ECOPEACE MIDDLE EAST

Feasibility Study on an Electric Railway Network Linking Gulf Ports to Gaza Port through Jordan and the West Bank



December 2026

RFQ-ECOPAL-2025-035

Acknowledgments

This study was prepared by EcoPeace Middle East as part of its ongoing efforts to explore the potential implications of regional connectivity initiatives for Palestine, with particular focus on a proposed electric railway network linking Gulf ports to Gaza through Jordan and the West Bank.

The study was undertaken by a multidisciplinary research team from Jusoor, under the overall coordination of EcoPeace Middle East. The research team comprised:

- Dr. Khaled Zeidan – Team Leader and Rail and Transport Economist

- Ms. Manal Zeidan – Geopolitical Expert

- Ms Dalia Nakhla – Environmental and Social Impact Expert

- Mr. Ghazi Qussous – GIS and Mapping Expert

EcoPeace Middle East extends its sincere appreciation to the research team for their technical expertise, analysis, and valuable contributions to the development of this study. Appreciation is also extended to the institutional representatives, technical experts, and relevant stakeholders whose insights and feedback helped inform the assessment of infrastructure requirements, economic opportunities, geopolitical considerations, environmental and social implications, and Palestinian development priorities.

Special acknowledgment is extended to the following EcoPeace Middle East staff members for their strategic guidance, technical input, institutional coordination, and review throughout the preparation and finalization of this report:

- Ms. Nada Majdalani – Palestine Director

- Ms. Yana Abu Taleb – Jordan Director

- Ms. Peleg Gottdiener – Advocacy Officer

- Ms. Danni Reches – Advocacy and IMEC Officer

- Mr. Ahmad Jalal Hasan – Business Development and National Projects Manager, Jordan

- Mr. Mohammad Tariq Ghnaimat – Government Relations and Advocacy Manager, Jordan

- Mr. Ali Abdou – Government Relations and Advocacy Manager, Palestine

EcoPeace Middle East gratefully acknowledges the Nathan Cummings Foundation (NCF) for its generous financial support, which made this study possible.

Through this work, EcoPeace Middle East seeks to contribute to informed policy dialogue and advance understanding of how future regional connectivity initiatives could support Palestinian economic development, Gaza's reconstruction, and inclusive regional cooperation.

Disclaimer

This report presents a preliminary assessment of a proposed regional electric railway network. Its findings, routes, maps, and cost estimates are indicative and should not be interpreted as a detailed engineering feasibility study, an investment-ready proposal, or confirmation of an approved project.

Any future development would require further technical, financial, environmental, social, legal, and regulatory assessments, including consultation with relevant national authorities and affected communities, due consideration of land ownership and property rights, and the necessary institutional approvals.

The study does not constitute endorsement of any specific political arrangement or imply the consent or commitment of relevant authorities or stakeholders. Its findings are intended to inform further research and policy dialogue, with due consideration of Palestinian development priorities and community interests.

The contents of this report are the responsibility of EcoPeace Middle East and do not necessarily reflect the views of the Nathan Cummings Foundation (NCF).

Citation

Please reference this report as follows:

EcoPeace Middle East. (2026). *Feasibility Study on Electric Railway Network Linking Gulf Ports to Gaza Port through the West Bank and Jordan as a Logistics Hub*.

© All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, including photocopying, recording, or other mechanical or electronic methods, for commercial purposes without prior written permission from EcoPeace Middle East. The text may be used for educational and research purposes, provided that EcoPeace Middle East is fully acknowledged as the source.

For more information about EcoPeace Middle East or to access its publications, please visit www.ecopeaceme.org

Table of Contents

Executive Summary 7
1. Introduction 13
1.1 Background and Context 13
1.2 Purpose and Objectives of the Study 14
1.3 Scope and Route Structure 14
1.4 Methodology and Approach 14
1.5 Structure of the Report 15
2. Context and Baseline Analysis 16
2.1 Regional Overview 16
2.1.1 Pan Arab Rail Network 16
2.1.2 IMEC: Bridging the Gap 16
2.2 IMEC Rail: Country-Level Review 17
2.2.1 The United Arab Emirates 17
2.2.2 Saudi Arabia 19
2.2.3 Jordan 21
2.2.4 Israel 23
2.2.5 Palestine 25
2.3 Summary: Baseline Assessment and Gap Analysis 27
2.4 IMEC Interoperability 28
2.4.1 Regional legal and facilitation framework 31
2.4.2 Summary of Country-level interoperability assessment 31
2.5 Relevant Regional Network Components 33
2.5.1 Egypt-Gaza Connection 33
2.5.2 Syria and Lebanon 34
2.5.3 Iraq's Development Road 35
3 Technical Feasibility Analysis 36
3.1 Demand Analysis 36
3.1.1 Methodology in brief 36
3.1.2 Combined branch demand and Gaza-side terminal component 36
3.1.3 Trains per day and single-track sufficiency 37
3.1.4 Cargo mix and tonnage cross-check 38
3.1.5 Key findings 38
3.1.6 Key Assumptions and Limitations 38
3.2 Technical Specifications 39
3.2.1 Rail Track 39
3.2.2 Technical Interoperability Requirements 39
3.3 Route Alternatives 40
3.3.1 Option 1: King Hussein Bridge Route 41
3.3.2 Option 2: The Prince Mohammed (Damia) Route 42
4. Financial Analysis: CAPEX/OPEX 45
4.1 Methodology and Benchmark Framework 45
4.2 CAPEX Build-Up by Route Option 46
4.3 CAPEX Allocation by Country/Region 48
4.4 Operating Expenditure (OPEX) 49
4.5 Scenario Sensitivity Analysis 51
4.6 Findings and Comparative Conclusion 52
5. Environmental Assessment 54
5.1 Methodology and source framework 54
5.2 Route scope and environmental baseline 55
5.3 Protected areas and sensitive receptors 56
5.3.1 Jordanian side 56
5.3.2 Palestinian side: Jordan River to proposed north-south rail spine 56
5.4 Option 1: King Hussein Bridge Route 57

5.5 Option 2: Prince Mohammed (Damia) Route 58
5.6 Comparison of potential impacts 59
5.7 Environmental and Social Impact Assessment (ESIA) Requirements 60
5.8 Key assumptions and limitations 60
6. Overview of Economic and Social Impacts on Palestine and Jordan 61
6.1 Scope, method, and source framework 61
6.2 Macro-economic context of the corridor economies 61
6.3 Indicative economic-impact pathways 63
6.3.1 Jordan 64
6.3.2 Palestine 65
6.3.3 Gaza recovery and reconstruction 66
6.4 Social impacts 66
6.5 Key assumptions and limitations 68
7 Geopolitical Analysis 69
7.1 Purpose, Scope, and Method 69
7.2 Overview and Current Landscape 70
7.3 Geopolitical Logic of the Corridor 71
7.4 Normalization, Public Opinion, and the Abraham Accords Upgrade 72
7.5 The Gaza Reconstruction Imperative 73
7.6 Overall Political Feasibility Assessment 75
7.7 Core Actor Alignment Matrix 76
7.8 Actor-by-Actor Assessment 78
7.8.1 Palestine/Palestinian Authority 78
7.8.2 Jordan 79
7.8.3 Israel 79
7.8.4 Saudi Arabia 80
7.8.5 United Arab Emirates 81
7.8.6 India 81
7.8.7 United States 82
7.8.8 European Union and Key Member States 83
7.8.9 Egypt 83
7.8.10 Türkiye 84
7.8.11 Syria 84
7.8.12 Lebanon 85
7.9 Required Political Package for IMEC-Gaza 85
7.10 Political Constraints and Veto Risks 87
7.11 Political Risks and Spoiler Dynamics 87
7.11.1 The Iran War 89
7.12 Conclusions and Recommendations 89
8 Conclusions and Recommendations 91
8.1 Overall conclusion 91
8.2 Preferred route: Option 1- King Hussein Bridge Entry 91
8.3 Implementation strategy 93
8.4 Recommendations 95
Annex A. Full Demand Analysis 105
Annex B. Full CAPEX/OPEX and Financing Envelope Build 116
Annex C. Environmental Analysis 128
Annex D. Economic Impact: Supporting Material 135

List of Abbreviations and Acronyms

Acronym	Definition
AC	Alternating Current
AED	United Arab Emirates Dirham
CAPEX	Capital Expenditure
CBA	Cost-Benefit Analysis
CBAM	Carbon Border Adjustment Mechanism
CCDR	Country Climate and Development Report
CIM	Uniform Rules Concerning the Contract of International Carriage of Goods by Rail
CMCC	Civil-Military Coordination Center
COTIF	Convention concerning International Carriage by Rail
CSDP	Common Security and Defense Policy
CUI	Uniform Rules concerning the Contract of Use of Infrastructure in International Rail Traffic
CUV	Uniform Rules concerning Contracts of Use of Vehicles in International Rail Traffic
DFC	United States International Development Finance Corporation
DP World	Dubai Ports World
DS	double-stack
EIB	European Investment Bank
EIA	Environmental Impact Assessment
EIIP	Employment-Intensive Investment Programme
EQA	Environment Quality Authority
ERTMS	European Rail Traffic Management System
ESCWA	United Nations Economic and Social Commission for Western Asia
ESIA	Environmental and Social Impact Assessment
ETCS	European Train Control System
EU	European Union
EUBAM	European Union Border Assistance Mission
EUPOL COPPS	European Union Police and Rule of Law Mission for the Palestinian Territories
EUR	Euro
G20	Group of Twenty
GCC	Gulf Cooperation Council
GDP	gross domestic product
GHG	greenhouse gas
GIS	geographic information system
ICT	information and communications technology
IEA	International Energy Agency
IFI	International Financial Institution
ILO	International Labor Organization
IMEC	India-Middle East-Europe Economic Corridor
IMF	International Monetary Fund
IRR	internal rate of return
IRU	International Road Transport Union
ISR	Israel Railways
ITF	International Transport Forum
ITREC	Iraq Transport Road Enhancement Corridors
ITSAS	Integrated Transport System in the Arab States
IUCN	International Union for Conservation of Nature
JD	Jordanian dinar
KHB	King Hussein Bridge
LAS	League of Arab States
MAITRI	Master Application for International Trade and Regulatory Interface
MoU	memorandum of understanding
MOPIC	Ministry of Planning and International Cooperation
NAP	National Adaptation Plan
NCAG	National Committee for the Administration of Gaza
NDC	Nationally Determined Contribution
NIS	New Israeli Shekel
NPV	net present value
NS	north-south

NSDP	National Spatial Development Plan
NSR	North-South Railway
O&M	operations and maintenance
O-D	origin-destination
OCHA	United Nations Office for the Coordination of Humanitarian Affairs
OCS	overhead catenary system
OECD	Organization for Economic Co-operation and Development
OPEX	operating expenditure
ORR	Office of Rail and Road
OTIF	Intergovernmental Organization for International Carriage by Rail
PA	Palestinian Authority
PAN	Protected Area Network
PCBS	Palestinian Central Bureau of Statistics
PGII	Partnership for Global Infrastructure and Investment
PNA	Palestinian National Authority
PPP	public-private partnership
Q3	third quarter
RDNA	Rapid Damage and Needs Assessment
RFQ	Request for Quotations
RID	Regulations concerning the International Carriage of Dangerous Goods by Rail
SAR	Saudi Arabia Railways
SEZ	Special Economic Zone
SIPG	Shanghai International Port Group
SMGS	Agreement on International Goods Transport by Rail
SPA	Saudi Press Agency
SS	single-stack
TEU	twenty-foot equivalent unit
TIR	Transports Internationaux Routiers customs transit system
TOC	Train Operating Company
ToR	Terms of Reference
TVET	technical and vocational education and training
UAE	United Arab Emirates
UIC	International Union of Railways
UK	United Kingdom
UN	United Nations
UNDP	United Nations Development Programme
UNECE	United Nations Economic Commission for Europe
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNESCWA	United Nations Economic and Social Commission for Western Asia
UNFCCC	United Nations Framework Convention on Climate Change
UNSCR	United Nations Security Council Resolution
US	United States
USA	United States of America
USD	United States dollar
UXO	unexploded ordnance
WAFA	Palestinian News and Information Agency
WDPA	World Database on Protected Areas

Executive Summary

Purpose and strategic context

This executive summary presents the core findings of the strategic feasibility study commissioned by EcoPeace Middle East under RFQ-ECOPAL-2025-035. The study assesses a regionally integrated electric railway network linking Gulf ports through Jordan and the West Bank to Gaza Port via the Safe Passage, with Jordan serving as a logistics hub and West Bank–Gaza connectivity forming the critical Palestinian component.

The study was designed as a decision-oriented pre-feasibility assessment. Its purpose is to test technical feasibility, evaluate the financial envelope for capital and operating expenditure, and provide evidence-based outlooks on the geopolitical, environmental, economic, and social dimensions of the proposed railway. It is not a substitute for detailed engineering design, a full Environmental and Social Impact Assessment, or investment-grade financial structuring.

The report frames the corridor within three overlapping realities. First, IMEC provides the broader strategic architecture for a Gulf-to-Mediterranean multimodal corridor. Second, Gaza reconstruction requires a logistics platform far beyond incremental repair, with the estimated needs of approximately USD 71.4 billion over 10 years, including about USD 26.3 billion in the first 18 months. Third, Palestinian economic recovery requires a credible physical connection between Gaza, the West Bank, Jordan, and Mediterranean gateways.

The study's central conclusion is that the proposed railway is strategically feasible, but only as a phased, politically negotiated, Palestinian-inclusive development corridor. It should not be presented as a narrow IMEC spur or as a substitute for a political settlement. Its strongest value lies in combining Gaza reconstruction logistics, Palestinian trade capacity, Jordanian logistics development, Israeli security management, Gulf-to-Mediterranean connectivity, and long-term regional interdependence.

Dimension	Headline finding	Executive implication
Strategic logic	A Gulf-Jordan/West Bank-Gazarailway is coherent with IMEC and Pan-Arab connectivity.	Advance as an integrated regional corridor, not as isolated national segments.
Core condition	Feasibility depends on Gaza stabilization, Safe Passage, Palestinian agency, Israeli security, and regional sponsorship.	Treat diplomacy, security, and financing as design components.
Preferred Jordan entry route	Option 1, via King Hussein/Karamah-Allenby, is shorter, cheaper, and more direct.	Use Option 1 for investment-grade feasibility while retaining Option 2 as a comparator.

Baseline and technical feasibility

Corridor baseline

The proposed railway does not begin from a blank slate. The UAE has an operational standard-gauge freight network; Saudi Arabia has major operational assets, including the North-South Railway reaching the Jordanian border; and Israel has an advanced standard-gauge network, Haifa Port rail connectivity, and an existing Haifa-Beit Shean corridor. These elements provide a partial physical foundation for a Gulf-to-Mediterranean corridor.

The structural gaps are concentrated in Jordan and Palestine. Jordan has no operating national standard-gauge railway, although national planning and the Jordan-UAE Aqaba minerals railway provide relevant momentum. Palestine is a greenfield rail environment, meaning there is no operating railway, no commercial-scale Gaza port, and no operational cross-border rail connection with Jordan, Israel, or Egypt. The report, therefore, treats the project as a phased new-infrastructure program rather than an incremental upgrade.

Demand and operating concept

The demand model is built around three freight layers: Gaza origin-destination flows, West Bank origin-destination flows, and IMEC through-transit captured by Gaza Port as a Mediterranean gateway. Under the Base case, total rail branch demand is estimated at approximately 0.36 million TEU per year at opening, 0.76 million TEU in year 5, and 1.43 million TEU in year 15. The Gaza Port/western-gateway component grows from approximately 0.12 million TEU to 0.81 million TEU across the same horizons.

The technical assessment concludes that a single-track railway with passing loops can serve Base-case demand if double-stack operations, ETCS Level 2/ERTMS-compatible signaling, high terminal productivity, and disciplined cross-border dispatching are achieved by maturity. Under the Upside year-15 case, selective double-tracking, additional passing loops, or other higher-capacity operating provisions should be protected in the planning envelope.

The recommended technical basis is a standard-gauge, electric-ready freight corridor designed for 25 kV AC overhead electrification, double-stack clearance, interoperable signaling, rail-compatible border yards, and terminal interfaces at the key crossing and port nodes. The report emphasizes that all demand and capacity outputs are order-of-magnitude planning results and must be validated through shipper interviews, customs data, port-capacity analysis, commodity-level trade analysis, and timetable simulation.

Technical issue	Findings	Next-stage requirement
Demand	Base-case branch demand reaches about 1.43 million TEU/year by year 15.	Validate through investment-grade demand and gateway-choice modeling.
Capacity	Single-track double-stack operation is sufficient for Base-case horizons.	Simulate train paths, passing loops, terminal handling, and border dispatching.
Interoperability	Standard-gauge signaling, ETCS-compatible signaling, and an electric-ready design are required.	Prepare a corridor-wide design-basis and interoperability memorandum.

Route, financial, and environmental findings

Route options and preferred alignment

The report assesses two primary route alternatives between Jordan, the West Bank, the Safe Passage, Gaza, and Gaza Port. Option 1 begins near the planned Jordanian network around Sahab and the Amman logistics area, moves west toward the King Hussein/Karamah-Allenby crossing, continues through the West Bank to Tarqumia, passes through the Safe Passage, enters Gaza near the Beit Hanoon (Erez) Industrial Zone, and terminates at Gaza Port. Its indicative core length is about 150-160 km.

Option 2 begins from a junction at the planned Amman-Mafraq rail link, moves west toward the Prince Mohammed/Damia Bridge, connects to the proposed Palestinian north-south rail spine, then runs south and west toward Tarqumia, the Safe Passage, Gaza, and Gaza Port. Its indicative length is about 205 km. The report finds that Option 1 is the preferred route for investment-grade feasibility because it is shorter, more direct, less costly, operationally more efficient, and clearer as a Jordan-West Bank-Gaza political narrative.

Financial envelope

The financial analysis estimates Base-case CAPEX at approximately USD 3.49 billion (NIS 12.93 billion) for Option 1 and approximately USD 4.49 billion (NIS 16.62 billion) for Option 2. The approximately USD 1.00 billion difference is structural and is preserved across the tested sensitivity scenarios, where Option 1 remains around USD 0.8-1.4 billion cheaper. Base-case OPEX also favors Option 1. Option 2 is estimated to be approximately 14-21 percent more expensive to operate annually, with the gap narrowing as traffic-volume-driven costs become more important over time.

The largest high-end financial risk is political delay rather than engineering cost alone. Delay risk can add costs comparable to a major national segment of the investment. Conversely, integration with a wider IMEC procurement and guarantee architecture is identified as a policy-actionable cost-reduction lever.

Environmental and social safeguards

Option 1 has lower route-length-related land take, construction disturbance, material movement, spoil generation, and operating emissions. Still, it carries higher sensitivities to protected areas, heritage, landscape, wadis, and permitting in the King Hussein/Karamah-Allenby/Jordan Valley/Jericho/eastern-slope setting. Option 2 is longer and therefore performs worse on route-length-related impacts, but may have lower confirmed protected-area risk on the Jordanian side and may allow alternative optimization in the northern West Bank.

This means that Option 1 should be advanced only subject to mandatory GIS optimization, full ESIA, heritage assessment, hydrology and seismic analysis, land and community-impact studies, and explicit no-go or avoidance conditions for protected-area, cultural heritage, spring, wadi, agricultural, and community receptors.

Economic, social, and geopolitical findings

Economic and social impacts

For Jordan, the corridor offers construction activity, recurrent logistics revenue, and strategic positioning as a Gulf-Mediterranean transit and logistics hub. The report identifies Jordan's direct construction share at roughly USD 380 million, before corridor-wide overlays and contingency, and highlights potential value-added logistics activity around Sahab, Mafraq, and the Amman metropolitan area. These benefits are aligned with Jordan's stated transport and logistics ambitions but depend on procurement design, workforce readiness, vocational training, and local-content provisions.

For Palestine, the relative economic impact is larger because the Palestinian economy is smaller, more fragile, and more constrained by movement and access. The corridor could improve Gaza reconstruction logistics, reduce pressure on truck-based border operations, support West Bank trade facilitation, and physically connect Gaza, the West Bank, and Jordan into a single logistics chain. A single double-stack train of 270 TEU could materially reduce truck movements for reconstruction and commercial cargo, improving reliability and cost predictability if the required governance and border-operating conditions are in place.

Socially, the corridor's value lies in employment, skills development, reconstruction capacity, and the tangible expression of the Peace Triangle concept. These benefits are not automatic. They depend on whether procurement includes local-content commitments, technical and vocational training, employment pathways in Gaza and the West Bank, compensation and grievance mechanisms, and safeguards to protect affected communities along the alignment.

Geopolitical feasibility

The geopolitical finding is conditional but not implausible. The route is strategically compelling because it aligns Jordanian logistics ambitions, Palestinian West Bank-Gaza connectivity and recovery, Gulf interest in diversified logistics and regional influence and stability, Indian and European interests in reliable connectivity, Israeli and US interests in regional integration, and Egyptian interests in Gaza stabilization. However, deliverability depends on a political package that gives each core actor sufficient confidence to support the same route simultaneously.

The principal risks are Gaza governance uncertainty, an undefined Safe Passage regime, weak Palestinian legitimacy, Israeli security concerns, Jordanian domestic framing, Saudi political conditionality, UAE bankability requirements, Egyptian concerns around Rafah, Sinai, Suez, and Gaza reconstruction, and broader Levantine corridor dynamics involving Turkiye, Syria, and Lebanon. The report emphasizes that the corridor should be framed as a practical mechanism for Palestinian agency and recovery, West Bank-Gaza connectivity, Jordanian logistics development, controlled Israeli security management, Gulf investment, and regional connectivity.

The project is therefore best understood as politically enabled infrastructure. Engineering, financing, operating rules, border procedures, security management, Gaza governance, Palestinian agency, and public narrative must be developed together. Without this integrated package, the corridor could be delayed or politically blocked even if the engineering is feasible.

Recommended way forward

Implementation strategy

The report recommends moving from pre-feasibility to a structured political-enabling and investment-grade feasibility phase. The sequencing should move from diplomatic definition to investment-grade feasibility to institutional and border-operating design to financing and procurement structuring.

The next decision should authorize investment-grade feasibility for Option 1, while keeping Option 2 as a comparator until environmental, heritage, and political risk screening confirm that the preferred alignment can be delivered responsibly. Option 1's shorter length, lower CAPEX, lower OPEX, and clearer narrative justify this route preference, but the preference is conditional on avoidance, mitigation, and safeguards.

Priority recommendations

- Adopt Option 1 (King Hussein Bridge entry) as the preferred route for investment-grade feasibility.
- Provide for a capacity strategy based on a single track with passing loops at opening, double-stack clearance, ETCS Level 2, and passive provision for selective double-tracking.
- Complete investment-grade demand, operating, shipper, customs, port-capacity, commodity, gateway-choice, competing-route, and timetable studies before financing decisions.
- Undertake full GIS optimization, ESIA, heritage assessment, hydrology, seismic, geotechnical, UXO, land, agricultural, and community-impact studies before fixing the alignment, including entry into Gaza with consideration for entering near Almentar (Karni).
- Develop the Safe Passage and border-operating framework as a core project component, including inspection, sealed cargo, customs, data exchange, emergency protocols, liability, and terminal governance protocols.
- Secure Palestinian ownership and a credible Gaza governance and reconstruction framework, including Palestinian regulatory, land, customs, terminal, and operating roles.
- Establish a Jordan-Palestine technical and logistics track covering regulation, customs, terminal governance, operating rules, and logistics-hub integration.
- Create a financing and guarantees platform before procurement, anchored in Gulf sponsorship, IFI support, EU/US guarantees, blended finance, and a clear political risk allocation.
- Link procurement to local content, employment, TVET, and reconstruction benefits for Jordan, the West Bank, and Gaza.
- Maintain Egypt and Levantine consultation tracks while preserving the Palestinian-inclusive core of the corridor.
- Mobilize private-sector and civil-society advocacy around a credible peacebuilding corridor narrative.
- Establish a corridor coordination body, with the main stakeholders represented, to facilitate practical discussions and coordinate route planning, customs, safety, border procedures, security interfaces, data exchange, environmental safeguards, financing conditions, and sequencing. Such a body would include the US, Israel, Jordan, Palestine, Saudi Arabia, and the UAE, and could work through subject-matter-related committees to address different issues as needed.

Conclusion

The proposed electric railway is far from ready for implementation. Still, it is sufficiently coherent, strategically valuable, and analytically supported to justify the next stage of diplomatic convening, investment-grade due diligence, and the preparation of structured financing. Its value lies in joining technical feasibility to political legitimacy: an electric railway that supports Gaza reconstruction, reconnects the West Bank and Gaza, strengthens Jordan's logistics role, gives Palestine and Israel a meaningful place in regional connectivity, and provides IMEC with a more inclusive and stabilizing Mediterranean route.

As such, discussions should be pursued by the key IMEC partners, under the leadership of the United States, to enable the inclusion of Israel, Palestine, and Jordan officially within the IMEC framework.

To this end, it is important to utilize EcoPeace's active advocacy and engagement mechanisms with governments, civil society, and businesses to support the advancement of the project as part of the Peace Triangle, with the aim of raising awareness of the importance of such initiatives in advancing the prospects of peace in the region, on the one hand, while setting the foundation for the realization of the fruits of peace as progress is made.

Introduction

1.1 Background and Context

The idea of a railway connecting the Gulf to the Mediterranean through Jordan and Palestine is not new. It is rooted in the Ottoman-era Hejaz Railway (a narrow-gauge, 1,050 mm system), which linked Damascus to Medina and included a major branch from Darʿā to Haifa on the Mediterranean [1] The Haifa connection helped integrate the port city into wider regional trade networks, linking it with Damascus and areas east of the Jordan River.[2] In this sense, the concept of rail infrastructure as a tool of regional trade and integration has deep historical precedents.[1][2]

The India–Middle East–Europe Economic Corridor (IMEC), announced on the sidelines of the G20 Summit in New Delhi on September 9, 2023, is the most ambitious recent expression of this regional connectivity vision.[3] The memorandum of understanding was signed by India, the United States, Saudi Arabia, the United Arab Emirates, the European Union, Italy, France, and Germany. Jordan and Israel are transit states along the envisaged corridor but are not parties to the MoU.[3] IMEC envisions a multimodal corridor composed of an eastern corridor linking India to the Gulf and a northern corridor linking the Gulf to Europe, including a railway that would connect India, the UAE, Saudi Arabia, Jordan, Israel, and Europe via a cross-border ship-to-rail network.[4] According to the memorandum, the corridor is intended to increase efficiency, reduce costs, improve trade facilitation, and deepen economic integration across Asia, the Arabian Gulf, and Europe.[4]

The timing of this study is significant. Gaza has suffered catastrophic destruction since the war began in October 2023.[10] Recovery and reconstruction needs are estimated at approximately US$ 71.4 billion over ten years, of which about US$ 26.3 billion is required in the first 18 months, a scale of investment that, according to the assessment, points towards a new development paradigm rather than incremental repair.[10] The railway corridor studied here is precisely that, an infrastructure investment that simultaneously addresses Gaza's reconstruction and recovery needs, Palestine's economic isolation, Jordan's ambition to become a regional logistics hub, broader regional integration, and the broader IMEC imperative to operationalize a Gulf-to-Mediterranean land bridge.[5][7] In EcoPeace's framing, it represents a potential driver of Gaza's economic recovery and a material contribution to longer-term regional stability.[5][7]

EcoPeace's Peace Triangle: A Catalytic Addition to IMEC

In EcoPeace's framing, within the broader IMEC framework, EcoPeace Middle East has identified three climate-smart catalytic projects, collectively called the "Peace Triangle", that are intended both to deepen IMEC's strategic value and to advance regional peacebuilding through economic interdependence.[5][6] The first of these is a proposed transport corridor linking Jordan, the West Bank, Israel, and Gaza, which EcoPeace presents as part of a wider regional connectivity vision tied to IMEC and to the future role of Gaza Port within wider regional connectivity..[5][7] The second is an expanded water-energy exchange between Israel, Jordan, and Palestine.[5][8] The third is large-scale renewable energy exports from the Middle East to Europe via Palestine and Israel.[5][9] Together, these three projects are presented not merely as infrastructure investments but as instruments of environmental peacebuilding, designed to create shared interests and physical interdependence in support of more durable regional stability.[6][9]

1.2 Purpose and Objectives of the Study

This report presents the findings of a strategic feasibility study commissioned by EcoPeace Middle East under RFQ-ECOPAL-2025-035. The study was conducted by a multidisciplinary consulting team with expertise in transport and railway engineering, financial feasibility analysis, geopolitical and regional affairs, and environmental and climate assessment.

The primary objectives of the study are to:

- Assess the technical feasibility of a regionally integrated electric railway network linking Gulf ports to Gaza Port through Jordan and the West Bank.
- Assess the financial feasibility of the proposed network, including capital expenditure (CAPEX) and operating expenditure (OPEX), and conduct a scenario-based sensitivity analysis.
- Provide concise, evidence-based outlooks on the geopolitical, environmental, and economic dimensions of the proposed railway.

The study is explicitly designed as a strategic, decision-oriented assessment, sufficient to generate political and private-sector interest, inform high-level advocacy and diplomatic dialogue, and guide the design of the next stage of investment-grade feasibility work. It does not purport to substitute for detailed engineering design, environmental and social impact assessment, or investment-grade financial structuring, all of which would be required at subsequent stages of project development.

1.3 Scope and Route Structure

This study focuses on a proposed rail corridor linking Gulf ports through Jordan to the West Bank, continuing via the Safe Passage to Gaza Port. The corridor is assessed through technical, financial, geopolitical, environmental, economic, and social analyses, with particular attention to its potential contribution to Palestinian connectivity, Gaza reconstruction, and regional trade integration.

The geographic scope of the context analysis covers the entire corridor, including the UAE, Saudi Arabia, Jordan, Palestine, and Israel. The geopolitical analysis further extends to key external actors, including the USA, the EU, Egypt, Syria, and Lebanon, whose interests and positions may materially affect the initiative's political feasibility.

1.4 Methodology and Approach

The study used an integrated, desk-based methodology that combined secondary data analysis, international and regional benchmark reviews, GIS-based spatial analysis, and expert judgment across the four thematic pillars of the assessment. The approach is consistent with IFI early-stage feasibility standards, including the World Bank and EIB pre-feasibility frameworks. It applies a high degree of transparency in sourcing, benchmarking, and caveating all estimates and assumptions.

Stakeholder engagement followed a hybrid approach combining virtual consultations and targeted in-person meetings, coordinated with EcoPeace to ensure alignment with the study's technical, policy, and advocacy objectives. Two in-person stakeholder roundtables were held in Ramallah as part of the consultancy's deliverables.

Given the desk-based nature of the assignment and the significant political, security, and data constraints in the study area, all quantitative estimates, particularly CAPEX, OPEX, and capacity figures, are presented as order-of-magnitude assessments based on comparable international projects and regional benchmarks. The study's assumptions and limitations are explicitly set out in each thematic section and summarized in the risk and assumptions matrix, which is included as an annex to the advanced and final reports.

1.5 Structure of the Report

The remainder of this report is organized as follows:

a. Section 2 provides a context and baseline analysis of existing and planned railway infrastructure across the study corridor countries.
b. Section 3 presents the technical feasibility analysis of the primary Gaza route, including route definition, interoperability, electrification, capacity, and cross-border operational considerations.
c. Section 4 presents the financial feasibility analysis, covering CAPEX and OPEX, along with sensitivity scenarios.
d. Section 5 covers the environmental and climate analysis, including risks, impacts, and proposed mitigation measures.
e. Section 6 provides a brief economic outlook, focusing on the impacts on Jordan and Palestine, as well as the role of the railway in Gaza's reconstruction and recovery.
f. Section 7 presents the geopolitical analysis, mapping the interests and political will of key actors.
g. Section 8 presents the study's conclusions and recommendations.

Supporting materials, detailed analysis, and the risks and assumptions are included in the annexes for each part of the study.

2. Context and Baseline Analysis

2.1 Regional Overview

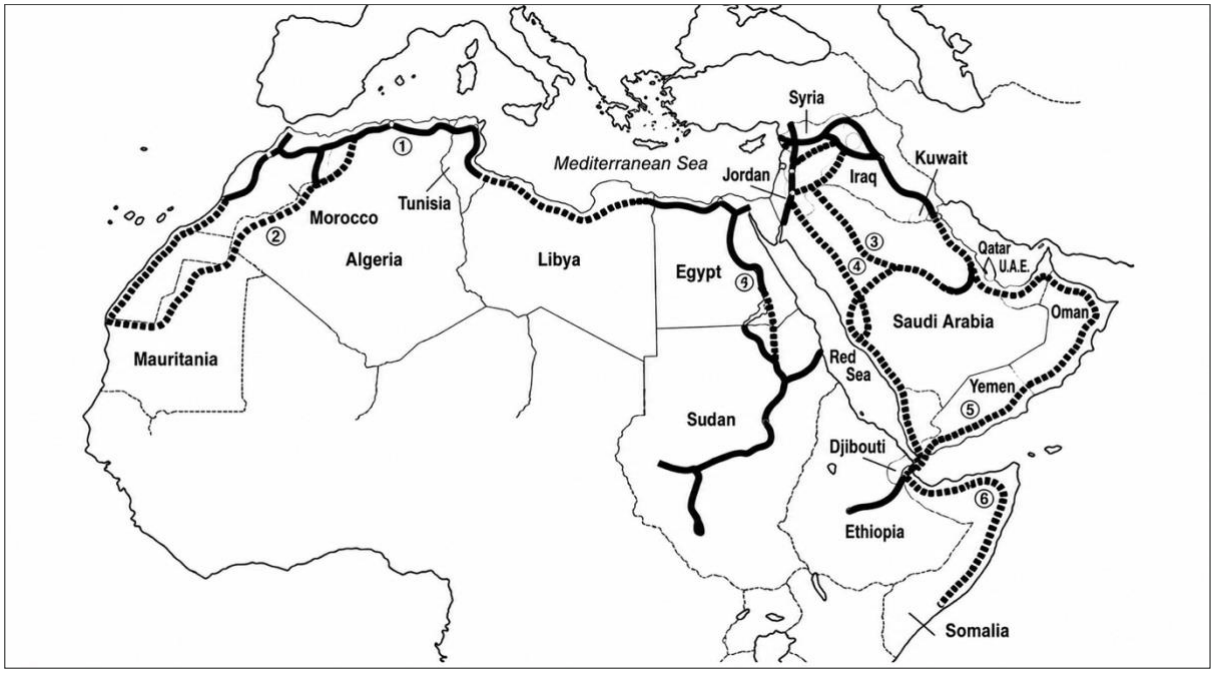
2.1.1 Pan Arab Rail Network

The concept of a rail corridor connecting the Arabian Gulf to the Mediterranean through Jordan and Palestine is deeply rooted in the region's infrastructure history and long-standing integration ambitions, as set out in (section 1.1).

Within the United Nations Economic and Social Commission for Western Asia/League of Arab States (ESCWA/LAS) framework, transport is treated as the backbone of regional connectivity and integration.[11][12] The related agreements include the Agreement on International Roads in the Arab Mashreq, the Agreement on International Railways in the Arab Mashreq, and the Memorandum of Understanding on Maritime Transport Cooperation in the Arab Mashreq, as well as facilitation mechanisms and the broader concept of the Integrated Transport System in the Arab States (ITSAS).[11][12]

Figure 2.1 Arab Railway Network: Existing and Approved

Total Pan Arab Rail Network Approved: 19,528 km, of which 7,912 km were built by the end of 2023. Sixty percent of links remained planned.[12] Most of Jordan's and the Gulf region's links are already either built or approved as part of national plans.



Source: ESCWA (2023) - Multimodal Transport Corridors in the Arab Region. A Presentation by Yarob Bader & Fouad Ghorra.

2.1.2 IMEC: Bridging the Gap

Zooming in on the Pan Arab Rail Plan, including approved links from Gaza to Egypt through Rafah, and planned links from Gaza to the West Bank and internationally,[13] on the one side, and the Israeli National Railway System, on the other, it becomes clear that the physical infrastructure disconnect is a product of political realities, and not aligned with best-practice railway development to enhance connectivity, improve trade, and support economic development and efficiency.

As such, the proposed IMEC electric railway does not emerge from a blank slate. It traverses a corridor where railway infrastructure is advancing rapidly in the Gulf, constrained by political reasons in Palestine, actively expanded and electrified in Israel, and planned but not yet built in Jordan.[14][15] Understanding this uneven landscape is the starting point for any credible assessment of feasibility. The gap between what exists and what the corridor requires is large, but it is not unbridgeable. Several of the most critical enabling assets, including the Saudi North-South Railway reaching the Jordanian border and the Jezreel Valley line in Israel connecting Haifa to Beit She'an, are already in place.[16][17] The most significant structural gap remains in Jordan and Palestine.

In Jordan, a national standard-gauge railway network faces substantial funding challenges.[11] This includes the IMEC section from Mafraq to Sheikh Hussein. Palestine is a greenfield with no functioning railway, no port infrastructure of commercial scale, and no cross-border rail connection with Israel, Jordan, or Egypt in operation. The study therefore proceeds from the recognition that this initiative requires not incremental improvement but a phased program of new infrastructure investment, coordinated across five jurisdictions with fundamentally different political, regulatory, and institutional frameworks.

2.2 IMEC Rail: Country-Level Review

This section reviews the baseline railway infrastructure and relevant planning frameworks in each corridor country, identifies key gaps and discontinuities, and maps existing and planned logistics assets, particularly ports and border crossings, that define the operational context for the proposed corridor.

