible for managing and maintaining the railway network, and for providing access to the network to licensed railway undertakings subject to payment of track access charges. MoTI and TCDD jointly plan the railway network; newly-constructed, publicly-financed expansions of the network (such as under ETMIC) are executed by MoTI's Directorate-General of Infrastructure Investments (AYGM) and handed over to TCDD for operations and maintenance. As a holding company, TCDD comprised four affiliated companies, including, most notably, TCDD Transport, the 100% government-owned railway undertaking and incumbent provider of passenger and freight rail transport services in Türkiye, as well as five subsidiaries. In addition to TCDD Transport, the other 3 TCDD-affiliated enterprises included rolling stock manufacturers TÜLOMSAŞ, TÜDEMSAŞ and TÜVASAŞ. In March 2020 these latter 3 companies were merged into a single entity, called Türkiye Rail System Vehicles Industry, JSC (TÜRASAŞ). TCDD's 5 subsidiaries include a switching and railway systems provider, two concrete sleeper manufacturers, and two railway maintenance companies.

5. In January 2017 TCDD issued its first Network Statement, thus launching the open-access market, while TCDD Transport signed its licensing agreement with TCDD and began operations as an unbundled entity offering freight and passenger services. In 2018, one year after the introduction of the open-access market, two privately-owned non-incumbent rail freight undertakings were licensed for the first time. As of 2022 there were four active, licensed, non-incumbent private rail freight undertakings in Türkiye, with a ton-km market share for that year of 18%, up from a non-

[45] Law No. 6461, published in the Official Gazette on May 1, 2013.

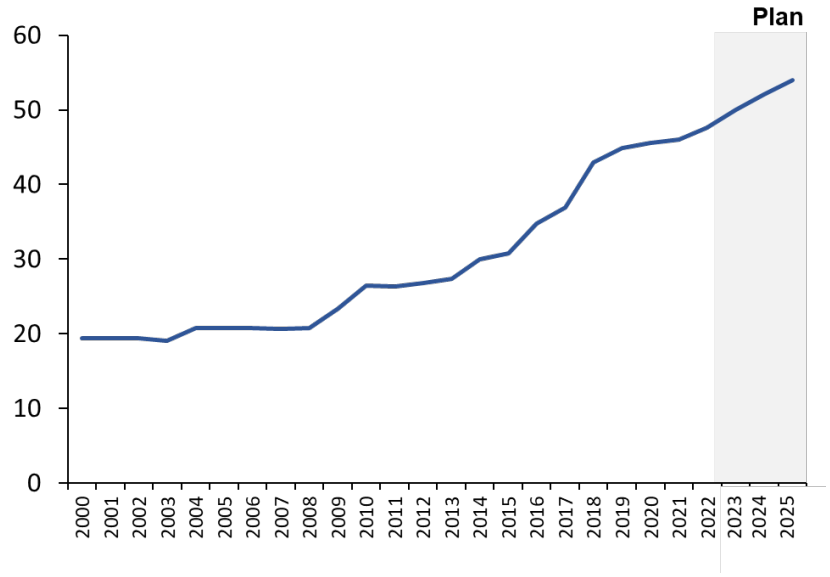
incumbent share of 16% in 2019 and 12% in 2018 (and from no private participation in rail freight service provision prior to 2018).

Operational Readiness for Electrified Operations: Next-Generation Electric Locomotives and Rolling Stock

6. ETMIC involves the conversion of 660km of a non-electrified, non-signalized railway line, passing through difficult terrain with occasional high gradients that will require powerful electric locomotives with high tractive power for sustainability of operations. As a part of the due diligence for the project, the GoT's plans for adequate and timely provision of new-generation high-power electric locomotives has been carefully reviewed.

7. The GoT started giving priority to rail electrification only after 2009. Figure A4.1 indicates that the length of electrified lines stayed around 20% of the network for most of the 2000s, with a clear upward trend from 2009 onwards, reaching 47% in 2022, with a target to reach 54% by 2025. ETMIC alone is expected to increase the electrification ratio of Türkiye's national railway network by 5 percentage points.

Figure A4.1. Percentage of Türkiye's Railway Network that is Electrified, 2000-2025



Source: TCDD.

8. In line with the GoT's commitments under the Paris Agreement and the European Green Deal targets, TCDD adopted in 2023 its first Energy Management and Climate Change Action Plan (2023-25). In addition to reaching a 54% network electrification rate by 2025, the plan calls for meeting 35% of TCDD's energy consumption from renewable resources, and reduce its total carbon footprint by 10% compared to 2023 levels, by the same timeframe.

9. The challenge is that, of the 879 locomotives and train sets presently under operation in Türkiye, more than half are diesel-powered and above 30 years of age. This illustrates the large-scale need for rolling stock replenishment and conversion to electric power necessary to meet the demand for new-generation electric locomotives and train sets that will be required to meet that GoT's electrification and climate change targets. It was in this context, with these goals already in mind, that the GoT sought to increase rolling stock manufacturing efficiency by creating TÜRASAŞ from the merger of TCDD's affiliated companies in rolling stock manufacturing.

10. By 2024 TÜRASAŞ had become one of the largest rail system vehicle manufacturers in the Middle East. It produces new-generation locomotives, diesel and electric train sets, passenger and freight cars, traction converters, traction motors, diesel engines, and train control management systems domestically in compliance with international standards. At TÜRASAŞ's Eskişehir regional facilities—the main hub of Turkish rail industry, consisting of seven integrated factories for manufacturing of locomotives, bogies, electrical machines, and rail engines—912 locomotives and 11,974 rail cars of various types have been completed to date.

11. In 2023, TÜRASAŞ launched production of 95 units of its first self-designed, new-generation 'Eskişehir 5000 (E5000)' electric mainline locomotives for TCDD Transport, planned to be fully delivered by 2027. This 5 MW locomotive with a maximum speed of 140 km/h, will be used in both passenger and freight trains, and has received the EU Technical Specification for Interoperability in Railways (TSI) certification. The units' traction system, transformer, auxiliary power unit, and converter units are mostly designed and produced domestically (about 85%). In addition, two prototype sets of Türkiye's first domestic electric train set project, called "New Sakarya", with a max speed of 160 km/h, were completed and put into service in May 2024. TÜRASAŞ plans initiation of mass production of these train sets and increase their number to 56 by 2030.

12. TÜRASAŞ's experience in the next-generation electric equipment market was initially solidified during 2013-2015, a period in which it delivered 72 units of the E68000, an electric mainline locomotive with 6800 HP/5 MW power, AC-AC drive system, and regenerative braking capability, suitable for use in freight and passenger train transportation. Production of the E1000 electric shunting locomotive was also started in 2019.

13. Most recently, in collaboration with the Scientific and Technological Research Council of Türkiye/Rail Transportation Technologies Institute (TÜBİTAK-RUTE), TÜRASAŞ has been working on what is referred to as the "National Electric High-Speed Train", capable of max speed of 225 km/h. Ten prototype sets are planned to be built by 2026-27. To support this new locomotives program, TÜRASAŞ has expanded the Sivas Bogie Production Factory. The expanded factory, with an enclosed area of 10,500 m^2, has an annual bogie production capacity of 4,600 units/9,200 wheel sets.

14. As of mid-2024, TCDD Transport's rolling stock order book with TÜRASAŞ has an estimated total value of EUR2.2 billion, and includes 19 electric train sets (160 km/h), 10 high-speed train sets (225 km/h), 95 electric mainline locomotives (E5000), 43 new generation sleeper cars, 6 specially designed VIP passenger cars, and 3,600 assorted freight cars. Concerted efforts and a well-designed program is in place for development and manufacturing of new-generation electric locomotives to sustainably meet the demand for additional electric traction power that will be necessary with the railway electrification program, including the Divrigi-Kars-Georgia Border corridor.

Railway Sector Financial Sustainability and Possible Avenues of Future Reform

15. Like other railway infrastructure managers across Europe, TCDD receives public subsidies to support its infrastructure management operations. This funding arrangement has legal backing, in the form of a long-term contractual agreement between the Ministry of Treasury and Finance (MoTF) and TCDD, currently in effect through 2033 and with a history of extensions. In addition, most capital investments in network capacity expansion and modernization are financed by the state.

16. The sectoral reform process, which remains ongoing and to date has placed most emphasis on market structure (e.g., institutional unbundling and open access), could introduce future innovations with regard to the way railway infrastructure is financed, funded, and maintained in Türkiye. At present, the long-term funding contract between

TCDD and MoTF, and the GoT's access to concessional, blended, and commercial finance, including through international financial institutions and other bilateral and multilateral development partners, like the European Union, the World Bank, AIIB, IsDB, EBRD, and others, provide sectoral certainty that AYGM will carry out its strategic investment plans on behalf of the GoT, and that TCDD will be able to manage (e.g., maximize capacity utilization) and maintain the network, including network expansions/enhancements implemented by AYGM (such as under ETMIC).

17. The importance of strengthening the railway sector's financial sustainability has increased in recent years in the context of Türkiye's ambitious rail freight infrastructure and service delivery expansion plans. These include, among other priorities, (i) completion of the Middle Corridor within Türkiye, to chiefly include provision of an additional, higher-capacity, overland railway connection across the Bosphorus Strait via Istanbul's Yavuz Sultan Selim Bridge (Third Bosphorus Bridge); (ii) support, through coordination and collaboration, of a more capable, more integrated, and more competitive Middle Corridor across its entire alignment, from the China-Kazakhstan border to the Türkiye-Bulgaria border; (iii) potential investments in new or expanded railway lines within Türkiye as part of the proposed Iraq Development Road, an intercontinental corridor linking Asia, the Middle East, and Europe via Iraq and Türkiye, with the Iraqi port of Al Faw, south of Basra, as main gateway; (iv) potential investments in new lines to connect Türkiye with the South Caucasus; and (v) reconstruction or upgrade of strategic domestic lines, including the Malatya-Narli line, heavily damaged by the 2023 Türkiye-Syria earthquakes, and significant expansion of last-mile rail connections to/from freight nodes like logistics centers, large manufacturing facilities, organized industrial zones, and maritime ports.

The Evolution of TCDD's Maintenance Function

18. One of the ways in which innovation could strengthen the financial sustainability of Türkiye's railway sector is through the adoption of digital technologies for more cost-effective maintenance, particularly preventive maintenance. To this end, TCDD has introduced, on a proof-of-concept basis, a remote sensing network monitoring and early warning system, initially deployed in the Ankara-Konya section of the national railway network. This technology can issue status alerts on several network conditions, such as rail track temperatures, water levels at culverts, and the presence of physical obstructions on tracks, in real time. This information can be used to mitigate sources of network risk through proactive, preventive maintenance before expensive, reactive maintenance is necessary. It can also inform the formulation of train paths to make train operations safer. Having proven the value of this technology, TCDD intends to expand its roll-out nationally, as a complementary tool to its existing asset management systems.

Broader Middle Corridor Coordination

19. The proposed investment to rehabilitate and modernize the Divriği-Kars-Georgia border railway line is expected to attract greater freight volumes to Türkiye's railway network, primarily through its impact on Middle Corridor connectivity. However, the corridor's intercontinental span means that cross-border coordination will be needed to fully realize the economic potential of this (and future) similar investments. One immediate example of this is the opportunity for the BTK line hosts/owners (Türkiye, Georgia, and Azerbaijan) to collaborate towards ensuring that ETMIC's target line is operationally compatible with the BTK line, particularly as regards train operations to/from and across the Türkiye-Georgia border. Such collaborative efforts are already underway. For example, in August 2024 Azerbaijan and Georgia announced the creation of a joint venture responsible for operations and management of the BTK line within their territories. Similarly, by confirming the GoT's commitment to investing in the MC, including in the BTK line itself, ETMIC is expected to facilitate collaboration between Türkiye and Georgia as a priority, for example to improve train services across their border. Recent capacity expansion investments in the BTK line within Georgia, conducted in 2023-24 (see Annex 5) are compatible with ETMIC's proposed investment and show that the broader MC within the South Caucasus has the capacity to handle the larger volumes that the project is expected to unlock.

ANNEX 5: Economic Analysis

1. A standard economic evaluation was conducted to assess the viability of the proposed railway infrastructure investments under the Eastern Türkiye Middle Corridor Railway Development Project (ETMIC). The project will rehabilitate and modernize the 660km main line between Divriği (Sivas province) and the Türkiye-Georgia border at the eastern end of Türkiye's national railway network. The project's rehabilitation and modernization improvements comprise: (i) infrastructure and superstructure upgrading, including embankments, culverts, bridges, drainage systems, overpasses, lines of track (including installation of dual-gauge track for the Kars-Georgia border section), tunnel clearance and rehabilitation works, building construction works, and development of controlled level crossings; (ii) provision of EU-compliant signaling, telecommunication, and electrification along the entire line; (iii) capacity expansion and modernization of 30 train stations along the line—including the Kars Logistics Center; and (iv) deployment of digital technologies to enhance operational resilience and improve safety, including Centralized Traffic Control (CTC) and a distributed acoustic detection system (DAS).

2. A discounted resource flow analysis of the expected economic benefits and costs of these investments, over the period 2024-2060, was used to estimate the economic returns to ETMIC's investments relative to a "business-as-usual," without-project baseline.

3. **Strategic Rationale for Investment.** As a large, open, upper middle-income economy at the crossroads between Asia and Europe, Türkiye seeks to strengthen its trade connectivity and competitiveness to increase productivity, generate high-quality job opportunities, and spur economic growth. In particular, Türkiye seeks to strengthen its *intercontinental* trade connectivity, by better linking itself to the Middle Corridor, thus facilitating trade across the Caspian Sea with the 5 nations of Central Asia, China, and the broader East Asia. It also seeks to strengthen its *domestic regional* connectivity, by better linking provinces in the eastern half of the country with the main centers of economic activity in the western half of the country, thus contributing to regional economic convergence. Furthermore, due to its increasing exposure to the impacts of climate change, Türkiye seeks to strengthen the climate resilience of its national transportation infrastructure, particularly in the case of national-level assets that suffer from maintenance backlogs and incompatibility with modern national and international standards. And as a signatory to the Paris Agreement, Türkiye seeks to attain its Nationally Determined Contribution targets in the medium term and achieve a net-zero economy by 2053. In its present condition, the Divriği-Kars-Georgia border railway line is a bottleneck relative to these objectives, and its rehabilitation and modernization would make significant contributions to meeting them.

4. Specifically, modernization of the Divriği-Kars-Georgia border railway line is expected to:

- Increase rail freight carrying capacity and reduce freight travel times along the Türkiye branch of the Middle Corridor, linking Central and East Asia with Türkiye, the rest of Europe, and, via Turkish and other European ports, with the rest of the world. This will make the Türkiye branch of the MC more attractive, leading to savings in logistics costs for MC shippers, and to lower emissions of greenhouse gases from the transportation of this freight, both in absolute terms and per ton-km transported;

- Increase rail freight carrying capacity for domestic shipments (a) between the host provinces of Erzincan, Erzurum, and Kars and points west across the country, and (b) among all four host provinces themselves (including Sivas). This will make rail freight viable—and a more competitive alternative relative to trucking—on these domestic trade lanes. This in turn would elicit truck-to-rail modal shift, reduce shipper transport costs and greenhouse gas emissions per ton-km transported, improve highway safety outcomes by taking heavy-duty vehicles off highways, and contribute to a more balanced national freight modal distribution for Türkiye;

- Modernize and electrify an obsolete national transportation asset that lacks modern signaling. The project-financed investments will make the target line (a) compatible with the signalization system of the rest of Türkiye's mainline railway network (and with the EU's TEN-T corridor standards); (b) safer and less prone to downtime due to, in addition to modern signalization and telecommunication, the deployment of a sensor-based early warning system that can help avoid accidents and facilitate preventive maintenance, leading to savings compared to reactive maintenance; and (c) less carbon intensive, by eliminating tank-to-wheel GHG emissions from trains operating on the line, which are currently based on diesel-powered equipment, through electrification; and

- Contribute to the deepening of Türkiye's multimodal logistics industry, by more strongly positioning Türkiye as an MC transit hub.