2.2.1 The United Arab Emirates

UAE's national railway developer and operator has built and operationalized an approximately 900 km standard-gauge freight mainline connecting all seven emirates, from the Saudi border at Ghuwaifat in the west to the port of Fujairah on the eastern coast, with a total planned network length of about 1,200 km.[18] The freight network was inaugurated and began commercial operations in February 2023, with 38 diesel-electric locomotives and more than 1,000 wagons serving major ports and logistics centers across the country.[18] The network has a designed freight capacity of up to 60 million tonnes per year once the full fleet is in service.[18] Passenger services are scheduled to launch in 2026, beginning with major stations in Abu Dhabi, Dubai, Sharjah, and Fujairah, and expanding in phases to connect 11 cities and areas.[19] A separate high-speed electrified line connecting Abu Dhabi and Dubai at speeds of up to 350 km/h was announced in 2025, with a target completion by 2030.[20]

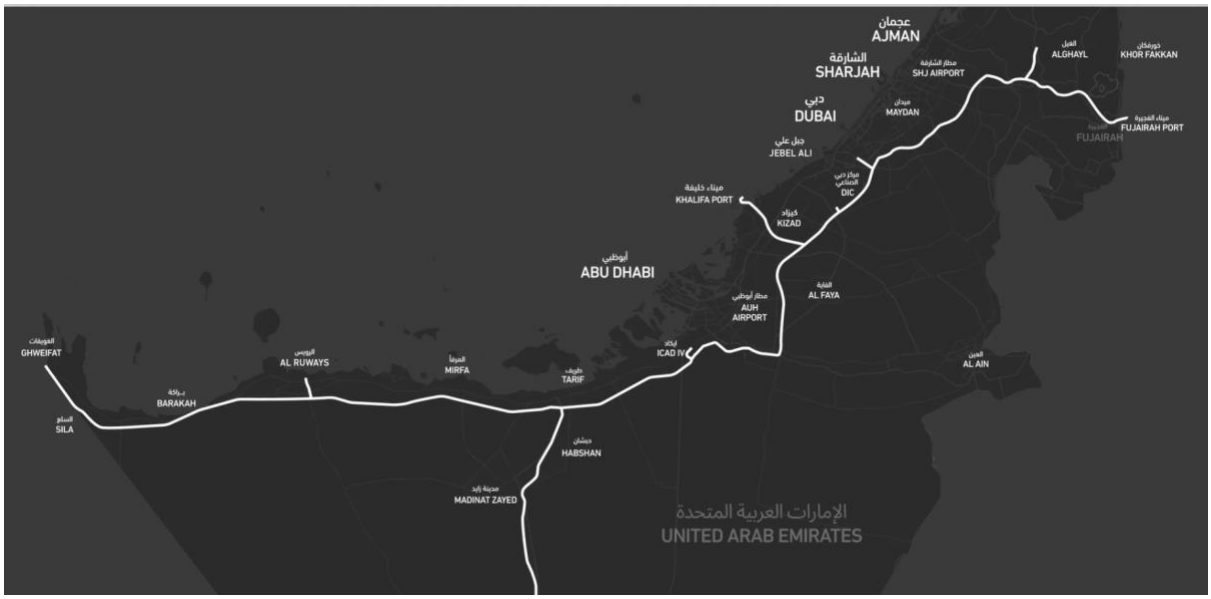
The main ports acting as an entry into the IMEC rail corridor in the UAE include the following:

Table 2.1: Main UAE Ports Relevant to the IMEC Rail Corridor

Port	Location	Role in IMEC	Notes
Jebel Ali [80]	Dubai	Primary container hub & main entry point	World's busiest ports; handles massive volumes; well-connected to Etihad Rail. Often highlighted as the key link from Indian ports (Mundra, Mumbai, etc.).
Khalifa Port (Abu Dhabi) [81]	Abu Dhabi	Major deep-water port for containers & general cargo	Complements Jebel Ali; strong focus on efficiency and integration with rail.
Fujairah [82]	Fujairah	Strategic alternative (Gulf of Oman)	Bypasses Strait of Hormuz risks; useful for oil/products and diversified routes.

Etihad Rail's connection to the Saudi border at Ghuwaifat is a critical enabling asset for this corridor. Goods entering the UAE from Gulf ports, including Jebel Ali, can already be transferred by rail toward the Saudi border, reducing dependence on road freight

Figure 2.2 Etihad Rail Network in the United Arab Emirates



Source: Etihad Rail 2026. Network.[18]

A joint venture between Etihad Rail, Oman Rail, and Mobadala Investment Company (Hafeet Rail) is also underway to construct a 303 km cross-border link connecting Sohar Port to the UAE National Rail Network, further extending the UAE's rail reach across the eastern Gulf.[21][22]

The UAE network does not currently extend eastward toward Qatar or Kuwait. Still, the Etihad Rail system is designed as the UAE's contribution to the broader GCC Railway, intended to form the western spine of the corridor through which Gulf-originating freight would eventually flow northward toward Saudi Arabia and Jordan.[18][23]

Technically, the UAE uses standard gauge, with heavy-haul design, and double-stack capable. Traction is diesel, with electrification plans, and European-compatible signaling.

Legal/contracts, the UAE is a part of the GCC agreement. It is not a member of COTIF. With regard to customs, the UAE is part of the TIR for road transport and is part of the GCC and Arab agreements.

With India, the UAE uses the Virtual Trade Corridor and the Master Application for International Trade and Regulatory Interface (MAITRI), an advanced digital platform between the two countries that ensures advanced interoperability. [57]

Table 2.2. UAE Rail Technical and Interoperability Characteristics

Component	UAE
Gauge	Standard gauge [18]
Axle load	Heavy-haul design on Etihad Rail [23]
Loading gauge	Double-stack capable [23]
Signaling	ETCS Level 2 [23]
Electrification/ traction	Diesel operation today [18][23]
Regional rail framework	Outside OTIF/CIM; inside broader GCC/Arab setting [54][56]
Customs/transit	GCC customs/transit + TIR [58][59][60]
Border/security basis	National and bilateral

2.2.2 Saudi Arabia

Saudi Arabia operates the most extensive railway network in the corridor, and it is currently undergoing the most consequential expansion in its history. Three separate rail systems are operational, with a fourth, the Saudi Landbridge, in advanced planning.

The North-South Railway (NSR/ “North Train”) [24][25]: The North-South Railway (NSR) is a 2,750 km network of lines in central and northern Saudi Arabia. Its freight and industrial components connect the phosphate and bauxite mining regions of northern Saudi Arabia to the industrial port complex at Ras Al-Khair, near Jubail on the Arabian Gulf. A separate approximately 1,250 km passenger line (SAR, “Our Network”) connects Riyadh northwestward to the Jordanian border at Al-Haditha, and also carries general cargo. Design speeds are 100 km/h for bulk mineral trains, 120 km/h for freight trains, and up to 200 km/h for passenger services, with commercial operation typically at about 160 km/h. The NSR operates on standard gauge (1,435 mm) with ERTMS/ETCS Level 2 signaling. The Al-Haditha border branch is the direct connection point with any future Jordanian rail network and is therefore among the most strategically important assets for this corridor.

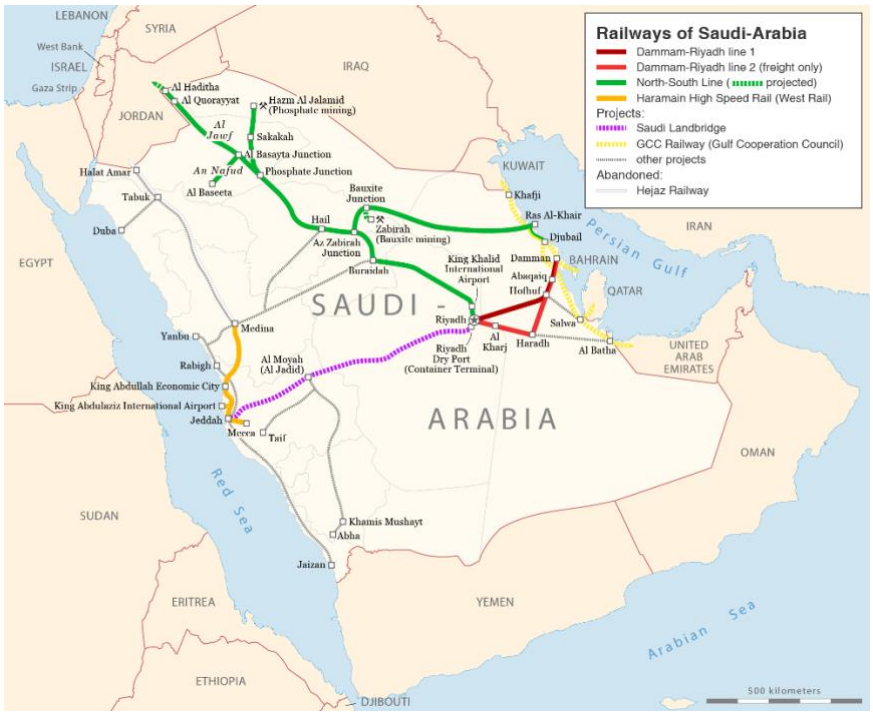
The Eastern Railway (Riyadh–Dammam line) [26]: A standard-gauge line connecting Riyadh to Dammam, one of the Gulf’s major commercial and industrial port cities. This line provides the east-west freight backbone between the Arabian Gulf and Riyadh.

The Haramain High-Speed Railway [27]: An electrified high-speed line connecting Makkah, Madinah, Jeddah, and King Abdullah Economic City, designed primarily for passenger service and operating at up to 300 km/h.

The Saudi Landbridge [28][29]: The centerpiece of Saudi Arabia’s rail expansion under Vision 2030, the Landbridge is a proposed approximately 1,500 km rail corridor connecting the Red Sea port of Jeddah to the Arabian Gulf at Dammam and Jubail via Riyadh. SAR disclosed in January 2026 a revised project cost of approximately SAR 100 billion (about USD 26.6 billion), with phased delivery under a new procurement model and completion targeted for 2034, following the collapse of earlier Chinese consortium PPP negotiations. An updated lead design contract was awarded in 2026 to Spain’s Sener. The program comprises more than 1,500 km of new or upgraded track, including an approximately 900 km new Riyadh–Jeddah line, upgrades to the Riyadh–Dammam line, a Riyadh bypass, a link between King Abdullah Port and Yanbu, and seven new logistics hubs. The project is intended to create a sea-to-sea freight corridor linking Asia via Gulf ports to Europe via the Mediterranean, thereby serving as a direct structural enabler of the IMEC architecture.

Saudi Arabia Railways (SAR) launched in March 2026 an international freight corridor from King Abdulaziz Port in Dammam and the industrial ports at Jubail to the Jordanian border crossing at Al-Haditha, a route of more than 1,700 km capable of carrying more than 400 standard containers per train.[17] This development marks the first time SAR has offered cross-border containerized rail freight service and directly operationalizes the Gulf-to-Jordan rail link that forms the southern half of this corridor. SAR’s published freight volumes show total tonnage reaching 30 million tonnes in 2025.[30]

Figure 2.3 Saudi Arabia Rail Network and Key Corridor Connections



Source: Maximilian Dorrbecker (Chumwa). File: Rail transport map of Saudi Arabia.png - Wikimedia Commons.

The Saudi rail system is, therefore, in practical terms, already partially delivering on the southern leg of this corridor. The Al-Haditha–Jordanian border connection is operational on the Saudi side.[31] The missing piece is the Jordanian national railway that would receive and continue these flows northward toward Israel and Palestine.

Along the UAE-Saudi Border, though, the link from Al Ghuwaifat to Haradh, about 270 km, remains “planned” in Saudi Arabia, which is a key IMEC link.[39]

Table 2.3. Saudi Arabia Rail Technical and Interoperability Characteristics

Component	Saudi Arabia
Gauge	Standard gauge / GCC standard [26]
Axle load	GCC heavy-haul 32.4–34.2 t system [39]
Loading gauge	Double-stack GCC freight system [39]
Signaling	ETCS Level 2 direction on key lines [25]
Electrification/ traction	Diesel-based operation on major freight corridors [24][25][26]
Regional rail framework	Outside OTIF/CIM; inside GCC/Arab setting [54][56]
Customs/transit	GCC customs/transit + TIR [58][59][60]
Border/security basis	National and bilateral

Saudi Arabia uses a standard-gauge track with a loading gauge suitable for double-deck axle loading for heavy-haul, aligned with GCC requirements.

It uses diesel traction and is moving to electrification for passenger rail, with room for freight-rail upgrade. The signaling system is compatible with European standards.

Saudi Arabia is not a member of COTIF; therefore, CIM is not applicable, yet it aligns with GCC and Arab requirements. It is a party to the TIR and GCC customs/transit framework.

The link from Al Ghuwaifat to Haradh, about 270 km, is essential for IMEC and remains planned.

2.2.3 Jordan

Jordan has a critical infrastructure gap in the corridor. It is also the country where momentum remains far from physical delivery due to funding constraints.

Jordan currently has no standard-gauge national railway. The country’s existing rail consists of two narrow-gauge (1,050 mm) legacy systems: the Hejaz Jordan Railway, a passenger line connecting Amman, Zarqa, and Mafraq (historically running to Damascus,

now severed by the Syrian conflict); and the Aqaba Railway, a mineral freight line that transported phosphate from the southern mines to Aqaba port until it was decommissioned in 2018.[32][33] Both systems used the narrow Ottoman gauge, which is incompatible with the standard-gauge network required for IMEC integration.[32][33]

As part of its Economic Vision, Phase 2 (2026-2029) of its Railway Modernization Project, Jordan proposed a modern 897 km standard-gauge network through its National Railway Project, linking the nation's key cities (the national capital, Amman, and major industrial cities such as Mafraq and Zarqa), the country's gateway port (the Port of Aqaba), and the largest phosphate mine (Shidiya Mine). The network will also connect to the railways of Saudi Arabia and Syria (and, in the future, onward to Turkey and Europe), as well as to important markets in Iraq. [38]

In September 2025, Türkiye, Syria, and Jordan signed a draft memorandum to restore the historic Hejaz Railway connection between the three countries.[34] While an important step toward realizing comprehensive regional rail network coverage, the commercial freight significance of this memorandum for the Gulf-Mediterranean corridor is not foreseen in the short- to medium-term.

The transformative development for this study is the 2024 agreement between the Jordanian Ministry of Transport and Etihad Rail (UAE) to construct a 360 km standard-gauge freight railway linking Jordan's phosphate and potash mines at Ghor Al-Safi and Shidiya to the Port of Aqaba.[35][36] The estimated cost of this line is USD 2.3 billion, or approximately USD 6.4 million per km.[35][36] Under the agreement, detailed design studies were to be completed by the end of 2025, with construction bids targeted for early 2026 and operations projected to begin in 2030.[36] The line will initially carry approximately 16 million tonnes of mineral products annually (approximately 13 million tonnes of phosphate and 2.6 million tonnes of potash) for the Jordan Phosphate Mines Company and the Arab Potash Company. In April 2026, Jordan and the UAE signed the formal execution agreements establishing the UAE–Jordan Railway Company, a 50/50 joint venture led on the Emirati side by L'IMAD Holding and on the Jordanian side by a consortium of Jordan Phosphate Mines, Arab Potash, the Government Investments Management Company and the Social Security Investment Fund; financial closure is targeted for early 2027, with a construction period of approximately five years and implementation led by Etihad Rail.[36]

The longer-term national railway plan, a 897 km standard-gauge network connecting Aqaba, Amman, Zarqa, Shidiya, and border points with Saudi Arabia, Iraq, and Syria, has been under development since 2010.[37][38] The Union for the Mediterranean has endorsed the project, and the European Investment Bank has contributed to early-stage studies.[37] The North-South corridor, estimated at approximately EUR 2.05 billion for the 509 km Aqaba–Amman–Zarqa–Syrian border backbone, remains the core planning framework.[37] Construction on the national network has not commenced.

The critical segments for the corridor within Jordan are the connections between the Al-Haditha border crossing with Saudi Arabia and the Jordanian logistics hub near Mafraq (150 km), as identified in IMEC planning documents, and from Mafraq to the Sheikh Hussein Bridge with Israel (75 km). Additionally, the Jordan–West Bank connection is being

assessed in this study. These segments do not yet exist and represent the largest infrastructure gaps in the proposed corridor.[39]

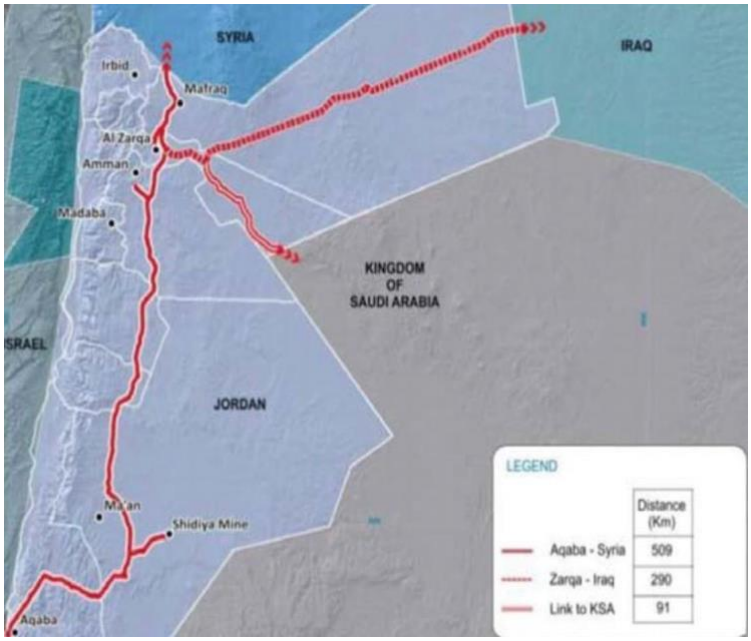


Figure 2.4 Jordan National Railway Project and Key Corridor Links . Source: Jordan Ministry of Transport, Long Term National Transport Strategy and Action Plan, Figure 21, "Jordan National Railway project," p. 80.

Key border crossing assets

- Al-Haditha/Al-Omari Crossing: Jordan–Saudi Arabia border; Saudi NSR connects to the crossing, but no Jordanian rail connection exists on the eastern side.[31]
- Sheikh Hussein Bridge (North Jordan Valley): The proposed Jordan–Israel rail crossing, highlighted in IMEC plans. The Jezreel Valley line is planned to extend from Beit She'an to this crossing on the Israeli side.[39][40] No Jordanian rail connection currently exists on the western side.
- Allenby/King Hussein Bridge: The principal road crossing between the West Bank and Jordan; not currently suitable for rail without significant infrastructure works.

The entire standard-gauge rail network in Jordan, including the section from Al-Haditha/Al-Omari Crossing to Mafraq (150km) and from Mafraq to Sheikh Hussein Bridge (75km), is nonexistent.

The gauge, axle load, and loading gauge are aligned with the GCC and Arab Rail Network Agreement. Signaling will be European aligned. Traction will start as diesel, with an electric upgrade in the future.

Jordan is a part of the Arab Transit

Table 2.4 Jordan Rail Technical and Interoperability Characteristics

Component	Jordan
Gauge	Standard gauge under the Arab Mashreq framework and current national/project planning [54][35][36]
Axle load	30 t maximum axle load in Jordan's 2016 transport strategy; equivalent specification not yet fully restated in public material for the latest Aqaba project [35][36]
Loading gauge	7.1 m maximum vertical clearance in Jordan's 2016 transport strategy, suitable for double-stack container operations; full restatement for the latest project phase not yet public [35][36]
Signaling	Likely to converge, but detailed public confirmation remains limited for the latest project phase [35][36]
Electrification/ traction	Diesel traction in the 2016 strategy; likely diesel-first in initial implementation [35][36]

Agreement and aligns with the GCC, in addition to being a party to TIR. Jordan is an associate member of COTIF, therefore, CIM does not apply.	Regional rail framework	Party to Arab Mashreq rail agreement; OTIF associate member [54][56][61]
	Customs/transit	Arab/GCC-adjacent transit tools + TIR [58][59][60]
	Border/security basis	National and bilateral

2.2.4 Israel

Israel operates the most technically advanced and rapidly modernizing railway network in the corridor. Israel Railways (ISR) manages a nationwide standard-gauge (1,435 mm) rail network.[41] As of late 2024, electrification at 25 kV 50 Hz AC (overhead catenary) was approximately 70% complete across the network, with full network electrification scheduled for 2027.[41] The electrification plan for the Jezreel Valley (HaEmek) line from Haifa to Beit She'an was presented to the National Infrastructure Committee in December 2025, covering approximately 60 km of track through Yokneam, Afula, and Beit She'an.[42]



Israel has the most advanced rail network in the region. The Israel 2040 rail strategy focuses on: (1) increasing existing capacity to reach 300 million passengers per year by removing key bottlenecks and adding or upgrading double-track corridors; (2) enhancing coverage by adding new suburban and intercity sections and improving north-south connections; and (3) achieving better environmental outcomes and reduced operating expenses through electrification.[13][14]

Rail freight has substantial coverage along the north-south coastal corridor, with established west-east links, including the Haifa–Beit She'an line in the north, and planned development into the Negev.[15]

Figure 2.5 Israel Railways Network

Source: Israel Map 360. Map of Israel trains: rail lines and high speed train of Israel.

Key assets for this corridor:

The Jezreel Valley Railway (reopened 2016)[39][40]: The single most strategically important rail asset for this corridor on the Israeli side. The line runs about 60 km from Haifa to Beit She'an and was rebuilt in standard gauge between 2011 and 2016.[40] It is currently used for passenger services and was developed with a freight function tied to Jordan-bound trade via Haifa Port.[40] A short extension from Beit She'an to the Sheikh Hussein crossing has long been proposed, but has not been built. The stronger corridor-planning estimate is approximately 15 km, with significant engineering works required because of the difficult topography of the Jordan Rift Valley.[39] Despite the short physical distance, the terrain challenges make this one of the most critical and clearly defined missing links in the entire corridor.

Haifa Port and the Bay Port rail link[43][44][45]: Haifa is the designated Mediterranean terminus for the IMEC corridor. In July 2022, a consortium of Adani Ports and SEZ (70%) and Israel's Gadot Group (30%) won the privatization tender for Haifa Port with an offer of NIS 4.1 billion (about USD 1.18 billion).[44] The transfer of ownership was completed in January 2023.[44] In March 2025, Haifa Bay Port (Bayport), a distinct container terminal operated by Shanghai International Port Group (SIPG) under a separate concession from the older Adani/Gadot-operated Haifa Port, was connected to Israel Railways' national network,

enabling direct rail freight movement from the terminal to the national grid.[43] Haifa remains one of Israel's two principal container gateways; in recent years, the newer, privately operated Bay Port has accounted for a rising share of container throughput, processing approximately 830,000 TEUs in 2023.[45]

Israel uses standard gauge with axle load of 22.5t, and is compatible with double-stack loading. It uses ETCS Level 2 European signaling and has electrified 70% of its network with 25 kV AC.

For legal/contracts, Israel is a member of COTIF/CIM, and for transit, it is a party to the TIR.

The only missing link in the network related to IMEC is a 15km section from Beit She'an to Sheikh Hussein Bridge.

Table 2.5 Israel Rail Technical and Interoperability Characteristics

Component	Israel
Gauge	Standard gauge [40][41]
Axle load	22.5 t published procurement benchmark [75]
Loading gauge	Compatible with European-/UIC-derived practice [41][42]
Signaling	ETCS Level 2 rollout underway [41][42]
Electrification/ traction	25 kV AC electrification expanding [41][42]
Regional rail framework	OTIF/CIM member [55][56]
Customs/transit	TIR + OTIF/CIM legal layer [55][56][58]
Border/security basis	Bilateral treaty basis with Jordan [76]

2.2.5 Palestine

There are no operating railways anywhere in Palestine.[46] This is not merely a technical gap; it reflects decades of structural exclusion from regional infrastructure investment, compounded by political and spatial fragmentation.

Historically, several rail connections once traversed Palestinian territory, including former links in the Jenin–Nablus corridor and former rail connections between Israel and Gaza.[47] All of these connections are now defunct, with physical infrastructure either removed or derelict.

Planning frameworks: The Palestinian Ministry of Transport's Road and Transportation Master Plan (2016, prepared by Systematica) was the first comprehensive multimodal transport strategy for the West Bank and Gaza since the PNA's establishment in 1994.[46] The plan proposed two railway lines: an international line connecting the Rafah border crossing in Gaza to the Al-Beyda crossing in the northern West Bank, and a national line serving the main urbanized areas of the West Bank between Hebron and Jenin.[46] These proposals remain unimplemented.

In September 2025, the Palestinian Council of Ministers formally approved the National Spatial Development Plan 2050 (NSDP 2050).[48] The NSDP 2050 establishes a framework for transportation networks, border crossings, seaports, and economic development corridors across the West Bank and Gaza, explicitly including a physical corridor connecting the two territories.[48] It is the most authoritative current planning reference for Palestinian spatial infrastructure priorities and serves as a key contextual document for this study.

The RAND Corporation's 2025 spatial vision for Palestine, A Spatial Vision for Palestine: A Long-Term Plan That Can Begin Now, further reinforced the case for heavy and light rail, improved road networks, an airport, and maritime ports as components of a viable Palestinian infrastructure framework, identifying specific projects for Nablus, Jericho, Hebron, Gaza City, the North Jordan Valley, and East Jerusalem.[49]

Gaza Strip — current infrastructure status: The war that began in October 2023 has resulted in near-total destruction across much of Gaza's built infrastructure.[50] Before the war, the Gaza Strip's transportation system consisted of approximately 76 km of main roads, 122 km of regional roads, and 99 km of local roads, for a total of about 297 km across 365 km² of territory (PCBS 2013 baseline data; more recent pre-war figures should be verified against the most recent PCBS statistical yearbook).[51] There is no functioning commercial seaport or airport in Gaza.[50][52] The Gaza Industrial Zone at Almentar (Karni), considered a potential logistics hub for the rail corridor, was Gaza's principal cargo terminal until Israel permanently closed the Almentar (Karni) Crossing in 2011.[53]

The proposed route in Palestine requires new rail infrastructure through the West Bank and through the Safe Passage to Gaza Port.[46][48] None of this infrastructure exists.

The proposed railway, endorsed in the Spatial Plan 2050, is based on the Transportation Master Plan for the West Bank and Gaza.[46][48] The route in the northern West Bank starts at the Al-Beyda Crossing with Israel, currently undeveloped, and continues along the proposed alignment to Jenin (approx. 30 km).[46] From there, it follows the central ridge of the West Bank through the main population centers before entering the Safe Passage near Tarqumia (approx. 120 km) and continuing onto Gaza Port (approx. 50 km), where it would then move toward the Rafah Crossing for connection with Egyptian rail (approx. 35 km).[46]

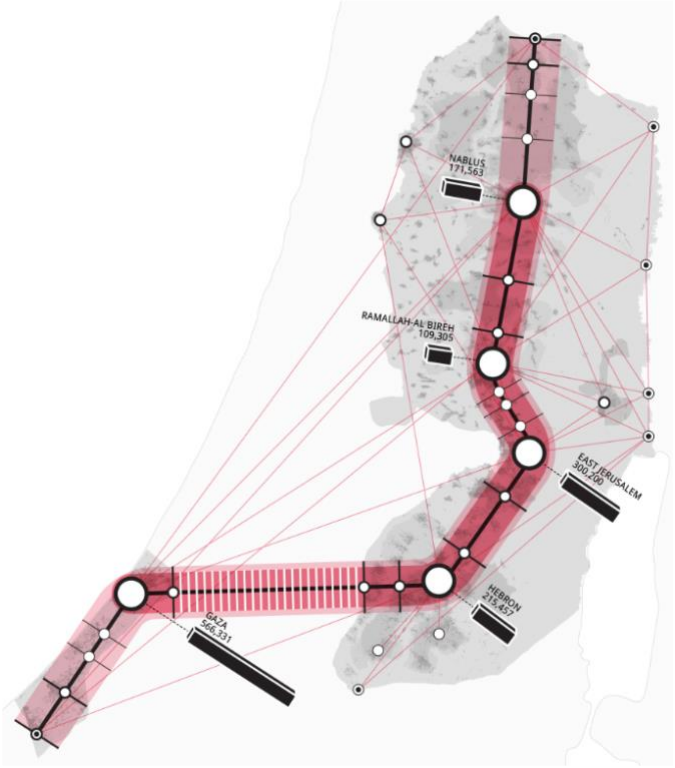


Figure 2.6 Palestinian Transport and Proposed Railway Network

Source: Road and Transportation Master Plan of West Bank and Gaza Strip - Systematica

Main IMEC Ports and Border Crossings in Palestine

AlBayda Crossing: Proposed new crossing, north of Jenin at the border with Israel, falling along the link from Affoula to Jenin.[46][48]

Prince Mohammed Bridge (Damia): Road crossing closed. A potential rail crossing to be assessed in this study.[48]

King Hussein Bridge/Karameh (Allenby) Crossing: Road crossing operations, including commercial truck traffic between Jordan and the West Bank. A potential rail crossing to be assessed in this study.[38]

Tarqumia Crossing: Road-crossing operations, including commercial truck traffic between Israel and the West Bank, are considered the entrance to the Safe Passage between the West Bank and Gaza.[46]

Beit Hanoon (Erez) Industrial Zone: A damaged, non-operational crossing area with Israel. It was operational for roadway traffic. It is considered the Gaza end of the West Bank-Gaza Safe Passage. [53] Optional consideration for detailed feasibility may be to enter near Almentar (Karni).

Gaza Port: Planned, requires construction. It is the Terminal point proposed by this IMEC for maritime shipping to Europe from Gaza through the Mediterranean. [48]

Palestine is not a member of many international conventions, including COTIF/CIM and TIR. It is a party to the Arab Rail Agreement in the Mashrak, the different Arab Transport Plan, and the Arab Transit Agreement. [54][59][60]

Based on these agreements, gauge, axle load, and loading gauge are set and are aligned with the requirements, as in Jordan/GCC. This project assesses the feasibility of electric rail, as part of IMEC. Given the development of the rail developments in neighboring countries, signaling will be compatible with European standards

2.3 Summary: Baseline Assessment and Gap Analysis

The table below summarises the key baseline findings across the five corridor countries and identifies the principal gaps that the proposed railway must address.

Table 2.6 Baseline Railway Assessment and Principal Gaps by Corridor Country

Country	Existing Standard-Gauge Rail	Key Enabling Asset	Principal Gap
UAE	About 900 km operational (Etihad Rail freight network); passenger services planned from 2026	Saudi border connection at Ghuwaifat	No major infrastructure gap on the UAE side
Saudi Arabia	Extensive operational network, including the NSR (2,750 km network), Eastern Railway, and Haramain High-Speed Railway	Al-Haditha border branch; international freight service to Jordan launched in 2026	Landbridge is still under planning; no infrastructure gap on the Saudi side of the Jordan border
Jordan	None (standard gauge); legacy narrow-gauge systems only	2024 Jordan–Etihad Rail agreement for 360 km minerals line; national railway plan in place	Entire national standard-gauge network absent; critical corridor gap
Israel	Standard-gauge national rail network; electrification about 70% complete as of late 2024; Jezreel Valley line to Beit She'an operational	Haifa Port / Bay Port rail connectivity; Beit She'an corridor asset	Approx. 15 km Beit She'an–Sheikh Hussein extension not built; no West Bank or Gaza rail connection
Palestine	None	Palestinian NSDP 2050; Ministry of Transport Master Plan	Entire West Bank and Gaza rail network absent; no functioning commercial port; greenfield condition

The baseline picture reveals a corridor advancing rapidly at its Gulf end but facing its most significant structural deficits precisely at the Palestinian end, where the political, security, and institutional preconditions for infrastructure development are most constrained. This asymmetry is central to the study's findings on technical feasibility, financial risk, and geopolitical conditionality, which are developed in the sections that follow.

Specifically, regarding key nodes, including ports and border crossings, the following is a summary of the baseline.

The proposed corridor's commercial logic depends not only on the railway itself but on its integration with port terminals and functioning border crossings. The baseline assessment of these interface points is as follows.

Table 2.7 Key Ports and Border Crossings along the Proposed Corridor

Interface Point	Location	Current Status	Corridor Role
Khalifa Port, Abu Dhabi/Jebel Ali, Dubai	UAE	Operational; rail-connected	Primary Gulf origin terminal
Al Batha/Ghuwaifat	UAE-Saudi Arabia	Road crossing operational; rail UAE side, no rail Saudi side	Primary border crossing along IMEC route
King Abdulaziz Port, Dammam	Saudi Arabia	Operational; limited rail integration	Secondary Gulf origin / Landbridge east end
Al-Haditha/Al-Omari	Saudi Arabia–Jordan	Road crossing operational; rail interface in development	Primary Gulf-to-Jordan border crossing
Sheikh Hussein Bridge	Israel–Jordan	Road crossing operational; no rail	Northern Jordan–West Bank entry for Route 1
King Hussein / Allenby Bridge	Israel–Jordan	Road crossing only; sensitive status	Jordan–West Bank interface
Tarqumia Crossing	West Bank–Israel	Commercial freight crossing; no rail	Principal West Bank–Gaza Safe Passage entry
Gaza Port (planned)	Gaza Strip	Needs Construction	Mediterranean terminal (Gaza branch) — primary project goal

The Tarqumia crossing, which currently serves as the primary commercial freight entry/exit point for the southern West Bank, is designated in this study and in EcoPeace's humanitarian corridor study (2025) as the most practical routing point for the Safe Passage rail link between the West Bank and Gaza.[7] Its existing customs and inspection infrastructure, while designed for truck freight, provides a base for upgraded rail-compatible border procedures.

2.4 IMEC Interoperability

The transshipment of goods from India to Europe follows a maritime route through the Suez Canal. IMEC, among other corridors, offers an alternative maritime-rail-maritime route, with rail moving between the Gulf and the Mediterranean.

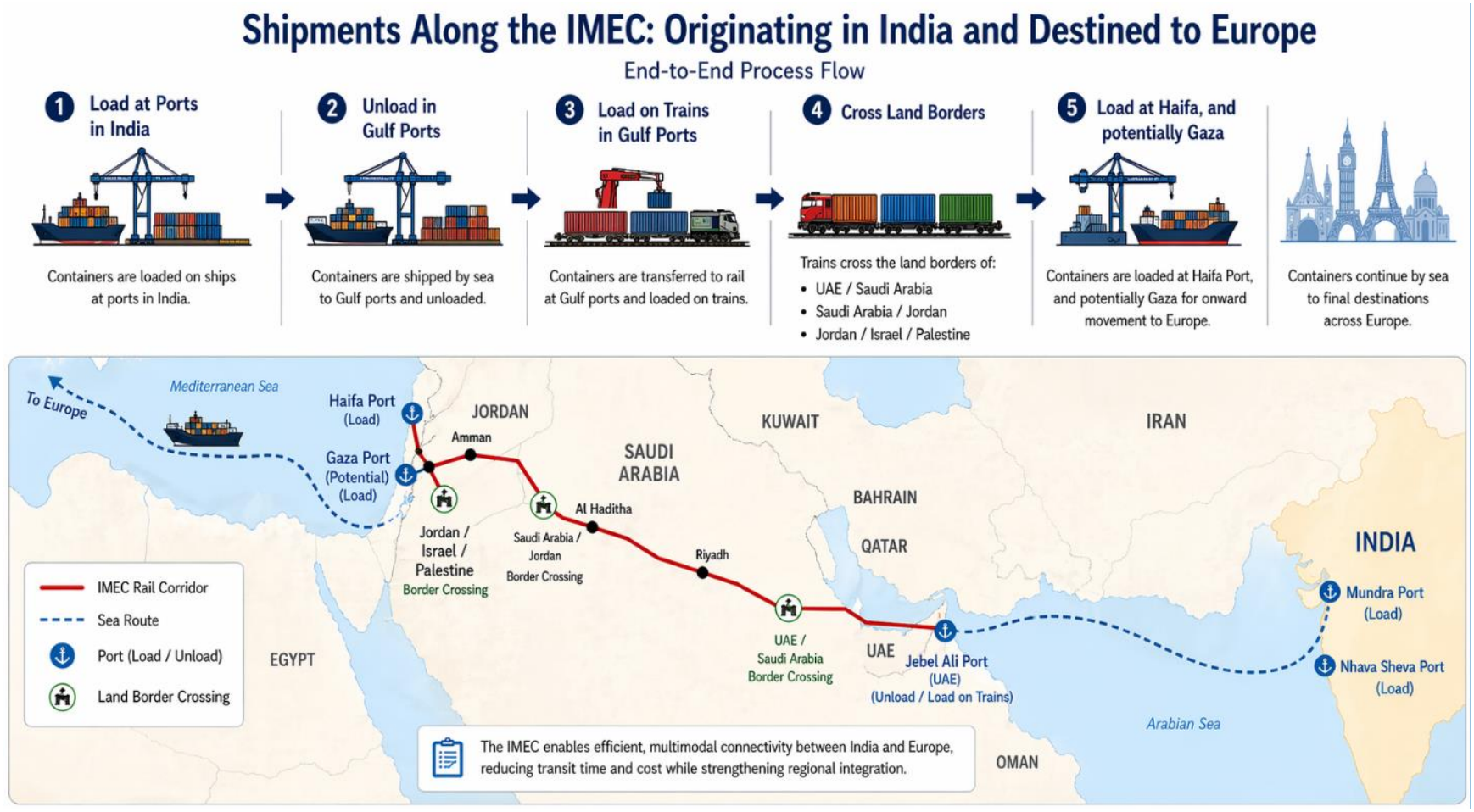

Shipments Along the IMEC: Originating in India and Destined to Europe
End-to-End Process Flow
1 Load at Ports in India
Containers are loaded on ships at ports in India.
2 Unload in Gulf Ports
Containers are shipped by sea to Gulf ports and unloaded.
3 Load on Trains in Gulf Ports
Containers are transferred to rail at Gulf ports and loaded on trains.
4 Cross Land Borders
Trains cross the land borders of:
• UAE / Saudi Arabia
• Saudi Arabia / Jordan
• Jordan / Israel / Palestine
5 Load at Haifa, and potentially Gaza
Containers are loaded at Haifa Port, and potentially Gaza for onward movement to Europe.
Containers continue by sea to final destinations across Europe.
To Europe
Mediterranean Sea
Haifa Port (Load)
Gaza Port (Potential) (Load)
JORDAN
Amman
SAUDI ARABIA
KUWAIT
IRAN
BAHRAIN
QATAR
INDIA
Jordan / Israel / Palestine Border Crossing
Saudi Arabia / Jordan Border Crossing
Al Haditha
Riyadh
UAE / Saudi Arabia Border Crossing
UAE
Jebel Ali Port (UAE) (Unload / Load on Trains)
Mundra Port (Load)
Nhava Sheva Port (Load)
EGYPT
Arabian Sea
OMAN
IMEC Rail Corridor
Sea Route
Port (Load / Unload)
Land Border Crossing
The IMEC enables efficient, multimodal connectivity between India and Europe, reducing transit time and cost while strengthening regional integration.

Figure 2.7 IMEC Freight Movement from India to Europe via the Gulf and Mediterranean

The IMEC's success rests on the proposition that goods shipped via the IMEC rail are delivered faster and, in some reports, at lower cost than if shipped via a fully maritime route through the Suez Canal.[39]

It is true that goods shipped by rail move faster than those shipped by sea. Yet key issues affecting shipment time include potential bottlenecks along the route. In the IMEC case, there are two hard discontinuities, with complete loading and unloading requirements at ports in the Gulf and the Mediterranean. Modern loading and unloading technology can substantially reduce the time required for these operations.

Other critical bottlenecks related to IMEC include harmonizing cross-border rail shipments, including border-crossing infrastructure and processes. In the IMEC case, the rail route passes through four or five countries, creating three to four potential chokepoints along the route, in addition to the hard discontinuity at the ports.

This section focuses on rail interoperability among these countries. The following table presents a non-exhaustive list of interoperability elements across technical, legal/contractual, and operational domains.