5. The World Bank's 2023 report on the Middle Corridor[46] found that "due to inefficiencies and infrastructure gaps in Türkiye, the [MC's] Black Sea route is currently preferred by operators," and that "the transportation time via Türkiye is significantly lower [than the Black Sea route] but due to the lack of capacity this route is not that attractive to shippers." This suggests—and is supported by evidence on the current and potential travel time profile of available MC branches—that removal of these infrastructure gaps would lead to changes in operator preferences, and thus to a rebalancing of freight along the corridors' two available branches for long-distance shipments: via the Black Sea, and via Türkiye. The report further found that the Divriği-Kars-Georgia border line is the single most capacity-constrained railway section across the entire MC, from the China-Kazakhstan border to the Türkiye-Bulgaria border. This makes the proposed investment well-targeted and more likely to be a source of economic benefits at a scale sufficient to more than offset its economic costs.

6. Beyond the quantification of directly-attributable economic benefits such as those listed above (e.g., reductions in transport and logistics costs, reductions of greenhouse gas emissions, and improved road safety outcomes), the proposed investments are expected to generate **wider economic benefits** which, though not explicitly quantified here, are part of ETMIC's investment rationale. These include (i) **increases in firm-level productivity**—a driver of sustained economic growth—associated with (a) the use of fewer inputs (such as units of inventory or transportation expenditures) for every unit of output sold, and (b) firms finding it more accessible to embed themselves in global value chains (GVCs) or serve more export markets; (ii) **employment generation** in the transport and logistics industry, as well as by beneficial cargo owners (BCOs) with greater revenues from improved access to markets in Central and East Asia, including China; and (iii) improvements in **spatial economic convergence** between the line's four host provinces and the rest of the country, by spurring local economic activity and by positioning these provinces as part of Türkiye's transition to becoming a Middle Corridor transit hub.

Demand-Supply Assessment and Definition of Market Segments

7. On the **demand side**, from the perspective of Türkiye, the Divriği-Kars-Georgia border railway line serves **two primary freight demand markets**: (i) Middle Corridor freight, and (ii) domestic freight to/from (and between) the provinces that host the corridor and points west within Türkiye.

8. The **Middle Corridor market**, in turn, comprises two segments: (i) freight flows between countries other than Türkiye, which this analysis will refer to as "third country MC freight flows", defined as flows between (Central/East) Asia and points in Europe (or elsewhere) *west of Türkiye*; and (ii) freight flows between Türkiye and (Central/East) Asia, which this analysis will refer to as Türkiye's *own* MC flows—as distinct from 'third country' flows.

[46] World Bank (2023), *Middle Trade and Transport Corridor: Policies and Investments to Triple Freight Volumes and Halve Travel Time by 2030*, Washington DC.

9. The Middle Corridor is a **multi-branch corridor**. This means that both third country flows and Türkiye's own MC flows have discretionary routing options from origin to destination, and the ETMIC-proposed interventions will alter the relative logistics competitiveness of these options. Taking east-to-west (headhaul) Asia to Europe shipments as an example, third country flows are presented with 2 main routing options once cargo reaches Tbilisi by rail after crossing the Caspian Sea: either (a) reach Europe by crossing the Black Sea from Georgia's maritime ports, which entails, in addition to short sea shipping, two additional rail-to-vessel/vessel-to-rail transshipment moves (after having done similar operations to cross the Caspian Sea from Kazakhstan's railway network); or (b) reach Europe via Türkiye's railway network, by staying on the Baku-Tbilisi-Kars (BTK) railway line, and continuing on along the rest of the Divriği-Kars-Georgia border railway line towards the Türkiye-Bulgaria border (thus avoiding short sea shipping and additional rail-to-vessel transshipments). Due to the target line's capacity and service delivery limitations, it is estimated that in 2021-2022 only about 10-11% of the third country flow segment relied on the Türkiye branch of the MC. The ETMIC-supported investments are expected to make the target line and, by extension, the Türkiye branch of the MC, more competitive and less carbon intensive, thus presenting the third country segment with a more attractive and environmentally sustainable routing option, leading to gains in segment share over time for the Türkiye branch.

10. Capacity constraints along the target line mean that Türkiye's own MC freight shippers have routing options to/from markets in Central/East Asia across the Caspian Sea. In the case of outbound/eastbound shipments (with analogous options for inbound/westbound trips), either (a) reach Baku port by rail via the target line (if capacity limitations permit and service levels are acceptable) and onward along the BTK line, or (b) reach Baku port by bypassing the Turkish railway network and connecting to Georgia's railway network (and onward to Azerbaijan's network) via Black Sea shipping—a more circuitous, more time-consuming, costlier, and more carbon intensive option compared to a more direct, all-electric, rail-only option.[47] Due to capacity constraints along the Divriği-Kars-Georgia border railway line, it is estimated that in 2021-2022 the line served only about 30% of Türkiye's own MC freight flows segment. By expanding the capacity of this line, the ETMIC-financed investments are expected to allow the target line (and, by extension, the BTK line to which it connects) to account for the full extent of Türkiye's own MC flows, thus diverting cargo from the current (inefficient) bypass connection(s) to the most efficient MC connection available to Turkish BCOs.

11. Regarding the **domestic market**, Türkiye's national logistics system is dominated by truck-based operations, with a 2022 trucking modal share of 78%, compared to 4% for rail freight. Domestic rail freight participation is even rarer in contexts of railway infrastructure obsolescence and capacity constraints, such as along the Divriği-Kars-Georgia border railway line. As a result, substantially all freight flows to/from (and between) the target line's host provinces and domestic points west are estimated to be transported by truck at present, despite a significant portion of these flows being bulk commodity shipments that are in principle compatible with the use of rail freight over long distances (such as those between western and eastern Türkiye). By removing capacity constraints and enabling the provision of more competitive domestic rail freight services, the ETMIC-proposed investments are expected to elicit truck-to-rail modal shift in these domestic trucking lanes, particularly, but not only, for bulk commodity flows.

12. For **all freight flows**, whether MC-linked or domestic, this analysis in turn makes the critical distinction between (a) shipments of *bulk commodities*, such as grains or construction materials, which are typically characterized by low value-to-weight ratios, relatively low sensitivity to travel times, and relatively high sensitivity to transport costs; and (b) *containerized commodities*, such as industrial and consumer goods, which are characterized by higher levels of value content and therefore higher sensitivity to travel times, and lower sensitivity to transport costs, compared to bulk shipments.

[47] Another available option is to reach Baku port by truck from Türkiye, which would be significantly costlier and more emissions intensive than the Black Sea option, and likely only viable for higher-value containerized freight in a corridor that is intense in bulk freight transport.

13. On the **supply side**, the Divriği-Kars-Georgia border railway line is a capacity-constrained, obsolete railway asset. Specifically, while it has a *theoretical design capacity* of 5 million tons per year, the lack of modern signalization on the line, its significant maintenance backlog, and the outdated, unfit-for-purpose nature of many of its structures, including bridges and tunnels with insufficient clearance and infrastructure with inadequate drainage systems, mean that the line's *effective capacity* is only a fraction of its theoretical capacity, estimated to be in the 10-15% range, or up to 750,000 tons per year. Meanwhile, the BTK railway line, to which the target line connects, had as of 2022 a capacity of 1 million tons per year, though this is being expanded in 2024 to 5 million tons per year through targeted civil works (implemented mainly in select sections within Georgia). Over the long-term, the expected maximum capacity of the BTK line at full buildout is 17 million tons per year. Meanwhile, the proposed ETMIC investments will increase the maximum capacity of the Divriği-Kars-Georgia border railway line to 20 million tons per year, with the rehabilitated line expected to become operational in 2030.

14. Tables A5.1, A5.2, and A5.3 summarize and break down the demand flows for the **MC market segment** during 2021-2023. At present most tonnage transported along the Divriği-Kars-Georgia border railway line is MC cargo originated in or destined for Türkiye, with only a relatively small portion of the demand originated by third-country MC traffic (Table A5.1). Due to capacity constraints, Türkiye's own MC cargo demand served by the Divriği-Kars-Georgia border railway line is only a portion of the country's total own MC inbound and outbound flows, with the balance relying on more circuitous bypass routes (Table A5.2).

Table A5.1. Divriği-Kars-Georgia Border Railway Line: Demand and Capacity Trends, 2021-2023

Thousands of metric tons

	2021	2022	2023\1
Total tons	**480**	**427**	**127**
Bulk	295	259	92
Containerized	185	168	35
Of which:			
Türkiye's own MC tons	**407**	**360**	**109**
Bulk	247	216	81
Containerized	159	144	28
Third-country MC tons	**73**	**67**	**18**
Bulk	48	43	11
Containerized	25	24	7
Estimated effective capacity	750	750	750

MC = Middle Corridor.
1\ Impacted by Baku-Tbilisi-Kars (BTK) line closures due to capacity expansion works in Georgia.
Source: TCDD Taşımacılık A.Ş.; World Bank analysis and estimates.

Table A5.2. Türkiye: Own Middle Corridor Tonnage, 2021-2023

Thousands of metric tons

	2021	2022	2023
Total	**1,324**	**1,350**	**1,377**
Bulk	883	901	918
Containerized	441	450	459
Of which:			
Via target railway line\1	407	360	109
Via alternative routes	917	990	1,268

1\ 2023 impacted by Baku-Tbilisi-Kars (BTK) line closures due to capacity expansion works in Georgia.
Source: World Bank analysis and estimates.

15. Table A5.3 provides a broader view of the mutually-exclusive segments of the Middle Corridor market for the period 2021-2023. The broader third country MC market includes flows that are "serviceable" by Türkiye's transportation network, such as flows between Central Asia and Europe as defined as above, as well as flows that are not generally serviceable by Türkiye's transportation network, such as flows across the Caspian Sea between Central Asia and the South Caucasus. As most crude oil and oil product shipments across the Caspian Sea are transported via pipeline after reaching the Caspian shore, this source of demand is excluded from the analysis, as the focus is on MC freight flows that can use rail and sea-rail freight itineraries (i.e., non-oil freight flows).

Table A5.3. Non-oil Middle Corridor Tonnage, 2021-2023

Thousands of metric tons

	2021	2022	2023
Non-oil freight flows across the Caspian Sea	2,582	2,655	2,731
Of which:			
Third country MC flows serviceable by Türkiye	**649**	**679**	**711**
Third country MC flows not serviceable by Türkiye	609	626	643
Türkiye's own MC flows	1,324	1,350	1,377

MC = Middle Corridor.
Source: World Bank analysis and estimates.

16. Table A5.4 summarizes and breaks down Türkiye's **domestic trucking market** in 2022. Specifically, it disaggregates, out of the full national trucking market (914 million tons), the trucking lanes (10.3 million tons in 2022) that would compete with rail freight alternatives in the "with-project" scenario of improved mainline rail connectivity to/from the provinces of Sivas, Erzincan, Erzurum, and Kars and domestic points west, facilitated by a more capable Divriği-Kars-Georgia border railway line.

Table A5.4. Türkiye: 2022 Truck Tonnage by Market Segment

Millions of metric tons

National trucking volumes	**914**
Intra-provincial flows	292
Inter-provincial flows	621
Of which: ETMIC-relevant truck market segments	
To/from Erzincan Province and domestic points west	2.5
To/from Erzurum Province and domestic points west	5.6
To/from Kars Province and domestic points west	2.2
Inter-provincial to Sivas, Erzincan, Erzurum, and Kars provinces	0.1
Total ETMIC-relevant truck market segments	**10.3**

Source: Turkish Statistical Institute; World Bank analysis and estimates.

Supply-Demand Projections by Scenario

17. Long-term supply-demand projections were made for the "with-project" and "without project" scenarios.

18. **Demand projections** were based on three factors: (i) historical and expected rates of economic and trade growth in Türkiye, the main MC host countries, and their trading partners, informed by forecasts made by World Bank (2023)[48]; (ii) historical demand growth rates in relevant segments of Türkiye's transportation system, including rail and truck tonnage as reported by the Turkish Statistical Institute; and (iii) infrastructure capacity constraints and associated service levels in terms of travel times (see below), and assumptions about the likely sources of MC demand and the operational requirements of those trade flows, for example by differentiating between bulk and containerized commodity trade. The main demand projections for the target line are summarized in Table A5.5.

Table A5.5. Demand Projections for the Divriği-Kars-Georgia Border Railway Line by Market Segment and by Scenario, 2024-2060

Thousands of metric tons and number of trains per day

	Target line operational ->							
	2024	**2030**	**2035**	**2040**	**2045**	**2050**	**2055**	**2060**
Without project	**388**	**505**	**541**	**702**	**691**	**708**	**669**	**623**
Middle Corridor market	**388**	**505**	**541**	**702**	**691**	**708**	**669**	**623**
Third countries via Türkiye	84	161	184	309	253	208	152	116
Türkiye's own MC flows	304	344	357	393	438	501	517	507
Domestic market	-	-	-	-	-	-	-	-
Total trains per day	1	2	2	2	2	2	2	2
With project	**388**	**2,047**	**2,888**	**5,041**	**6,574**	**8,686**	**10,233**	**11,426**
Middle Corridor market	**388**	**1,789**	**2,514**	**4,497**	**5,706**	**7,297**	**8,524**	**9,459**
Third countries via Türkiye	84	206	597	2,081	2,687	3,479	4,116	4,639
Türkiye's own MC flows	304	1,584	1,917	2,416	3,019	3,818	4,407	4,820
Domestic market	**-**	**258**	**374**	**544**	**868**	**1,389**	**1,709**	**1,967**
Total trains per day	1	4	6	11	14	18	20	23

Source: World Bank analysis and estimates.

19. For the domestic market, Table A5.6 summarizes the projections made for trucking volumes in the without project scenario and truck-to-rail modal shift volumes in the with-project scenario.

20. **Supply projections** were based on (a) ETMIC's scope of investments and their intended impact on the capacity and service delivery profile of the Divriği-Kars-Georgia border railway line, and (b) supply projections elsewhere in the Turkish and broader MC transport networks, based on investment plans either already announced or under consideration by host countries. ETMIC's investments are expected to increase the effective capacity of the target line from less than 1 million tons per year to 20 million tons per year at full buildout, and to become operational in 2030. Key additional supply-side projections and assumptions include the following:

- Georgia will expand maritime port capacity in the short to medium term (through the mid-2030s);

[48] World Bank (2023), *Middle Trade and Transport Corridor: Policies and Investments to Triple Freight Volumes and Halve Travel Time by 2030*, Washington DC.