Table 2.8 Cross-Border Rail Interoperability Dimensions

Cross-Border Rail Interoperability Dimension		
Technical: to ensure physical and system compatibility between infrastructure and rolling stock.[54][55]	Legal/Contractual: to provide a uniform legal framework for the carriage contract across borders. [55][56]	Operational: To cover the day-to-day rules and procedures for running trains smoothly. [57][58][59]
Key elements include the following:		
Track gauge and basic geometry (curve radius, superelevation, gradients)	A single consignment note valid for the entire journey (e.g., CIM under COTIF in Europe/West, SMGS in Eastern systems, or the common CIM/SMGS note)	Harmonized operating rules (train composition, tonnage, speeds, braking regimes, traffic management)
Axle load and loading gauge (clearance profile for wagons/containers)	Unified rules on carrier liability for loss, damage, or delay	Driver certification and language requirements
Electrification system (voltage, overhead catenary or third rail)	Contract formation, rights/obligations of shipper, carrier, and consignee	Maintenance and safety management systems
Signaling and train control systems (e.g., ETCS/ERTMS in Europe, or compatible equivalents)	Rules for dangerous goods (RID), use of vehicles (CUV), and use of infrastructure (CUI)	Timetabling and slot allocation across networks
Braking systems, couplers, and vehicle approval rules		Border procedures coordination (including with non-rail authorities)- customs, immigration, agriculture, health, and other border agencies

Track centers distance, platform heights/lengths, and siding lengths		
Cross-Cutting Issues		
Digital interoperability: data exchange, electronic consignment notes, digital twins, and real-time information sharing.		
Safety and certification: mutual recognition of vehicle/authorization approvals		
Institutional aspects: bilateral/multilateral agreements, corridor coordination bodies, and harmonization of licensing for railway undertakings		

At the strategic level, not every engineering parameter needs to be resolved in advance. The critical questions for IMEC are whether the corridor countries are converging on a common gauge and train-control philosophy, whether axle-load and loading-gauge standards are compatible with the intended freight market, whether traction changes are required at interfaces, and whether customs, contractual, and border procedures can be organized so that the time advantage of rail is not lost at national frontiers.

2.4.1 Regional legal and facilitation framework

The main regional agreement directly addressing rail interoperability in the Arab Mashreq is the Agreement on International Railways in the Arab Mashreq, adopted under ESCWA in 2003.[54] Article 3 requires existing lines on the agreed network to be upgraded to the treaty's technical specifications and requires new lines to be designed in conformity with Annex II.[54] Annex II establishes a common baseline centered on 1,435 mm standard gauge, a minimum UIC/B loading gauge, a nominal minimum speed of 120 km/h, axle-load parameters derived from UIC practice, minimum siding and platform lengths, and future electrification references linked to UIC and Trans-European railway standards.[54] For IMEC, this agreement is important because it creates a UIC-oriented technical reference point for Jordan, Saudi Arabia, the UAE, and Palestine, even though implementation remains uneven and many rolling-stock and operating issues still require national or bilateral follow-up.[54][55]

The broader facilitation framework is more fragmented. The Arab Transit Agreement provides a regional basis for transit facilitation among Arab states, but in practice, it has remained more road-oriented and less operationally robust than global transit tools.[59][60] The TIR system is the strongest documented common transit instrument across the IMEC states, but it is primarily a customs transit framework and, by itself, does not create a uniform railway carriage contract.[58] By contrast, Israel participates in the OTIF/COTIF system, including the CIM rules for international rail freight contracts, while Jordan is only an associate member, and the UAE and Saudi Arabia are not OTIF members.[56][61][55] This leaves the corridor with a clear legal gap, as technical convergence is progressing faster than contractual and customs convergence.[57][58][56][55]

2.4.2 Summary of Country-level interoperability assessment

Based on the country-level assessment, the following table summarizes the interoperability findings of this study.

Table 2.9 Country-Level Rail Interoperability Assessment

Component	UAE	Saudi Arabia	Jordan	Israel	Interoperability Implications
Gauge	Standard gauge [18]	Standard gauge / GCC standard [26]	Standard gauge under the Arab Mashreq framework and current national/project planning [54][35][36]	Standard gauge [40][41]	Gauge is the least serious interoperability issue
Axle load	Heavy-haul design on Etihad Rail [23]	GCC heavy-haul 32.4–34.2 t system [39]	30 t maximum axle load in Jordan's 2016 transport strategy; equivalent specification not yet fully restated in public material for the latest Aqaba project [35][36]	22.5 t published procurement benchmark [75]	The biggest technical gap is heavy freight moving into Israel
Loading gauge	Double-stack capable [23]	Double-stack GCC freight system [39]	7.1 m maximum vertical clearance in Jordan's 2016 transport strategy, suitable for double-stack container operations; full restatement for the latest project phase not yet public [35][36]	Compatible with European-/UIC-derived practice [41][42]	Double-stack continuity is not yet fully demonstrated end-to-end
Signaling	ETCS Level 2 [23]	ETCS Level 2 direction on key lines [25]	Likely to converge, but detailed public confirmation remains limited for the latest project phase [35][36]	ETCS Level 2 rollout underway [41][42]	Strong convergence trend
Electrification/ traction	Diesel operation today [18][23]	Diesel-based operation on major freight corridors [24][25][26]	Diesel traction in the 2016 strategy; likely diesel-first in initial implementation [35][36]	25 kV AC electrification expanding [41][42]	Traction break remains a practical issue
Regional rail framework	Outside OTIF/CIM; inside broader GCC/Arab setting [54][56]	Outside OTIF/CIM; inside GCC/Arab setting [54][56]	Party to Arab Mashreq rail agreement; OTIF associate member [54][56][61]	OTIF/CIM member [55][56]	Legal fragmentation is the main corridor gap
Customs/transit	GCC customs/transit + TIR [58][59][60]	GCC customs/transit + TIR [58][59][60]	Arab/GCC-adjacent transit tools + TIR [58][59][60]	TIR + OTIF/CIM legal layer [55][56][58]	No unified rail customs regime covers the whole corridor
Border/security basis	National and bilateral	National and bilateral	National and bilateral	Bilateral treaty basis with Jordan [76]	Border governance remains corridor-specific, not multilateral

2.4.2.1 Overall corridor interoperability implications

Taken together, the country profiles indicate that gauge is the least serious interoperability issue across the corridor. All four states are aligned, or moving clearly toward alignment, on standard gauge. There is also a strong trend toward signaling convergence, especially around ETCS-compatible systems. The more serious technical issue is axle-load compatibility, particularly the transition from the GCC's heavy-haul freight model in the UAE and Saudi Arabia to the lower published benchmark in Israel. The loading gauge appears broadly compatible in direction in all four states.

Beyond the technical layer, the larger challenge is institutional. The Gulf states operate within the GCC and Arab regional settings, Jordan occupies a hybrid position, and Israel sits within OTIF/CIM. Customs and transit rules remain fragmented, and border governance remains bilateral and national rather than corridor-wide. For that reason, the principal interoperability gap for IMEC is not only physical infrastructure but also the absence of a unified legal, customs, and border framework capable of supporting seamless cross-border rail freight.

2.5 Relevant Regional Network Components

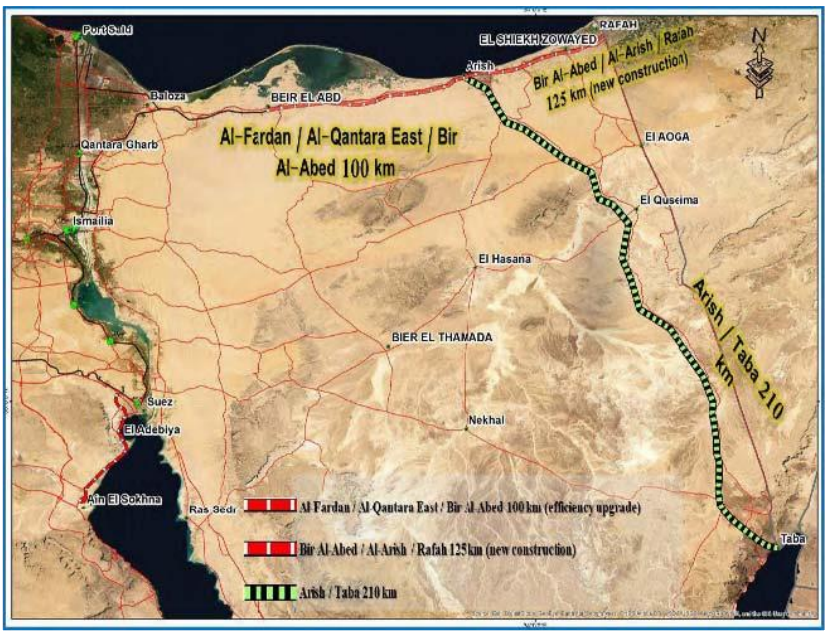
2.5.1 Egypt-Gaza Connection

The southern connection of Gaza at the Rafah crossing is planned, within the Pan Arab Rail Network, to connect to the Egyptian rail network.[13] Egypt is actively reviving and expanding the Sinai rail network as part of its national strategy to develop the Sinai Peninsula and integrate it into the country's transportation and logistics system.[62][63]

After more than 50 years of suspension, trial passenger services resumed in October 2024 on the refurbished 100 km Al-Fardan–Bir al-Abd line, with operations restarting from the Suez Canal area.[63][64] This forms the first phase of a larger railway corridor, about 500 km long, planned to extend from Al-Fardan/East Port Said through Bir al-Abd, Al-Arish, and Rafah to Taba.[62][63] The project is intended to boost passenger and freight movement, support industrial zones, mining, agriculture, and tourism, and create an east-west logistics corridor linking the Mediterranean and the Red Sea.[62]

The Rafah link is included in the plan as part of the Bir al-Abd–Al-Arish–Rafah segment, connecting onward to the broader Al-Arish–Taba corridor.[62] This alignment is intended to support logistics development in North Sinai and strengthen the integration of the border area into Egypt's wider transport and development strategy.[62][63]

Figure 2.8 Egypt's Planned Sinai Railway Connections toward Rafah



Egypt has an extensive rail network and substantial port and logistics infrastructure. A key component of the 2030 plan is the development of the Sinai Peninsula and its stronger integration with mainland Egypt through rail and logistics corridors.[62][65]

Source: Statement of Future Projects-Ministry of Transport. Egypt Vision 2030. A Presentation. Microsoft PowerPoint - SessionII_MinistryTransport_English_presentation_futureprojects-compr-v

2.5.2 Syria and Lebanon

In February 2026, Saudi Arabia and Syria agreed to deepen cooperation on railways and highways, aiming to leverage both countries' geographic positions to facilitate the movement of goods between Europe and the Arabian Gulf through more integrated transport networks.[66] The discussions provided for follow-up coordination between technical teams and included plans for a further meeting of transport experts to advance implementation details.[66]

This bilateral track fits into broader regional efforts, including the trilateral transport mechanism involving Türkiye, Jordan, and Syria, which aims to revive the historic Hejaz Railway corridor and strengthen a north–south transport axis extending toward the Gulf.[67][68] The trilateral framework also emphasizes technical coordination, harmonization of procedures, and the development of new rail connections among the three countries.[66][67]

In addition to reviving railway infrastructure, the trilateral framework calls for simplifying border procedures, reducing barriers for transport operators, linking ports to their hinterlands, and improving the wider logistics environment for regional trade.[67]

Lebanon has also expressed interest in participating in wider regional connectivity initiatives, but its role in IMEC-related rail development is still in the early stages of discussion.

2.5.3 Iraq's Development Road

Iraq's Development Road is a major multimodal infrastructure initiative involving an approximately 1,200 km corridor of parallel highway and railway lines running from southern Iraq to the Turkish border, with onward connections toward Europe.[69][70] Its rail component is planned as a new railway aligned with the wider corridor, alongside a parallel motorway intended to support freight movement and national logistics integration.[69][70]

While the overall goals of the corridor relate to Iraqi development and economic diversification, part of its purpose is to position Iraq as a transit hub connecting the Gulf and Asia to Türkiye and Europe, offering a potentially faster alternative to the Suez route for some cargo flows.[69][71]

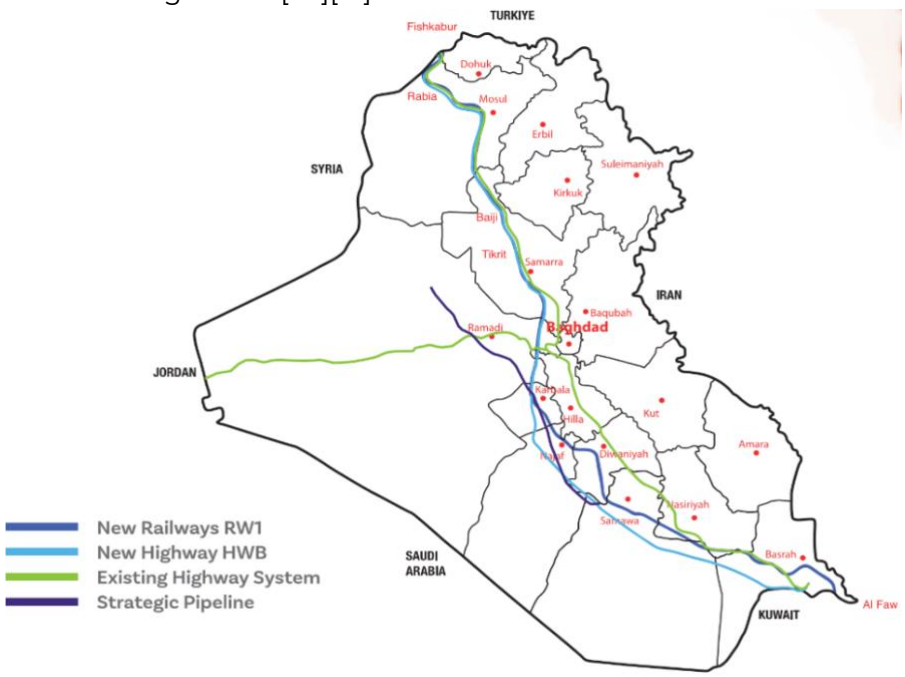


Figure 2.9 Iraq Development Road Railway and Highway Corridor

In April 2024, Iraq, Türkiye, Qatar, and the UAE signed a quadrilateral Memorandum of Understanding on cooperation in the Development Road project.[71][72] Iraq and Türkiye are the principal corridor states, while Qatar and the UAE are participating as strategic partners and potential financiers.[71][73]
Initial design work and soil surveys for parts of the railway alignment have reportedly been completed, while early construction and tendering activity have begun on connected infrastructure from the Grand Faw Port area northward.[70][74] Full completion is planned in phases, with key early sections targeted for the late 2020s, and the wider project extending toward 2050.[69][70]

Source: The Development Road Project. pdfdownload.php

3 Technical Feasibility Analysis

The technical feasibility analysis involves demand determination for the primary Gaza branch and its Gaza-side terminal component, in addition to route definition, interoperability, electrification, capacity, and cross-border operational considerations.

3.1 Demand Analysis

This section presents the demand analysis for the proposed West Bank-Gaza rail branch. The full Methodology, parameter tables, calculation framework, sensitivity analysis, and assumption register are provided in Annex A. The demand analysis is an early-stage planning model and should not be read as an investment-grade traffic forecast.

3.1.1 Methodology in brief

Demand is built in three layers that distinguish Palestinian origin-destination demand from IMEC through-transit:

- Layer 1 - Gaza origin-destination demand: Gaza imports, Gaza exports or re-exports, and potential Gaza-West Bank inter-territorial flows. The quantified base is anchored on the EcoPeace Pre-Feasibility Study [7] estimate of approximately 5,500 truckloads/day of post-stability import requirements for Gaza. Gaza exports and Gaza-West Bank flows are not separately forecast at this stage; this makes the estimate conservative for the Safe Passage segment.
- Layer 2 - West Bank origin-destination demand: West Bank external imports and exports through either the eastern gateway via KHB/Jordan or the western gateway via Gaza Port/Mediterranean markets. Gaza-West Bank flows are excluded from Layer 2 to avoid double-counting.
- Layer 3 - IMEC transit capitalizationby Gaza Port: Through-traffic between India/Gulf/Asia and Europe assumed to use Gaza Port as a Mediterranean gateway.

Three horizons are used: opening year 0 (assumed 2033), year 5 (2038), and year 15 (2048). These dates are placeholders and can be shifted without changing the model structure. Three scenarios are tested: Low, Base, and Upside. The Base case is an upper-central planning case for capacity and phasing decisions, not an expected forecast. None of the source studies directly models rail demand for this specific branch; the rail figures are an analytical synthesis of the source trade-flow evidence.

The 280-workday convention used to annualize road/crossing demand is taken from Gal [83]. EcoPeace [7] uses 360 crossing days/year for the Gaza import-needs table; applying 280 days to the rail-demand build is therefore a conservative normalization to KHB-type cross-border operations. Train-path calculations use separate rail operating-day assumptions: 300 days at opening, 313 days at year 5, and 340 days at year 15.

3.1.2 Combined branch demand and Gaza-side terminal component

Aggregating the three layers gives the planning envelope shown in Table 3.1. The final column is not the total Gaza Port throughput. It represents the indicative branch-related Gaza Port/western-gateway component: the Layer 1 reverse-flow uplift, the western-gateway share of Layer 2, and all Layer 3 transit captured by the Gaza Port. East-gateway cargo from KHB to Gaza and the West Bank, and eastern-gateway trade, are included in total branch demand but not in the Gaza Port/western-gateway column.

Table 3.1. Combined rail branch demand and indicative branch-related Gaza Port / western-gateway component, by scenario and horizon.

Scenario/horizon	Layer 1 Gaza O-D	Layer 2 West Bank O-D	Layer 3 IMEC to Gaza Port	Total rail branch demand (TEU/yr)	Indicative branch-related Gaza Port / western-gateway component
Low - opening	73,500	37,000	24,000	134,500	33,000
Low - year 5	117,600	83,600	72,000	273,200	90,100
Low - year 15	154,400	133,500	180,000	467,800	207,400
Base - opening	201,200	81,900	78,000	361,100	116,800
Base - year 5	301,900	183,700	273,000	758,600	346,400
Base - year 15	365,900	392,800	675,000	1,433,700	806,500
Upside - opening	468,800	151,200	210,000	830,000	324,100
Upside - year 5	694,200	353,400	787,500	1,835,200	1,001,800
Upside - year 15	766,400	863,600	1,837,500	3,467,400	2,239,700

Under the Base case, total rail branch demand is approximately 0.36 / 0.76 / 1.43 million TEU/year at opening, year 5, and year 15. The indicative branch-related Gaza Port/ western gateway component is approximately 0.12/0.35/0.81 million TEU/year. These figures exclude a separately quantified Gaza-West Bank inter-territorial trade layer because no reviewed source provides a robust post-stability forecast for that flow.

3.1.3 Trains per day and single-track sufficiency

Converting annual demand into trains per operating day uses horizon-specific operating days (300 at opening, 313 at year 5, and 340 at year 15; see Annex A.6), 70% train utilization, and standard intermodal capacities of 135 TEU for single-stack mixed loading and 270 TEU for double-stack operation. Empty-return uplift is applied to convert loaded-train equivalents into total train paths, reflecting directional asymmetry during Gaza reconstruction and more balanced IMEC transit over time.

Table 3.2. Total DS train paths/day

Scenario/horizon	Total TEU/yr	Op. days	Loaded SS @ 70%	Loaded DS @ 70%	Empty-return uplift	Total DS train paths/day
Low – opening	134,500	300	4.7	2.4	33%	3.2
Low - year 5	273,200	313	9.2	4.6	19%	5.5
Low - year 15	467,800	340	14.6	7.3	12%	8.1
Base – opening	361,100	300	12.7	6.4	33%	8.5
Base - year 5	758,600	313	25.6	12.8	18%	15.2
Base - year 15	1,433,700	340	44.6	22.3	11%	24.8
Upside – opening	830,000	300	29.3	14.6	34%	19.5
Upside - year 5	1,835,200	313	62.0	31.0	18%	36.6
Upside - year 15	3,467,400	340	107.9	54.0	11%	60.0

At the pre-feasibility level, Base-case demand is compatible with a single-track railway with passing loops, ETCS Level 2 signaling, and double-stack clearance, provided double-stack operations, high terminal productivity, and disciplined cross-border dispatching are achieved by maturity. If single-stack operation persists into year 15, the Base case would

require approximately 49 total train paths/day after empty-return uplift, leaving a limited margin within the indicative single-track envelope. The Upside year-15 case requires approximately 60 total double-stack paths/day and therefore approaches or exceeds the indicative envelope, making selective double-tracking a structural requirement under the peace-dividend scenario. All single-track conclusions must be validated by timetable simulation at the investment-grade stage.

3.1.4 Cargo mix and tonnage cross-check

The three cargo profiles are: (a) Gaza origin-destination demand, dominated at opening by reconstruction materials, consumer goods, and humanitarian/recovery inputs; (b) West Bank origin-destination trade in industrial inputs, consumer goods, and agricultural/industrial products; and (c) IMEC through-transit container traffic potentially captured by Gaza Port from competing Mediterranean gateways.. Bulk liquids, very high-value low-volume air cargo, and strategic or unsuitable cargo are excluded from the rail-demand model, consistent with the commodity-screening logic in Gal [83] and the cargo-type discussion in Fredman and Rozen [84].

The tonnage cross-check confirms that TEU volumes correspond to realistic intermodal trainloads. The Base year-15 demand of approximately 1.43 million TEU/year corresponds to approximately 10.8 million tonnes/year using layer-specific load factors: approximately 9 t/TEU for mature Layer 1 and approximately 7 t/TEU for general intermodal traffic in Layers 2 and 3. The branch is therefore more likely to be constrained by train paths, terminal productivity, storage, and border processing than by axle load, assuming the infrastructure is designed for heavy intermodal service.

3.1.5 Key findings

- Base-case total rail branch demand is approximately 0.36 / 0.76 / 1.43 million TEU/year at opening, year 5, and year 15. The Base case should be interpreted as an upper-central planning case, not an expected forecast.
- Layer 1 dominates at opening because Gaza reconstruction and recovery needs are front-loaded. Layer 3 becomes the largest layer by year 15, reflecting the strategic role of Gaza Port as a possible alternative Mediterranean gateway for IMEC transit.
- Single-track double-stack operation is sufficient for the Base case across all horizons. Under the Upside year-15 case, selective double-tracking, additional passing loops, or higher-capacity operations become prudent planning provisions.
- Layer 3 remains the most judgment-driven layer. Downstream investment-grade work must be validated through shipper interviews, gateway-choice modeling, port-competition analysis, and competing-route analysis, including Haifa, Syria-Turkiye, the Iraq Development Road, and other alternatives.

3.1.6 Key Assumptions and Limitations

The demand estimates are order-of-magnitude planning figures. The most important assumptions are: Gaza stabilization; Gaza Port commissioning before or at rail opening; a functioning Safe Passage operating regime; rail-compatible KHB operations; adequate terminal capacity; and a regional political environment that allows IMEC to function through Gaza Port. No figure in this section should be treated as an investment-grade forecast without primary shipper surveys, customs and border data, port-capacity analysis, commodity-level trade data, and timetable simulation.

3.2 Technical Specifications

3.2.1 Rail Track

Based on the demand analysis, a single-track railway with passing loops will be sufficient for Base-case demand through the West Bank and onto Gaza Port, provided that double-stack clearance and disciplined cross-border operations are achieved by maturity. Under the Upside scenario, selective double-tracking should be protected in the planning envelope.

3.2.2 Technical Interoperability Requirements

While legal and institutional interoperability requirements are essential for the sustainable operation of rail, this section focuses on technical interoperability as it relates to infrastructure.

Based on the analysis of the baseline in section 2, and to ensure proper interoperability, the following is a summary of the key technical requirements for the proposed line:

Table 3.3 Recommended Technical Requirements for the Proposed Railway

Item	Recommended requirement	Notes
Track gauge	1,435 mm standard gauge	Aligns with GCC, Jordan planning, Israel Railways, and the Arab Mashreq rail framework.
Track configuration	Single track with passing loops at opening; protect corridor for selective double-tracking	Adequate for Base-case demand if double-stack, terminal productivity, and cross-border dispatching are achieved. Upside maturity case requires protected double-track sections.
Passing loops	Freight-length loops, provisionally 1.5–2.0 km; spacing to be confirmed by timetable simulation	Required for long intermodal trains, recovery margins, and border/terminal queue management.
Design speed	Freight design: 80–120 km/h, subject to terrain	Lower speeds may apply on steep approaches to the West Bank/Jordan Valley. Final values require alignment engineering.
Gradients	Minimize ruling gradients; target heavy-freight gradients where feasible	Jordan Valley–ridge transitions are the critical constraint; tunnel/viaduct options may be needed to avoid excessive operating penalties.
Traction strategy	Electric-ready from construction; possible interim diesel-electric operation	A strategy that may be considered subject to funding availability.
Electrification	25 kV AC, 50 Hz overhead catenary	Aligns with Israel's electrification system and international heavy-rail practice. Double-stack clearance under the catenary must be explicitly designed.
Signaling and train control	ETCS Level 2 / ERTMS-compatible	Supports interoperability with Israel and European-compatible systems planned or used elsewhere in the corridor.

Item	Recommended requirement	Notes
Axle load	25–30 t design range; 30 t preferred for new heavy-intermodal sections	Must reconcile GCC/Jordan heavy-haul ambitions with Israeli interface constraints.
Loading gauge/clearance	Single-stack operational minimum; passive provision for double-stack clearance where feasible	Double-stack should be a civil-design provision, especially under bridges, tunnels, OCS, yards, and terminals.
Terminals and yards	Rail-compatible border yards, customs inspection areas, and the Gaza Port intermodal terminal	
Standards basis	UIC/Arab Mashreq-compatible civil standards, ETCS-compatible signaling, 25 kV AC electrification	Should be confirmed in the next feasibility phase through a formal design-basis memorandum.

3.3 Route Alternatives

According to the ToR of this study, the primary line under consideration moves from Jordan entering the West Bank at its eastern end, continues across the West Bank, existing near Tarqumia, at the western end of the West Bank, continuing through the Safe Passage, entering Gaza at the northern end, near Beit Hanoon (Erez) industrial zone, and from there continues to the Gaza Port.



The feasibility assessment of this study concerns the new sections that would be added to the IMEC, forming this branch towards the Gaza Port.

To define potential route alternatives, starting with the Jordan-West Bank border, there are two existing crossing points. These include the King Hussein Bridge, also known as Karameh (Allenby), an operational road bridge across the Jordan Valley between the West Bank and Jordan. The other appears at the closed Prince Mohammed or Damia bridge.

Aside from the crossing points, several factors need to be considered when defining the initial potential route. These include the following:

- Existing/Planned Rail Lines
- Grade Profile
- Seismic Activity, as the Jordan Valley area falls along a major seismic ridge.

The objective of factoring these issues into early route definition is to address cost impacts and align with existing or planned rail lines. Subsequently, the financial and environmental impacts can be assessed at a high level, along with the potential impact on communities, to enable a recommended alternative for a detailed feasibility study.

Based on these factors, two potential rail route alternatives were defined.

3.3.1 Option 1: King Hussein Bridge Route

The first option, on the Jordanian side, includes a link from the planned North-South rail link near the Sahab (Amman area) industrial and logistics hub, which is connected to air cargo via Queen Alia International Airport. From that starting point, the proposed route moves west towards King Hussein Bridge (Karamah/Allenby).

On the Palestinian side, the proposed route moves from the Bridge area westwards, connecting near the southern end of the proposed Palestinian North-South link, and continues westwards towards Tarqumia. From Tarqumia, it continues through the Safe Passage towards the Gaza border at Beit Hanoon (Erez) Industrial Zone, and from there to the Gaza Port. The map below illustrates this route.

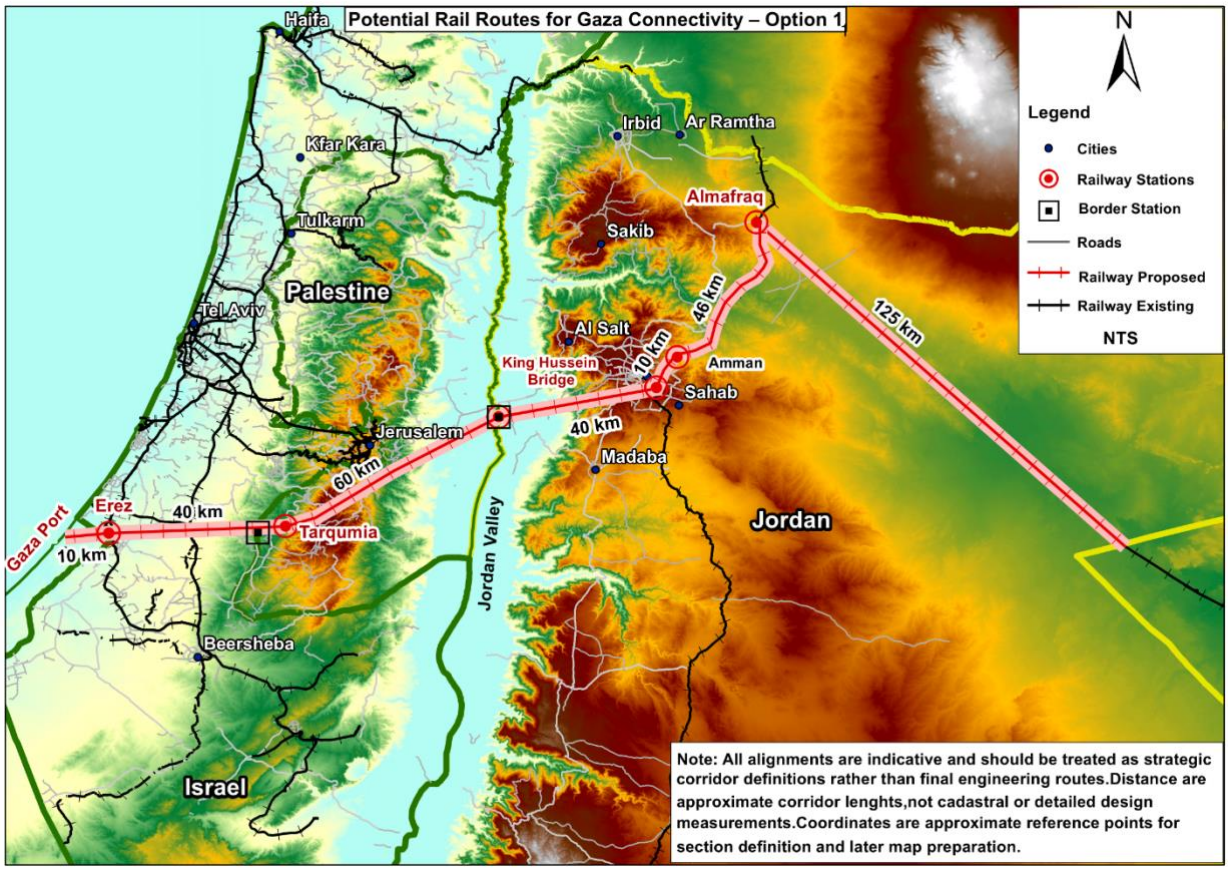


Figure 3.1 Route Option 1: King Hussein Bridge Alignment

Route Option 1: Entering the West Bank from Jordan near the King Hussein Bridge

As can be seen in the figure, the following summarizes the sections traversed along the route.

Table 3.4: Route Sections and Indicative Lengths – Option 1

Section	Length (km)	Description of key facts
Jordanian side of the route		
From the NS planned link near Sahab to the King Hussein Bridge.	40	Descending route from the Amman/Sahab plateau toward the Jordan Valley. Significant grade transition and seismic exposure near the Jordan Valley. A short local connector of approximately 10 km may be required, depending on the exact tie-in point between Sahab and the logistics hub.
Palestinian side of the route		
King Hussein Bridge (Karamah/Allenby) westwards to the proposed Palestinian NS link	Approx. 35	Starts in the Jordan Valley flat zone, within the seismic-ridge area, and then begins the climb toward the West Bank hill range. The exact split with the following section requires alignment engineering.
Central Ridge Southward, then to the west to Tarqumia	Approx. 25	Runs through the southern West Bank ridge corridor, then descends westward toward Tarqumia. (Together with the previous row, the King Hussein Bridge–Tarqumia corridor is approximately 60 km).
Tarqumia to the West Bank-Israel border, and onto the Safe Passage to Gaza	40	Relatively flat compared with the West Bank ridge sections.
Gaza border to Gaza Port	10	Relatively flat. Requires new Gaza-side rail access and integration with the planned Gaza Port terminal.
Indicative total, excluding local Sahab connector	150	Strategic planning length only.
Indicative total, including possible Sahab/local connector	160	To be confirmed after defining the precise tie-in to the Jordanian planned network and logistics hub.

3.3.2 Option 2: The Prince Mohammed (Damia) Route

This option on the Jordanian side starts at a junction from the planned rail link from Amman to Mafraq, and moves west towards the Damia Bridge, where it enters the West Bank.

Inside the West Bank, the route moves from the Damia Bridge Westwards, connecting with the planned North-South railway link, along the middle ridge of the West Bank. From there, it moves south, turns towards Tarqumia, then onto the Safe Passage to Gaza near the Beit Hanoon (Erez) Industrial Zone, and finally to Gaza Port.

The following figure illustrates this route.

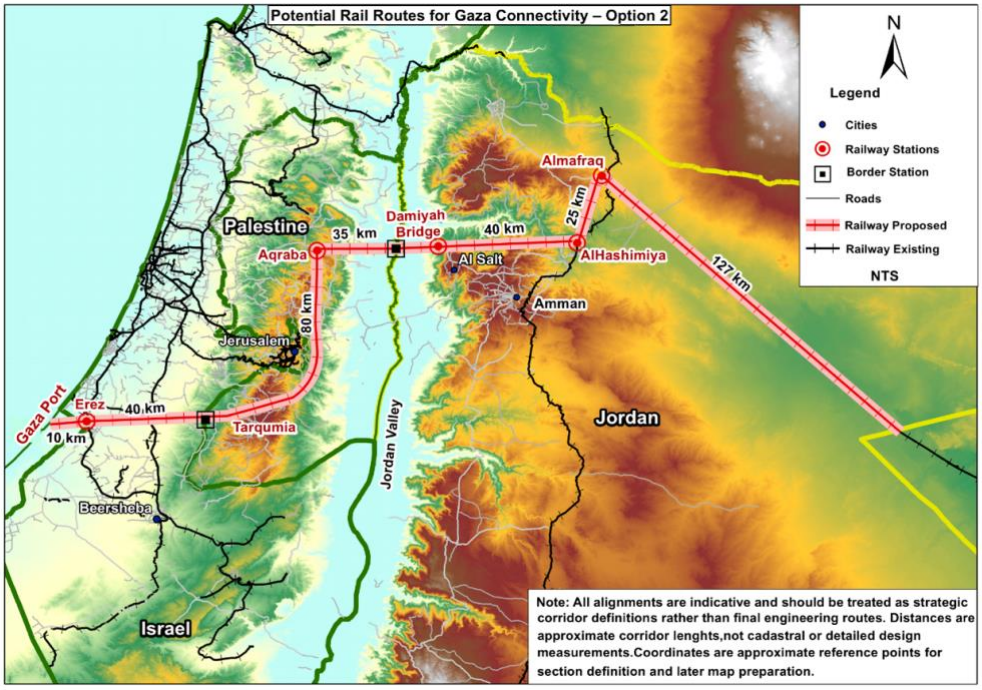


Figure 3.2 Route Option 2: Prince Mohammed (Damia) Bridge Alignment

Route Option 2: Entering the West Bank from Jordan, near Prince Mohammed Bridge

As shown in the figure, the following summarizes the sections traversed along the route.

Table 3.5: Route Sections and Indicative Lengths – Option 2

Section	Length (km)	Description of key facts
Jordanian side of the route		
From NS Planned Link Towards Damia Bridge	40	Traverses lower-gradient terrain toward the Jordan Valley, with potential environmental sensitivity around valley/natural reserve areas. Ends near the Jordan Valley seismic zone.
Palestinian side of the route		
Damia Bridge westwards to the proposed Palestinian NS link	35	Starts in the Jordan Valley flat area, within the seismic-ridge zone, then ascends toward the central/northern West Bank hill range.
Central Ridge Southward, then to the west to Tarqumia	80	Runs along the central ridge before turning west and descending toward Tarqumia.
Tarqumia to the West Bank-Israel border, and onto the Safe Passage to Gaza	40	Relatively flat.
Gaza border to Gaza Port	10	Relatively flat. Requires Gaza-side rail access and integration with planned Gaza Port facilities.
Indicative total via Mafraq and Al-Hashimiyah connector	205	

Conclusion

Option 1 is shorter and more direct, with an indicative Sahab–Gaza Port length of about 150–160 km, but it involves a steeper ascent from the Jordan Valley into the West Bank. Option 2 is longer, at about 205 km, but may offer a more northerly West Bank connection and potentially better integration with a future Palestinian north–south rail spine. However, length alone is not sufficient to define a more suitable option. This is especially the case given that the central NS West Bank link is proposed for future development. If that is factored into the length, i.e., "This link will be built," both options will have the same added length: the link from the Jordanian side to the West Bank Crossing, and from the West Bank Crossing to the NS proposed rail link in the West Bank. Yet, for purposes of this analysis, given that the planned NS rail link in the West Bank has not been built, the actual route options' measured lengths are used.

The next section presents the financial analysis, followed by the environmental assessment for both options.

4.Financial Analysis: CAPEX/OPEX

This section presents the strategic CAPEX/OPEX and financing-envelope assessment of the proposed Gulf–West Bank–Gaza electric railway corridor. It assesses capital expenditure (CAPEX) and operating expenditure (OPEX) for the two route options defined in section 3.3, namely Option 1 (King Hussein/Karamah-Allenby Bridge route) and Option 2 (Prince Mohammed/Damia Bridge route). The full demand build that underpins the OPEX and capacity reasoning is set out in section 3.1 and Annex A; the full calculation framework, country-by-country CAPEX build-up, sensitivity scenarios, and assumption register are presented in Annex B. In line with the Terms of Reference and the pre-feasibility, strategic nature of this study, all figures are order-of-magnitude planning estimates anchored in directly comparable regional and international benchmarks. They are not investment-grade cost estimates.