- Caspian ports will expand their capacity and implement climate change adaptation interventions to ensure business continuity in the face of increased climate impacts, such as falling water levels in the Caspian sea;
- Targeted capacity expansions will be implemented in the railway networks of Kazakhstan, Azerbaijan, Georgia (including its portion of the BTK line), Bulgaria, Romania, and Serbia to accommodate larger tonnage levels in accordance with existing investment plans;
- Notably, for reasons of analytical conservatism, the supply-side projections do not assume that an above-ground, high-capacity railway crossing across the Bosphorus Strait will be built along Istanbul's Third Bridge, and therefore dwell times in Istanbul at assumed for cargo that surpasses the carrying capacity of the only Bosphorus railway crossing available at present, the Marmaray tunnel. However, given its direct operational link with ETMIC's target line, supply-side considerations assume that Georgia will deploy by 2028 a dual-gauge track along the Akhalkalaki-Türkiye border section (~30km in length) of the BTK line, with the estimated economic cost of this investment (~US$46m) included in the cost of the target line for analytical completeness and fairness in the accounting and matching of economic benefits and costs; this investment is expected to increase the efficiency and technical compatibility of the combined BTK and Divriği-Kars-Georgia border lines, by giving railway undertakings and cargo operators the option of conducting gauge-change operations at either Akhalkalaki or Kars, thus expanding the logistics cost reduction potential of the Kars Logistics Center.

Table A5.6. Trucking Volumes and Modal Shift Projections by Lane and by Scenario, 2022-2060
Thousands of metric tons

	Target line operational ->							
	2022	**2030**	**2035**	**2040**	**2045**	**2050**	**2055**	**2060**
Truck tonnage without project	**10,300**	**13,654**	**16,106**	**19,000**	**21,772**	**24,948**	**26,993**	**28,595**
Bulk commodities								
To/from Erzincan Province and domestic points west	1,477	1,919	2,212	2,551	2,859	3,205	3,459	3,678
To/from Erzurum Province and domestic points west	2,948	3,825	4,414	5,093	5,743	6,477	6,981	7,386
To/from Kars Province and domestic points west	1,137	1,469	1,688	1,940	2,197	2,489	2,682	2,835
Inter-provincial to Sivas, Erzincan, Erzurum, and Kars	62	78	90	104	117	131	143	155
Containerized commodities								
To/from Erzincan Province and domestic points west	985	1,352	1,640	1,986	2,331	2,733	2,970	3,154
To/from Erzurum Province and domestic points west	2,626	3,573	4,332	5,247	6,114	7,121	7,727	8,180
To/from Kars Province and domestic points west	1,055	1,425	1,713	2,056	2,381	2,758	2,991	3,163
Inter-provincial to Sivas, Erzincan, Erzurum, and Kars	10	13	17	22	28	36	40	44
Truck-to-rail modal shift with project	**258**	**374**	**544**	**868**	**1,389**	**1,709**	**1,967**	
Bulk commodities								
To/from Erzincan Province and domestic points west	41	58	82	132	213	263	305	
To/from Erzurum Province and domestic points west	99	140	197	326	540	663	763	
To/from Kars Province and domestic points west	37	51	71	115	188	232	267	
Inter-provincial to Sivas, Erzincan, Erzurum, and Kars	0.9	1.2	1.6	2.3	3.2	3.8	4.3	
Containerized commodities								
To/from Erzincan Province and domestic points west	15	23	36	55	84	103	117	
To/from Erzurum Province and domestic points west	47	74	115	177	273	336	385	
To/from Kars Province and domestic points west	17	26	40	60	88	109	125	
Inter-provincial to Sivas, Erzincan, Erzurum, and Kars	0.05	0.1	0.1	0.2	0.3	0.3	0.4	

Source: World Bank analysis and estimates.

21. In addition to determining the volume of absolute tons that can be transported along the MC's linear and nodal infrastructure across host countries, the main implication of these supply-side assumptions is manifested in the travel times that they imply, which are in turn associated with desirable outcomes like increases in logistics efficiency. The travel time trajectories used in the analysis, segregated by route, are shown in Table A5.7. Current travel times are based on findings from World Bank (2023). These are then adjusted for the ETMIC operational period based on the above-discussed assumptions on supply-side interventions within and outside Türkiye.

Table A5.7. Freight Travel Times for Main Middle Corridor Routes, 2022-2060
Days

			Target line operational ->						
	2022	**2029**	**2030**	**2031**	**2032**	**2033**	**2040**	**2050**	**2060**
For third country Middle Corridor market									
Tbilisi-Budapest via Black Sea	19.4	16.4	15.4	14.4	13.4	12.4	12.4	12.4	12.4
Tbilisi-Budapest via Türkiye\1	13.8	13.8	8.4	8.4	8.4	8.4	8.4	8.4	8.4
For Türkiye's own Middle Corridor flows									
Tbilisi-Divriği via rail\1	4.5	4.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Tbilisi-Türkiye via Black Sea\2	16.6	13.6	12.6	11.6	10.6	9.6	9.6	9.6	9.6
Tbilisi-Türkiye via Turkish railway network\1			2.5	2.5	2.5	2.5	2.5	2.5	2.5

1\ Currently subject to capacity constraints at the target line and therefore only able to accommodate a limited amount of volume.
2\ Shipments that currently bypass the Turkish railway network due to capacity constraints at the target line.
Source: World Bank (2023)[49]; World Bank analysis and estimates.

Economic Benefit-Cost Analysis

22. An economic benefit-cost analysis was conducted through a spreadsheet-based model of Middle Corridor and domestic transport flows. The model takes into consideration (i) the unit-cost differential between truck, rail, and sea freight transport services, which are primarily determined by the freight conveyance capacity of these modes and reflect the average size of heavy-duty trucks, train lengths, wagon-load, and vessel carrying capacities in the various market segments covered, and how these are expected to evolve over time; (ii) the expected capacity, current and over time, of the linear rail infrastructure and nodal maritime port and logistics center capacity infrastructure under consideration; (iii) differences in the incidence and cost of accidents between road and rail itineraries per ton-km transported within Türkiye; and (iv) the mode-specific "well-to-wheel" CO_2 emission factors per ton-km transported for truck, rail, and vessel transport under the unique technical characteristics of each jurisdiction, such as national networks or trade lanes (e.g., electrified vs. non-electrified, incidence of renewable energy in the energy mix, etc.), based on Europe-specific market data.[50] Well-to-wheel emissions account for the emissions generated not only by the transportation activity itself, but also by the generation of the energy used in transportation (e.g., the electricity used by electrified rail). For all market segments, the model takes into consideration average lengths of haul, and the likely ways in which lengths of haul may change over time.

23. **Typology of Net Economic Benefits.** When comparing the with- and without-project scenarios, the model assesses four sources of net economic benefits associated with the ETMIC-financed investments: (i) changes in

[49] Ibid.
[50] CE Delft (2018*), Environmental Prices Handbook EU28 Version: Methods and Numbers for Valuation of Environmental Impacts*.

transport costs incurred by shippers when deciding how to route freight from origin to destination; (ii) changes in **in-transit inventory carrying costs** associated with routing decisions; (iii) changes in the **emissions of greenhouse gases** associated with routing and modal choice; and (iv) for the domestic market, the cost of **traffic accidents** associated with the freight transport safety profile differential between trucking and rail freight services within Türkiye. The project's interventions are expected to result in net economic savings in transport costs, in-transit inventory carrying costs, the cost of emissions of greenhouse gases, and in the cost of freight transport accidents. A residual value of 5% of the 2024 economic cost of the infrastructure investments was assumed to be recovered as a benefit at the end of the appraisal period. Table A5.8 summarizes key parameters used to model the economic benefits of project interventions.