4.1 Methodology and Benchmark Framework

The assessment applies a bottom-up unit-cost method, segmenting each route into engineering-homogeneous sections (Jordanian approach, Jordan River crossing structure, central ridge to Tarqumia, Safe Passage, and Gaza access) and applying differentiated unit costs by terrain class and structure intensity. This approach is standard for pre-feasibility rail corridor studies. It is consistent with the World Bank's Railway Reform Toolkit and the European Investment Bank's pre-feasibility framework, both of which recommend transparent unit-cost benchmarking at this stage rather than detailed quantity surveying. [109][110]

Unit-cost benchmarks are drawn from three layers of comparable projects, prioritized in the following order: (i) directly comparable regional projects under active implementation or recent procurement, in particular the USD 2.3 billion Jordan-UAE Aqaba Port Railway (360 km, freight, standard gauge) [77][78] and the reported upper-bound USD 26.6 billion Saudi Landbridge programme (approximately 1,500 km, mixed-use) [28][29]; (ii) the Etihad Rail / UAE national railway programme, approximately AED 40 billion (about USD 11 billion) for the planned 1,200 km national network, with Stage Two covering the core 605 km Ghuwaifat-Fujairah/GCC link and using heavy-haul freight design, ETCS Level 2 signalling and double-stack capability [18][23]; and (iii) international electrified freight benchmarks for catenary and 25 kV AC traction works, including Rail Baltica and OECD freight-electrification literature. [111][112]

Country- or region-specific cost modifiers are then applied to reflect local conditions. Jordan-side costs are anchored on the implicit USD 6.4 million per kilometer Aqaba benchmark [77][78], adjusted upward for the descent into the Jordan Valley and seismic-zone engineering. Safe Passage costs reflect the higher unit costs of Israel Railways' electrification programs and security infrastructure, as well as the likely alignment through built-up areas, which may be tunneled or grade-separated. [41][42] West Bank costs assume greenfield construction in moderately challenging terrain with no existing rail right-of-way. Gaza-side costs include post-conflict site-clearance and unexploded ordnance (UXO) screening provisions consistent with the Gaza Rapid Damage and Needs Assessment. [10][105]

OPEX is built from train-paths-per-day outputs of the demand model (section 3.1 and Annex A) using standard freight-operations cost categories (energy, traction maintenance, crew, infrastructure maintenance, signaling and telecommunications, terminal operations, and administration). Unit costs are calibrated against published European freight-rail benchmarks and OECD/IEA evidence on the economics of electric versus diesel traction. [111][112][113]

4.2 CAPEX Build-Up by Route Option

Table 4.1 presents the indicative CAPEX build-up for both route alternatives, segmented by national jurisdiction and engineering section. The values shown are base-case estimates at constant 2026 prices and include civil works, track, signaling and telecommunications, electrification (25 kV AC catenary), border yards at crossings, and a single basic intermodal terminal at each national entry point. A 25 percent contingency is applied at the section level, consistent with World Bank pre-feasibility practice for early-stage estimates with limited engineering definition. [109][110]

The Jordan River crossing structure (bridge plus border yard) is treated as a single lump-sum item within the linear section build-up and is included in all subtotals and totals below. The base estimates also exclude the optional 10 km Sahab/local connector on the Jordanian side, which would add approximately USD 130 million, including contingency (about NIS 0.48 billion) if required; this is noted in Annex B and in the exclusions box (Box 4.1) at the end of this section.

Table 4.1. Base-case CAPEX build-up by route option, country/region, and engineering section.

Section	Length km (Opt 1 / Opt 2)	Unit cost (USD M/km)	Option 1 base CAPEX (USD M)	Option 2 base CAPEX (USD M)
Jordanian approach to the border	40 / 40	8.0	320	320
Jordan River crossing structure (bridge/border yard)	lump sum	120 (lump sum)	120	120
West Bank: Jordan River to NS spine connector	35 / 35	10.0	350	350
West Bank: central ridge / westward to Tarqumia	25 / 80	12.0	300	960
Safe Passage (Tarqumia–Gaza border)	40 / 40	18.0	720	720
Gaza border to Gaza Port (Gaza-side rail access)	10 / 10	14.0	140	140
Subtotal: civil and track (linear sections, including bridge)	150 / 205	—	1,950	2,610
Electrification (25 kV AC catenary) overlay	150 / 205	2.5	375	513

Border yards, terminals, depots, and control systems[1]	lump sum	350 (lump sum)	350	350
Cross-border interoperability and ETCS integration	lump sum	120 (lump sum)	120	120
Subtotal: direct construction (pre-contingency)			2,795	3,593
Contingency at 25 percent			699	898
Total base-case CAPEX (USD millions)			3,494	4,491
Total base-case CAPEX (NIS billions, at 3.70)			12.93	16.62

Source: Consultant's estimate. Unit costs informed by the Jordan-UAE Aqaba Port Railway (approximately USD 6.4M/km, freight, similar terrain) [77][78]; the Saudi Landbridge reported upper-bound programme benchmark (approximately USD 17.7M/km, mixed-use, longer span) [28][29]; the Etihad Rail / UAE national railway programme (approximately USD 9M/km equivalent across the planned 1,200 km programme, with Stage Two as the core heavy-haul/GCC link) [18][23]; OECD/IEA freight-electrification literature [111][112]; and Israel Railways electrification programmes [41][42]. Gaza access and Safe Passage premiums reflect UXO/site-clearance provisions [10][104][105] and the higher unit costs of built-up-area and security-sensitive alignments. [41][42] Subtotals and totals include the Jordan River crossing structure.

The aggregate CAPEX is approximately NIS 12.93 billion (USD 3.49 billion) for Option 1 and approximately NIS 16.62 billion (USD 4.49 billion) for Option 2. The headline difference of about NIS 3.69 billion (USD 1.00 billion, around 28 percent) is driven principally by the additional 55 km of ridge-following alignment in Option 2 between the central West Bank and Tarqumia, which carries both the highest section unit cost and the largest cost-driver weight in the overall build-up.

Several observations can be deduced from Table 4.1. First, the Safe Passage segment (Tarqumia to Gaza border) is the single most expensive linear section in both options, reflecting the combination of built-up terrain in Israel, the security architecture required at both the West Bank–Israel and Israel–Gaza interfaces, and the high likelihood that the alignment will require partial tunneling or some grade separation. Second, electrification adds roughly 14 percent to the linear civil cost, a ratio consistent with international experience for 25 kV AC freight electrification on new-build infrastructure. [111][112] Third, lump-sum items (Jordan River crossing, border yards, depot, cross-border ETCS integration) amount to about NIS 2.18 billion (USD 590 million) and are common to both options.

4.3 CAPEX Allocation by Country/Region

[1] Basic border yards, terminal interfaces, depot, and control center package, lump sum USD 350M, includes rail-compatible yards at the Jordan–West Bank crossing and Tarqumia/Safe Passage interface, basic terminal interfaces for West Bank and Gaza/Gaza Port operations, and one corridor-level depot/control-center package. Exact number, location, and scope to be confirmed at investment-grade design stage. Estimate is composite from Etihad Rail benchmarks.

Because the IMEC corridor spans multiple countries and regions, CAPEX is also presented in Table 4.2, broken down by the region in which the expenditure is incurred. This allocation is critical for downstream financing discussions, since each country's contribution is expected to be financed under its own sovereign envelope or through co-financing instruments anchored on that jurisdiction (donor trust funds for Palestine; bilateral and IFI financing for Jordan; private concession for the Safe Passage; and PGII[2]/IMEC pooled instruments for the integration overlay). The Jordan River crossing structure (USD 120 million) is allocated 50/50 between Jordan and Palestine, in line with standard practice for shared cross-border infrastructure.

Table 4.2. Base-case CAPEX allocation by country and route option (USD millions and NIS billions).

Country/jurisdiction	Option 1 (USD M)	Option 1 (NIS B)	Option 2 (USD M)	Option 2 (NIS B)	Share of total (Opt 1)
Jordan (Sahab/Mafraq to Jordan River, plus 50 % of the bridge)	380	1.41	380	1.41	11 %
Palestine-West Bank: (50 % of the bridge, plus Jordan River to Tarqumia, including the border yard)	710	2.63	1,370	5.07	20 %
Palestine-Safe Passage: Tarqumia to Gaza border, including built-up-area alignment	720	2.66	720	2.66	21 %
Palestine-Gaza: Gaza border to Gaza Port rail interface	140	0.52	140	0.52	4 %
Cross-border / corridor-wide overlays (electrification, ETCS, terminals, depot, contingency)	1,544	5.71	1,881	6.96	44 %
Total base-case CAPEX	3,494	12.93	4,491	16.62	100 %

Source: Consultant's estimate based on Table 4.1 and section-by-country mapping. The Jordan River crossing structure is allocated 50/50 between Jordan and the West Bank. Cross-border overlays include electrification, the ETCS/interoperability integration package, terminals and depots, and the 25 percent contingency reserve, presented here as a corridor-wide line for financing purposes.

Two financing implications are observed. First, the largest single allocation is the cross-border integration overlay, which accounts for approximately 44 percent of the corridor total and serves as the natural anchor for corridor-level multi-donor financing under PGII, EU Global Gateway[3], or an IMEC-coordinated instrument. [3][39] This line is a financing

[2] PGII, or the Partnership for Global Infrastructure and Investment, is a G7 initiative intended to mobilize public and private investment for high-quality infrastructure in partner countries. The G7 target is to mobilize up to USD 600 billion by 2027 for sustainable, inclusive, resilient infrastructure.

[3] EU Global Gateway is the European Union's external infrastructure strategy. It supports "smart, clean and secure" links in sectors such as transport, energy, digital connectivity, health, education, and research. The European Commission describes it as the EU's

presentation rather than a physical jurisdiction: it includes corridor-wide systems, electrification, terminals/depot, and the contingency reserve, some of which would ultimately be incurred inside national territories. Second, the Palestinian West Bank share is significantly higher under Option 2 (NIS 5.07 billion versus NIS 2.63 billion), with direct consequences for the level of donor mobilization required for the Palestinian segment. Conversely, the Jordanian, Israeli, and Gaza-side allocations are essentially insensitive to the route option chosen.

4.4 Operating Expenditure (OPEX)

Operating expenditures are primarily driven by traffic volume rather than route length, but route length influences energy use, infrastructure maintenance, and traction wear. OPEX is therefore built from the train-path output of the demand model (section 3.1 and Annex A, Table A.11), applied against unit cost categories calibrated to European freight rail benchmarks for electrified double-stack operations. [111][112][113] Table 4.3 presents Base-case OPEX for both options at the three model horizons (opening, year 5, and year 15).

The traction-energy line in Table 4.3 is calibrated using an effective consumption of approximately 80 kWh per train-km for heavy double-stack freight operating across the corridor's rolling, partly mountainous terrain, at an indicative blended regional industrial-tariff electricity price of USD 0.075 per kWh. It applies the same horizon-specific rail operating-day convention used in the demand model (300 days at opening, 313 days in year 5, and 340 days in year 15), so the energy line can be reproduced directly from train paths/day, route length, kWh/train-km, and the NIS/USD exchange rate. This figure is consistent with IEA evidence for heavy double-stack freight on gradient routes. It is appropriately higher than the approximately 25-40 kWh/train-km typical of flat-line single-stack operations. [111][112] All other OPEX categories are calibrated against the UK Office of Rail and Road (ORR) and the Train Operating Company (TOC) benchmarking dataset and adjusted for corridor-specific characteristics. [113]

Table 4.3. Base-case annual OPEX by option and horizon (NIS millions, constant 2026 prices).

OPEX component	Opening (Opt 1/Opt 2)	Year 5 (Opt 1 / Opt 2)	Year 15 (Opt 1/Opt 2)
Traction energy (25 kV AC, est. 80 kWh/train-km on this terrain)	9 / 12	16 / 22	28 / 38
Rolling-stock maintenance	55 / 60	110 / 120	200 / 215
Train crew (drivers, shunters, dispatch)	70 / 75	130 / 140	230 / 250
Infrastructure maintenance (track, structures, drainage)	90 / 123	97 / 132	108 / 148

contribution to narrowing the global infrastructure investment gap and aligning with sustainable development and climate goals.

Signaling, ETCS, and telecommunications	30 / 41	33 / 45	37 / 50
Terminal and border-yard operations	65 / 65	130 / 130	230 / 230
Administration, insurance, security, and regulatory fees	60 / 67	100 / 110	170 / 185
Subtotal: operating OPEX	379 / 443	616 / 699	1,003 / 1,116
Plus: annualized renewals reserve (est. 1.5 % of CAPEX)	194 / 249	194 / 249	194 / 249
Total OPEX (NIS millions/year)	573 / 692	810 / 948	1,197 / 1,365
Total OPEX (USD millions/year, at 3.70)	155 / 187	219 / 256	324 / 369

Source: Consultant's calculation. Train-path volumes from Annex A, Table A.11 (Base case: 8.5 / 15.2 / 24.8 total DS train paths/day at opening / year 5 / year 15). Unit costs informed by ORR European Benchmarking [113], OECD freight-electrification studies [111][112], and corridor characteristics. Route-length-dependent items (energy, infrastructure maintenance, signaling) scale by the 150 km/205 km ratio; volume-dependent items scale with train paths. Renewals reserve set at 1.5 percent of base CAPEX (NIS 12.93 B / 16.62 B).

Base-case OPEX rises from approximately NIS 570 million per year at opening to about NIS 1.20 billion per year by year 15 for Option 1. Option 2 is approximately 14-21 percent more expensive to operate annually under the Base case, with the premium narrowing over time as traffic-volume-driven costs become more important than route-length-driven costs. The OPEX gap between the options is narrower, in proportional terms, than the CAPEX gap because crew, terminal operations, and several administrative costs are largely volume-driven and are similar for both options when carrying the same traffic. The extra cost of Option 2 is concentrated in the route-length-dependent components, particularly infrastructure maintenance, signaling/telecommunications, and traction energy, which increase broadly in line with train-km.

The electric-versus-diesel cost advantage is reflected in the traction energy line, which is approximately one-half to one-third of the diesel-equivalent on a per-train-km basis under regional energy prices. [111][112] This advantage compounds over the project life and is a primary argument for the electrification investment, alongside the environmental and policy alignment discussed in section 6 and Annex C. [86][101]

4.5 Scenario Sensitivity Analysis

This assessment presents two separate views of cost sensitivity, which should be read together. The first is the engineering estimate range in Annex B, Table B.3. It tests how the cost changes when the underlying section-by-section unit costs and contingency assumptions are varied, producing a Low/Base/High range for current pre-feasibility cost uncertainty. The second is the scenario sensitivity range in Table 4.4. It starts from the Base case in Table 4.1 and tests broader external conditions, including favorable procurement conditions, commodity price shocks, political delays, severe delays, and IMEC integration. Both are anchored on the Base-case CAPEX of USD 3.49 billion (NIS 12.93 billion) for Option 1 and USD 4.49 billion (NIS 16.62 billion) for Option 2.

Table 4.4. Scenario sensitivity range — USD billions (NIS billions)

Scenario	Description	Option 1 CAPEX	Option 2 CAPEX
Base	Central-case unit costs and 25% contingency; project delivered on schedule.	3.49 (12.93)	4.49 (16.62)
Low (favorable)	Unit costs reduced by 15% through regional scale economies and integrated procurement under the IMEC umbrella.	2.85 (10.55)	3.66 (13.56)
High (commodity shock)	Unit costs +20% from steel, copper, and bitumen price escalation, in line with 2021–2023 volatility.	4.36 (16.13)	5.61 (20.74)
Political-delay scenario	Five-year political delay; 10% real cost escalation, and 15% rework applied to 60% of partially completed works.	4.16 (15.38)	5.34 (19.77)
Severe-delay scenario	Ten-year delay; 20% real escalation, 25% rework applied to 60% of works, and partial redesign for updated standards.	4.91 (18.15)	6.31 (23.33)
Optimistic-IMEC integration	Integrated IMEC procurement; 25% reduction on electrification, terminals/depot and ETCS package, with contingency reduced to 20%.	3.10 (11.47)	4.02 (14.86)

Source: Consultant's calculation. Scenarios are applied to the base-case build-up in Table 4.1. Low and High cases multiply pre-contingency construction costs and apply the stated contingency rates. In political-delay cases, it is assumed that 60 percent of pre-contingency direct construction is partially completed when rework is triggered; the rework percentage is applied to that share before contingency. The Optimistic-IMEC case reduces electrification, terminals/depot, and the ETCS package by 25 percent and applies a 20 percent contingency. Political-delay parameters are informed by World Bank infrastructure-delay studies and the documented cost evolution of the Saudi Landbridge (cost revision over a multi-year delay period). [28][29][109] These macro-level scenarios are distinct from the engineering estimate range in Annex B, Table B.3.

The sensitivity analysis highlights three issues. First, the difference between Option 1 and Option 2 is preserved across all scenarios, with Option 1 consistently around USD 0.8–1.4 billion (NIS 3.0–5.2 billion) cheaper. The route-length advantage of Option 1 is structural, not assumption-driven. Second, delay risk remains the largest high-end financial exposure. The severe-delay scenario adds approximately USD 1.4 billion (NIS 5.2 billion) to Base-case CAPEX for Option 1 and approximately USD 1.8 billion (NIS 6.7 billion) for Option 2, a cost increase comparable in magnitude to a major national segment of the investment. Third, integration with the wider IMEC procurement architecture is a concrete, policy-actionable cost-reduction lever; however, the broader Low scenario remains more favorable because it assumes wider market and procurement efficiencies beyond the systems-integration overlay alone.

Box 4.1: Items NOT included in the CAPEX / OPEX figures of this assessment

- Gaza Port construction and marine works (assessed separately under EcoPeace's Gaza Port pre-feasibility study [7]; indicative range USD 2–4 billion).
- Full rolling-stock fleet beyond the minimum service fleet sized to the Base case opening year (additional locomotives and wagon sets, indicative USD 300–600 million).
- Optional 10 km Sahab/local connector on the Jordanian side (indicatively USD 130 million including contingency, or about NIS 0.48 billion).
- Land acquisition, right-of-way procurement, and associated compensation across all four jurisdictions.
- Major utility diversions (water, gas, fiber, electricity, irrigation) along the alignment.
- Comprehensive security and surveillance systems and customs/ICT integration beyond the basic ETCS and border-yard provisions included in the overlay line.
- Connected logistics-zone development in Gaza and the West Bank (dry ports, free zones, intermodal yards beyond the basic terminals included here).
- Major tunnel and viaduct alternatives beyond the generic grade-separation allowance embedded in the Safe Passage unit cost, together with stations, should be added when surveyed alignment becomes available.
- Revenue-side cash flows: no tariffs, access charges, NPV, IRR, or carbon-pricing benefits are modeled (see Annex B.7 for the full assumption register).

4.6 Findings and Comparative Conclusion

The assessment supports four high-level conclusions. First, the corridor is large but not an exception by regional or international standards: a base-case CAPEX of USD 3.5 to 4.5 billion (NIS 12.9 to 16.6 billion) for a 150 to 205 km new-build electrified freight corridor sits within the range of comparable projects under active implementation or advanced planning in the immediate region, including the Jordan-UAE Aqaba Port Railway and the Saudi Landbridge reported upper-bound program benchmark. [28][77][78] Second, Option 1 has a material and durable financial advantage over Option 2, on the order of USD 0.8–1.4 billion (NIS 3.0–5.2 billion) across all scenarios. Third, the OPEX gap between the two options is proportionally narrower than the CAPEX gap, with Option 2 approximately 14-21 percent more expensive to operate annually under the Base case, narrowing to 14 percent by year 15. Fourth, the largest high-end financial risk is political delay, which is policy-driven rather than market-driven and is the area in which corridor-level diplomacy is most likely to generate measurable financial benefit.

Option 1 is financially preferred on CAPEX and OPEX grounds, but route selection remains conditional on environmental, heritage, and geopolitical factors, among others.

5. Environmental Assessment

This section provides a strategic environmental screening of the two route alternatives defined in section 3.3. The assessment remains an early-stage planning analysis and does not replace a full Environmental and Social Impact Assessment (ESIA), protected-area boundary survey, or investment-grade route-alternatives study.

5.1 Methodology and source framework

The analysis applies a corridor-screening method suitable for pre-feasibility route selection. It combines the route lengths and route descriptions in section 3.3 with a review of national plans, environmental regulations, protected-area literature, and international climate and post-conflict environmental assessments.

The screening focuses on eight dimensions: land take; protected areas and sensitive habitats; cultural heritage and landscape setting; wadis, drainage, groundwater, and flood risk; construction disturbance and spoil management; operational greenhouse-gas emissions; community and agricultural receptors; and permitting risk.

Because no surveyed alignment is available, the analysis distinguishes between confirmed protected-area crossings and likely protected-area interface risk. The findings should therefore be read as route-screening conclusions, not as final ESIA determinations.

Table 5.1 presents key national sources available for environmental protection regulation. Most of these regulations are, to a good extent, aligned with IFI requirements. However, while affirming the importance and need for such environmental assessments, these sources must be noted as insufficient; other regional and international environmental legal requirements will need to be utilized for the EIA, especially given the need for IFI financing.

Table 5.1. National and international environmental source framew

Source group	Key sources	Use in this assessment
Jordan national planning and regulation	Green Growth National Action Plan, National Climate Change Policy, National Adaptation Plan, Environmental Classification and Licensing Regulation No. 69 of 2020, Jordan CCDR.	Defines low-carbon transport, adaptation, water scarcity, ESIA, and environmental licensing requirements for the Jordanian approach sections. [85][86][87][88][89]
Jordan Valley and Jordanian protected-area sources	National Master Plan for the Jordan River Valley; UNESCO Al-Maghtas World Heritage listing; Protected Planet Swaimeh and Homret Maeen; Jordan Biodiversity protected-area portal.	Used to screen the King Hussein/Karamah-Allenby and Damia approaches for Jordan Valley, riparian, heritage, forest, and proposed/sensitive-area constraints. [90][91][92][93]
Palestinian environmental plans and law	National Adaptation Plan, Updated NDC, National Biodiversity Strategy action plans, Environmental Law No. 7 of 1999, Palestinian Environmental Assessment Policy, NSDP 2050, Road and Transportation Master Plan.	Defines the Palestinian planning, protected-area, Biodiversity, climate adaptation, and EIA context for the Jordan River-to-north-south rail spine connector sections. [94][95][96][97][98][48][46]
Palestinian protected-area literature	State of Palestine Biological Diversity Portal and Qumsiyeh et al. updated Protected Area Network review.	Used to identify Wadi el Qilt, Al Aghwar, Wadi Fasayil, Qarn Sartaba, Al Muzawqa, Ras Jadir, Wadi Gaza, and other relevant protected areas. [99][100]

International climate and Gaza environmental sources	World Bank West Bank and Gaza CCDR; Wadi Gaza Coastal Wetland sources; UNEP Gaza preliminary environmental assessment; Gaza RDNA; IEA rail emissions sources; UK GHG conversion factors.	Used for climate-resilience, post-conflict environmental risk, modal-shift, and GHG screening. [101][102][103][104][105][106][107][108]

5.2 Route scope and environmental baseline

Option 1 runs from the planned Jordanian network near Sahab to the King Hussein Bridge/Karamah-Allenby area, then from the crossing westward to the proposed Palestinian north-south railway spine, onward to Tarqumia, through the Safe Passage, and finally to Gaza Port. The indicative length is about 150-160 km.

Option 2 starts from a junction on the planned Amman-Mafraq link, proceeds west toward the Prince Mohammed/Damia Bridge, then crosses into the West Bank and connects westward to the proposed Palestinian north-south railway spine. From there, it runs south along the ridge before turning west toward Tarqumia, the Safe Passage, Gaza, and Gaza Port. It's indicative length is about 205 km.

Table 5.2. Route sections used for environmental screening.

Route section	Option 1 length (km)	Option 2 length (km)	Environmental relevance
Jordanian approach	40	40	Option 1 approaches King Hussein/Karamah-Allenby from Sahab; Option 2 approaches Damia via the planned Amman-Mafraq link.
Jordan River crossing to the proposed Palestinian NS rail spine	35	35	The key protected-area screening zone for both alternatives in Palestine.
Central ridge southward and west to Tarqumia	25	80	Option 2 adds substantial ridge mileage, increasing land take and construction footprint.
Tarqumia to the West Bank-Israel border and Safe Passage	40	40	Common section: environmental risk driven by border yards, security infrastructure, drainage, and construction disturbance.
Gaza border to Gaza Port	10	10	Common sections: coastal, debris, contamination, UXO, drainage, and Wadi Gaza interfaces require a detailed ESIA.
Indicative total	150-160	205	Option 2 is longer, but Option 1 has a higher risk of protected-area and heritage interface.

5.3 Protected areas and sensitive receptors

5.3.1 Jordanian side

Available Jordanian sources do not confirm that either option directly crosses a designated Jordanian protected area at this strategic stage. The limitation is that no surveyed alignment or GIS route polygon is available. The assessment, therefore, treats both options as requiring protected-area screening, with differentiated risk by approach corridor.

For Option 1, the main environmental constraint is the southern Lower Jordan Valley setting around the King Hussein/Karamah-Allenby approach. The Jordan River Valley Master Plan identifies Wadi Al-Kharrar/Baptism Site as a proposed protection area next to the northern Dead Sea. At the same time, UNESCO lists the Baptism Site “Bethany Beyond the Jordan”/Al-Maghtas on the eastern bank of the Jordan River, about 9 km north of the Dead Sea, and notes its protection through heritage and site-level management controls. The World Database on Protected Areas also lists Swaimeh and Homret Maeen as terrestrial and inland water protected areas, totaling 62.49 km2. [90][91][92]

For Option 2, the Damia approach does not appear to be within a confirmed protected-area polygon, according to the available sources. The wider northern Jordan Valley and northern highlands nevertheless include designated or recognized reserves and sensitive ecological settings, including Ajloun Forest Reserve, Dibeen Forest Reserve, and Yarmouk Forest Reserve, which become relevant if the alignment shifts north or into highland/wadi corridors. [93]

5.3.2 Palestinian side: Jordan River to proposed north-south rail spine

The Palestinian Protected Area Network consists of 28 areas and has increased the protected landmass from 9% to 9.98%. It was prepared through a review process involving EQA, IUCN, the Ministry of Agriculture, the Ministry of Local Government, and the Palestine Institute for Biodiversity and Sustainability, and is relevant to land-use planning and the National Spatial Development Plan. [99][100][48]

Option 1, from King Hussein/Karamah-Allenby Bridge westward to the proposed north-south rail spine, has high protected-area sensitivity. The likely screening interface is the Jericho/Jordan Valley/eastern-slope landscape, especially AlAghwar (Jordan Valley), Wadi el Qilt, Qarn Sartaba, El Katar, Jerusalem Wilderness, and related wadi and spring systems. These areas include Category II, IV, V, and Ib sites in the revised Protected Area Network and should be avoided by alignment design. [99][100]

Option 2, from Damia/Prince Mohammed Bridge westward to the proposed north-south rail spine, has moderate-to-high protected-area sensitivity. The main screening constraints are Wadi Fasayil, Qarn Sartaba, Al Aghwar, Al Muzawqa, Ras Jadir, and, depending on alignment drift, other Tubas/Jericho eastern-slope protected areas. [99][100]

Table 5.3. Protected-area screening summary.

Segment	Option 1	Option 2	Implication
Jordanian approach	No confirmed direct protected-area crossing, but higher sensitivity near King Hussein/Karamah-Allenby, Wadi Al-Kharrar/Baptism Site, Swaimeh, and Homret Maeen, in the northern Dead Sea setting.	No confirmed direct protected-area crossing; the Damia approach requires screening for Jordan Valley riparian/wadi habitats and possible northern reserve interfaces if the route shifts north.	Option 1 has a higher heritage and proposed/sensitive-area permitting risk; Option 2 has a lower confirmed protected-area risk but still needs GIS screening.
Palestinian connector from Jordan River to NS spine	High sensitivity: AlAghwar, Wadi el Qilt, Qarn Sartaba, El Katar, Jerusalem Wilderness, and Jericho/eastern-slope systems are likely screening constraints.	Moderate-to-high sensitivity: Wadi Fasayil, Qarn Sartaba, AlAghwar, Al Muzawqa, and Ras Jadir require avoidance and GIS optimization.	Same as for the Jordanian approach
Common Tarqumia/Safe Passage/Gaza sections	Same as Option 2.	Same as Option 1.	Does not differentiate the two options; requires separate Gaza and Safe Passage ESIA.

5.4 Option 1: King Hussein Bridge Route

Option 1 remains the shorter and more direct route. This gives it a clear advantage in terms of route-length-dependent impacts, including permanent land take, construction disturbance, material movement, spoil generation, and operational emissions. Annex B estimates a permanent linear footprint of about 375 ha for the 150 km core route, or about 400 ha if the possible Sahab connector is included.

Potential environmental advantages

- Shortest route length: approximately 150-160 km compared with approximately 205 km for Option 2.
- Lower route-length-related permanent footprint, temporary construction disturbance, construction traffic, drainage-crossing count, and operating tonne-kilometers.
- Lower gross rail operating emissions for the same freight volume, before considering embodied carbon and grade/traction differences.
- More direct connection to the Sahab/Amman logistics area and Queen Alia International Airport cargo catchment, which may reduce some external truck-km if logistics facilities are concentrated there.

Potential environmental constraints

- Higher protected-area and sensitive-area screening risk on the Jordanian side because the route approaches the southern Lower Jordan Valley near King Hussein/Karamah-

Allenby, Wadi Al-Kharrar/Baptism Site, the northern Dead Sea setting, and Swaimeh and Homret Maeen. [90][91][92]

- Higher cultural-heritage and landscape risk because the Baptism Site/Al-Maghtas World Heritage landscape requires buffer, visual-impact, access, and heritage-impact screening even if the railway does not enter the property or buffer. [91]
- High Palestinian protected-area sensitivity from the Jordan River crossing to the proposed NS rail spine, especially around Al Aghwar, Wadi el Qilt, Qarn Sartaba, El Katar, and Jerusalem Wilderness. [99][100]
- Potentially more difficult grade and slope transition from the Jordan Valley into the West Bank ridge, which may require cuttings, tunnels, viaducts, retaining structures, and spoil disposal areas.
- Higher risk of redesign if GIS screening confirms direct or close protected-area, spring, wadi, heritage, or community interfaces.

Overall, Option 1 is environmentally efficient in terms of length, but it entails high protected-area, heritage, and permitting requirements.

5.5 Option 2: Prince Mohammed (Damia) Route

Option 2 is longer and therefore performs worse on land take, construction footprint, and gross operating emissions. However, the protected-area screening conducted for this redraft indicates that the Damia option poses the lesser risk to protected or sensitive areas, subject to detailed GIS alignment optimization.

Potential environmental advantages

- Lower confirmed protected-area risk on the Jordanian side than Option 1, based on currently available sources; the immediate Damia approach is not confirmed as lying inside a designated protected-area polygon.
- Potentially more avoidable Palestinian protected-area interface, provided the alignment avoids Wadi Fasayil, Qarn Sartaba, Al Aghwar, Al Muzawqa, Ras Jadir, and other revised PAN sites. [99][100]
- Potentially lower heritage and visual-landscape risk than the King Hussein/Karamah-Allenby/Baptism Site/Jericho landscape, although archaeological screening remains required.
- Better ability to connect to the central/northern portion of the proposed Palestinian NS rail spine, which may allow route optimization along already disturbed corridors.
- A more northerly connection may allow future environmental trade-offs to be managed through alignment alternatives before descending south along the ridge.

Potential environmental constraints

- Longer total length of about 205 km, adding approximately 112.5-137.5 ha of permanent linear footprint and approximately 180-220 ha of temporary construction disturbance compared with Option 1.
- Higher route-length-related construction emissions, material requirements, drainage structures, vegetation clearance, dust, noise, and spoil generation.
- Moderate-to-high protected-area sensitivity on the Palestinian connector if the route encroaches on Wadi Fasayil, Qarn Sartaba, Al Aghwar, Al Muzawqa, Ras Jadir, or Tubas/Jericho eastern-slope habitats. [99][100]

- Potential for a higher community and agricultural interface because the route spends more distance in the West Bank ridge and valley system before turning toward Tarqumia.

At this point, absent a more detailed environmental assessment, neither option can be excluded on environmental grounds. Both remain viable, pending further detailed assessment.

5.6 Comparison of potential impacts

Table 5.4. Comparative environmental impact assessment.

Impact category	Option 1	Option 2	Comparison of Options
Permanent land take	Lower: approximately 375-400 ha linear footprint.	Higher: approximately 512.5 ha linear footprint.	Option 1 preferred on route-length footprint only.
Construction disturbance	Lower: approximately 600-640 ha temporary disturbance.	Higher: approximately 820 ha temporary disturbance.	Option 1 is preferred on the construction footprint only.
Operational GHG emissions	Lower gross route-length emissions.	Higher gross route-length emissions due to longer route.	Option 1 is preferred on operating emissions, but both remain lower than road freight under the modal-shift proxy.
Jordanian protected area and heritage risk	Moderate-to-high: King Hussein/Karamah-Allenby approach, Wadi Al-Kharrar/Baptism Site, Swaimeh and Homret Maeen, northern Dead Sea setting.	Moderate: Damia's approach has no confirmed designated protected-area crossing but requires riparian/wadi and northern-reserve screening.	Option 2 preferred.
Palestinian connector protected-area risk	High: likely screening interface with AlAghwar, Wadi el Qilt, Qarn Sartaba, El Katar, and Jerusalem Wilderness.	Moderate-to-high: Wadi Fasayil, Qarn Sartaba, AlAghwar, Al Muzawqa and Ras Jadir require avoidance.	Option 2 is preferred because the risk appears more avoidable.
Wadis, springs, and drainage	High around Jericho/eastern slopes and Wadi el Qilt systems.	Medium-high around Wadi Fasayil, Sartaba and Tubas/Jericho eastern-slope systems.	Option 2 is slightly preferred, subject to hydrology.
Permitting risk	Higher because protected areas, UNESCO/heritage, visual, and wadi constraints may trigger redesign and additional approvals.	Moderate-to-high but more manageable if GIS optimization avoids revised PAN sites.	Option 2 preferred.
Overall environmental suitability	Both options remain viable pending a more detailed environmental assessment.		

5.7 Environmental and Social Impact Assessment (ESIA) Requirements

Under Jordanian Regulation No. 69 of 2020, railway and bridge infrastructure would be treated as a high-risk activity requiring comprehensive EIA procedures if classified as Category 1. The Palestinian Environmental Assessment Policy also requires screening to identify projects that may affect natural reserves, wetlands, archaeological and cultural sites, or other sensitive receptors. [88][98][109]

Additionally, and for purposes of IFI financing, a detailed ESIA is required for either alternative.

5.8 Key assumptions and limitations

This assessment is based on desk sources, strategic route lengths, and route descriptions rather than a surveyed alignment. No protected-area polygon overlay, land ownership map, hydrology model, biodiversity baseline, social baseline, or heritage-impact assessment has been completed. The conclusions, therefore, indicate general environmental suitability for next-stage study, not final approval.

6. Overview of Economic and Social Impacts on Palestine and Jordan

This section provides a brief, evidence-based overview of the economic and social impacts of the proposed new IMEC branch on Palestine and Jordan. In line with the strategic, pre-feasibility nature of this study, the section is deliberately concise. It identifies the principal channels through which the corridor would affect the economies of Jordan and Palestine, as well as the dimensions most relevant to Gaza's recovery and long-term regional cooperation. It does not constitute a full economic appraisal, a cost-benefit analysis, or an investment-grade socio-economic impact assessment, all of which would be required at the next stage of project preparation. [110]

6.1 Scope, method, and source framework

The Terms of Reference call for an initial overview of the potential impact on the national economies of Jordan and Palestine and an explicit treatment of how the corridor could serve and enhance the reconstruction of the Gaza Strip, in line with EcoPeace's earlier work on the humanitarian and trade corridor. [7][115] The analysis below addresses three dimensions: national-economy effects in Jordan and Palestine, and the specific contribution of the corridor to Gaza's recovery and reconstruction. It also adds a fourth, social-impact dimension covering employment, female labor participation, community effects along the alignment, and the social cohesion implications consistent with EcoPeace's Peace Triangle framing. [5][6]

The method is consistent with the framework used in the preceding sections of this report. It is desk-based, draws on the demand and CAPEX outputs presented in sections 3 and 4 of the main report, and is anchored on the latest available macroeconomic and reconstruction-needs evidence for the corridor economies, including: the World Bank's most recent Macro Poverty Outlook and country briefs for Jordan and for the West Bank and Gaza; [116][117] the joint EU–UN–World Bank Gaza Rapid Damage and Needs Assessment (RDNA), April 2026, which establishes the post-conflict reconstruction baseline; [10] Jordan's Economic Modernisation Vision and supporting transport and logistics analyses; [118][119] the Palestinian National Spatial Development Plan 2050 and the Road and Transportation Master Plan; [48][46] and EcoPeace's own pre-feasibility study on the humanitarian and trade corridor. [7]

Where applicable, the analysis reuses the demand envelope from section 3.1 (a Base-case rail branch demand of approximately 0.36, 0.76, and 1.43 million TEU per year at opening, year 5, and year 15) and the CAPEX/OPEX figures from section 4 (Base-case CAPEX of approximately USD 3.5 to 4.5 billion across Options 1 and 2). This ensures internal consistency across the technical, financial, and economic chapters of this report.

6.2 Macro-economic context of the corridor economies

Table 6.1 provides a concise macroeconomic snapshot of the two anchor economies in this study, namely Jordan and Palestine, distinguishing between the West Bank and Gaza within Palestine. The data are presented at a strategic level of detail to frame the discussion of impact potentials in section 6.3.

Table 6.1. Macro-economic snapshot of the corridor economies (2024–2025 baseline).

Indicator	Jordan	West Bank	Gaza Strip
Real GDP growth, 2025	Approx. 2.8% (full-year estimate).	Approx. 3% (modest recovery from a low base).	Underlying activity remains largely paralyzed; any 2025 statistical rebound is from an extremely low base after the 2024 contraction.
GDP scale, indicative (current US$)	Approx. USD 60–61 billion economy (2025 estimate); small, import-dependent, services and tourism-led.	Combined West Bank and Gaza GDP is about USD 14 billion (2024); both territories remain materially below pre-conflict baselines.	Gaza's economy contracted by approximately 83-84% relative to the pre-conflict 2023 baseline; underlying productive activity remains severely impaired.
Labor market (most recent quarterly data)	Overall unemployment among all residents was about 16.2% in Q3 2025; unemployment among Jordanians was about 21.4%; female unemployment among Jordanians was about 33.9%.	West Bank unemployment elevated due to lost access to the Israeli labor market and pervasive movement restrictions; structural informality.	Mass displacement of 1.9 million people; over 60% of the population has lost their homes; near-total loss of formal employment.
Transport and logistics policy framework	The Economic Modernization Vision targets the transport and logistics sector's contribution to GDP of more than JD 2.9 billion by the early 2030s.	The National Spatial Development Plan 2050 and the Road and Transportation Master Plan both identify rail as a strategic gap.	The Rapid Damage and Needs Assessment identifies the free movement of people, goods, and reconstruction materials as an enabling condition for recovery.
Reconstruction needs	Not applicable; host economy and prospective logistics gateway.	Required for both Gaza and the West Bank under the EU–UN–World Bank RDNA framework.	USD 71.4 billion over 10 years, of which USD 26.3 billion is required in the first 18 months.