Table A5.8. Key Transport Parameters Used to Model Economic Benefits

Transport costs (2024 US$ per ton-km transported, except where otherwise noted)	
Long-haul trucking (Türkiye)	0.067
Truck drayage (Türkiye) *(US$ per ton)*	7.5
Rail freight (Türkiye)	0.024
Rail freight (Georgia)	0.040
Rail freight (EU)	0.045
Black Sea vessel	0.032

Value of freight (2024 US$ per ton)	**2030**	**2035**	**2045**	**2055**	**2060**
Bulk	553	567	596	622	629
Containerized	6,552	6,832	7,975	8,663	8,846

Türkiye generalized unit cost of accidents (2024 US$ per ton-km transported)	
Trucking	0.002
Rail freight	0.0004

Well-to-wheel emission factors (grams of CO_2 per ton-km transported)	**2030**	**2035**	**2045**	**2055**	**2060**
Diesel heavy-duty trucks (Türkiye)	109	103	86	74	70
Diesel rail	43	42	40	37	37
Electric rail (Türkiye)	17	14	7	5	4
Electric rail (Georgia)	5	5	3	1	1
Electric rail (EU)	13	8	4	2	2
Black Sea vessel	20	19	14	12	11

Source: World Bank analysis, research, and estimates.

24. **GHG Emissions Accounting.** A GHG emissions accounting and valuation exercise was conducted as part of the economic analysis. Based on World Bank standard guidance on the shadow price of carbon,[51] the economic value of a ton of CO_2 is assumed to be US$124 in 2030 (the first year the project-financed facilities are expected to become

[51] World Bank (2024), "Guidance Note on the Shadow Price of Carbon in Economic Analysis".

operational), growing gradually in real terms to reach US$139 in 2035, US$155 in 2040, US$193 in 2050, and US$241 in 2060. It is estimated that in 2030 the project will result in the avoidance of 72,332 tons of CO_2, and that the annual volume of avoided emissions due to the project will grow to 245,835 tons by 2060 (Table A5.9). In aggregate, over the 31-year period of analysis, it is estimated that the project will result in the cumulative avoidance of 5.0 million tons of CO_2, with an estimated present economic value of US$236 million.

Table A5.9. ETMIC: CO_2 Emissions Accounting, 2030-2060[\1]

Tons of CO_2

	Net CO_2 emissions	Gross CO_2 emissions
2030	72,332	48,994
2031	75,845	52,218
2032	79,775	55,164
2033	82,643	59,569
2034	87,159	62,253
2035	92,152	64,726
2036	96,629	67,725
2037	101,696	71,605
2038	107,142	77,650
2039	113,038	86,940
2040	120,192	101,076
2041	127,488	100,320
2042	134,313	99,537
2043	141,447	98,756
2044	148,909	98,029
2045	156,727	97,314
2046	165,289	98,672
2047	174,405	100,062
2048	184,114	101,488
2049	194,458	102,954
2050	205,042	104,820
2051	211,584	105,631
2052	218,355	106,433
2053	225,358	107,230
2054	228,157	106,070
2055	230,541	105,394
2056	232,950	104,719
2057	235,383	104,044
2058	238,819	103,445
2059	242,303	102,851
2060	245,835	102,260
Cumulative	**4,970,078**	**2,797,949**

1\ Net CO_2 emissions are those expected to be avoided due to the project; gross CO_2 emissions are expected emissions in the with-project scenario.
Source: World Bank analysis and estimates.

25. **Typology of Economic Costs.** Implementation costs for the proposed investments include the cost of civil works and acquisition and installation of equipment, inclusive of construction supervision consulting services and PIU staffing and equipping costs. As earlier stated, for reasons of conservatism in the apportioning of economic costs to the project commensurate with the expected economic benefits, this analysis further assumes that the Akhalkalaki to Türkiye border section of the BTK line within Georgia will be upgraded to dual-gauge track. While this investment is beyond ETMIC's scope, purely for analytical reasons to better assess the true economic viability of building the proposed line by maximizing its operational potential, the cost of this additional BTK investment is included in the economic costs of the project. Financial costs were converted to economic costs by (a) removing VAT, and (b) conservatively assuming an 8% rate of savings during procurement; the economic cost analysis excludes the cost of land acquisition and resettlement compensation payments, which are considered net economic transfers. The resulting economic cost estimates are shown in Table A5.10. It was further assumed that (a) routine maintenance on all ETMIC-financed facilities is to be conducted yearly, with an economic cost equal to 0.5% of the economic cost of civil works and equipment; and (b) periodic maintenance is conducted every 5 years, with an economic cost equal to 1.5% of the economic cost of civil works and equipment.

Table A5.10. Project Costs
Millions of 2024 US$

	Financial costs including VAT	Financial costs excluding VAT	Economic costs
Civil works and equipment\1	1,374.7	1,145.6	1,053.9
Contingencies	206.2	171.8	-
Construction supervision\1	26.2	21.8	20.1
PIU staffing and equipping	6.5	5.5	5.5
Total ETMIC costs	**1,613.6**	**1,344.6**	**1,079.4**
Complementary BTK line investment\2			46.0
Routine maintenance (yearly)			4.8
Periodic maintenance (every 5 years)			15.3

VAT = Value added tax.
1\ Economic cost excludes VAT and includes an estimated 8% in procurement savings.
2\ Estimated economic cost to provide dual-gauge track for the Akhalkalaki-Türkiye border section of the BTK line.
Source: AYGM; World Bank analysis and estimates.

26. **Economic Returns and Sensitivity Analysis.** Comparing the economic benefits and costs of the with- and without-project scenarios yields an **Economic Internal Rate of Return (EIRR) of 11.7%** for the ETMIC investments (Table A5.11). This is above the World Bank-recommended economic cost of capital for Türkiye of 6.0%.[52] At this economic discount rate, the ETMIC interventions generate an **Economic Net Present Value (ENPV) of US$1.19 billion** over the appraisal period. On this basis, it is concluded that ETMIC's proposed investments are economically viable: they will create net economic value to the Turkish economy, and are therefore desirable as a matter of economic efficiency and public policy. Sensitivity analysis indicates that the economic viability of the investments is robust to a simultaneous increase in costs and decrease in benefits of up to 38.5% each. Sensitivity analysis further indicates that the project's

[52] World Bank (2016), "Discounting Costs and Benefits in Economic Analysis of World Bank Projects".

economic viability is robust to utilizing the Low estimate, rather than the High estimate, of the shadow price of carbon as provided in World Bank (2024),[53] yielding an EIRR of 11.3% and an ENPV of US$1.07 billion.