Source: Compilation from the World Bank Macro Poverty Outlook and country briefs for Jordan and the West Bank and Gaza [116][117]; the Jordan Department of Statistics quarterly labor-market release for Q3 2025 [122]; the Palestinian Central Bureau of Statistics and Palestine Monetary Authority Economic Monitor for 2025 [120]; the joint EU–UN–World Bank Gaza Rapid Damage and Needs Assessment, April 2026 [10]; Jordan's Economic Modernisation Vision [118]; and supporting transport and logistics literature [119][48][46].

Several issues are worth noting. First, Jordan is a relatively small, services-led, import-dependent economy of around USD 60–61 billion at current prices (2025 estimate), [116] that has positioned the transport and logistics sector as a strategic growth pillar under the Economic Modernization Vision, with a target of more than JD 2.9 billion sectoral GDP contribution by the early 2030s. [118] A Gulf–Mediterranean rail corridor passing through Jordan is therefore aligned with national policy rather than in conflict with it. Second, the Palestinian economy remains in a deep recession driven by movement and access

restrictions, fiscal pressures arising from clearance-revenue deductions, restrictions on economic activity, declining revenues, and reduced external support. [117][120] Even in the West Bank, the most resilient component of the Palestinian economy, GDP per capita is not expected to recover to pre-conflict levels before approximately 2028. [121] Third, the scale of Gaza reconstruction needs (USD 71.4 billion over ten years, with USD 26.3 billion required in the first 18 months) is unprecedented in regional terms and cannot be delivered efficiently without a credible, high-capacity logistics backbone. [10]

6.3 Indicative economic-impact pathways

Table 6.2 summarizes the principal pathways through which the proposed corridor would affect the Jordanian and Palestinian economies. Each pathway is treated qualitatively, with indicative magnitudes drawn from the demand and CAPEX outputs of this study and from international rail-sector benchmarks. The discussion below the table elaborates on the most significant pathways.

Table 6.2. Indicative pathways to national-economy impact.

Channel	Jordan	Palestine (West Bank & Gaza)	Indicative magnitude/direction
Construction stimulus	Civil works and electrification on the Jordanian segments: an opportunity for Jordanian contractors and suppliers.	Construction of West Bank, Safe Passage, and Gaza-side segments; localized employment if procurement is structured for local content.	Order-of-magnitude CAPEX of USD 3.5–4.5 billion over the construction period; concentrated multi-year demand for engineering, materials, and unskilled labor.
Logistics and gateway revenues	Transit fees, terminal services, and corridor management revenues; capture of value-added logistics services around Sahab/Mafraq/Amman.	Gaza Port handling revenue, intermodal services, free-zone and warehousing activity; West Bank dry-port and terminal services at major nodes.	Recurrent revenue stream that scales with corridor throughput; in the Base case, total branch demand grows from approximately 0.36 to 1.43 million TEU per year between opening and year 15.
Trade facilitation and export competitiveness	Could lower inland-haul costs to the Mediterranean; improved access for Jordanian exports to European markets through Gaza Port.	Could lower freight unit costs for Palestinian imports and exports, reduce reliance on truck-only chains, and reduce reliance on a single border crossing.	Lower freight rates and shorter transit times could translate into measurable competitiveness gains for tradable sectors; the magnitude depends on tariff and access regimes.
Reconstruction logistics for Gaza	Jordan serves as a marshaling and transit base for materials, equipment, and humanitarian cargo bound for Gaza.	Bulk delivery of construction materials, equipment, and humanitarian goods at scale; reduced unit costs and	Approximately USD 26.3 billion in early-recovery needs over the first 18 months; rail-based delivery of even a fraction of this demand could represent a

		reduced congestion at land crossings.	material reduction in delivered logistics cost.
Employment	Direct construction and operating jobs in Jordan; indirect demand in supply chains and services.	Direct construction and operating jobs in the West Bank and Gaza, including reconstruction-linked employment.	Indicative employment estimates are provided in Annex D, Table D.1, based on standard infrastructure employment-intensity benchmarks.
Regional integration	Strengthening the position of Jordan as a Gulf–Mediterranean logistics hub within the IMEC architecture.	Reintegration of Palestine into regional trade networks, one of the few infrastructure investments that could physically connect Gaza, the West Bank, and Jordan in a single logistics chain.	Strategic, not directly quantifiable; magnitude depends on the degree of political normalization and on harmonization of customs and rail-operating rules.

Source: Consultant's analysis. CAPEX magnitudes from section 4 of this report; demand envelope from section 3.1; reconstruction figures from the joint EU–UN–World Bank RDNA, April 2026 [10]; employment-intensity benchmarks from international infrastructure-sector studies [106][125].

6.3.1 Jordan

For Jordan, the corridor offers three economically material opportunities. The first is a construction-phase activity associated with the Jordanian segments of the alignment, the cross-border bridge structure, and the corridor-wide electrification overlay. Based on the Base-case CAPEX in section 4 of this report (Table 4.2), Jordan's direct construction share is on the order of USD 380 million (about NIS 1.41 billion), to which must be added a share of corridor-wide overlays and contingency. The second is recurrent revenue associated with the operation of the corridor as a logistics gateway, including transit fees, terminal services, and value-added logistics activities clustered around Sahab, Mafraq, and the Amman metropolitan area. This is consistent with the Economic Modernization Vision's intent to grow the transport and logistics sector's GDP contribution. [118] The third is a strategic positioning effect: a functioning Gulf–Mediterranean electric railway corridor passing through Jordan, with Palestine extension, further reinforces Jordan's role as a logistics hub within the India–Middle East–Europe Economic Corridor (IMEC) and Pan-Arab rail architecture, with potential spillovers in investment attraction, investor perception, and bilateral cooperation. [5][39]

The principal constraints on the realization of these benefits are domestic. Jordan's labor-market structure, with overall unemployment of about 16.2% among all residents and 21.4% among Jordanians in Q3 2025, suggests that the employment dividend will be sensitive to procurement design and to the availability of a trained domestic workforce for railway operations and logistics. [116][122] Active labor-market policies, vocational training in rail-sector occupations, and explicit local-content provisions are likely to be required to convert the headline construction and operating opportunities into durable employment outcomes.

6.3.2 Palestine

For Palestine, the economic impact pathways are larger in relative terms because the Palestinian economy is smaller, more fragile, and more constrained by movement and access. [117] Three key benefits stand out.

The first is reconstruction logistics for Gaza. Based on the joint EU–UN–World Bank RDNA, recovery and reconstruction in Gaza require approximately USD 71.4 billion over ten years, of which approximately USD 26.3 billion is required in the first 18 months. [10] Delivery of even a modest share of these material flows by rail rather than by truck would represent a material reduction in delivered logistics costs, road-system stress, and border congestion. The Layer 1 demand build in section 3.1 of this report is anchored on EcoPeace's pre-feasibility estimate of approximately 5,500 truckloads per day of post-stability import requirements for Gaza, [7] and the resulting Base-case Gaza-side rail demand corresponds to a material share of that requirement under the Base-case assumptions. The macroeconomic significance is therefore large relative to Gaza's pre-conflict GDP base, although precise estimates depend on assumptions about the pace of reconstruction, governance, and tariff regimes, which are beyond the scope of this study.

The second is West Bank trade facilitation. The West Bank economy is structurally constrained by reliance on truck-based freight and on a small number of land crossings, with measurable cost penalties for tradable sectors. [46][120] A functional rail corridor providing an alternative to the dominant road-truck logistics chain and a direct rail connection to a Mediterranean gateway could lower the effective transport cost of Palestinian imports and exports and, over time, support the industrial and agricultural diversification objectives of the National Spatial Development Plan 2050 and related Palestinian planning frameworks. [48][46]

The third is regional reintegration. The proposed corridor is among the very few infrastructure investments that could physically connect Gaza, the West Bank, and Jordan into a single logistics chain. It is also one of the few that could credibly link the Palestinian economy with the IMEC architecture and with the broader Pan-Arab rail network. [5][39] In a context where Palestinian economic recovery depends on the restoration of movement for people, goods, and reconstruction materials, the corridor represents an infrastructure expression of an enabling condition that the RDNA itself identifies as essential. [10]

As with Jordan, realization is conditional. The most binding conditions are political solution and movement-regime conditions, in addition to the establishment of an administrative and security framework for Gaza in line with UN Security Council Resolution 2803 (2025), adopted on 17 November 2025, [124] and rail-compatible operating regimes at the West Bank–Israel, Israel–Gaza, and Jordan–West Bank crossings. These conditions are discussed in detail in section 7 of this report (Geopolitical Analysis).

6.3.3 Gaza recovery and reconstruction

Consistent with the Terms of Reference, this sub-section makes explicit the linkage between the corridor and Gaza's recovery. The corridor contributes to Gaza's recovery through four reinforcing mechanisms.

- **Bulk delivery capacity**. A single double-stack train of 270 TEU could carry the equivalent of approximately 270 twenty-foot containers or 135 forty-foot containers, reducing the number of required truck movements and easing pressure on border crossings and roads, with a corresponding reduction in border-crossing dwell time and per-tonne delivered cost. [106][107] This is directly relevant to the scale of reconstruction inflows implied by the RDNA. [10]
- **Cost predictability**. Once operational, rail-based delivery exhibits markedly lower unit-cost volatility than truck-based chains operating across multiple borders. This matters for the financial planning of multi-year reconstruction programs and for the credibility of donor pledges.
- **Humanitarian-grade reliability**. Scheduled rail operations are easier to plan, monitor, and secure than diffuse truck flows, particularly for medical supplies, school materials, and other time-sensitive humanitarian cargo. [7] While the hope is that the humanitarian conditions would not persist until the construction and operationalization of the rail, if needed, rail presents a marked advantage.
- **Reconstruction multipliers**. The construction of the Gaza-side rail access, the Safe Passage, and the associated Gaza-side intermodal terminal and Gaza Port interface is itself an early-recovery activity that generates direct employment, restores logistics capability, and signals the credibility of the political and security framework on which broader reconstruction depends.

It is important to note here that the corridor's contribution to Gaza recovery is conditional on Gaza Port being commissioned, on the Safe Passage operating regime being functional, and on rail-compatible operations at the relevant land crossings, all of which are assumptions also used in the demand analysis in section 3.1 of this report and discussed further in the assumption register in Annex A.

6.4 Social impacts

Table 6.3 summarizes the principal social-impact dimensions associated with the corridor. The selected dimensions are those most directly relevant to Jordan, Palestine, and the wider regional context, as consistent with the ToR's emphasis on the social, as well as economic, contributions of the proposed initiative.

Table 6.3. Social impact dimensions and conditioning factors.

Social dimension	Expected effects	Risks and conditioning factors
Employment and skills	Direct construction and operating jobs across Jordan, the West Bank, and Gaza, with positive spillovers to local supply chains, training institutions, and the engineering profession.	Realization depends on local-content provisions in procurement, and on the absorptive capacity of TVET and engineering institutions.
Access to services and markets	Lower freight costs could ultimately reach the consumer; for Gaza, reliable bulk movement of materials and humanitarian goods is a precondition for restoring health, education, and shelter at scale.	Benefits accrue only if tariff and crossing regimes preserve the cost advantage of rail and if last-mile distribution networks are functional.

Community impacts along the alignment	Improved connectivity for communities adjacent to the alignment; potential reduction in heavy truck traffic on shared roads, with corresponding road-safety and air-quality benefits.	Land take, noise, severance, and construction disturbance require ESIA-grade management; equitable compensation and grievance mechanisms are essential.
Social cohesion and peacebuilding	Shared cross-border infrastructure could build confidence between Palestinian, Jordanian, Israeli, and Gulf actors and create durable economic interdependence consistent with EcoPeace's Peace Triangle framework.	Cohesion effects are conditional on the political settlement; in a cold-peace scenario, the corridor may operate without the wider social dividends it could otherwise generate.
Vulnerable groups in Gaza	Faster, larger-scale, and more predictable delivery of construction materials, medical supplies, and humanitarian goods supports women, children, older people, and persons with disabilities who have borne the greatest burden of the conflict.	Depends on the restoration of proper Palestinian governance in Gaza and the building of state institutions.

Source: Consultant's analysis, drawing on World Bank country briefs and Macro Poverty Outlook material [116][117]; the joint EU–UN–World Bank Gaza RDNA [10]; EcoPeace's pre-feasibility study on the humanitarian and trade corridor [7]; the Jordan Department of Statistics labor-market release for Q3 2025 [122]; and international evidence on rail-sector employment and gender outcomes [106][113].

The social dimensions that deserve specific attention include employment generation, which is potentially substantial during construction and significant, though smaller in absolute terms, during operation; an indicative employment build is provided in Table 6.4 with calculations in Annex D. Additionally, the corridor is a tangible expression of the Peace Triangle concept advanced by EcoPeace, [5][6] in which shared, climate-smart infrastructure underpins long-term regional cooperation.

Table 6.4. Indicative employment build for the proposed corridor, by phase and category.

Phase/category	Option 1 (150 km)	Option 2 (205 km)	Basis/assumption
Construction employment, person-years over construction.	Approx. 21,000–28,000 person-years.	Approx. 27,000–36,000 person-years.	Order-of-magnitude estimate using a 6–8 jobs per USD million CAPEX benchmark for civil and electromechanical works in new-build infrastructure, applied to Base-case CAPEX (USD 3.49 / 4.49 billion).
Indicative average annual workforce, over an illustrative 5-year construction period	Approx. 4,200–5,600 workers/year (average).	Approx. 5,400–7,200 workers/year (average).	Person-years divided by an illustrative 5-year construction period; the peak workforce in any given year would typically be higher than the average.
Direct rail operations (year 15)	Approx. 1,200–1,800 staff.	Approx. 1,400–2,000 staff.	Train crew, operations control, terminal and border-yard staff, infrastructure maintenance,

			signaling and electrification maintenance, and administration, scaled to year-15 train paths and route length.
Logistics and intermodal nodes (year 15)	Approx. 2,500–4,000 staff across corridor terminals, dry ports, and customs.	Same order of magnitude as Option 1.	Terminal-side employment is volume-driven rather than route-length-driven and scales with TEU throughput; both options share the same Base-case throughput envelope.
Indirect and induced employment	Approx. 1.5–2.5x direct rail operations and logistics employment.	Approx. 1.5–2.5x direct rail operations and logistics employment.	Indirect/induced multipliers from international infrastructure-sector employment studies; magnitude depends on local-content levels and the depth of domestic supplier industries.

6.5 Key assumptions and limitations

The following are the main assumptions and limitations related to this section. First, the analysis is strategic and qualitative; it does not attempt a cost-benefit analysis, an NPV or IRR computation, an input-output multiplier exercise, or a labor-market simulation. Each of these would be valuable at the investment-grade stage but is out of scope at the pre-feasibility level. Second, the macro-economic baseline reflects the state of the regional economy at the time of writing, using the latest available 2025 and April 2026 macroeconomic and RDNA evidence, which is itself unusual: Gaza's economy is largely paralyzed, the West Bank is in a deep recession, and Jordan is operating under elevated regional risk. [10][116][117][120] The impacts described above assume a transition out of this state, in line with the peace-maturity framing discussed elsewhere in the report. Third, the employment, multiplier, and revenue magnitudes reported here are anchored on international benchmarks and on the CAPEX and demand outputs of this study; they are not Jordanian or Palestinian national accounts estimates and should not be treated as such.

Despite these limitations, the principal finding of this section is robust. The corridor is materially relevant to the national economies of Jordan and Palestine. It is one of the few proposed infrastructure investments capable of operationalizing the scale of logistics activity implied by Gaza's reconstruction needs and its social impact. At the same time, conditional on the political and procurement framework, it is consistent with EcoPeace's Peace Triangle vision of shared, climate-smart infrastructure as a driver of regional stability. [5][6]

7 Geopolitical Analysis

7.1 Purpose, Scope, and Method

This section assesses the political feasibility of the proposed core route as one integrated corridor: Gulf ports through Jordan to the West Bank, onward through a Safe Passage arrangement, and terminating at Gaza and Gaza Port. It does not treat the route as a set of detachable sub-projects. The central question is whether a political package can align the interests, constraints, and decision points of the core actors whose support is necessary for the corridor to move from strategic pre-feasibility to investment-grade preparation.

The following analysis is based on publicly available information and expert assessment as of the study period. The geopolitical environment in the Middle East is highly dynamic. Assessments of political will and actor positions should therefore be treated as a snapshot of conditions at the time of writing, subject to rapid change in response to developments in the US/Israel-Iran war, the Israeli-Palestinian conflict, Gulf normalization processes, Gaza governance arrangements, and US foreign policy. The outcome of the Iran war will also shape what kinds of regional cooperation remain possible once the fighting subsides. [124][155][162]

The assessment included “political will”, which refers to whether an actor has a strategic reason to support the corridor; “political influence”, which refers to whether that actor can enable, block, finance, legitimize, or host part of the route, and “implementation feasibility, which refers to whether current political, security, financial, and institutional conditions allow that actor to act. These aspects of the analysis are essential to frame the geopolitical feasibility properly. An actor may have high political will but low implementation feasibility under current conditions. Similarly, an actor may support the corridor in principle but remain unable to commit unless certain conditions are clarified.

The core actors assessed are Palestine, Jordan, Israel, Saudi Arabia, the United Arab Emirates, India, the United States, the European Union and key member states, Egypt, Türkiye, Syria, and Lebanon.

7.2 Overview and Current Landscape

This assessment comes at a time of great geopolitical tensions, uncertainty, and a highly dynamic situation in the Middle East. With ongoing regional instability, active conflicts, and precarious ceasefires, the geopolitical feasibility of the IMEC and, in turn, the Peace Triangle proposal appears low in the immediate to medium term. The recent US/Israel-Iran war and the resultant disruption and closure pressure in the Strait of Hormuz have sharply stressed the urgent need to secure regional and global connectivity away from maritime disputes instigated by Iran or its proxies. This could potentially drive momentum for countries to actively invest in IMEC and thereby increase its geopolitical feasibility after the current round of war ends. [134][135][162]

The reconstruction and stabilization of Gaza is considered an urgent strategic need regionally and internationally. However, progress toward creating the right environment to effectively move the process forward has stalled, which also reflects negatively on the feasibility of such an undertaking in the immediate to medium term. The Board of Peace and the framework endorsed by UN Security Council Resolution 2803 provide a current diplomatic architecture. Still, the transition from ceasefire management to disarmament, civilian administration, Israeli withdrawal, Palestinian institutional participation, and reconstruction delivery remains incomplete.[124][133][149][155]

In assessing the various frameworks integrated into the Peace Triangle proposal, concrete expressions of political will - allocating resources, enacting legislation, and willingness to endure political pushback - remain limited. Nonetheless, there are strong expressions of interest, conditional in many cases, from the various players in the region regarding both IMEC and Gaza's recovery and reconstruction. Capitalizing on these interests through robust diplomatic engagement and advocacy efforts can help translate these expressions into concrete political will and build significant momentum toward regional stabilization and sustainable peace.

Despite the currently low geopolitical feasibility for the proposed project, the outcomes of several shifting dynamics in the coming months have the potential to boost political feasibility significantly:

- Significant progress in the implementation of the US Administration's 20-point peace plan, the enabling of the National Committee for the Administration of Gaza (NCAG) to assume civilian administration, security stabilization and the Israeli withdrawal from Gaza. [124][155]
- Substantive progress in the Palestinian Authority's reform efforts and readiness to assume Gaza administration from the NCAG and resume its responsibilities in the Strip. [124][147][148]
- The outcome of the upcoming Israeli general elections and the makeup of the new government. A more diplomatically inclined government would increase the likelihood that most regional players would engage constructively with the proposal.
- The outcome of the US midterm elections in November could produce a Congress more inclined to actively support a two-state solution outcome to the Palestinian-Israeli conflict.

7.3 Geopolitical Logic of the Corridor

The political logic of the corridor is different from that of a conventional railway project. A standard freight feasibility study would primarily ask whether traffic volumes, engineering costs, and operating efficiencies justify investment. This corridor requires a broader question: whether infrastructure can operationalize a political and economic framework that links Gulf connectivity, Jordanian logistics development, Palestinian territorial and economic integration, Gaza reconstruction, Israeli regional integration, and Mediterranean access.

IMEC provides the wider strategic architecture. Endorsed at the G20 New Delhi summit in September 2023 by the USA, EU, India, UAE, Saudi Arabia, France, Germany, and Italy, IMEC represents the most ambitious statement of Western strategic intent regarding Middle East connectivity in decades. Its core architecture is a rail and multimodal spine from the Arabian Peninsula to the Mediterranean through Jordan and Israel. [3][4]

The October 2023 outbreak of war in Gaza temporarily arrested IMEC's political momentum, but has not extinguished it. By 2025 and 2026, IMEC has re-emerged as an active priority, with the UAE-Jordan Etihad Rail agreement, Saudi Arabia's launch of its international freight service to the Jordanian border, and Haifa's integration into Israel Railways all reflecting IMEC-aligned investment decisions. [17][31][35][36][43] The discussion surrounding IMEC has also shifted from a fixed, single-linear route to a more flexible, multilayered network of interconnected pathways, sometimes referred to as IMEC 2.0. [141][145]

EcoPeace's proposed corridor is not a parallel track to IMEC. It is IMEC's missing Palestinian dimension. It proposes extending the corridor to integrate Gaza and the West Bank into the wider regional economy, while providing the Peace Triangle with a concrete transport backbone. Its value extends beyond connecting the Gulf to the Mediterranean; it lies in making Palestine part of the connectivity equation, creating a physical logistics link between the West Bank and Gaza, and providing Gaza with a durable freight and port platform rather than relying solely on temporary emergency channels. [5][6][7]

Combining IMEC with Gaza reconstruction creates significant synergies, transforming post-war Gaza from a conflict zone into a central logistics hub within a broader regional political, security, and economic framework. Creating synergies increases political feasibility by broadening the base of support, unlocking co-benefits, and maximizing funding and investment potential. The frameworks integrated into the Peace Triangle proposal have the potential to expand stakeholder buy-in by addressing multiple regional priorities simultaneously, creating an overlapping web of shared interests and incentives.

In addition, including political framing on Palestinian rights will help ease popular opposition to the prospect of regional normalization and the expansion of the Abraham Accords. The route should therefore be framed not as a bypass of the Palestinian question, but as a practical mechanism for pursuing Palestinian recovery, West Bank-Gaza connectivity, Jordanian logistics development, Gulf investment, Israeli integration, and regional connectivity within a single diplomatic package.

7.4 Normalization, Public Opinion, and the Abraham Accords Upgrade

Normalization and diplomatic relations with Israel remain extremely unpopular across much of the region. Citizens in Arab and regional states view the Palestinian cause as a central, non-negotiable issue. Public opinion polling across the Middle East demonstrates that normalization with Israel is deeply constrained by the absence of progress on Palestinian rights and by the aftermath of the Gaza war. [152][153] Despite decades-old peace treaties, popular rejection of normalization in Egypt and Jordan remains strong. Even in the UAE and Saudi Arabia, public support for formal ties or business deals with Israel remains low and lags behind government-level diplomatic considerations. [152][153][154]

The Peace Triangle proposal provides a pragmatic alternative to traditional full-scale diplomatic normalization: a pathway to normalization. The logic underpinning IMEC's infrastructure diplomacy remains valid. A framework backed by extensive commercial investments, institutional integration, energy cooperation, and multilayered governance creates overlapping dependencies that make reversal more costly for all parties. Durable peace is not built solely on trust between governments; It is built on a web of interests so dense that breaking the peace costs more than maintaining it.

Linking Gaza to IMEC institutionalizes normalization through daily economic and security coordination. However, the viability of this concept fundamentally requires treating reconstruction as a broader geopolitical package rather than only physical rebuilding. It demands a synchronized diplomatic effort from the United States, the European Union, the Gulf states, Jordan, Egypt, Israel, and Palestine to ensure that economic integration facilitates a lasting political resolution. An approach in which a pathway to Palestinian statehood becomes the pathway to regional normalization and integration for all stakeholders has the most potential to drive a sustainable solution and shared prosperity. [124][130][143][146]

The Abraham Accords of 2020 created the political and commercial foundation for the broader framework of Gulf-Israel economic cooperation on which IMEC depends. While the existing agreements have delivered benefits and largely remained stable, progress toward deepening and expanding the Accords has stalled amid widespread regional conflict and the failure to achieve regional stability. Criticism of the premise that regional stability and normalization could be achieved while indefinitely bypassing Palestinian rights has increased. [143]

The feasibility of IMEC's northern route logic hinges on at least a minimal level of Saudi-Israeli normalization or functional coordination. Saudi Arabia has not joined the Abraham Accords and remains interested in normalization only within a strategic framework that guarantees regional stability and a credible pathway toward a Palestinian state. [129][130][154] In Israel, public and political attitudes after the October 7th traumatizing attacks have hardened against Palestinian statehood or major concessions, driven mainly by security fears and concerns. [161] The only way to bridge these gaps is through an inclusive, credible diplomatic process led by the international community that holistically addresses the valid concerns of all actors in the region.

At the level of corridor diplomacy, the Peace Triangle proposal suggests a holistic and inclusive framework. In essence, it seeks to advance economic interdependence and security cooperation in tandem with a viable diplomatic process with a clearly defined deliverable.

7.5 The Gaza Reconstruction Imperative

There is tremendous regional and international interest in the recovery and reconstruction of the Gaza Strip, albeit motivated by differing and sometimes conflicting reasons, goals, and interests. It is considered a major priority by international bodies, regional powers, and the Palestinian government, all of whom have engaged in diplomatic and transitional planning initiatives. Gaza's post-war reconstruction needs are far beyond incremental repair; the report's baseline is based on the April 2026 RDNA estimate of approximately USD 71.4 billion over ten years, including USD 26.3 billion in the first eighteen months. [10]

Discourse around the reconstruction effort is being heavily conditioned on the sustainability of the ceasefire and on initiatives contingent on the disarmament of Hamas, the establishment of an effective civilian administration, and a credible security framework. The currently endorsed US-led transitional framework includes the Board of Peace, the NCAG, and international stabilization and reconstruction arrangements under the framework of UN Security Council Resolution 2803.[124][133][155] Nonetheless, the long-term success of reconstruction depends on a comprehensive framework that addresses the root causes and effectively all dimensions of the conflict. The main political challenge is balancing Palestinian political concerns with Israeli security concerns to stabilize the region and encourage regional and international investment.

The United States has taken an active role in pushing forward redevelopment and investment proposals to rebuild Gaza. The Trump Administration's 20-point plan provides broad American backing for Gaza reconstruction and has set the stage for broader international coordination, including through the Civil-Military Coordination Center (CMCC), where international representatives have been involved in stabilization, humanitarian, logistics, and engineering working groups. [155][156] While Israelis have been included in coordination processes, effective Palestinian inclusion remains a key political test.

The Palestinian Authority is eager to participate in Gaza reconstruction primarily to reunify and reintegrate the population and governance institutions throughout the Palestinian territory, and to reassert political and security control over the territory as an essential step in realizing Palestinian self-determination. In addition to national and political motivations, reconstruction would alleviate dire humanitarian conditions and enable the PA to access funds to rebuild critical infrastructure and stabilize the Palestinian economy. The PA remains suspicious of, and rejects, plans that seem to marginalize Palestinian political agency. [147][148]

While the current Israeli government has rejected a direct PA role in Gaza and some members of the Israeli governing coalition reject the PA's political role more broadly, the PA remains the only internationally recognized entity that can legitimately represent and negotiate a resolution on behalf of the Palestinian people. [160] Regional and international players committed to finding a viable solution to the Israeli-Palestinian conflict have insisted on a Palestinian Authority role in Gaza, albeit conditioned on governance reforms and serious security capacity-building efforts. [124][147][148]

Israel's interest and approach to Gaza reconstruction appear primarily driven by security considerations: stabilizing the territory, preventing Hamas military rebuilding, reducing radicalization, and maintaining strict control over dual-use risks. Gaza recovery is also important to Israel as a means of mitigating international pressure and preventing a humanitarian catastrophe that could further exacerbate regional instability. Press reporting has also indicated Israeli and US-linked discussions around a civilian port in Gaza and potential private-sector involvement in port and reconstruction infrastructure. [144][150][151]

The European Union is highly interested in Gaza reconstruction to foster stability, strengthen a reformed Palestinian Authority, and support eventual demilitarization and sustainable peace based on the two-state solution. It is mobilizing resources and has proposed a multiannual, comprehensive support program worth up to EUR 1.6 billion for the Palestinian Authority, while also renewing and preparing relevant CSDP missions, such as EUBAM Rafah and EUPOL COPPS, to support border management and Palestinian police training. [147][148]

The United Arab Emirates strongly supports Gaza reconstruction, but demands specific security and political conditions before investing heavily in the territory, including a reformed Palestinian governance structure, Hamas exclusion from governance, and a clear legal framework. The UAE is also in active discussions on infrastructure development, including the possibility of a Gaza port and DP World's involvement. [151][158]

Egypt considers the reconstruction of Gaza to be profoundly important. It views reconstruction as an essential strategy to protect its national security and maintain the integrity of its borders. A devastated Gaza creates a security and humanitarian vacuum on Egypt's immediate border, while the displacement of Palestinians into Sinai would threaten Egyptian sovereignty and regional security. Through mediation and reconstruction planning, Egypt also seeks to preserve diplomatic leverage in Middle Eastern diplomacy and ensure that Rafah, Sinai, and Suez sensitivities are not bypassed. [136][146]

Saudi Arabia is interested in Gaza reconstruction for strategic, political, security, and economic reasons. The Kingdom positions itself as a leading diplomatic champion for Palestinian rights. It seeks to assert regional leadership and political leverage to push for a viable political solution to the Israeli-Palestinian conflict. Riyadh views rebuilding Gaza as

an opportunity to protect regional stability, prevent the displacement of Palestinians, and help neutralize the influence of Iran-backed militant groups. Direct Saudi involvement in Gaza within an appropriate political framework would allow Riyadh to steer the path to a viable Palestinian state away from radicalism and toward pragmatic governance. [129][130][158]

Jordan is highly interested in facilitating massive, long-term reconstruction in Gaza. The Kingdom advocates for Palestinian rights and vehemently opposes any displacement of Gazans to neighboring countries. HRH King Abdullah II and Foreign Minister Ayman Safadi have definitively rejected plans that would force Gazans into Jordan or Egypt. [159] Jordanian leadership views displacement as an existential threat to the Kingdom and is strongly invested in stabilizing the Palestinian territories as a fundamental prerequisite for regional stability. Additionally, HRH King Abdullah is a staunch advocate for the two-state solution with East Jerusalem as the capital of an independent Palestinian state. He emphasizes this framework as the only viable path to achieving lasting peace, security, and stability in the Middle East.

Any progress on the broader reconstruction efforts' feasibility will also affect the feasibility of presenting Gaza's reconstruction as part of the IMEC project. Conversely, obstacles to reconstruction will, for the most part, also impede the proposed Gaza-IMEC connection. Key challenges include:

- The situation in Gaza remains blocked by uncertainty over the 20-point plan: whether and when Hamas will disarm and turn over governance to the NCAG, whether and when a reformed PA will assume responsibilities in Gaza, and the extent and sequencing of Israeli withdrawal.[124][149][155]
- Access restrictions, strict dual-use rules, and bureaucratic delays could create significant bottlenecks. Israel controls the movement of goods into Gaza, while many reconstruction inputs, such as cement, steel, heavy equipment, and critical infrastructure items, are subject to restrictions or review. [157][163]
- A successful reconstruction effort requires effective governance, law and order, legal responsibility, security control, and the ability to manage billions in aid effectively and prevent corruption. PA reform and the acceleration of a legitimate Palestinian administrative presence in Gaza are therefore crucial. [147][148]
- Donor fatigue and the risk of repeating another reconstruction-destruction-reconstruction cycle are serious constraints. Gulf states have signaled that they do not want to fund reconstruction again without guarantees that what they build will not be destroyed and without a credible political framework. [158]

Considering the tremendous interest in Gaza reconstruction and stabilization, incorporating Gaza reconstruction within IMEC may provide a pathway to expanding regional normalization. It also offers Israel and Palestine a competitive advantage in the face of regional connectivity proposals that might reroute IMEC in ways that bypass both Israel and Palestine, denying them the strategic, economic, and diplomatic benefits of integration. [141][145][146]

The scale of Gaza's destruction creates the need for new thinking about the logistics architecture of Palestinian recovery. EcoPeace's September 2025 Humanitarian and Trade Corridor study estimated that more than 5,500 truck-equivalent daily movements could be required at peak reconstruction. [7] No existing land infrastructure can deliver this at scale without major bottlenecks. The corridor proposed in this study directly addresses this need, transforming the Gaza reconstruction challenge from a logistical problem into a strategic opportunity: the infrastructure built to deliver reconstruction materials becomes the

permanent commercial backbone of Palestinian economic integration and Gulf-Mediterranean trade.

7.6 Overall Political Feasibility Assessment

The overall geopolitical finding is that the route from the Gulf to Gaza, through Jordan, the West Bank, and the Safe Passage, is strategically compelling but politically conditional. It aligns with a recognizable set of interests: Jordan's ambition to become a logistics hub; Palestinian interest in West Bank-Gaza connectivity and economic recovery; Gulf interest in diversified logistics and regional influence; India's interest in reliable Europe-bound connectivity; European interest in de-risked Eurasian routes and Palestinian stabilization; Israeli and US interest in regional integration linked to the Abraham Accords and IMEC; Egypt's interest in Gaza stabilization and Suez-compatible reconstruction logistics; and Türkiye, Syria, and Lebanon's interest in how a wider Levantine connectivity architecture is shaped. [4][5][7][66][67][68][126] [128][137][138][145]

However, alignment of interests is not the same as deliverability. The binding political issue is not whether the project has strategic value. It clearly does. The binding issue is whether the project can be packaged in a way that gives each core actor enough confidence to support the same route simultaneously. For Palestine, this requires agency, legitimacy, and a credible governance framework for Gaza. For Jordan, it requires financing and a clear Palestinian-benefit narrative. For Israel, it requires a security and inspection regime that is politically acceptable. For Saudi Arabia and the UAE, it requires a bankable project that is not exposed to immediate destruction or reputational backlash. For the United States and the EU, it requires a serious diplomatic package that can justify guarantees and concessional finance. For Egypt, it requires inclusion rather than bypass. For Türkiye, Syria, and Lebanon, it requires a complementary regional framing that reduces the risk that the Gaza route is treated as a zero-sum exclusion from Levantine connectivity.

The corridor should therefore be understood as a politically enabled infrastructure project. It cannot advance solely through engineering design, nor can it be reduced to a symbolic diplomatic proposal. It requires an integrated political package in which the route, security regime, border procedures, Gaza governance interface, financing instruments, and public narrative are mutually reinforcing.

7.7 Core Actor Alignment Matrix

Table 7.1 summarizes the route-wide political alignment of the core actors. The ratings are qualitative and reflect current strategic incentives, influence, and implementation constraints. They do not represent formal commitments by governments or institutions.

Table 7.1. Core actor alignment for the Gulf-Jordan-West Bank-Safe Passage-Gaza-Gaza Port route and its regional enabling environment.

Actor	Role	Political will	Influence	Binding constraint / enabling condition
Palestine/ PA	Host and direct beneficiary; source of legitimacy for West Bank-Gaza integration, Gaza terminal access, and regulatory authority.	High, if the Palestinian agency is protected.	High on legitimacy; limited on implementation capacity.	Credible Gaza governance, PA capacity, and a Palestinian-led planning and operating framework.
Jordan	Indispensable transit state and logistics hub	High.	High.	External financing, domestic political framing, and stable

Actor	Role	Political will	Influence	Binding constraint / enabling condition
	connecting the Gulf side of the corridor to Palestine and Israel.			cross-border arrangements with Palestine and Israel.
Israel	Controls the West Bank and Gaza.	Conditional / medium.	Decisive.	A security, inspection, and liability regime that separates controlled freight movement from unacceptable security exposure.
Saudi Arabia	Core Gulf sponsor, normalization variable, and strategic logistics actor linking the Gulf to Jordan.	Medium-high but conditional.	High.	A credible Palestinian political horizon, Gaza reconstruction guarantees, and alignment with Saudi regional legitimacy interests.
United Arab Emirates	Commercial logistics actor, Etihad Rail partner, investor, and potential implementation bridge to private-sector logistics operators.	High commercially; medium-high politically.	High.	Bankability, risk guarantees, and a role that complements rather than competes with Saudi and Egyptian interests.
India	Demand-side anchor and strategic justification for the India-Gulf-Europe connectivity proposition.	Medium-high.	Medium.	Operational reliability, secure transit, and a route that can be presented as commercially useful rather than politically speculative.
United States	Diplomatic broker, political enabler, security guarantor, and potential mobilizer of DFC and private capital.	Medium-high.	High.	Sustained political attention and willingness to support advancing political arrangements & normalization trade-offs.
European Union and key member states	Financing, standards, Palestinian institutional support, Jordan support, and Mediterranean connectivity partner.	High for Palestinian and Jordanian elements; medium on Israeli preconditions.	High.	Member-state alignment, safeguard compliance, and a clear diplomatic basis for engagement with Israel, Palestine, Jordan, and Egypt.
Egypt	Gaza-adjacent actor with influence over Rafah, Sinai security, Gaza reconstruction diplomacy, and Suez-related sensitivities.	Conditional.	Medium-high.	Inclusion in the reconstruction and logistics package, and assurances that the corridor complements rather than undermines Egyptian interests.
Türkiye	Core regional connectivity actor; potential Development Road and northern-corridor competitor; influential in Syria and Gaza diplomacy.	Medium-high but conditional.	Medium.	A complementary-corridor framing that avoids treating IMEC as a zero-sum bypass of Türkiye, and a Gaza/Syria setting that does not deepen Turkish-Israeli rivalry.
Syria	Levantine corridor and potential long-term rail/port actor; affects Jordan-Syria-Türkiye	Low-medium currently; potentially	Medium-low now; potentiall	Security stabilization, institutional capacity, sanctions and legal clarity, and a regional framework

Actor	Role	Political will	Influence	Binding constraint / enabling condition
	connectivity, alternative Mediterranean routes, and regional security.	higher if stabilizatio n advances.	y higher later.	that complements rather than displaces the Gaza route.
Lebanon	Eastern Mediterranean port and political actor seeking inclusion in regional connectivity; it affects port competition, Israel-Lebanon security, and Arab/Gulf reintegration narratives.	Medium-high leadership; low-medium feasibility.	Medium-low.	State capacity, security and sovereignty concerns, financing, and a consultation track that makes the corridor complementary to Lebanon's recovery rather than excluding it.

7.8 Actor-by-Actor Assessment

7.8.1 Palestine/Palestinian Authority

Palestine is not a secondary stakeholder in the Gaza route. It is the project's political center. The corridor's distinctive value lies in connecting the West Bank to Gaza, supporting Gaza's reconstruction, and placing Palestinian economic recovery within a wider regional connectivity architecture. Without Palestinian participation and ownership, the project would risk being perceived as an externally imposed transit project rather than a Palestinian recovery and integration instrument.

Palestinian strategic interest is therefore high. The route would lay the groundwork for a durable freight connection between the West Bank and Gaza, support Gaza Port as a future reconstruction and commercial asset, and strengthen the economic case for Palestinian territorial contiguity in functional terms, advancing potential for final-status resolution. It could also give the Palestinian Authority a practical regulatory agenda related to railway law, customs interfaces, terminal governance, safety oversight, and logistics-sector development.

Implementation feasibility is nevertheless constrained. Palestine currently lacks the permitting authority and control required for implementation. Additionally, it lacks a functioning railway, Gaza Port does not yet operate at a commercial scale, and Gaza governance remains a significant uncertainty. The recent warnings that the Gaza division could become permanent further reinforce the need for the railway to be framed as a West Bank-Gaza integration mechanism, not simply a Gaza reconstruction facility. [149]

The Palestinian enabling condition is a clear, recognized, and technically capable Palestinian role in corridor planning and implementation. This should include a Palestinian corridor unit or authority capable of working with Jordan, Israel, Egypt, the United States, the EU, and Gulf partners. EU support to the Palestinian Authority and the renewal of relevant EU civilian missions, including EUBAM Rafah and EUPOL COPPS, provide institutional entry points for border management, regulatory support, and rule-of-law capacity building. [147][148]

The political risk is legitimacy. Any arrangement that moves goods through Palestine or into Gaza without clear Palestinian governance, revenue, employment, and regulatory participation would weaken the project's peacebuilding rationale. The financing discussion around Palestinian revenues and Gaza reconstruction also indicates that fiscal arrangements will be politically sensitive and must not be treated as technical bookkeeping. [132]

7.8.2 Jordan

Jordan is the indispensable territorial and political bridge of the core route. The project directly supports Jordan's long-standing ambition to become a regional logistics hub connecting the Gulf to the Mediterranean and to Palestine. The route also provides a strategic economic rationale for accelerating Jordan's standard-gauge railway development, including the connection from the Saudi border to Jordanian logistics nodes and onward to the West Bank and Israel.

Jordan's political will is assessed as high. The UAE-Jordan railway agreement and the subsequent execution arrangements for the Aqaba mineral railway demonstrate that Jordan is willing to use rail as a national development and logistics instrument when financing and implementation partners are available. [35][36][77][78] The corridor would add a wider regional role to this national railway agenda, positioning Jordan as the operational land bridge between Gulf rail systems and Palestinian reconstruction logistics.

High political will does not eliminate political constraints. Jordan must manage domestic sensitivity around visible cooperation with Israel, particularly if the project is not clearly framed as supporting Palestinian rights, Gaza reconstruction, and West Bank-Gaza connectivity. Jordan also faces fiscal constraints and cannot be expected to carry the sovereign financing burden of the corridor alone. The Jordanian role, therefore, depends on an external financing package and on a public narrative that centers on Palestinian benefit rather than normalization for its own sake.

The recent Palestinian-Jordanian economic and logistical high-level discussions are important because they show that the Jordanian-Palestinian interface is not merely an engineering issue. It is also an institutional and commercial relationship that must be strengthened before rail operations can be credible. [131] For Jordan, the enabling condition is a financing and diplomacy package that allows the government to present the railway as both a national logistics project and a Palestinian recovery project.

7.8.3 Israel

Israel is the decisive control actor over the West Bank and Gaza, in addition to the Safe Passage, and for any practical movement regime between the West Bank and Gaza. The corridor cannot be implemented or operated without Israeli consent, security coordination, or a mutually acceptable inspection framework. This gives Israel very high influence over route feasibility.

Israel's strategic incentives are mixed. On one side, IMEC and related Gulf-Mediterranean connectivity initiatives can reinforce Israel's role in regional trade, strengthen its links to Gulf states and India, and support a broader Abraham Accords-based regional architecture.

[4][143] On the other side, a Palestinian-facing corridor through Safe Passage raises security, sovereignty, land-use, and domestic political concerns. The project, therefore, requires a careful distinction between Israeli interest in regional connectivity and Israeli willingness to enable a Gaza-bound Palestinian corridor.

The route should not be presented to Israel as an uncontrolled opening. Its feasibility depends on a controlled freight system with defined inspection points, sealed or monitored cargo movements, digital documentation, liability rules, emergency stop protocols, and third-party verification where appropriate. This approach is consistent with the report's emphasis on border procedures, interoperability, and institutional arrangements as essential to preserving rail's time advantage. [54][55][76]

Gaza reconstruction adds both a political opportunity and a political constraint. Israeli policy discussions on Gaza's future and reconstruction remain unsettled and politically sensitive, and press reporting on internal discussions should be treated as indicative rather than definitive policy. [144][150] From a feasibility perspective, the key requirement is not a fully resolved final-status settlement. It is a minimum operational agreement that allows controlled freight movement to Gaza under a governance and security framework accepted by Israel, Palestine, and international guarantors.

7.8.4 Saudi Arabia

Saudi Arabia is a core actor because the corridor depends on Gulf-to-Jordan connectivity, Saudi regional leadership, and the broader normalization and reconstruction context. Saudi Arabia's interest in infrastructure is real. Saudi Arabia Railways has already launched an international logistics corridor linking Gulf ports to the Jordanian border at Al-Haditha, which is one of the most concrete enabling developments for the southern portion of the IMEC architecture. [17][31]

Saudi political will is best assessed as medium-high but conditional. The Kingdom has a strategic interest in logistics diversification, Vision 2030 implementation, and positioning itself as a regional connectivity power. At the same time, Saudi Arabia has repeatedly linked deeper engagement with Israel to the Palestinian issue. The Saudi position on Palestinian rights and the importance of a political horizon is not peripheral to this project; it is central to whether the route to Haifa and Gaza can be politically packaged as part of a legitimate regional framework. [129][130]

Saudi participation also depends on the credibility of the reconstruction. Riyadh is unlikely to support or finance a Gaza-facing corridor if it believes that the infrastructure will be destroyed again or become politically associated with a failed reconstruction framework. For Saudi Arabia, the enabling condition is therefore a package that links Gulf-Jordan rail development, Palestinian economic recovery, Gaza governance in a way that is defensible domestically and regionally.

Saudi-UAE dynamics should also be managed. The two states share an interest in logistics and regional connectivity, but they are not identical actors and may compete over ports, logistics platforms, and regional influence. [142] This does not make the corridor infeasible. It means the project should give each Gulf actor a clear and complementary role: Saudi Arabia as the strategic Gulf-to-Jordan land bridge and political sponsor; the UAE as an

implementation, investment, and logistics partner; and both as part of a wider Gulf-backed reconstruction and connectivity package.

7.8.5 United Arab Emirates

The United Arab Emirates has a strong commercial and implementation interest in the route. Etihad Rail is already the most advanced national rail platform in the Gulf, and the UAE's agreement with Jordan provides a practical demonstration of Emirati willingness to invest in railway development outside its own territory. [18][35][36][77][78] This gives the UAE an unusually concrete role in moving the corridor from concept to implementation.

The UAE's political will is assessed as high commercially and medium-high politically. The corridor aligns with Emirati strengths in ports, logistics, rail development, private-sector partnerships, and infrastructure finance. It also fits the UAE's broader role as a regional commercial hub. However, the UAE is likely to remain disciplined about risk allocation. It will not treat Gaza-facing infrastructure as bankable unless governance, security, and political-risk guarantees are credible.

The UAE may be particularly useful in structuring terminal, logistics, and port-interface components, including through private-sector operators. References to discussions involving DP World and Gaza reconstruction illustrate that global logistics firms may play a role in reconstruction logistics if political conditions permit. [151] Such participation should be treated as contingent, not assumed. The more important feasibility point is that the UAE can help translate political endorsement into an implementable logistics structure.

The UAE enabling condition is a clear commercial role embedded in a multilateral political framework. If the corridor is framed only as a politically sensitive Gaza project, the UAE may hesitate. If it is framed as a bankable Gulf-Jordan-Palestine reconstruction logistics corridor with international guarantees and a strong Palestinian role, the UAE can be one of the most effective delivery actors.

7.8.6 India

India is a core actor even though it does not host the physical rail alignment. IMEC begins with India, and the strategic case for the corridor depends on Indian trade demand, Indian port connectivity, and India's diplomatic interest in diversified routes to Europe. India was a signatory to the IMEC announcement and is one of the principal beneficiaries of a more efficient, resilient, and politically diversified India-Gulf-Europe logistics chain. [3][4]

India's influence is different from that of Jordan, Israel, or Palestine. It does not control border crossings or Safe Passage. Its influence lies in demand creation, diplomatic legitimacy, trade facilitation, and the ability to give the corridor a broader economic rationale beyond Middle East politics. The UAE-India digital trade-facilitation relationship, including platforms such as MAITRI, also shows that India can contribute to the corridor's soft infrastructure through digital interoperability and customs modernization. [57]

India's political will is assessed as medium-high, conditional on operational credibility. India is unlikely to prioritize a route that remains politically symbolic and commercially uncertain. Its support becomes more consequential if the corridor can be presented as a credible

future logistics option with predictable transit procedures, secure cargo movement, and a reconstruction-development purpose that does not expose Indian participation to reputational or security risk.

7.8.7 United States

The United States is the most influential external political actor for the route. Its role is not primarily technical; it is diplomatic, strategic, financial, and security-related. Washington's interest in IMEC has been linked to supply-chain diversification, competition with rival connectivity models, regional integration between Gulf states and Israel, and the extension of the Abraham Accords logic into a more practical economic architecture. [4][126][143]

The United States has medium-high political will but uneven implementation leverage. Recent bipartisan legislative activity around the Eastern Mediterranean Gateway Act indicates continued congressional interest in the Eastern Mediterranean and IMEC-related connectivity. [126] The United States can also help mobilize DFC financing, political-risk guarantees, and private-sector interest. However, the US willingness and ability to secure Israeli acceptance, advance a credible Gaza governance package, and sustain attention beyond crisis management are the main constraints.

The most useful US role would be as a political enabler and guarantor of the route rather than as a construction manager. US support is needed to embed the corridor inside a broader diplomatic package that links Saudi normalization incentives, Israeli security requirements, Palestinian recovery, and Gaza governance. Strategic policy discussions around "IMEC 2.0" after the Gaza war reinforce the idea that the corridor's next phase must be tied to a post-war regional vision rather than treated as a pre-2023 connectivity project carried over unchanged. [141]

The US enabling condition is a clear deliverable. The corridor should be framed as a concrete, phased political-economic project within a wider regional settlement architecture: a rail-based reconstruction and trade corridor with Palestinian agency, Israeli security controls, Jordanian logistics benefits, Gulf sponsorship, and US/EU guarantees.

7.8.8 European Union and Key Member States

The European Union and key member states are central to the corridor's financing, standards, and Palestinian-development dimensions. The EU's interest is grounded in Mediterranean stability, uncontrolled migration flow safguards, de-risked Eurasian connectivity, climate-aligned infrastructure, and the long-standing European role in supporting the Palestinian Authority and Jordan. The Global Gateway strategy gives the EU an established framework for connectivity investment, while recent analysis of corridor politics highlights Europe's interest in diversified Eurasian routes. [128][145]

EU political will is assessed as high for the Palestinian and Jordanian components and as medium for direct pressure on the Israeli position. The EU can support technical assistance, regulatory preparation, safeguards, concessional finance, and institutional capacity. It can also help ensure that the corridor is framed as a climate-smart, rule-based, development-oriented project rather than a purely geopolitical alignment exercise. [127][128]

The EU also has concrete instruments relevant to Palestinian capacity and border governance. The Commission's multiannual support proposal for the Palestinian Authority and the renewal of EUBAM Rafah and EUPOL COPPS offer possible entry points for regulatory, customs, border management, and rule-of-law support. [147][148] These instruments do not by themselves make the corridor feasible, but they can reduce the institutional gap that currently limits Palestinian implementation capacity.

Key member states have complementary roles. Italy has a direct interest as a European terminus of IMEC. France has an important regional diplomatic role, including through Egypt and the Eastern Mediterranean. Germany has economic weight and credibility in infrastructure, standards, and development finance. The EU enabling condition is strong internal political alignment sufficient to support a corridor that is simultaneously a logistics project, a Palestinian reconstruction instrument, and a regional stability initiative.

7.8.9 Egypt

Egypt is not part of the physical rail alignment of the proposed core route. Still, it is a core geopolitical actor because the corridor terminates in Gaza, touches the Gaza reconstruction economy, and shapes regional perceptions of logistics. Egypt controls Rafah, has a central role in Gaza diplomacy, carries major Sinai security concerns, and is highly sensitive to any infrastructure narrative that appears to bypass the Suez Canal or reduce Egypt's regional logistics role.

Egypt's likely position is conditional rather than opposed. Egypt has a strong interest in stabilizing Gaza, avoiding uncontrolled spillover into Sinai, preserving its role in Palestinian diplomacy, and maintaining the strategic value of the Suez. At the same time, Egypt has publicly linked progress on the India-Europe corridor to resolving the Palestinian issue, which is broadly consistent with the Peace Triangle logic. [146]

Red Sea disruption and shipping volatility create a dual effect for Egypt. They increase international interest in alternative and complementary routes, but they also heighten Egyptian sensitivity to corridor designs that could be interpreted as competing with the Suez Canal. [134][135] The project should therefore be framed as complementary to Egypt's role, not as a bypass. Gaza Port, reconstruction logistics, Rafah-related coordination, and possible Egyptian participation in terminal, customs, or humanitarian logistics discussions should all be part of the diplomatic package.

Egypt's relationship with key European actors, including France, also offers a diplomatic entry point. The France-Egypt strategic dialogue and broader EU-Egypt engagement can help ensure that Egypt is consulted early and that its security and economic interests are integrated into the corridor's political design. [136] The Egyptian enabling condition is a role in Gaza's stabilization and reconstruction logistics that makes the corridor beneficial, or at least non-threatening, to Egypt's core interests.

7.8.10 Türkiye

Türkiye is a core regional actor because it is the principal northern connectivity power adjacent to the Levant and because its policy choices can affect both competing corridor narratives and the Gaza/Syria diplomatic setting. It is not part of the proposed physical

alignment. Still, it can influence the corridor by influencing post-Assad Syria and by engaging politically in Gaza. [71][72][137]

Türkiye's political will toward the proposed route is best assessed as medium-high but conditional. Ankara has an incentive to support regional trade expansion and to maintain relevance in Europe-Middle East connectivity. At the same time, it has reason to resist any corridor architecture that permanently channels Gulf-Europe trade through routes that exclude Turkish territory. This does not, by definition, make Türkiye an opponent. Still, it does make Turkish buy-in dependent on whether the corridor is framed as part of a wider regional network rather than as a bypass of Türkiye. [164]

The enabling condition is not Turkish authorization of the core route, but structured consultation and a complementary-corridor narrative. Türkiye should be treated as a regional actor whose cooperation can reduce diplomatic friction and whose exclusion could amplify competing-route politics.

7.8.11 Syria

Syria is a core regional actor because its stabilization and reintegration affect the wider Levantine connectivity architecture around the proposed route. It does not host the Gulf-Jordan-West Bank-Safe Passage-Gaza alignment, but it sits on potential northern and eastern Mediterranean routes that could either complement or compete with the Gaza corridor. The report already notes Saudi-Syrian transport cooperation and the trilateral Türkiye-Jordan-Syria mechanism to revive parts of the Hejaz Railway and strengthen regional rail coordination. [66][67][68]

Syria's political will is difficult to assess as a conventional expression of state capacity. The emerging Syrian position appears oriented toward reintegration, transport restoration, and attracting regional infrastructure interest, but current implementation feasibility remains low to medium. The country is still facing fragile transition conditions, internal security risks, damaged infrastructure, limited institutional capacity, and unresolved legal and financial constraints. [165]

The project should therefore treat Syria neither as a precondition for delivery nor as an irrelevant actor. Syria's role is prospective and regional. If stabilization advances, Syrian routes could become part of a broader Gulf-to-Mediterranean network. If instability persists, Syria will remain a source of security, insurance, and corridor-competition risk. The enabling condition is a regional framing that allows Syrian connectivity to develop as a future complement without displacing the Palestinian-inclusive Gaza route or the Israeli Haifa route.

7.8.12 Lebanon

Lebanon is a core regional actor because it is an Eastern Mediterranean state seeking inclusion in IMEC-related connectivity discussions and because Lebanese exclusion or instability can shape the political narrative around regional corridors. Lebanon does not host the proposed core route, but its ports, Israel-Lebanon security environment, and economic recovery needs make it relevant to the wider Levantine connectivity map. In

February 2026, Lebanese leaders publicly expressed interest in joining the US-led IMEC framework. [138]

Lebanon's political will at the state leadership level appears medium-high, driven by the desire to rejoin regional economic projects and secure a new recovery narrative after years of economic collapse and political instability. Implementation feasibility is much lower. Lebanon faces severe state-capacity constraints, financing limitations, port and infrastructure weaknesses, and unresolved sovereignty and security questions that would complicate any near-term rail or port integration.

Lebanon's practical relevance is not as an immediate delivery actor for the Gaza route, but as a regional legitimacy and corridor-competition actor. The enabling condition is early consultation and a complementary Levantine port-and-logistics narrative. Lebanon should be reassured that the Gaza route is not designed to exclude Beirut or Tripoli, but to create a wider regional connectivity framework in which Palestinian recovery and Eastern Mediterranean economic reintegration can be mutually reinforcing.

7.9 Required Political Package for IMEC-Gaza

The actor assessment points to a central conclusion: the route becomes feasible only if the political package is designed for the entire corridor, including Gaza and Gaza Port, while also managing the wider Levantine connectivity environment. Technical preparation can proceed in parallel, but the project cannot be credibly advanced as an investment-grade corridor until the following political conditions are addressed together.

Table 7.2. Required political package for the core route.

Condition	Function in the corridor	Principal actors	Feasibility implication
Palestinian ownership and institutional capacity	Prevents the project from being perceived as externally imposed and creates a legitimate counterpart for regulation, land, customs, and terminal governance.	PA / Gaza governance framework, EU, Jordan, United States	High priority precondition.
Gaza governance and reconstruction framework	Defines who can authorize, receive, operate, and secure Gaza-facing infrastructure and how reconstruction flows are managed.	Palestine, United States, Egypt, EU, Gulf states, Israel	Binding precondition for Gaza Port feasibility.
Safe Passage legal and security arrangement	Allows controlled rail freight movement between the West Bank and Gaza while addressing Israeli security requirements.	Israel, Palestine, United States, Jordan, EU	Most politically sensitive requirement.
West Bank control and security arrangements	Allows rail passage through the West Bank.	Israel, Palestine, United States, EU, Egypt, Saudi Arabia, and Jordan.	
Jordanian logistics-hub financing package	Enables Jordan to advance the corridor without unsustainable sovereign exposure and anchors the route in a practical logistics platform.	Jordan, UAE, Saudi Arabia, EU/EIB, United States/DFC	Necessary to convert political will into implementation .

Gulf sponsorship linked to Palestinian recovery.	Aligns Saudi and UAE roles with a legitimate Palestinian narrative and regional stability.	Saudi Arabia, UAE, Palestine, United States	Essential for political and financial credibility.
Egyptian inclusion	Reduces the risk of Egyptian resistance and integrates reconstruction sensitivities for Rafah, Sinai, Suez, and Gaza into the package.	Egypt, Palestine, United States, EU, France, Gulf states	Required for regional acceptance.
Political-risk guarantees and blended finance	Reduces investor exposure to conflict, access restrictions, and political discontinuity.	United States, EU, IFIs as instruments, Gulf funds, host governments	Necessary for private logistics participation.
Levantine and Türkiye consultation track	Reduces the risk that Türkiye, Syria, or Lebanon interpret the corridor as a zero-sum exclusion from regional connectivity and creates room for future complementary links.	Türkiye, Syria, Lebanon, Jordan, Palestine, Egypt, United States, EU, Gulf states	Important for regional acceptance and long-term scalability; not a substitute for Gaza-route political agreement.

7.10 Political Constraints and Veto Risks

The core route has no single veto point; it has multiple linked veto points. The most important are Gaza governance, Safe Passage, Palestinian legitimacy, Israeli security acceptance, Jordanian domestic framing, Saudi political conditionality, UAE bankability, Egyptian inclusion, Türkiye's competing-corridor posture, Syria's stabilization trajectory, Lebanon's inclusion concerns, and the availability of credible guarantees. A failure in any one of these areas can delay or block the route as a whole.

The most serious risk is that Gaza remains politically and administratively divided from the West Bank. In that case, the corridor's central peacebuilding logic would be weakened, as the railway would no longer credibly serve as an instrument of West Bank-Gaza integration. Warnings that the Gaza division could become permanent should therefore be read as directly relevant to rail feasibility, not merely as background politics. [149]

The second major risk is that Safe Passage remains undefined. Without a legally and operationally credible Safe Passage framework, the route cannot function as a rail corridor. Road-based humanitarian or commercial access arrangements cannot simply be scaled into rail operations without rules on inspection, custody, documentation, emergency response, liability, and operating authority.

The third major risk is that the project is framed incorrectly. If the Jordanian public perceives it as normalization without Palestinian benefit, Jordanian political feasibility will weaken. If Egypt perceives it as a Suez bypass, Egyptian acceptance will weaken. If Saudi Arabia perceives it as detached from a Palestinian political horizon, Saudi sponsorship will weaken. If Israel perceives it as a security concession without control mechanisms, Israeli

acceptance will weaken. If Palestinians perceive it as external control over Gaza reconstruction, or as a path to normalization that excludes Palestinian rights, it will weaken.

Iran, China, and non-state armed groups remain important external risk factors. They may affect escalation risks, competing corridor narratives, insurance costs, and diplomatic bandwidth. Türkiye, Syria, and Lebanon are treated differently in this section: they do not host the core alignment, but they are core regional actors because their political choices, infrastructure ambitions, and security environments shape the wider Levantine setting in which the Gaza route would be advanced.

7.11 Political Risks and Spoiler Dynamics

The route's political feasibility is exposed to a set of route-wide risks. These risks should not be treated as separate actor assessments. Rather, they are external or cross-cutting conditions that could prevent the core actors from aligning around the same route. With Türkiye, Syria, and Lebanon now treated as core regional actors, Levantine instability and competing northern-corridor narratives should be managed as part of the political package rather than left as background risk.

Table 7.3. Route-wide political risks and implications.

Risk	Why it matters for the core route	Mitigation logic
Failure of the Gaza governance transition	Without a credible civilian administration, the Gaza terminal and Gaza Port interface cannot be authorized, operated, or financed.	Link the corridor to a recognized Palestinian role, PA reform, NCAG transition, and international monitoring.
Safe Passage rejection or excessive restriction	Without controlled West Bank-Gaza freight movement, the corridor loses its integrated political and economic logic.	Frame Safe Passage as a security-managed freight corridor with sealed cargo, inspection, data exchange, and emergency protocols.
Arab public opposition to normalization	A project perceived as normalization without Palestinian benefit could face domestic backlash in Jordan, Saudi Arabia, Egypt, and the Gulf.	Anchor the narrative in Palestinian recovery, Gaza reconstruction, and a credible political horizon. [152][153][154]
Israeli security and coalition constraints	Security concerns and opposition to Palestinian statehood can block Gaza-facing and Safe Passage arrangements.	Use phased, monitored, freight-only arrangements and international guarantees without weakening Palestinian legitimacy. [160][161]
Saudi-UAE rivalry	Competition over ports, logistics, and regional influence could complicate financing and corridor sponsorship.	Design complementary Gulf roles rather than a zero-sum sponsor model. [142]
Iran war and maritime disruption	The war makes IMEC more urgent in the long term but	Treat IMEC as resilience infrastructure while avoiding

	more hazardous in the immediate term.	overclaiming short-term deliverability. [162]
Dual-use and access restrictions	Reconstruction logistics may be delayed by restrictions on materials and equipment needed for rebuilding.	Build inspection, verification, and end-use monitoring into the corridor architecture. [157][163]
Donor fatigue and reconstruction-destruction risk	Donors may refuse to fund another cycle without guarantees that the infrastructure will endure.	Link financing to ceasefire durability, political settlement, and risk guarantees. [158]
Levant instability and competing northern corridors	Türkiye, Syria, and Lebanon can shape alternative corridor narratives, port competition, and diplomatic reactions to a Palestinian-inclusive IMEC route.	Treat the Gaza route as part of a complementary regional network, maintain consultation with Levantine actors, and avoid zero-sum routing language. [66][67][68][137][138][165]

7.11.1 The Iran War

The 2026 US/Israel-Iran war has far-reaching economic and geopolitical implications for the region and for the international system. Understanding the extent of the larger strategic shifts underway may still need time. In the immediate term, the shift in regional and international priorities toward conflict containment and crisis management reduces the political focus and momentum needed to advance long-term connectivity projects. In such an environment, infrastructure investment becomes a secondary concern, overshadowed by the urgency of immediate security and diplomatic challenges.

Nonetheless, the connectivity fallout of the war will force regional and international actors to address logistical bottlenecks and the need for alternative trade routes, which have become clear amid the closure pressure in the Strait of Hormuz and the ongoing threat to the Red Sea maritime route. The Iran war will likely make IMEC more crucial and less optional in the long term, while simultaneously making its short-term development more hazardous and complex. [134][135][162]

Several issues will need continued assessment as the fog of war lifts: whether Gulf countries reprioritize their expenditures toward defense and inwardly directed investments in a way that delays IMEC and Gaza reconstruction financing; whether the security threat to Gulf countries changes their alignments and alliances in ways that affect regional connectivity; whether Israel's budget, in light of war spending, can absorb the required infrastructure investments; and whether Iran and its proxy network continue to threaten trade routes and corridor infrastructure.

7.12 Conclusions and Recommendations

The proposed corridor has high strategic value but conditional geopolitical feasibility. The commercial logic of a Gulf–Jordan land bridge is strong and is increasingly supported by infrastructure already under development in the Gulf and Jordan. However, the political will

and feasibility to make the connection between the Gulf and Jordan, and Israel, are undermined by the perception that it is a normalization project bypassing Palestinian rights.

The full Peace Triangle route to the West Bank and Gaza, however, depends on a more demanding political package: Palestinian agency and governance, an agreed Safe Passage framework, credible Gaza stabilization, Israeli security assurances, Jordanian domestic stability, Gulf financing, and sustained United States–European Union diplomatic sponsorship. The project's strongest political value lies precisely in not bypassing Palestine. It provides the Peace Triangle with a concrete transport backbone and IMEC with a Palestinian-inclusive reconstruction dimension, while requiring careful management of the wider regional environment.

The project is not ready to be described as politically easy or implementation-ready. It is, however, ready to be used as a structured diplomatic proposition. The corridor has enough strategic alignment to justify continued advocacy, technical refinement, and diplomatic convening. The next phase should not only ask whether the railway can be built. It should ask whether the political package can be assembled to make the railway a credible, secure, Palestine-inclusive, Jordan-enabled, Israel-accepted, Gulf-backed, US/EU-guaranteed, Egypt-compatible, and Levant-aware reconstruction and trade corridor.

The principal recommendation is to advance the corridor through a political-enabling roadmap before presenting it as a construction project. This roadmap should include:

- A short diplomatic concept note defining the core route as a Palestinian-inclusive IMEC and Gaza reconstruction corridor.
- A Palestinian-Jordanian technical track on rail regulation, customs, terminal governance, and logistics-hub integration.
- A discreet Safe Passage working track involving Palestine, Israel, Jordan, the United States, and the EU, focused on controlled freight movement rather than final-status questions.
- A Gulf sponsorship track clarifying complementary Saudi and UAE roles and linking financing to Gaza reconstruction guarantees and Palestinian economic recovery.
- An Egypt consultation track to ensure that Rafah, Sinai, Suez, and Gaza reconstruction sensitivities are incorporated from the outset.
- A Türkiye-Syria-Lebanon consultation track to manage competing corridor narratives, complementary Levantine port and rail options, and the political messaging around inclusion rather than exclusion.
- A financing and guarantees platform that treats IFIs as instruments of political sponsorship and risk reduction, not as substitutes for political agreement.
- Joint discussions and mobilization of private sector and civil society actors to amplify advocacy. Aligning corporate self-interest with peacebuilding often leads to positive political and behavioral momentum. As multiple stakeholders see potential benefits, they become more vocal advocates for the initiative.

Overall, the geopolitical feasibility of the Gaza route is conditional but not implausible. The strongest conclusion is that the corridor should be presented neither as a purely technical rail project nor as a symbolic peace proposal. It should be presented as a practical political-economic corridor whose feasibility depends on whether core actors can align around Gaza

reconstruction, Palestinian connectivity, Jordanian logistics development, Israeli security, Gulf sponsorship, Egyptian acceptance, US/EU guarantees, and a Levantine consultation framework that includes Türkiye, Syria, and Lebanon.

The geopolitical assessment does not independently select a preferred route, but it has implications for route choice. The principal trade-off is between directness, political symbolism, operational practicality at the border, and the ability to protect the public legitimacy of Palestinians and Jordanians. Option 1 has the advantage of directness and proximity to the best-known existing Jordan-West Bank crossing route. It is easier to explain politically as a Jordan-West Bank-Gaza route and aligns strongly with the Peace Triangle narrative. **Box 7.1. Route-Option Implications**

8 Conclusions and Recommendations

8.1 Overall conclusion

The study concludes that the proposed electric railway linking Gulf ports to Gaza Port through Jordan and the West Bank is strategically feasible, but only as a phased, politically negotiated, Palestinian-inclusive development corridor. Its technical and commercial logic is strongest where it connects existing or emerging Gulf, Saudi, Jordanian, and Israeli rail and port assets to Mediterranean gateways. Its strategic feasibility and peacebuilding value, however, depend on whether the project materially improves Gaza-West Bank connectivity, Palestinian trade capacity, Gaza reconstruction logistics, Jordan's role as a logistics hub, Israeli security management, and regional economic interdependence.

The corridor should therefore be advanced not as a narrow IMEC spur and not as a substitute for a political settlement, but as a practical infrastructure platform for reconstruction, stabilization, trade sovereignty, and long-term regional integration. The report's consistent finding is that the technically and financially strongest alignment must be paired with a diplomatic, security, environmental, and financing framework that protects Palestinian legitimacy and addresses Israeli security, as well as Jordanian, Egyptian, Gulf, and European political, security, and financing concerns.

At the pre-feasibility level, the technical analysis supports a standard-gauge, electric-ready corridor with 25 kV AC overhead electrification, ETCS Level 2/ERTMS-compatible signaling, and double-stack clearance as a civil design provision. Base-case demand can be accommodated by a single-track railway with passing loops, provided that double-stack operations, terminal productivity, and disciplined cross-border dispatching are achieved by maturity. Under the Upside case, selective double-tracking, additional passing loops, or higher-capacity operating measures should be provided for in the planning envelope.

The financial, environmental, economic, and geopolitical findings are mutually reinforcing. The project has a strong strategic rationale, but its feasibility remains conditional on Gaza stabilization, a functioning Safe Passage operating regime, Gaza Port commissioning, rail-compatible border procedures, credible Palestinian governance and ownership, political-risk guarantees, and sustained United States-European Union and Gulf sponsorship. The project should therefore move to the next stage as a structured political-economic proposition and investment-grade feasibility process.

8.2 Preferred route: Option 1- King Hussein Bridge Entry

Based on the analysis in the report, Option 1, the King Hussein/Karamah-Allenby Bridge route, should be selected as the preferred route for the next stage of project preparation. This recommendation is a route-selection decision for investment-grade feasibility, surveyed alignment design, ESIA, heritage assessment, hydrology and seismic analysis, demand validation, timetable simulation, and political-risk due diligence.

The case for Option 1 is strongest on directness, cost, operating efficiency, environmental footprint, and political narrative. Option 1 is approximately 150 km in its core planning length, or about 160 km if the possible Sahab/local connector is included, compared with approximately 205 km for Option 2. The shorter alignment reduces the amount of new West Bank ridge construction, produces a lower permanent linear footprint and construction disturbance area, lowers gross route-length-related emissions, and reduces route-length-dependent OPEX. Financially, Option 1 has a Base-case CAPEX of approximately USD 3.49 billion (NIS 12.93 billion), compared with approximately USD 4.49 billion (NIS 16.62 billion) for Option 2. The approximately USD 1.00 billion / NIS 3.69 billion difference is structural, and the sensitivity analysis preserves an Option 1 advantage of approximately USD 0.8-1.4 billion across tested scenarios.

Option 1 also aligns more directly with the Peace Triangle framing. It is easier to explain as a Jordan-West Bank-Gaza route because it uses the best-known existing Jordan-West Bank crossing logic and connects the Sahab/Amman logistics area toward the West Bank, Tarqumia, the Safe Passage, Gaza, and Gaza Port. This gives the preferred route a clearer political and communication narrative than a longer route that adds wider West Bank alignment interfaces before turning south and west toward the common Safe Passage and Gaza sections.

Option 1's disadvantages are real and must be treated as design constraints. The route carries higher protected areas, cultural heritage, landscape, wadi, and permitting sensitivity around the King Hussein/Karamah-Allenby/Jordan Valley/Jericho/eastern-slope setting, including the Wadi Al-Kharrar/Baptism Site/Al-Maghtas landscape, Swaimeh and Homret Maeen, AlAghwar, Wadi el Qilt, Qarn Sartaba, El Katar, Jerusalem Wilderness, and related spring and wadi systems. The recommended decision is therefore to select Option 1 subject to mandatory GIS optimization and ESIA screening, with the explicit instruction that the alignment must avoid or minimize protected-area, heritage, hydrological, agricultural, and community impacts before final approval.

Table 8.1. Basis for selecting Option 1 as the preferred route.

Criterion	Findings from the study	Recommendation implication
Route length and directness	Option 1 is about 150-160 km; Option 2 is about 205 km.	Select Option 1 as the preferred planning alignment because the shorter route reduces construction scope and operating exposure.
CAPEX	Option 1 Base-case CAPEX is about USD 3.49 billion / NIS 12.93 billion, compared with USD 4.49 billion / NIS 16.62 billion for Option 2.	Option 1 saves about USD 1.00 billion / NIS 3.69 billion in the Base case.
Sensitivity	Option 1 remains approximately USD 0.8-1.4 billion cheaper across the tested scenarios.	The financial advantage is structural and not dependent on a scenario assumption.

Criterion	Findings from the study	Recommendation implication
OPEX	Option 2 is approximately 14-21 percent more expensive to operate annually under the Base case.	Option 1 should be preferred for long-term operating efficiency.
Capacity	A single track can serve Base-case demand with passing loops, ETCS Level 2, and double-stack clearance, with selective double-tracking protected for Upside demand.	Advance Option 1 with protected capacity provisions rather than immediate full double-tracking.
Environmental footprint	Option 1 has lower land take, construction disturbance, route-length emissions, and material movement, but higher protected-area and heritage sensitivity.	Proceed with Option 1 only with GIS optimization, heritage screening, hydrology studies, and full ESIA.
Geopolitical narrative	Option 1 is easier to explain as a direct Jordan-West Bank-Gaza route and aligns strongly with the Peace Triangle narrative.	Use Option 1 as the preferred diplomatic and technical basis, while separating freight, pilgrim, passenger, humanitarian, and security functions at sensitive crossings.

8.3 Implementation strategy

The implementation strategy should be deliberately phased. The corridor should first be advanced as a political-enabling and investment-preparation process, because the report shows that the key constraints are not limited to engineering. The infrastructure cannot be credibly financed, permitted, or operated unless the political package, Safe Passage rules, Gaza governance framework, border-operating regime, environmental safeguards, and risk-allocation structure are developed in parallel with design work.

The recommended sequencing is to move from diplomatic definition to investment-grade feasibility to institutional and border-operating design to financing and procurement structuring, and only then to construction.

Table 8.2. Recommended implementation roadmap.

Phase	Primary purpose	Core outputs	Decision gate
Phase 0: Political-enabling roadmap	Define the corridor as a Palestinian-inclusive IMEC and Gaza reconstruction corridor rather than a bypass route.	Diplomatic concept note; Palestinian-Jordanian technical track; Safe Passage working track; Gulf sponsorship track; Egypt consultation track; Türkiye-Syria-Lebanon consultation track; financing and guarantees platform.	Proceed only if the core actors accept the corridor framing and agree to continue technical and political preparation.
Phase 1: Investment-grade feasibility	Convert the pre-feasibility findings into survey-based, decision-grade evidence.	Surveyed alignment; demand validation; shipper interviews; gateway-choice and port-competition analysis; commodity-level trade data; timetable simulation; engineering design basis; hydrology, seismic, geotechnical, UXO, heritage, and ESIA scoping.	Proceed only if Option 1 remains preferable after alignment optimization, environmental screening, and operating simulation.

Phase	Primary purpose	Core outputs	Decision gate
Phase 2: Institutional and operating architecture	Create the governance, regulatory, customs, safety, and security model needed for a multi-jurisdictional railway.	Corridor governance framework; Palestinian operating and regulatory roles; rail-compatible customs and border yards; sealed-cargo inspection protocols; data-exchange and emergency procedures; interoperability standards memorandum.	Proceed only if the Safe Passage, West Bank control, and Gaza terminal arrangements can be made operationally credible.
Phase 3: Financing and procurement structuring	Translate the CAPEX/OPEX envelope into a bankable and politically protected financing plan.	Blended-finance structure; Gulf, IFI, EU, and United States guarantee roles; risk allocation; procurement packaging; local-content and employment provisions; private-sector logistics participation model.	Proceed only if political risk guarantees and financing commitments are sufficient to support the procurement.
Phase 4: Enabling works and construction readiness	Prepare the corridor interfaces before major civil works begin.	Land, utility, and access planning; border-yard and terminal readiness; Gaza Port interface coordination; ESIA management plans; compensation and grievance mechanisms; contractor mobilization and construction-risk controls.	Proceed to construction only after safeguards, land, security, and terminal interfaces are approved.
Phase 5: Construction, testing, and staged operation	Build and commission the preferred alignment while protecting scalability.	Civil works, track, electrification, ETCS, terminals, border yards, testing, commissioning, and operating-readiness procedures; passive protection for selective double-tracking where required.	Open initially with controlled freight operations and scale capacity as demand, terminal productivity, and political conditions mature.