Table A5.11. Economic Evaluation of Project Investments
Millions of 2024 US$

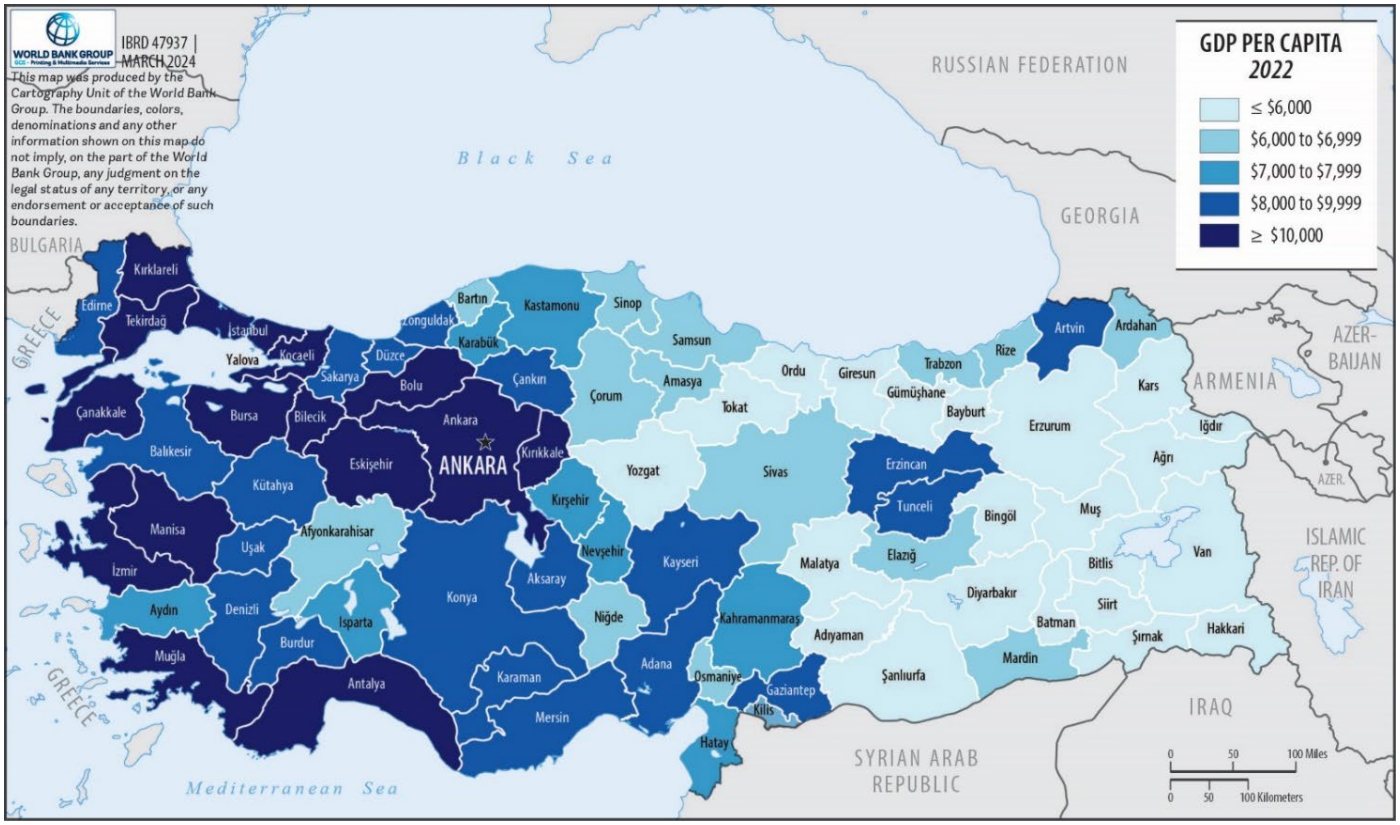
Present value of economic costs		Present value of economic benefits				Economic Evaluation	
Capital\1	O&M	Transport costs	In-transit inventory carrying costs	GHG emissions	Transport safety	ENPV	EIRR
(880.4)	(69.5)	770.5	1,127.8	235.7	7.0	**1,191.0**	**11.7%**

O&M = Operations and maintenance. GHG = Greenhouse gas. ENPV = Economic net present value.
EIRR = Economic internal rate of return.
1\ Including the offsetting residual value of the infrastructure at the end of the analysis period (2060).
Source: World Bank analysis and estimates.

[53] World Bank (2024), "Guidance Note on the Shadow Price of Carbon in Economic Analysis".

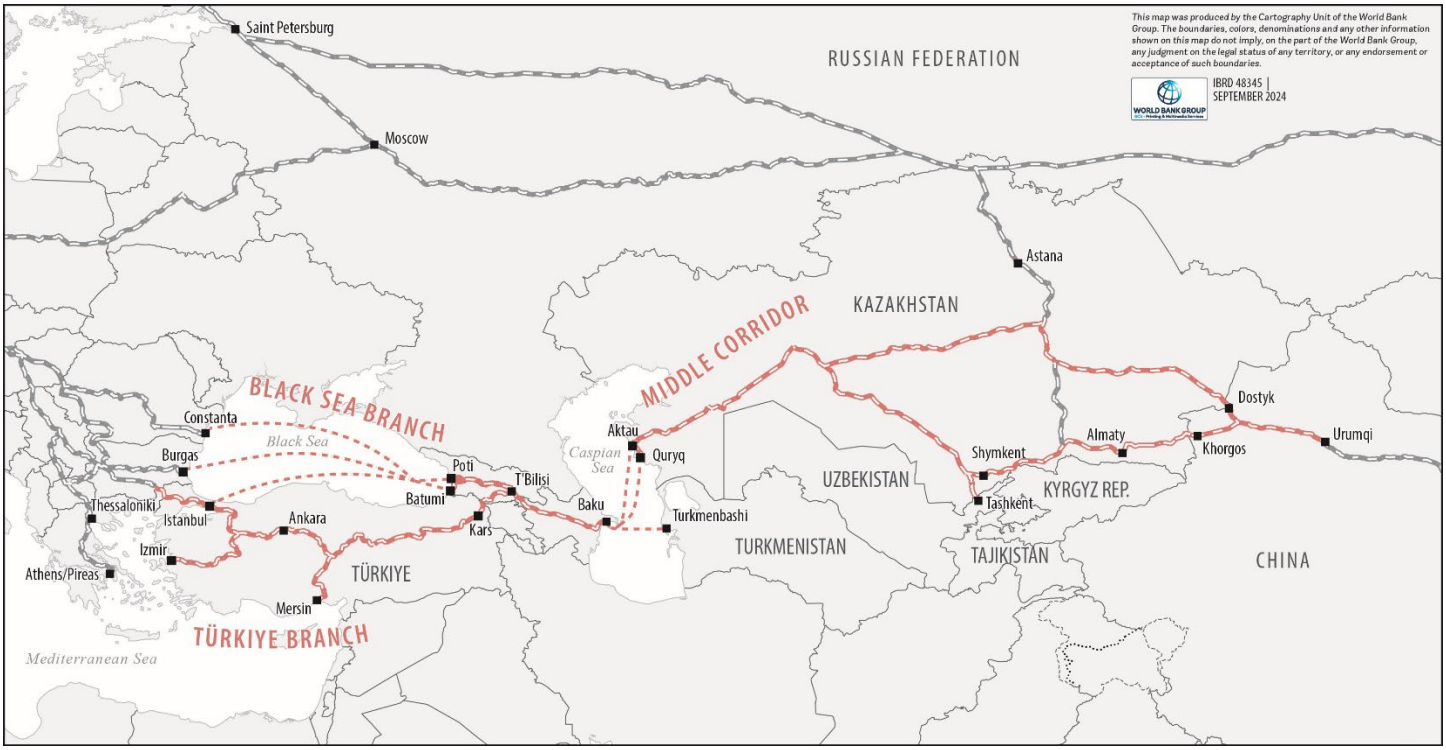
ANNEX 6: Maps

Map A6.1. Türkiye: GDP per Capita by Province, 2022 (current US$)[1]