The sequencing should remain flexible. If the ESIA or heritage-screening process shows that the Option 1 alignment cannot avoid unacceptable impacts, Option 2 should remain available as a comparator during the investment-grade stage. Conversely, if Option 1 can be optimized to avoid or mitigate the identified sensitive receptors, its shorter length, lower cost, lower OPEX, and clearer political narrative should guide the next stage of development.

Some form of a corridor coordination body, with the main stakeholders represented, will be necessary before investment-grade feasibility work becomes operationally meaningful. Its purpose would be to facilitate practical discussions and coordinate route planning, customs, safety, border procedures, security interfaces, data exchange, environmental safeguards, financing conditions, and sequencing. The technical interoperability framework discussed elsewhere in this report will only have value if paired with an equivalent political and institutional interoperability framework.

8.4 Recommendations

The following recommendations translate the report's technical, financial, environmental, economic, social, and geopolitical findings into an actionable work program for the next stage. They should be treated as linked recommendations: none is sufficient alone, and several are binding preconditions for credible implementation.

Table 8.3. Consolidated recommendations for the next stage.

No.	Recommendation	Rationale from the report	Required next action
1	Adopt Option 1 as the preferred route for investment-grade feasibility, not as a final construction approval.	Option 1 is shorter, approximately USD 1.00 billion cheaper in the Base case, structurally cheaper across sensitivity scenarios, less expensive to operate, and easier to frame as a direct Jordan-West Bank-Gaza route.	Issue a route-preference decision that explicitly remains subject to surveyed alignment design, ESIA, heritage, hydrology, seismic, and political-risk due diligence.
2	Protect a capacity strategy based on a single track with passing loops at opening, double-stack clearance, ETCS Level 2, and passive provision for selective double-tracking.	Base-case demand can be served with single-track double-stack operations, while the Upside year-15 case approaches or exceeds the indicative single-track envelope.	Prepare a formal design-basis memorandum and run timetable simulations to confirm passing-loop spacing, terminal capacity, and double-track protection needs.
3	Complete an investment-grade demand and operating study before financing decisions.	The demand model is an order-of-magnitude planning model; Layer 3 IMEC transit is the most judgment-driven component.	Undertake shipper interviews, customs and border-data review, gateway-choice modeling, port-capacity analysis, commodity-level trade assessment, competing-route analysis, and train-path simulation.
4	Undertake full GIS optimization, ESIA, heritage assessment, hydrology, seismic, geotechnical, UXO, land, and community-impact studies.	Option 1 has lower route-length impacts but higher protected-area, heritage, wadi, spring, and permitting sensitivity around the King Hussein/Karamah-Allenby/Jordan Valley/Jericho/eastern-slope setting.	Define avoidance corridors, mitigation hierarchy, compensation principles, grievance mechanisms, monitoring plans, and no-go conditions before fixing the alignment.
5	Develop a Safe Passage and border-operating framework as a core project component.	The corridor depends on controlled West Bank-Gaza freight movement and rail-compatible border operations; without this, the Gaza route loses much of its integrated economic and political logic.	Create inspection, sealed-cargo, data-exchange, emergency, liability, customs, security, and terminal-governance protocols for the KHB/Karamah-Allenby, Tarqumia, Beit Hanoon (Erez)/Gaza, and Gaza Port interfaces.

No.	Recommendation	Rationale from the report	Required next action
6	Secure Palestinian ownership and a credible governance and reconstruction framework for Gaza.	The report identifies the Palestinian agency, Gaza governance, and reconstruction guarantees as binding political and institutional preconditions.	Define Palestinian regulatory, land, customs, terminal, and operating roles, and link the corridor to Gaza reconstruction logistics and West Bank-Gaza economic integration.
7	Establish a Jordan-Palestine technical and logistics track.	Jordan is the indispensable transit state and logistics hub, while Palestine is the direct beneficiary and source of project legitimacy.	Prepare joint workstreams on rail regulation, customs, logistics-hub integration, terminal governance, operating rules, and corridor management.
8	Create a financing and guarantees platform before procurement.	CAPEX is material; OPEX is sensitive to length and delays; and private participation requires political risk reduction.	Structure Gulf sponsorship, IFI support, EU/United States guarantees, blended finance, risk allocation, and procurement packaging; treat IFIs as risk-reduction instruments, not substitutes for political agreement.
9	Link procurement to local content, employment, TVET, and reconstruction benefits.	The corridor can generate construction person-years, direct rail and logistics jobs, and broader supply-chain benefits, but benefits depend on procurement design and absorptive capacity.	Build local-content provisions, skills development, contractor requirements, and Gaza/West Bank/Jordan employment targets into procurement and implementation plans.
10	Maintain Egypt and Levantine consultation tracks while preserving the Palestinian-inclusive core of the corridor.	Egypt's Rafah, Sinai, Suez, and Gaza reconstruction sensitivities are material, and Türkiye, Syria, and Lebanon can shape alternative corridor narratives and port competition.	Frame the Gaza route as complementary regional connectivity, not a zero-sum exclusionary corridor; maintain consultation with Egypt, Türkiye, Syria, and Lebanon.
11	Mobilize private-sector and civil-society advocacy around a credible, peacebuilding corridor narrative.	The report recommends joint discussions and mobilization of the private sector and civil society to amplify advocacy and align commercial self-interest with peacebuilding.	Prepare a focused advocacy package around Gaza reconstruction, Palestinian trade capacity, Jordanian logistics development, Israeli security management, and regional economic interdependence.

In practical terms, the next decision should be to authorize an investment-grade feasibility and political-enabling phase for Option 1, while keeping Option 2 as a comparator until environmental, heritage, and political-risk screening confirms that the preferred alignment can be delivered responsibly. The next phase should be judged not only by whether the

railway can be engineered, but by whether the full enabling package can be assembled: Palestinian agency, Gaza governance and reconstruction arrangements, a controlled Safe Passage regime, Israeli security assurances, Jordanian logistics financing, Gulf sponsorship, United States-European Union guarantees, Egyptian acceptance, and a Levant-aware consultation framework.

The final recommendation is therefore to advance the project carefully but proactively. The corridor is sufficiently coherent, strategically valuable, and analytically supported to justify the next stage of diplomatic convening, investment-grade due diligence, and the preparation of structured financing. Its value lies in joining technical feasibility to political legitimacy: an electric railway that supports Gaza reconstruction, reconnects the West Bank and Gaza, strengthens Jordan's logistics role, gives Palestine a meaningful place in regional connectivity, and provides IMEC with a more inclusive and stabilizing Mediterranean route.

References

[1] Encyclopedia Britannica. “Hejaz Railway.”
[2] Yazbak, M. “The Hijaz-Palestine Railway and the Development of Haifa.” Institute for Palestine Studies / Jerusalem Quarterly.
[3] Ministry of External Affairs, Government of India. “Partnership for Global Infrastructure and Investment (PGII) & India-Middle East-Europe Economic Corridor (IMEC),” September 9 2023.
[4] Memorandum of Understanding on the Principles of an India–Middle East–Europe Economic Corridor (IMEC), September 9 2023.
[5] EcoPeace Middle East. “Our New Path to Peace for the ‘Day After’: The IMEC Peace Triangle,” July 16 2025.
[6] EcoPeace Middle East. “Map Story: The IMEC Peace Triangle.”
[7] EcoPeace Middle East. Pre-Feasibility Study: The Humanitarian and Trade Corridor — Jordan–West Bank–Israel–Gaza, September 2025.
[8] EcoPeace Middle East. Desk Study of the Economic and Geopolitical Feasibility of a Large-Scale Desalination Plant in the Gaza Strip and Its Incorporation into the Regional Water Supply System, August 2025.
[9] EcoPeace Middle East / Qamar Energy. “Geopolitical, Economic, and Environmental Feasibility of a Middle East–Europe Renewable Energy Corridor,” July 29 2025.
[10] European Union, United Nations, and World Bank. Gaza Strip Rapid Damage and Needs Assessment (final), April 2026.
[11] United Nations Economic and Social Commission for Western Asia. “ESCWA Vision for a Multimodal Transport System in the Arab Region,” April 23 2018.
[12] United Nations Economic and Social Commission for Western Asia. “Implementation of Activities under the ESCWA Program Plan in the Field of Transport, Logistics, Road Safety and Technology for 2022–2023,” January 10 2024.
[13] Bader, Y., & Ghorra, F. “Multimodal Transport Corridors in the Arab Region,” September 4 2023.
[14] Organization for Economic Co-operation and Development. Accelerating Climate Action in Israel, 2025.
[15] Government of Israel. State of Israel Green Bond Impact Report, 2025.
[16] Railway Pro. “Israel: Haifa-Beit She’an Line Finalized,” August 4 2016.
[17] Saudi Press Agency. “SAR Launches International Logistics Corridor Linking Gulf Ports with Jordan, the Countries North to Kingdom,” March 26 2026.
[18] Etihad Rail Website. “Network.”
[19] Etihad Rail. “Ahead of the Launch of the First Phase of Passenger Train Services in 2026, Etihad Rail Reveals Details of the UAE’s Full Passenger Railway Network,” January 8 2026.
[20] Etihad Rail. “With the Blessing of the UAE President, Khaled bin Mohamed bin Zayed and Hamdan bin Mohammed bin Rashid Witness Announcement of High-Speed Train Project Linking Abu Dhabi and Dubai,” January 23 2025.
[21] Etihad Rail. “Landmark Agreement between Oman Rail and Etihad Rail to Build a 3 Billion Dollar Railway Connecting Sohar Port to the UAE National Rail Network,” September 26 2022.
[22] Oman Rail. “Oman-UAE Rail Project.”
[23] Etihad Rail. “Etihad Rail Awards Contract for Systems and Integration for Stage Two of the National Railway Network,” January 27 2021.
[24] Network Rail Consulting. “Infrastructure Management and Operations for North-South Railway.”
[25] Thales. “Thales Awarded the Maintenance of 2400 km Line in Saudi Arabia,” September 20 2016.
[26] Saudi Arabia Railways. “Our Services / Our Story.”
[27] Visit Saudi. “Haramain High Speed Railway.”
[28] MEED. “Saudi Landbridge rail scheme to be delivered by 2034,” January 2026.
[29] Construction Review Online. “$26.6B Saudi Landbridge Project: Spanish firm Sener wins design role in major rail construction push,” 2026.

[30] Saudi Press Agency. “SAR Achieves Record 14 Million Passengers, 30 Million Tons of Freight in 2025,” February 6 2026.
[31] Jordan Times. “Saudi Arabia Launches New Rail Logistics Corridor Linking Jordan, Gulf Ports — SPA,” March 26 2026.
[32] Logistics Cluster. “2.4 Jordan Railway Assessment.”
[33] Oxford Business Group. “Jordan’s Rail System Looks to Move Beyond Domestic Freight Haul,” 2018.
[34] Daily Sabah. “Türkiye, Syria, Jordan to Revive Historic Hejaz Railway Line,” September 23 2025.
[35] Ministry of Investment, Jordan. “Jordan, UAE Ink $2.3 Billion Railway Investment Project,” September 4 2024.
[36] Etihad Rail. “UAE and Jordan Sign Investment Memorandum to Strengthen Cooperation in the Railway Sector,” September 4 2024.
[37] Union for the Mediterranean. “Jordanian Railway Network.”
[38] Ministry of Transport, Hashemite Kingdom of Jordan. Jordan Long-Term National Transport Strategy and Action Plan, 2016.
[39] Atlantic Council. The India-Middle East-Europe Economic Corridor: Connectivity in an Era of Geopolitical Uncertainty, 2025.
[40] Railway Pro. “Israel Inaugurates Jezreel Valley Railway,” September 2 2016.
[41] Israel Railways. “Acceleration of the Electrification Works – Changes in Train Traffic in the Southern Region in November 2024,” January 4 2025.
[42] Port2Port. “Electric Train Revolution Progresses: The Valley Line on Track for Full Electrification,” December 29 2025.
[43] Railway Gazette International. “World Rail Freight News Round-Up,” March 26 2025.
[44] Adani Ports and Special Economic Zone. “Adani and Gadot Win Tender to Privatise Israel’s Haifa Port,” July 15 2022.
[45] Israel Ports Company / Ministry of Transport. Haifa and Bay Port throughput statistics, most recent available (2023–2024). Supersedes the 2019 Haifa Port brochure previously cited here.
[46] Systematica. Road and Transportation Master Plan of West Bank and Gaza Strip, November 2 2016.
[47] Lockman, Z. The Railway Workers of Palestine (I): The Struggle for Arab Labor on the Railroads, 1919–1939. University of California Press.
[48] MOPIC / Palestine Geoportal. The National Spatial Development Plan 2050, 2025.
[49] Culbertson, S., Anthony, C. R., Ruthenberg, K., Lane, R., & Shelleh, S. A Spatial Vision for Palestine: A Long-Term Plan That Can Begin Now. RAND Corporation, 2025.
[50] World Bank, United Nations, & European Union. Gaza and West Bank Interim Rapid Damage and Needs Assessment, February 2025.
[51] Palestinian Central Bureau of Statistics. “Road Network Length in Palestine by Governorate, Region and Road Type,” 2013 data (baseline used pending update to the most recent pre-war PCBS statistical yearbook available).
[52] International Civil Aviation Organization Council. “Destruction of Gaza International Airport,” March 13 2002.
[53] United Nations Office for the Coordination of Humanitarian Affairs. “OCHA Weekly Report (12–18 January 2011),” January 18 2011.
[54] United Nations Economic and Social Commission for Western Asia. Agreement on International Railways in the Arab Mashreq, April 14 2003.
[55] OTIF. Convention concerning International Carriage by Rail (COTIF), Appendix B — Uniform Rules Concerning the Contract of International Carriage of Goods by Rail (CIM).
[56] OTIF. “Member States.”
[57] Heyes, E. “Digital Interoperability and Trade Facilitation in the India–Middle East–Europe Corridor.” ORF Middle East, November 14 2025.
[58] United Nations Economic Commission for Europe. “Contracting Parties / Countries – TIR Convention.”
[59] United Nations Economic and Social Commission for Western Asia. Trade Facilitation Initiatives in the ESCWA Region, 2016.

[60] IRU & Islamic Development Bank. Action Plan [Arab Transit Agreement Description and Transit-Document Framework], 2013.
[61] OTIF. “Jordan Becomes an Associate Member of OTIF from August 1,” July 30 2010.
[62] Ministry of Transport, Egypt. Statement of Future Projects at the Ministry of Transport.
[63] Presidency of the Arab Republic of Egypt. “Rehabilitation and Development of Al-Fardan/Bir Al-Abd Railway Line,” October 2024.
[64] State Information Service, Egypt. “Egypt Launches Trial Passenger Train,” October 7 2024.
[65] Egyptian National Railways. “Network Modernization and Capacity Expansion,” June 30 2025.
[66] Syrian Arab News Agency. “Syrian, Saudi and Turkish Transport Ministers Discuss Rail Cooperation in Istanbul,” February 14 2026.
[67] Anadolu Agency. “Türkiye, Jordan, Syria Sign Trilateral Deal on Transport to Boost Regional Trade,” April 7 2026.
[68] Syrian Arab News Agency. “Turkey: Agreement to Complete 30 km of Hejaz Railway,” December 31 2025.
[69] World Bank. Iraq Transport Road Enhancement Corridors (ITREC) Phase 1 (P510293) – Project Information Document, March 30 2026.
[70] ME Council. Iraq’s Development Road Project: A Path to Prosperity or Instability?, October 2024.
[71] Reuters. “Iraq, Turkey, Qatar, UAE Sign Preliminary Deal to Cooperate on Development Road Project,” April 22 2024.
[72] Directorate of Communications, Republic of Türkiye. “Türkiye, Iraq, Qatar and UAE Sign ‘Development Road’ Memorandum of Understanding,” April 22 2024.
[73] Reuters. “Iraq, Turkey to Elevate Security, Economic Ties after Erdogan Visit,” April 22 2024.
[74] Iraq Business News. “Iraq to Complete First Phase of Grand Faw Port in 2025,” October 25 2024.
[75] International Railway Journal. “Israel Railways invites bids for first electric locos,” July 31 2014. [Historical source; used as the published procurement benchmark for Israel Railways, which has not been publicly revised since.]
[76] Treaty of Peace Between the State of Israel and the Hashemite Kingdom of Jordan, October 26 1994, Article 13.
[77] The National. “Sheikh Mansour witnesses signing of $2.3bn railway project deal with Jordan,” April 15 2026.
[78] Petra / Jordan News. “Jordan and UAE Sign $2.3 Billion Agreements to Execute 360 km Aqaba Railway Project,” April 2026.
[79] Saudi Arabia Railways / Saudi Press Agency. “SAR Launches International Logistics Corridor Linking Gulf Ports with Jordan and Countries North of the Kingdom,” March 26 2026.
[80] DP World. “DP World Records Highest Cargo Volumes at Jebel Ali Port Since 2015.” Press Release, February 25 2025. Available at: www.dpworld.com.
[81] AD Ports Group. Annual Report and Port Statistics 2024 (Khalifa Port throughput: 5,421,201 TEU). Available at: www.adports.ae.
[82] Port of Fujairah Authority. “Port Overview and Statistics.” Available at: www.fujairahport.ae. (Port handles over 130 million tonnes of products annually; container capacity 720,000 TEU.)
[83] Gal, Y. Advancing IMEC Toward Implementation: Jordan River Crossing Study - Demand Analysis | Capacity Assessment | Expansion Guidelines. Konrad-Adenauer-Stiftung Israel and Institute for Maritime Policy & Strategy, February 2026.
[84] Fredman, A., & Rozen, J. The India-Middle East-Europe Economic Corridor: A Catalyst for Regional Integration and Global Prosperity. Misgav Institute for National Security and Konrad-Adenauer-Stiftung Israel, June 2025.
[85] Ministry of Environment and Global Green Growth Institute. Green Growth National Action Plan 2021-2025, Jordan, 2020.
[86] Ministry of Environment / UNDP. Jordan's 2022-2050 National Climate Change Policy, 2023.

[87] Hashemite Kingdom of Jordan. National Adaptation Plan - Jordan. UNFCCC submission, publication date 10 March 2025.
[88] Hashemite Kingdom of Jordan. Environmental Classification and Licensing Regulation No. 69 of 2020. Official Gazette, 5 July 2020.
[89] World Bank Group. Jordan Country Climate and Development Report. Washington, DC: World Bank, 2022.
[90] EcoPeace Middle East and Royal HaskoningDHV. National Master Plan for the Jordan River Valley, 2015.
[91] UNESCO World Heritage Centre. Baptism Site "Bethany Beyond the Jordan" (Al-Maghtas), World Heritage List entry 1446.
[92] UNEP-WCMC. Protected Area Profile for Swaimeh and Homret Maeen from the World Database on Protected Areas. Protected Planet, May 2026.
[93] Jordan Biodiversity / Clearing-House Mechanism. Protected areas in Jordan: Ajloun Forest Reserve, Dibeen Forest Reserve, and Yarmouk Forest Reserve.
[94] Environment Quality Authority, State of Palestine. National Adaptation Plan to Climate Change, 2016.
[95] State of Palestine. Updated Nationally Determined Contributions under the UNFCCC, 2021.
[96] Environment Quality Authority. Action Plans of the Palestinian National Biodiversity Strategy, 2023.
[97] State of Palestine. Environmental Law No. 7 of 1999.
[98] Environment Quality Authority. Palestinian Environmental Assessment Policy, 2000.
[99] State of Palestine Biological Diversity Clearing-House Mechanism. Protected Areas: revised Protected Area Network of Palestine.
[100] Qumsiyeh, M. B. et al. Updating and enhancing the Protected Areas Network of Palestine: A step towards biodiversity conservation. PARKS, The International Journal of Protected Areas and Conservation, 2023.
[101] World Bank Group. West Bank and Gaza Country Climate and Development Report. Washington, DC: World Bank, September 2023.
[102] UNDP/PAPP. Wadi Gaza Coastal Wetland Conservation and Development. Project information page.
[103] UNEP-WCMC. Protected Area Profile for Wadi Gaza from the World Database on Protected Areas. Protected Planet, May 2026.
[104] United Nations Environment Programme. Environmental Impact of the Conflict in Gaza: Preliminary Assessment of Environmental Impacts, 2024.
[105] World Bank, European Union, and United Nations. Gaza Strip Interim Rapid Damage and Needs Assessment / Rapid Damage and Needs Assessment, 2026.
[106] International Energy Agency. The Future of Rail: Opportunities for Energy and the Environment. Paris: IEA, 2019.
[107] International Energy Agency. Rail - Energy System. Online briefing, accessed 2026.
[108] UK Department for Energy Security and Net Zero. Greenhouse Gas Reporting: Conversion Factors 2024, 2024.
[109] World Bank. Railway Reform Toolkit: A Handbook for Policymakers and Railway Reform Implementation. Washington, DC: World Bank, most recent edition available.
[110] European Investment Bank. Economic Appraisal of Investment Projects at the EIB. Luxembourg: EIB, 2023.
[111] International Energy Agency. The Future of Rail: Opportunities for Energy and the Environment. Paris: IEA, 2019. [Also cited as [106] for environmental purposes; cross-referenced here for the freight-electrification cost evidence base.]
[112] Zenith, F., Isaac, R., Hoffrichter, A., Thomassen, M. S., and Møller-Holst, S. “Techno-economic analysis of freight railway electrification by overhead line, hydrogen and batteries: Case studies in Norway and USA.” Proceedings of the Institution of Mechanical Engineers, Part F: Journal of Rail and Rapid Transit, 2020.
[113] Office of Rail and Road (ORR). European Benchmarking of the Costs, Performance and Revenues of GB Train Operating Companies. United Kingdom, most recent edition available.
[114] Rail Baltica. Updated Cost-Benefit Analysis Outcomes. 2024.

[115] EcoPeace Middle East and EcoPalestine. Request for Proposal RFQ-ECOPAL-2025-035, Terms of Reference: Feasibility Study on Electric Railway Network Linking Gulf Ports to Gaza and Haifa Port through the West Bank and Jordan as a Logistics Hub, 27 December 2025.
[116] World Bank Group. Macro Poverty Outlook for Jordan, October 2025 update. Reports current US$ GDP of approximately USD 61.4 billion for 2025, full-year 2025 real GDP growth of 2.8 percent, headline labor-market figures, and policy context. Washington, DC: World Bank, 2025.
[117] World Bank Group. West Bank and Gaza country brief / Macro Poverty Outlook, 2025–2026 update. Reports West Bank GDP growth of approximately 3 percent in 2025, Gaza GDP collapse following the 2023–2025 conflict, and the linkage to the EU–UN–World Bank Rapid Damage and Needs Assessment. Washington, DC: World Bank.
[118] Government of the Hashemite Kingdom of Jordan. Economic Modernisation Vision and supporting Executive Plan 2023–2025, including the Transport and Logistics Sector roadmap with the target sectoral GDP contribution exceeding JD 2.9 billion by the early 2030s. Amman: Government of Jordan, 2022.
[119] Jordan Strategy Forum. Transportation and Logistics Sector: Jordan's Economic Vision Roadmap, 2022. Amman: Jordan Strategy Forum, 2022.
[120] Palestinian Central Bureau of Statistics and Palestine Monetary Authority. Palestinian Economic Monitor for 2025, December 2025. Reports the continued collapse of Gaza's economy relative to the pre-conflict 2023 baseline and a significant contraction in West Bank output over the same period.
[121] World Bank Group. Impacts of the Conflict in the Middle East on the Palestinian Economy — April 2025 Update. Washington, DC: World Bank, April 2025. Notes that West Bank GDP per capita is not expected to recover to pre-crisis levels before approximately 2028.
[122] Department of Statistics, Hashemite Kingdom of Jordan. Quarterly Report on Employment and Unemployment in Jordan, Q3 2025. Reports an overall (all-resident) unemployment rate of 16.2 percent, a Jordanian-only unemployment rate of 21.4 percent, Jordanian female unemployment of 33.9 percent, and Jordanian female labor force participation of 14.4 percent. Amman: DoS, December 2025.
[123] International Transport Forum / OECD. ITF Transport Outlook (most recent edition). Paris: OECD Publishing.
[124] United Nations Security Council. Resolution 2803 (2025), S/RES/2803 (2025), adopted by the Security Council at its 10046th meeting on 17 November 2025. Establishes the framework for transitional governance and security arrangements for the Gaza Strip in connection with the Comprehensive Plan to End the Gaza Conflict.
[125] International Labor Organization. Employment-Intensive Investment Programme (EIIP): guidance and publications on employment-intensive infrastructure investment. Geneva: ILO. Used as background literature for the consultant's order-of-magnitude jobs-per-USD-million planning assumption.
[126] Booker, C., & McCormick, D. “Booker & McCormick Introduce Bipartisan Legislation to Advance U.S. Energy, Security, Economic Interests, and Partnerships in the Eastern Mediterranean.” United States Senate, press release, 29 April 2026. https://www.booker.senate.gov/news/press/booker-and-mccormick-introduce-bipartisan-legislation-to-advance-us-energy-security-and-economic-interests-and-partnerships-in-the-eastern-mediterranean
[127] European Council. “European Council conclusions on the Middle East.” Council of the European Union, 19 March 2026. https://www.consilium.europa.eu/en/press/press-releases/2026/03/19/european-council-conclusions-on-middle-east/
[128] European Commission, Directorate-General for International Partnerships. “Global Gateway: Overview and Strategy.” Updated 12 March 2026. https://international-partnerships.ec.europa.eu/policies/global-gateway_en
[129] Ministry of Foreign Affairs of the Kingdom of Saudi Arabia / Saudi Press Agency. “Foreign Ministry: Saudi Arabia’s position has always been steadfast on the Palestinian issue and the necessity that the brotherly Palestinian people obtain their legitimate rights.” February 2025.

[130] Alghashian, A. “Saudi Arabia’s Diversified Support for a Two-State Solution.” Middle East Institute, 20 December 2024.
[131] WAFA (Palestinian News and Information Agency). “Joint Palestinian-Jordanian Discussions to Enhance Commercial Exchange and Address Obstacles to the Movement of Individuals and Goods.” 18 November 2025.
[132] Reuters. “US May Ask Israel to Put Palestinian Tax Money toward Trump’s Gaza Plan, Sources Say.” 15 May 2026.
[133] House of Commons Library, United Kingdom Parliament. “Gaza 2026: Board of Peace and National Transitional Authority.” Research Briefing CBP-10492, 17 February 2026.
[134] International Monetary Fund. “Red Sea Attacks Disrupt Global Trade.” IMF Blog / PortWatch, 7 March 2024.
[135] World Bank Group. The Deepening Red Sea Shipping Crisis: Impacts and Outlook. Washington, DC: World Bank, 2025.
[136] Ministry for Europe and Foreign Affairs, Republic of France. “Joint Communiqué Issued after the First Egypt-France Strategic Dialogue.” Paris, 20 April 2026.
[137] Reuters. “Why Turkey is so Influential in Post-Assad Syria.” 19 January 2025.
[138] Al Arabiya English. “Lebanon Expresses Interest in Joining US-Led IMEC.” 27 February 2026.
[139] International Monetary Fund. “Lebanon and the IMF: Frequently Asked Questions on Lebanon.” Updated 2026.
[140] Middle East Eye. “Turkey’s Erdoğan Opposes the India-Middle East Transport Project.” 11 September 2023.
[141] Afterman, G. IMEC 2.0: A New Regional Vision after the Gaza War. A Strategic Policy Paper for Israeli Decision-Makers. Mitvim - The Israeli Institute for Regional Foreign Policies, February 2026.
[142] Bianco, C. “From Partners to Rivals: What the Saudi-UAE Rupture Means for Europeans.” European Council on Foreign Relations, Middle East and North Africa Programme, 13 January 2026.
[143] Kateb, A. “The Abraham Accords After Gaza: A Change of Context.” Malcolm H. Kerr Carnegie Middle East Center, Carnegie Endowment for International Peace, 25 April 2025.
[144] Houri-Yafin, A. “Gaza Reconstruction: Risks, Opportunities, and Israel’s Role.” Mitvim - The Israeli Institute for Regional Foreign Policies, April 2026.
[145] Kausch, K. “Corridor Politics: Charting Europe’s De-Risking Route through Eurasia.” German Marshall Fund of the United States, 11 February 2026.
[146] Reuters. “Egypt Says Resolving Palestine Issue Is Key for Progress in India-Europe Transit Corridor.” 17 October 2025.
[147] European Commission. “High-Level Political Dialogue between the European Union and the Palestinian Authority: Commission Proposes Multiannual Comprehensive Support Programme Worth up to EUR 1.6 Billion.” Press release, 13 April 2025.
[148] Council of the European Union. “EU CSDP Civilian Missions: Council Renews Mandates of EUBAM Rafah and EUPOL COPPS.” Press release, 26 June 2025.
[149] Reuters. “Board of Peace Envoy Warns UN that Gaza Division Risks Becoming Permanent.” 21 May 2026.
[150] Asharq Al-Awsat. “Secret Israeli Ministerial Talks under US Pressure Discuss Vision of New Gaza.” 17 April 2026.
[151] Reuters. “Trump’s Board of Peace Holds Talks with DP World over Rebuilding Gaza, FT Says.” 21 April 2026.
[152] Arab Barometer. “Arab Public Opinion Constrains Normalization with Israel.” June 23 2025. https://www.arabbarometer.org/media-news/press-release-foreign-affairs-article-how-arab-public-opinion-constrains-normalization-with-israel/
[153] Arab Center Washington DC. “Arab Opinion Index 2025.” 2026. https://arabcenterdc.org/resource/arab-opinion-index-2025/
[154] Cleveland, C. “Saudi Public Opinion in a Changing Middle East: Great Powers, Gaza War, and Pathways for the Kingdom.” The Washington Institute for Near East Policy,

August 13 2025. https://www.washingtoninstitute.org/policy-analysis/saudi-public-opinion-changing-middle-east-great-powers-gaza-war-pathways-kingdom
[155] The White House. “Statement on President Trump’s Comprehensive Plan to End the Gaza Conflict.” January 16 2026. https://www.whitehouse.gov/briefings-statements/2026/01/statement-on-president-trumps-comprehensive-plan-to-end-the-gaza-conflict/
[156] United States Central Command. “CMCC Grows with Representatives from 50 Nations and International Organizations.” November 28 2025. https://www.centcom.mil/MEDIA/PRESS-RELEASES/Press-Release-View/Article/4344137/cmcc-grows-with-representatives-from-50-nations-and-international-organizations/
[157] Gisha. “Essential and Denied: Israel’s Dual-Use Policy in Gaza.” March 17 2026. https://gisha.org/en/dual-use-items/
[158] Reuters. “Saudi Arabia Spearheads Arab Scramble for Alternative to Trump’s Gaza Plan.” February 14 2025. https://www.reuters.com/world/middle-east/saudi-arabia-spearheads-arab-scramble-alternative-trumps-gaza-plan-2025-02-14/
[159] Reuters. “Jordan’s King Rejects Any Displacement of Palestinians after Trump Floats Gaza Takeover Idea.” February 5 2025. https://www.reuters.com/world/middle-east/jordan-king-rejects-any-attempt-annex-land-displace-palestinians-2025-02-05/
[160] Reuters. “US, Israel Discuss Possible US-Led Administration for Gaza, Sources Say.” May 7 2025. https://www.reuters.com/world/middle-east/us-israel-discuss-possible-us-led-administration-gaza-sources-say-2025-05-07/
[161] Institute for National Security Studies. “INSS October 2025 Public Opinion Survey: In the Shadow of War and Regional Realignment.” November 3 2025. https://www.inss.org.il/publication/survey-october-2025/
[162] European Council on Foreign Relations. “Bypassing the Straits: The India-Middle East-Europe Corridor Needs a Wartime Redesign.” May 22 2026. https://ecfr.eu/article/bypassing-the-straits-the-india-middle-east-europe-corridor-needs-a-wartime-redesign/
[163] United Nations Office for the Coordination of Humanitarian Affairs, occupied Palestinian territory. “Humanitarian Situation Report: April 10 2026.” April 13 2026. https://www.ochaopt.org/content/humanitarian-situation-report-10-april-2026
[164] European Council on Foreign Relations. “Amid the Mayhem: Three Steps for the EU and Turkey to Protect Their Interests.” April 10 2026. https://ecfr.eu/article/amid-the-mayhem-three-steps-for-the-eu-and-turkey-to-protect-their-interests/
[165] United Nations Geneva. “Security Council Live: Regional War Threatens Syria’s Fragile Transition.” April 22 2026. https://www.ungeneva.org/en/news-media/news/2026/04/117901/security-council-live-regional-war-threatens-syrias-fragile

Annex A. Full Demand Analysis

This annex provides the full demand analysis for the proposed primary route from the King Hussein Bridge (KHB) through the West Bank and the Safe Passage to Gaza and Gaza Port. It contains the methodology, layer-by-layer parameter tables, calculation framework, sensitivity analysis, cargo-mix checks, and assumption register for the demand results presented in section 3.1. All values are pre-feasibility planning estimates and should be refined with primary data during investment-grade demand work.

A.1 Methodology and source studies

The demand model is organized around three freight functions: Gaza origin-destination demand, West Bank origin-destination demand, and IMEC through-transit potentially captured by Gaza Port from competing Mediterranean gateways. These layers cover the principal external freight streams relevant to the proposed rail branch. Gaza-West Bank inter-territorial flows are conceptually relevant to the Safe Passage segment but are not separately quantified.

Table A.1. Source studies underpinning the demand build.

Study	What it provides	Use in this rail demand build
EcoPeace Middle East, Humanitarian and Trade Corridor [7]	Post-stability Gaza import requirements, corridor architecture, KHB constraints, Gaza/West Bank logistics hubs, and Gaza entry systems.	Primary source for Layer 1; supporting source for Layer 2 and the KHB constraint environment.
Gal, Jordan River Crossing Study [83]	Jordan River Crossing demand methodology, 280-workday convention, truck-to-TEU conversion, 7,500 trucks/day Sheikh Hussein benchmark, and broader IMEC regional ceiling.	Operational and scale plausibility benchmark for Layer 3; not a direct Gaza-branch or Gaza Port forecast.
Fredman and Rozen, Misgav/KAS IMEC study [84]	IMEC route structure, trade-growth rationale, cargo types likely to use IMEC, transit-time advantages, and 638,889 TEU/year initial IMEC benchmark.	Baseline anchor for Layer 3 corridor-wide IMEC transit.

None of these studies directly forecasts rail demand for this specific West Bank-Gaza branch. The model, therefore, uses transparent scenario parameters. The model uses three horizons: opening year 0 (2033), year 5 (2038), and year 15 (2048). The dates are placeholders. The scenarios are Low, Base, and Upside. The Base case is used for capacity planning and phasing; it should not be read as the expected forecast.

A.2 Layer 1: Gaza origin-destination demand

Layer 1 captures cargo with Gaza as either origin or destination. The quantified model is anchored on EcoPeace [7], which estimates approximately 5,500 truckloads/day of post-stability imports into Gaza for humanitarian supply, reconstruction, consumption, and economic reactivation. The rail calculation focuses on the portion of Gaza origin-destination demand that would use the eastern gateway via KHB and the rail branch, then applies a small reverse-direction uplift for Gaza exports or re-exports. Gaza-West Bank inter-territorial flows are not separately quantified; their omission makes the estimate

conservative for the Safe Passage segment, though not necessarily for Gaza Port maritime throughput.

The demand was calculated using the following equation:

$$TEU/year = G(h) \times E \times R \times C(h) \times 280 \times 2 \times (1 + W)$$

Where G(h) is horizon-specific Gaza demand in trucks/day; E is eastern-gateway share via KHB; R is rail-suitable share; C(h) is branch capture by horizon; W is Gaza export/re-export uplift; 280 is the KHB workday convention from Gal [83]; and 2 converts a typical 40-ft truckload to TEU. EcoPeace [7] uses a 360-crossing-day convention for its Gaza import table; using 280 here is a conservative KHB-type cross-border annualization convention and should be sensitivity-tested at the next stage.

Worked example - Base, opening: 5,500 x 0.33 x 0.60 x 0.30 x 280 x 2 x 1.10 = 201,247, rounded to 201,200 TEU/year.

Table A.2. Layer 1 demand-build parameters.

Layer 1 input	Low	Base	Upside
Total Gaza demand at opening (trucks/day)	5,000	5,500	6,500
Total Gaza demand at year 5 (trucks/day)	4,000	4,500	5,500
Total Gaza demand at year 15 (trucks/day)	3,500	4,000	5,000
Eastern-gateway share via KHB	25%	33%	40%
Rail-suitable share	50%	60%	70%
Branch capture - opening	20%	30%	40%
Branch capture - year 5	40%	55%	70%
Branch capture - year 15	60%	75%	85%
Gaza export/re-export uplift	5%	10%	15%

Based on the equation and the parameters defined in Table A.2, the following summarizes the results for Layer 1 demand.

Table A.3. Layer 1 results.

Scenario	Opening (TEU/yr)	Year 5 (TEU/yr)	Year 15 (TEU/yr)
Low	73,500	117,600	154,400
Base	201,200	301,900	365,900
Upside	468,800	694,200	766,400

A.3 Layer 2: West Bank origin-destination demand

Layer 2 captures West Bank external origin-destination trade. Imports may enter through KHB/eastern routes or Gaza Port/Mediterranean routes; exports may move in the opposite direction, depending on destination. This layer excludes Gaza-West Bank inter-territorial flows to avoid double-counting with Layer 1. The opening baselines of 600/900/1,200 trucks/day are scenario assumptions informed by EcoPeace [7], which documents severe KHB constraints and states that pre-war import-entry demand to Palestine from the east was at least triple the observed 2024 KHB throughput. These values are not directly quoted forecasts and require validation in investment-grade demand work.

The equation used to calculate total Layer 2 demand is as follows:

TEU/year = B x growth factor x R x C(h) x 280 x 2

Where B is opening baseline demand in trucks/day; R is the rail-suitable share; C(h) is branch capture in horizon h; 280 is the KHB workday convention from Gal [83]; and 2 converts a typical 40-ft truckload to TEU. The growth factor is 1.00 at opening, (1 + g1)^5 at year 5, and (1 + g1)^5 x (1 + g2)^10 at year 15. Here, g1 is the annual growth rate from opening to year 5, and g2 is the annual growth rate from year 5 to year 15.

Worked example - Base, year 5: 900 x (1.045)^5 x 0.65 x 0.45 x 280 x 2 = 183,712, rounded to 183,700 TEU/year.

Table A.4. Layer 2 demand-build parameters.

Layer 2 input	Low	Base	Upside
Opening baseline (trucks/day)	600	900	1,200
Annual growth - opening to year 5	2.5%	4.5%	7.0%
Annual growth - year 5 to year 15	1.5%	4.0%	5.0%
Rail-suitable share	55%	65%	75%
Branch capture - opening	20%	25%	30%
Branch capture - year 5	40%	45%	50%
Branch capture - year 15	55%	65%	75%
Western-gateway share via Gaza Port	15%	25%	35%

Based on the equation and the parameters defined in Table A.4, the following summarizes the results for total Layer 2 demand.