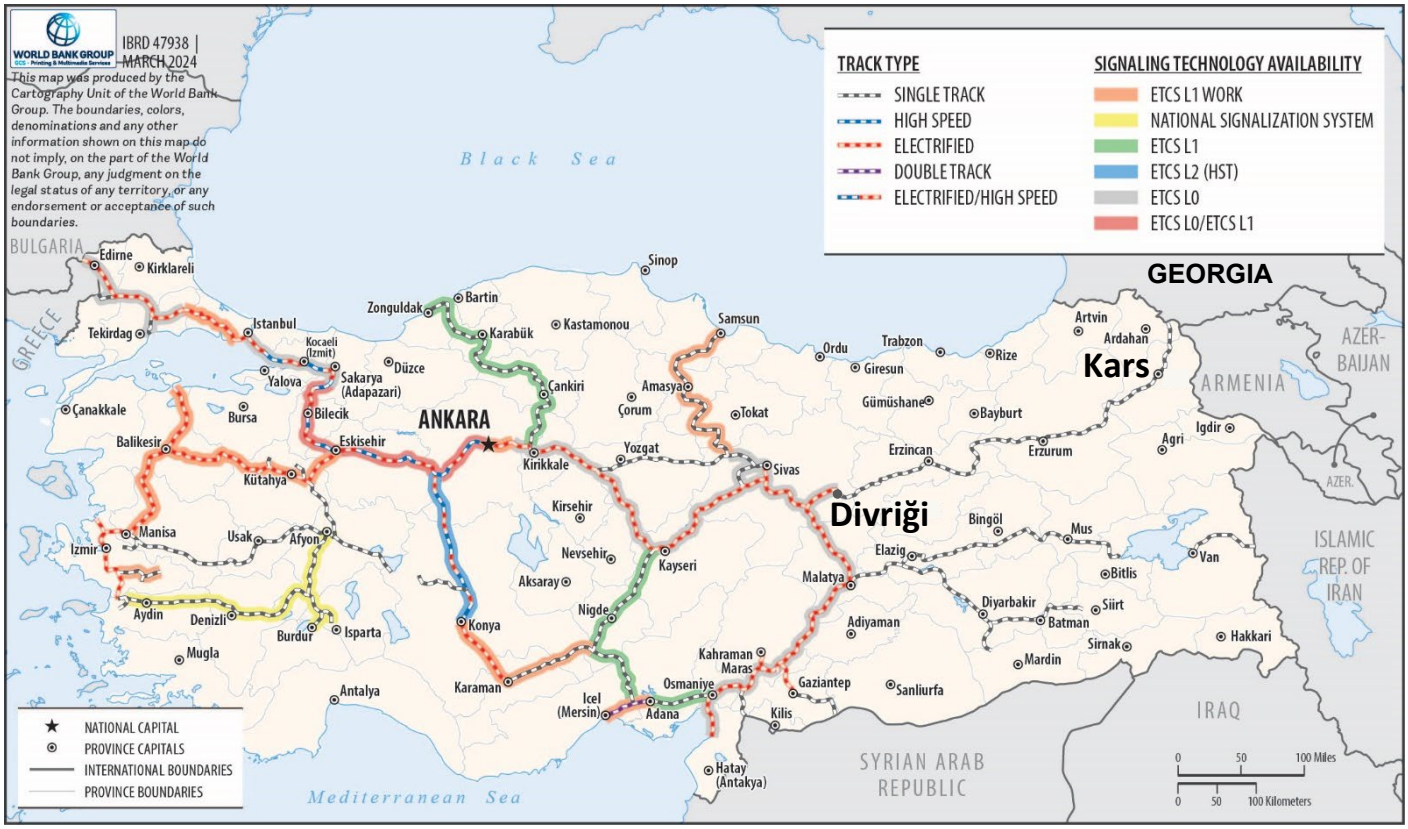
1\ The line connecting Nakhchivan with Azerbaijan is a standard cartographic way to depict territorial belonging of exclaves. The line does not portray, nor does it intend to portray, directionality, flow, or any other quantitative or qualitative information, other than to show graphically that Nakhchivan is an exclave of Azerbaijan and it cannot be interpreted otherwise than in the mentioned context.
Source: Turkish Statistical Institute.

Map A6.2. The Middle Corridor as an Alternative Connection Between East Asia, Central Asia, and Europe



Source: World Bank analysis and research.

Map A6.3. Türkiye's National Railway Network[1]

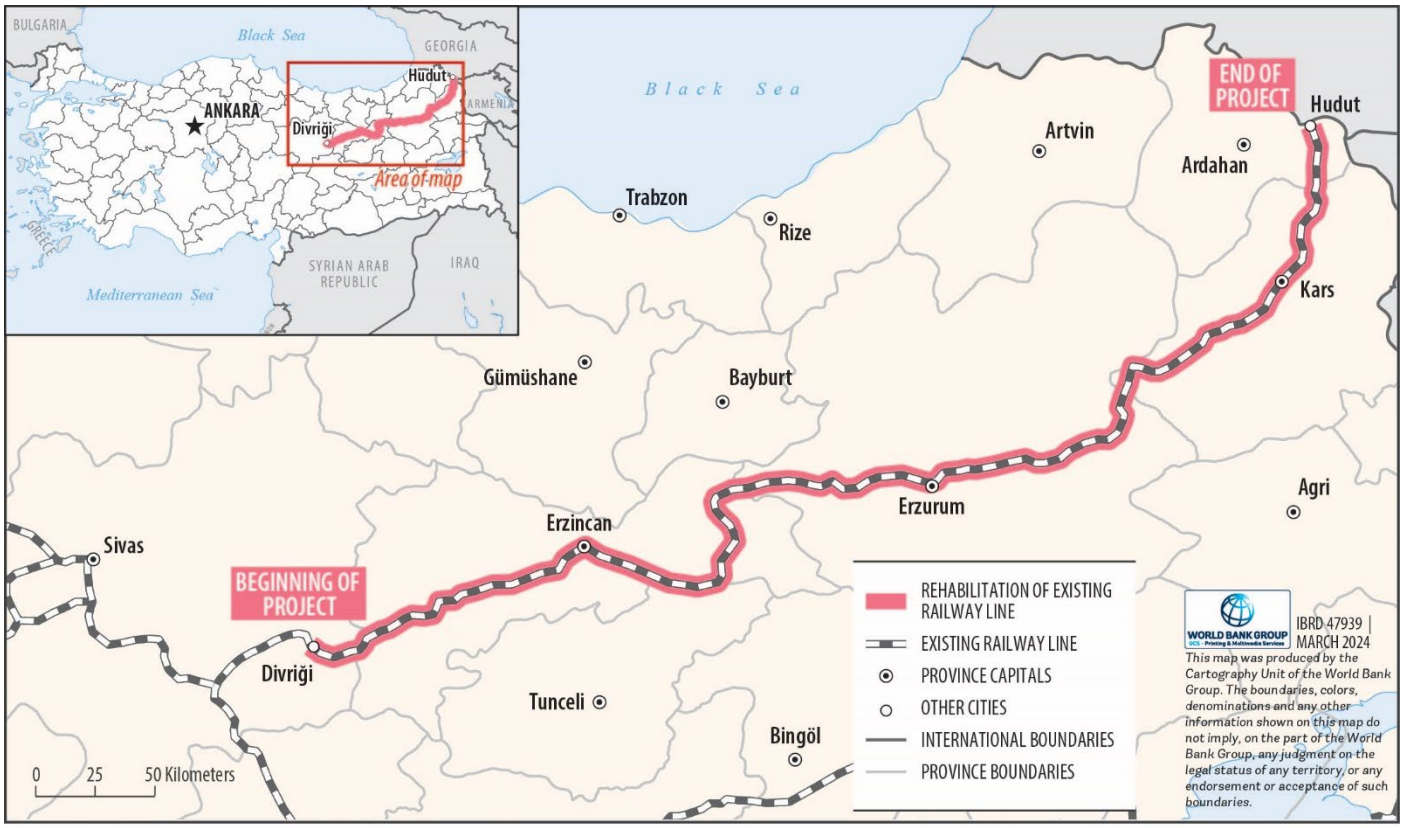


Note: Non-colored sections refer to non-signalized lines reliant on the manual, paper- and telephone-based "TMI" system.

1\ The line connecting Nakhchivan with Azerbaijan is a standard cartographic way to depict territorial belonging of exclaves. The line does not portray, nor does it intend to portray, directionality, flow, or any other quantitative or qualitative information, other than to show graphically that Nakhchivan is an exclave of Azerbaijan and it cannot be interpreted otherwise than in the mentioned context.

Source: Turkish Railway Journal and Review.

Map A6.4. ETMIC Project Area



Source: AYGM, World Bank analysis.