Table A.5. Layer 2 results.

Scenario	Opening (TEU/yr)	Year 5 (TEU/yr)	Year 15 (TEU/yr)
Low	37,000	83,600	133,500
Base	81,900	183,700	392,800
Upside	151,200	353,400	863,600

The western gateway's share of Layer 2 demand can be calculated to allocate it between the Gaza Port/Mediterranean gateway and the KHB/eastern gateway. This allocation is used only for gateway and terminal interpretation, not for calculating total rail branch demand.

Table A.6. Layer 2 gateway split, by scenario and horizon.

Scenario/horizon	Total Layer 2 demand (TEU/yr)	Western-gateway share	Western gateway via Gaza Port (TEU/yr)	Eastern gateway via KHB (TEU/yr)
Low – opening	37,000	15%	5,600	31,500
Low - year 5	83,600	15%	12,500	71,100
Low - year 15	133,500	15%	20,000	113,500
Base – opening	81,900	25%	20,500	61,400
Base - year 5	183,700	25%	45,900	137,800
Base - year 15	392,800	25%	98,200	294,600
Upside – opening	151,200	35%	52,900	98,300
Upside - year 5	353,400	35%	123,700	229,700
Upside - year 15	863,600	35%	302,300	561,300

A.4 Layer 3: IMEC transit Captured by Gaza Port

Layer 3 captures only through-transit cargo at the Mediterranean gateway to Gaza Port.

The corridor-wide IMEC values are anchored on the Fredman and Rozen/Misgav-KAS estimate of 638,889 TEU/year under conservative initial utilization assumptions [84], then scaled across horizons as a strategic planning envelope. Gal [83] is used only as a plausibility benchmark because it estimates large potential demand at Sheikh Hussein and a broader regional ceiling; it does not forecast demand for Gaza Port or this rail branch. Therefore, the table values (0.8M, 1.3M, 2.0M) and subsequent horizon values are rounded scenario assumptions placed between those benchmarks. Specifically,

- 800,000 TEU at opening in the Low case is a cautious value slightly above the Misgav/KAS 638,889 TEU benchmark.
- 1.3M TEU at opening in the Base case assumes IMEC has scaled beyond the initial benchmark by rail opening.
- 2.0M TEU at opening in the Upside case assumes faster regional integration and stronger early IMEC capture.
- 4.5M TEU in the Base year-15 case is approximately aligned with the 7,500 trucks/day Sheikh Hussein scale, but only as a plausibility benchmark, not as a direct Gaza-branch forecast.
- 7.0M TEU in the Upside year-15 case is above the Sheikh Hussein benchmark but still far below the broader 30,000 trucks/day regional ceiling.

For calculations of Layer 3 demand, the following equation was used:

Layer 3 TEU/year = corridor-wide IMEC TEU at horizon x Gaza Port capture share of corridor-wide IMEC

Worked example - Base, year 15: 4,500,000 x 0.150 = 675,000 TEU/year.

Table A.7. Layer 3 demand-build parameters.

Layer 3 input	Low	Base	Upside
Corridor-wide IMEC TEU at opening	800,000	1,300,000	2,000,000
Corridor-wide IMEC TEU at year 5	1,500,000	2,800,000	4,500,000
Corridor-wide IMEC TEU at year 15	2,500,000	4,500,000	7,000,000
Gaza Port capture of corridor-wide IMEC – opening	3.00%	6.00%	10.50%
Gaza Port capture of corridor-wide IMEC - year 5	4.80%	9.75%	17.50%
Gaza Port capture of corridor-wide IMEC - year 15	7.20%	15.00%	26.25%

Using the equation and applying the parameters above for each horizon, the following summarizes the demand generated by Layer 3.

Table A.8. Layer 3 results.

Scenario	Opening (TEU/yr)	Year 5 (TEU/yr)	Year 15 (TEU/yr)
Low	24,000	72,000	180,000
Base	78,000	273,000	675,000
Upside	210,000	787,500	1,837,500

A.5 Combined demand and Gaza Port / western-gateway component

Table A.9 presents total rail branch demand and the indicative Gaza Port/western gateway component. Total rail branch demand is the sum of the three quantified layers. The indicative Gaza Port/ western gateway component is reported separately because it informs port and terminal interpretation, but it is not identical to the total branch demand.

The indicative Gaza Port/ western gateway component is calculated as: Layer 1 export/re-export component + Layer 2 western gateway component + Layer 3. The Layer 1 export/re-export component is estimated as Layer 1 x W/(1 + W), because the Layer 1 total already includes the reverse-flow uplift W. This component excludes Gaza Port maritime imports that do not use the KHB-West Bank-Safe Passage branch.

Table A.9. Combined rail branch demand and indicative Gaza Port / western-gateway component.

Scenario/ horizon	Layer 1 Gaza O-D	Layer 2 West Bank O-D	Layer 3 IMEC to Gaza Port	Total rail branch demand	Indicative branch-related Gaza Port / western-gateway component
Low - opening	73,500	37,000	24,000	134,500	33,000
Low - year 5	117,600	83,600	72,000	273,200	90,100
Low - year 15	154,400	133,500	180,000	467,800	207,400
Base - opening	201,200	81,900	78,000	361,100	116,800
Base - year 5	301,900	183,700	273,000	758,600	346,400
Base - year 15	365,900	392,800	675,000	1,433,700	806,500
Upside - opening	468,800	151,200	210,000	830,000	324,100
Upside - year 5	694,200	353,400	787,500	1,835,200	1,001,800
Upside - year 15	766,400	863,600	1,837,500	3,467,400	2,239,700

The Base case provides the primary planning envelope. Total rail branch demand is approximately 0.36/0.76/1.43 million TEU/year at opening, year 5, and year 15. The indicative Gaza Port/ western gateway component is approximately 0.12/0.35/0.81 million TEU/year. These values are not interchangeable: total branch demand includes eastern-gateway traffic using the branch but not necessarily Gaza Port.

A.6 Directionality and empty returns

Actual rail operations require empty equipment repositioning because flows are not perfectly balanced by direction. The empty-return rates below are layer-specific assumptions used to convert loaded double-stack trains/day into total train paths/day. The weighted empty-return uplift in Table A.11 is calculated from the demand mix in each scenario and horizon.

Table A.10. Directional flow profile by demand layer.

Flow	Loaded direction	Return-flow assumption	Empty-return rate opening/year 5/year 15
Layer 1 - Gaza origin-destination	Mostly KHB/east to Gaza at opening; reverse flows rise as exports/re-exports recover.	High empty return early; improves as Gaza's productive activity resumes.	50% / 30% / 15%
Layer 2 - West Bank origin-destination	Both directions through the eastern and western gateways.	Partial balance; imports likely exceed exports in the early years.	15% / 12% / 10%
Layer 3 - IMEC transit to Gaza Port	Bidirectional through-transit between Gulf/Asia and Europe via Gaza Port.	More balanced than Layer 1; residual empty repositioning remains.	10% / 10% / 10%

A.7 Trains per operating day and single-track sufficiency

To calculate the number of trains per day, the TEU/year was converted into loaded trains/day using horizon-specific rail operating days[4]: 300 at opening, 313 at year 5, and 340 at year 15. These assumptions reflect progressive operational maturity, with more maintenance and contingency time at opening and higher availability as maturity increases.

- Single-stack (SS) train capacity: 135 TEU/train.
- Double-stack (DS) train capacity: 270 TEU/train.
- Utilisation factor: 70%.

Effective capacity is therefore 94.5 TEU/train for SS and 189 TEU/train for DS. Loaded SS trains/day = Total TEU/year/operating days / 94.5. Loaded DS trains/day = Total TEU/year/operating days / 189. Total DS train paths/day = Loaded DS trains/day x (1 + weighted empty-return uplift).

Example - Base, year 15: 1,433,700 / 340 / 189 = 22.3 loaded DS trains/day. Applying an 11% weighted empty-return uplift gives 22.3 x 1.11 = 24.8 total DS train paths/day. In the Upside year-15 case, 3,467,400 / 340 / 189 = 54.0 loaded DS trains/day; with an 11% uplift, total DS train paths/day reach 60.0.

Table A.11. Trains per operating day with empty-return uplift.

Scenario/horizon	Total TEU/yr	Op. days	Loaded SS @ 70%	Loaded DS @ 70%	Empty-return uplift	Total DS train paths/day
Low – opening	134,500	300	4.7	2.4	33%	3.2
Low - year 5	273,200	313	9.2	4.6	19%	5.5
Low - year 15	467,800	340	14.6	7.3	12%	8.1
Base – opening	361,100	300	12.7	6.4	33%	8.5
Base - year 5	758,600	313	25.6	12.8	18%	15.2

[4] To clarify, the 280-day convention is used only to annualize road/crossing-origin demand. Rail operating days used for train-path conversion are separate assumptions: 300 at opening, 313 at year 5, and 340 at year 15.

Scenario/horizon	Total TEU/yr	Op. days	Loaded SS @ 70%	Loaded DS @ 70%	Empty-return uplift	Total DS train paths/day
Base - year 15	1,433,700	340	44.6	22.3	11%	24.8
Upside – opening	830,000	300	29.3	14.6	34%	19.5
Upside - year 5	1,835,200	313	62.0	31.0	18%	36.6
Upside - year 15	3,467,400	340	107.9	54.0	11%	60.0

The Loaded SS and Loaded DS columns are diagnostic. The main capacity conclusion uses Total DS train paths/day because the report assumes the corridor is designed for double-stack clearance by maturity. Low and Base remain within the indicative 50-60 total bidirectional train-path/day single-track envelope. Upside year 15 reaches approximately 60 paths/day, indicating that selective double-tracking, additional passing loops, or higher-capacity operations would likely be required under the stress case. Precise capacity must be validated by timetable simulation, passing-loop design, terminal dwell assumptions, and border-processing regimes.

A.8 Cargo mix and tonnage cross-check

This section provides a high-level tonnage cross-check of the TEU-based demand results. Because the model is expressed primarily in TEU/year, the check converts representative cargo profiles into indicative tonnes per container, tonnes per TEU, and trainload tonnage. Its purpose is to confirm that the demand results are broadly consistent with realistic intermodal train weights and to identify whether the branch is more likely to be constrained by train paths, terminal productivity, storage, or border processing rather than by axle-load limits.

Table A.12. Tonnage cross-check by cargo profile.

Cargo profile	Est. t per 40-ft container	Est. t per TEU	Est. SS train tonnage (135 TEU)	Est. DS train tonnage (270 TEU)
Heavy reconstruction (Layer 1, opening)	24	12	1,620 t	3,240 t
Mixed Layer 1 (year 5)	20	10	1,350 t	2,700 t
Mature mixed Layer 1 (year 15)	18	9	1,215 t	2,430 t
Layer 2/3 general intermodal	14	7	945 t	1,890 t

Using layer-specific load factors, the Base year-15 total of approximately 1.43 million TEU/year corresponds to about 10.8 million tonnes/year: Layer 1 at approximately 9 t/TEU and Layers 2 and 3 at approximately 7 t/TEU. The branch is therefore primarily volume- and terminal-capacity-constrained rather than axle-load-constrained, assuming the infrastructure is designed for heavy intermodal service. Bulk construction materials and liquids would require a parallel bulk wagon or specialized cargo module if they are later included in the rail model.

A.9 Sensitivity analysis

Table A.13. Demand sensitivity analysis.

Sensitivity	Effect	Conclusion
Layer 1 eastern-gateway share via KHB	Reducing the Base opening share from 33% to 25% lowers Base Layer 1 opening demand from about 201,200 to about 152,500 TEU/year and Base total opening demand by about 14%.	Single-track sufficiency preserved.
Layer 3 Gaza Port capture of IMEC transit	Reducing Base year-15 Gaza Port capture from 15.0% to 7.2% lowers Layer 3 from 675,000 to 324,000 TEU/year and total Base year-15 demand to about 1.08M TEU/year.	Layer 3 is the largest year-15 uncertainty.
Reconstruction phasing	Holding Base Layer 1 at 5,500 trucks/day across all horizons raises Base year-15 Layer 1 from 365,900 to about 503,100 TEU/year and total Base year-15 demand to about 1.57M TEU/year.	Single-track DS sufficiency preserved.
Gaza Port commissioning	If Gaza Port is delayed, Layer 3 and western gateway components cannot materialize as modeled. Eastern-gateway Gaza demand can still terminate at interim Gaza-area logistics facilities.	Affects port throughput and strategic transit capture more than KHB-Gaza recovery flows.
Rail-opening lag relative to stabilization	If rail opens after much of the acute reconstruction surge has passed, a 4,500/4,000/3,500 trucks/day Base Layer 1 sequence reduces Base totals to about 0.32/0.73/1.39M TEU/year.	Accelerated delivery is important if the project is intended to capture reconstruction-surge traffic.
Gaza-West Bank inter-territorial flows	Not separately quantified. Each additional 100,000 TEU/year on the Safe Passage segment would add roughly 1.7-2.0 total DS paths/day, depending on horizon and empty-return assumption.	Conservative omission for Safe Passage capacity, but not necessarily for Gaza Port maritime throughput.
High empty-return	Using higher early empty-return assumptions raises Base opening DS train paths modestly, but they remain far below the indicative 50-60 path/day envelope.	Operational issue for wagon cycles and terminals, not a capacity-blocking issue in Base case.

A.10 Assumption register

Table A.14a. Route and scope assumptions.

Assumption	Basis	Defence
Three modeled layers cover the principal external freight streams.	Constructed from route geography and trade function: Gaza O-D, West Bank O-D, and IMEC transit to Gaza Port.	Gaza-West Bank inter-territorial flows are not separately quantified; exclusion is conservative for Safe Passage capacity.
Opening year placeholder = 2033; year 5 = 2038; year 15 = 2048.	Seven-year build-out from 2026 baseline.	Placeholder only; dates can be moved without altering model structure.
Gaza Port assumed operational at or before rail opening for western-gateway and Layer 3 flows.	Working assumption for the strategic Gaza Port route.	Major risk. If delayed, Layer 3 is deferred or remains Haifa-bound.
280 workdays/year used for annualization of road/crossing demand.	Taken from Gal [83]. EcoPeace [7] uses 360 crossing days/year for the Gaza import table.	Conservative normalization for KHB-type cross-border operations should be sensitivity-tested.

Table A.14b. Layer 1 and Layer 2 assumptions.

Assumption	Basis	Defence
Layer 1 Base total Gaza demand: 5,500 / 4,500 / 4,000 trucks/day.	Opening from EcoPeace [7]; later horizons reflect reconstruction phasing.	Reasonable for planning; should be validated by commodity-by-commodity reconstruction schedules.
Layer 1 Base eastern-gateway share via KHB: 33%.	Judgmental allocation informed by the EcoPeace corridor streams and the KHB role.	Sensitive at opening; should be tested against origin/destination data.
Layer 1 Base rail-suitable share: 60%.	Screens out cargo less suited to container rail; aligns with commodity-screening logic in [83].	Reasonable for early planning; bulk construction may require a parallel bulk-wagon model if included later.
Layer 1 Base branch capture: 30% / 55% / 75%.	Shipper adoption and rail service maturation.	Ambitious by maturity but defensible if rail service is reliable and border processing is efficient.
Layer 1 Base Gaza export/re-export uplift: 10%.	No separate Gaza export forecast available; included as a small reverse-flow allowance.	Conservative for long-term Gaza productive recovery.
Layer 2 Base opening baseline: 900 trucks/day.	Scenario assumption for latent West Bank own-trade via KHB, informed by EcoPeace [7] evidence of suppressed demand; not directly quoted from any source.	Conservative compared with EcoPeace's wider KHB requirement of at least 3,500 trucks/day in the Gaza corridor/Palestinian access context, but that figure is not a direct West Bank forecast.
Layer 2 Base growth: 4.5% to year 5; 4.0% thereafter.	Access normalization and Palestinian trade recovery assumption.	Requires validation using PCBS/customs trade data.

Assumption	Basis	Defence
Layer 2 Base rail-suitable share: 65%.	West Bank external trade mix closer to general intermodal cargo than Layer 1 reconstruction cargo.	Within the typical intermodal corridor range.
Layer 2 Base branch capture: 25% / 45% / 65%.	Mode substitution increases with maturity.	Plausible but should be validated by shipper interviews.
Layer 2 Base western-gateway share: 25%.	Gateway split assumption for Gaza Port/Mediterranean versus KHB/eastern routes.	Not a sourced number; requires trade-partner and commodity validation.

Table A.14c. Layer 3 and operations assumptions.

Assumption	Basis	Defence
Layer 3 Base corridor-wide IMEC: 1.30M / 2.80M / 4.50M TEU/year.	Rounded scenario assumptions anchored on Misgav/KAS 638,889 TEU/year initial benchmark [84], then scaled under stability and trade growth.	Ambitious; not directly forecast by [84]. Base year-15 implies rapid early scaling and must be validated.
Layer 3 Base Gaza Port capture: 6.0% / 9.75% / 15.0% of corridor-wide IMEC.	Judgmental Gaza Port diversion from the Haifa-route IMEC transit.	Largest strategic assumption. The remainder stays with Haifa and is not counted in the Gaza branch demand.
Gal [83] used only as a plausibility benchmark for Layer 3.	Gal estimates demand at Sheik Hussein and at wider regional IMEC ceilings, not at Gaza Port rail demand.	Prevents over-reading a road/crossing study as a Gaza branch forecast.
Train capacity: 135 TEU SS; 270 TEU DS; 70% utilization.	Consistent with the freight train capacity discussion in [84] and central planning utilization.	Double-stack must be protected by design; if single-stack only, year-15 margins narrow materially.

Annex B. Full CAPEX/OPEX and Financing Envelope Build

This annex provides the full CAPEX/OPEX and financing-envelope analysis for the proposed primary route from the Jordanian network through the West Bank and the Safe Passage to Gaza and Gaza Port, covering both Option 1 (King Hussein/Karamah-Allenby Bridge route) and Option 2 (Prince Mohammed/Damia Bridge route). It contains the methodology, benchmark table, unit-cost build-up, engineering estimate range (distinct from the scenario sensitivity in section 4.5), OPEX walk-through, financing-implications discussion, and assumption register for the results presented in section 4. All values are pre-feasibility planning estimates at constant 2026 prices and should be refined by investment-grade engineering, demand, and procurement work at the next stage. Revenue, tariffs, NPV, IRR, and externality monetization are out of scope and deferred to the investment-grade financial-feasibility appraisal.

B.1 Methodology and Source Studies

The financial build follows a four-step method consistent with pre-feasibility practice at the World Bank and the European Investment Bank. [109][110] First, the route is segmented into engineering-homogeneous sections, as described in section 3.3. Second, a benchmark unit cost is established for each section type from comparable regional and international projects. Third, lump-sum items, including terminals, border yards, electrification overlay, ETCS integration, are added. The Jordan River crossing structure is treated as a section-level lump-sum item and included in the linear-sections subtotal. Fourth, a contingency reserve is applied to capture pre-feasibility uncertainty. OPEX is built separately from train-path volumes (Annex A, Table A.11) using a category-by-category unit-cost approach.

Table B.1. Source studies and benchmarks underpinning the financial build.

Source/project	What it provides	Use in this financial build
Jordan–UAE Aqaba Port Railway, USD 2.3 billion for 360 km of freight rail [77][78]	Regional benchmark of about USD 6.4M/km for new-build standard-gauge freight rail in similar terrain.	Primary anchor for Jordan-side unit cost and a calibration cross-check for West Bank approach sections.
Saudi Landbridge reported an upper-bound USD 26.6 billion for approximately 1,500 km of new and upgraded rail [28][29]	Regional upper-bound benchmark of approximately USD 17.7M/km for a longer-span, mixed-use corridor with associated logistics hubs.	Upper-bound calibration for corridor-wide CAPEX and a benchmark for cost evolution under political delay.
Etihad Rail / UAE national railway program, approximately USD 9M/km equivalent across the planned 1,200 km network; Stage Two covers the core 605 km heavy-haul/GCC link [18][23]	Modern Gulf benchmark for ETCS Level 2, double-stack-capable, heavy-haul freight construction.	Cross-check the freight section unit cost and the cross-border interoperability overlay.

Rail Baltica updated CBA, about EUR 26M/km for new electrified mainline [114]	European benchmark for new-build electrified mainline, including all systems.	Upper-bound check for the electrification overlay and integrated-systems cost.
OECD / IEA freight-electrification literature [111][112]	Unit-cost benchmarks for 25 kV AC catenary, traction energy, and electric-versus-diesel OPEX.	Anchors the electrification overlay (USD 2.5M/km) and the traction-energy OPEX category.
ORR European TOC benchmarking [113]	Per-train-kilometer operating cost categories for freight rail in mature European networks.	Calibrates the OPEX unit cost categories (energy, crew, maintenance).
Israel Railways electrification program [41][42]	Israeli unit-cost evidence for electrified mainline and built-up-area alignment.	Anchors the Safe Passage section unit cost and accounts for security infrastructure.
Gaza Rapid Damage and Needs Assessment [10][105]; UNEP preliminary environmental assessment [104]	Gaza site conditions, debris, contamination, and UXO context.	Drives the Gaza-side unit-cost premium for site clearance and UXO screening.

No single comparable project replicates this corridor's exact combination of greenfield West Bank construction, the Safe Passage through Israeli territory under a security arrangement, and Gaza-side post-conflict construction. The unit costs used here are therefore composite benchmarks. The financial model uses three engineering scenarios (Low, Base, High) for the unit-cost-driven estimate range in section B.3, and a separate set of macro-level scenarios (favorable, commodity shock, political delay, severe delay, IMEC integration) for the scenario sensitivity in section B.5. The Base case is used for planning and should not be read as a point forecast.

B.2 Unit-Cost Build-Up by Section Type

Table B.2 presents the unit-cost build-up for the five linear engineering sections that comprise either option, along with the lump-sum items. Each unit cost is presented as a Base-case central value, with Low and High flanking values, for the engineering estimate range in section B.3. All values are in USD millions per kilometer at constant 2026 prices, except for lump-sum items, which are presented in USD millions.

Table B.2. Section unit-cost build-up (USD millions/km, except lump-sum items in USD millions).

Section type	Low unit cost	Base unit cost	High unit cost	Benchmark anchor
Jordanian approach (flat-to-rolling, planned-network tie-in)	6.5	8.0	10.0	Aqaba (USD 6.4M/km) +20–25 % for descent/seismic [77][78]
Jordan River crossing (bridge + border yard, lump sum USD M)	90	120	160	Composite of regional river-crossing bridge unit costs plus customs/border-yard fitout [18][32]
West Bank: Jordan River to NS spine (valley to ridge)	8.0	10.0	13.0	Aqaba + premium for greenfield ridge climb and seismic exposure [77][78][35]
West Bank: central ridge / westward to Tarqumia	9.5	12.0	15.0	Saudi Landbridge mountain sections [28][29] + greenfield WB premium
Safe Passage (Tarqumia–Gaza, built-up Israel)	14.0	18.0	23.0	Israel Railways electrified mainline + security infrastructure + likely partial grade separation [41][42]
Gaza border to Gaza Port (post-conflict greenfield)	11.0	14.0	18.0	Greenfield premium + UXO/site clearance per Gaza RDNA [10][104][105]
Electrification overlay (25 kV AC catenary)	2.0	2.5	3.2	OECD/IEA freight-electrification benchmarks [111][112]
Border yards, depot, and control center (lump sum USD M)	260	350	470	Composite of Etihad Rail terminal benchmarks and corridor scale [18][23]
ETCS integration and interoperability (lump sum USD M)	90	120	160	ETCS Level 2 cross-border integration in EU corridor practice [55][57]
Contingency (% of direct construction)	20 %	25 %	30 %	World Bank pre-feasibility practice for early-stage estimates [109][110]

Source: Consultant's calculation, drawing on the regional and international benchmarks referenced in Table B.1. Unit costs include civil works, track, basic signaling, drainage, minor structures, and generic grade-separation allowances for each linear section. Major tunnel and viaduct alternatives beyond that generic allowance, and stations, are not separately modeled at this stage; they should be added when surveyed alignments and engineering definition become available (see Box 4.1).

B.3 Engineering Estimate Range (CAPEX)

This section presents the engineering estimate range produced by varying the section-by-section unit costs (Table B.2) and the contingency rate. This is conceptually distinct from the macro scenario sensitivity in section 4.5/Table 4.4. The engineering estimate range flexes the bottom-up cost build under today's procurement conditions, whereas the

scenario sensitivity flexes external macro and political conditions. Both views are presented to give decision-makers a complete picture of cost and uncertainty.

The CAPEX for each option is calculated by multiplying the length of each linear section (from section 3.3) by the corresponding section unit cost, including the Jordan River crossing as a section-level lump sum, then adding the electrification overlay, the terminals/depot lump sum, the ETCS integration lump sum, and applying the contingency. The equation used is:

Base CAPEX = Σ ($L_i \times U_i$) + Bridge lump sum + Electrification + Terminals + ETCS, then add contingency

where L_i is the length of section i in kilometers and U_i is its unit cost in USD millions per kilometer. The worked Base values are presented in Table 4.1 of the main text; Table B.3 below shows the same calculation in expanded form, including the Low and High flanking estimates derived by applying the corresponding unit costs from Table B.2 and the corresponding contingency rates (20 % / 25 % / 30 %).

Table B.3. Engineering estimate range — CAPEX scenarios by route option (USD millions; NIS billions in parentheses).

Scenario	Direct constr. (incl. bridge)	Electr.	Terminals + ETCS	Pre-cont. subtotal	Contingency	Total CAPEX USD M (NIS B)
Option 1 — Low	1,538	300	350	2,188	438 (20 %)	2,626 (9.72)
Option 1 — Base	1,950	375	470	2,795	699 (25 %)	3,494 (12.93)
Option 1 — High	2,490	480	630	3,600	1,080 (30 %)	4,680 (17.32)
Option 2 — Low	2,060	410	350	2,820	564 (20 %)	3,384 (12.52)
Option 2 — Base	2,610	513	470	3,593	898 (25 %)	4,491 (16.62)
Option 2 — High	3,315	656	630	4,601	1,380 (30 %)	5,981 (22.13)

Source: Consultant's calculation. Direct construction line equals the section-by-section sum of length × unit cost for the six linear sections in Table 4.1, including the Jordan River crossing lump sum. The lump-sum line includes only the terminals/depot and ETCS integration packages (the bridge is already in the direct-construction line).

The Low-High engineering range is approximately NIS 9.7 to 17.3 billion (USD 2.6 to 4.7 billion) for Option 1 and approximately NIS 12.5 to 22.1 billion (USD 3.4 to 6.0 billion) for Option 2. The width of these ranges reflects pre-feasibility engineering uncertainty in today's procurement market. Detailed engineering, surveyed alignment, and competitive procurement at the next stage will materially narrow the band. Minor differences in row totals may arise from rounding to whole USD millions.

B.4 OPEX Calculation Walk-Through

OPEX is built by category from the train-path output of the demand model (Annex A, Table A.11). The Base case in section 4.4 uses the Base demand scenario; this annex also presents the Low and Upside OPEX trajectories that correspond to the Low and Upside demand scenarios in Annex A.

The unit-cost categories are drawn from European TOC benchmarking and OECD/IEA freight-electrification literature, then adjusted for the corridor's specific characteristics. [111][112][113] The seven OPEX categories used are:

- **Traction energy**: approximately 80 kWh per train-km for heavy double-stack freight operating across the corridor's rolling and partly mountainous terrain profile, valued at an indicative blended regional industrial-tariff electricity price of USD 0.075 per kWh and applied using 300 / 313 / 340 rail operating days at opening / year 5 / year 15.
- **Rolling-stock maintenance**: scales with train-km and with fleet size; calibrated to the minimum service fleet sized to the Base case opening year.
- **Train crew:** drivers, shunters, and dispatch staff, scaled to train paths per day with allowance for shift coverage and corridor working-time arrangements.
- **Infrastructure maintenance**: track, structures, and drainage, scaling broadly with route length; the dominant length-dependent OPEX component.
- **Signaling, ETCS, and telecommunications**: a relatively small but length-dependent line, with a corridor-wide premium for cross-border ETCS Level 2 operation.
- **Terminal and border-yard operations**: a volume-dependent line covering loading/unloading, customs interface, and gate operations.
- **Administration, insurance, security, and regulatory fees**: a composite line that includes the dedicated security envelope for the Safe Passage segment.

It must be noted here that, at this strategic stage, the ORR/European TOC evidence is used as a calibration benchmark rather than reproduced as a full source-cost database. The model translates those benchmarks into corridor-specific unit rates by applying three scaling bases: train-kilometers for rolling stock, crew, energy, and terminal-related costs; route-kilometers for infrastructure maintenance and signaling systems; and a fixed percentage of CAPEX for long-cycle renewals. The calibrated rates for the Base case are shown below. These rates should be refined at the investment-grade stage using operator quotations, country-specific wage data, asset-maintenance plans, terminal operating models, and electricity-procurement terms.

Table B.4. OPEX calibration basis and implied Base-case unit rates.

OPEX category	Benchmark/source basis	Calibration method used in this model	Calibrated Base-case unit rate
Traction energy	OECD / IEA freight-electrification literature	80 kWh/train-km × USD 0.075/kWh; applied to train paths, route length, and operating days	Approx. USD 6.0/train-km, equivalent to about NIS 22/train-km
Rolling-stock maintenance	ORR / European TOC rolling-stock maintenance benchmarks	Scaled by train-km and fleet intensity	Approx. USD 39–43/train-km for Option 1 Base case
Train crew and operations staff	ORR / European TOC labor-cost benchmarks	Scaled by train paths/day, shift coverage, drivers, shunters, dispatchers, and terminal movement staff	Approx. USD 49 /train-km for Option 1 Base case
Infrastructure maintenance	European rail infrastructure O&M benchmarks	Scaled primarily by route length, with allowance for track, structures, drainage, and terrain intensity	Approx. USD 162,000–195,000/route-km/year for Option 1 Base case
Signaling, ETCS, & telecommunications	European signaling and train-control O&M benchmarks	Scaled primarily by route length, with a premium for cross-border ETCS Level 2 operation	Approx. USD 54,000–67,000/route-km/year for Option 1 Base case
Terminal and border-yard operations	ORR / European TOC and freight-terminal operating benchmarks	Scaled by train paths, loading/unloading activity, customs interface, inspection movements, and gate operations	Approx. USD 46–49/train-km for Option 1 Base case
Administration, insurance, security, and regulatory fees	ORR / European TOC overhead-cost benchmarks plus corridor security premium	Composite allowance scaled by traffic volume and corridor-specific institutional/security complexity	Approx. USD 36–42/train-km for Option 1 Base case
Annualized renewals reserve	International heavy-rail asset-management practice	1.5% of Base CAPEX per year	NIS 194M/year for Option 1; NIS 249M/year for Option 2

Source: Consultant's calculation, calibrated from ORR European train-operating-company cost benchmarks, OECD/IEA freight-electrification literature, and corridor-specific operating assumptions. Implied unit rates are derived from the Base-case OPEX table using route length, train paths/day, and rail operating days. These are indicative strategic-feasibility rates and should not be read as operator quotations or investment-grade cost estimates.

An additional line, the annualized renewals reserve, is included to capture the long-cycle replacement obligation for track, structures, and overhead line equipment. This is set at approximately 1.5 percent of Base CAPEX per year, in line with international asset management practice for new-build heavy-haul rail. [109][111] For Option 1, this is NIS 194 million per year; for Option 2, NIS 249 million per year.

Table B.4a. OPEX scenarios by demand case and horizon — Option 1. USD millions per year (NIS millions per year).

Demand scenario	Train paths/day opening/yr 5 /yr15	Opening OPEX	Year 5 OPEX	Year 15 OPEX
Low	3.2 / 5.5 / 8.1	104.1 (385)	132.4 (490)	183.8 (680)
Base	8.5 / 15.2 / 24.8	154.9 (573)	218.9 (810)	323.5 (1,197)
Upside	19.5 / 36.6 / 60.0	241.9 (895)	402.7 (1,490)	678.4 (2,510)

Table B.4c continued. OPEX scenarios by demand case and horizon — Option 2. USD millions per year (NIS millions per year).

Demand scenario	Train paths/day opening/yr 5 /yr15	Opening OPEX	Year 5 OPEX	Year 15 OPEX
Low	3.2 / 5.5 / 8.1	125.7 (465)	158.1 (585)	213.5 (790)
Base	8.5 / 15.2 / 24.8	187.0 (692)	256.2 (948)	368.9 (1,365)
Upside	19.5 / 36.6 / 60.0	289.2 (1,070)	467.6 (1,730)	775.7 (2,870)

Source: Consultant's calculation. Train-path volumes from Annex A, Table A.11. Energy line calibrated at approximately 80 kWh/train-km for heavy double-stack freight on this corridor's terrain, using 300 / 313 / 340 rail operating days at opening / year 5 / year 15. The Option 2 figures are approximately 12 to 21 percent higher across horizons, reflecting the additional 55 km of route-length-dependent OPEX (infrastructure maintenance, energy, signaling) and the higher annualized renewals reserve associated with Option 2's larger CAPEX base.

The Low-case OPEX trajectory (NIS 385 to 680 million per year for Option 1) shows that even under a pessimistic demand case, the operating envelope is manageable relative to the CAPEX scale. Conversely, the Upside case (up to NIS 2.5 to 2.9 billion per year by year 15) indicates that, if demand realizes in line with the Upside corridor-wide IMEC scenario, the operation will require materially more rolling stock and labor than the minimum service fleet assumed here, and additional terminal-capacity investment may be needed.

B.5 Scenario Sensitivity Matrix

Table B.5 presents the scenario sensitivity matrix referenced in section 4.5. Unlike the engineering estimate range in section B.3, which varies section-level unit costs, Table B.5 starts from the Base-case CAPEX in Table 4.1 and applies broader scenario adjustments for cost escalation, delay, rework, and IMEC-related procurement savings. The Base and Optimistic-IMEC scenarios assume on-time delivery. The political delay and severe delay scenarios assume five-year and ten-year delays, respectively. In both delay scenarios, rework costs are applied to an assumed 60 percent of the pre-contingency direct construction, representing work that is partially completed or contractually committed before the delay. The Optimistic-IMEC scenario applies the 25 percent saving only to the shared systems and facilities package — electrification, terminals/depot, and ETCS — and not to site-specific civil alignment works.

Table B.5. Full scenario sensitivity matrix — USD billions (NIS billions), at NIS/USD 3.70

Scenario	Unit-cost multiplier	Contingency	Rework/escalation	Option 1 CAPEX	Option 2 CAPEX
Base	1.00 ×	25%	—	3.49 (12.93)	4.49 (16.62)
Low (favorable)	0.85 ×	20%	—	2.85 (10.55)	3.66 (13.56)
High (commodity shock)	1.20 ×	30%	—	4.36 (16.13)	5.61 (20.74)
Political delay (5 yr)	1.10 × real escalation	25%	+15% rework on 60% part-completed works	4.16 (15.38)	5.34 (19.77)
Severe delay (10 yr)	1.20 × real escalation	30%	+25% rework on 60% part-completed works + partial redesign	4.91 (18.15)	6.31 (23.33)
Optimistic-IMEC integration	1.00 × civil; 0.75 × systems	20%	−25% on systems overlay	3.10 (11.47)	4.02 (14.86)

Three observations follow from the matrix. First, the Option 1/Option 2 differential is preserved across all scenarios, ranging from approximately NIS 3.0 to 5.2 billion. Second, the spread between the Low and Severe-delay scenarios is approximately NIS 7.6 to 9.8 billion, indicating that political and procurement risks are at least as material as commodity-price risks. Third, the Optimistic-IMEC integration scenario shows that approximately NIS 1.5 to 1.8 billion of cost reduction is achievable through corridor-level procurement coordination focused on systems and terminal packages; this is a meaningful and policy-actionable lever, even though broader market-wide efficiencies would be required to reach the Low scenario.

B.6 Financing Implications

Although a full financing-structuring exercise is beyond the strategic scope of this study, the pre-feasibility cost numbers carry important implications for the architecture of any future financing package. Four financing tiers are likely to be relevant:

- Sovereign and bilateral financing for the Jordanian segment, plausibly anchored on the existing UAE–Jordan partnership architecture, demonstrated by the Aqaba Port Railway joint venture. [77][78]
- IFI and donor co-financing for the Palestinian segments (West Bank, Gaza, and Safe Passage), drawing on the post-war Gaza reconstruction envelope estimated at USD 71.4 billion over ten years in the joint EU/UN/World Bank assessment. [10][50]
- Corridor-level pooled financing for the integration overlay (ETCS, electrification standards, cross-border systems), drawing on PGII, EU Global Gateway, World Bank corridor instruments, and possible IMEC-coordinated facilities. [3][39]

On a Base-case CAPEX of approximately NIS 12.93 billion (Option 1) or NIS 16.62 billion (Option 2), and assuming an indicative 70/30 debt/equity split typical of large IFI-supported infrastructure transactions, the required equity envelope is in the order of NIS 3.9 to 5.0 billion (USD 1.05 to 1.35 billion). [109][110] This is smaller than, but broadly comparable in order of magnitude to, the overall Jordanian-Emirati Aqaba Port Railway investment

envelope. It should not be read as a like-for-like equity comparison. [77][78] The harder financing challenge is not the headline number but the multi-jurisdictional structuring required to coordinate amongst the different countries into a single bankable structure.

B.7 Assumption Register

The assessment rests on a defined set of assumptions, summarised below for transparency. Each assumption is presented with its basis and a defense/limitation note. The assumptions should be tested and refined at the investment-grade feasibility stage.

Table B.6a. CAPEX assumptions.

Assumption	Basis	Defense/limitation
Jordanian approach unit cost: USD 8.0M/km (Base).	Aqaba Port Railway implicit benchmark of USD 6.4M/km [77][78], adjusted +25 % for descent into the Jordan Valley and seismic-zone engineering.	Plausible upper bound for similar-class freight rail; could be lower if alignment uses existing planned-network corridor.
Safe Passage unit cost: USD 18.0M/km (Base).	Composite of Israel Railways electrified mainline costs [41][42] plus security infrastructure and likely partial grade separation in built-up areas.	Subject to security-architecture decisions still to be made; could rise materially if full tunneling is required.
Gaza-side unit cost: USD 14.0M/km (Base).	Greenfield premium plus UXO/site-clearance provisions consistent with Gaza RDNA. [10][104][105]	It could be lower with a planned mine action and debris-clearance program funded under the reconstruction envelope.
Jordan River crossing structure: USD 120M lump sum (Base).	Composite of regional river-crossing bridge unit costs plus customs/border-yard fitout [18][32]; treated as a section-level lump sum included in the linear-sections subtotal.	Allocated 50/50 to Jordan and the Palestinian West Bank in Table 4.2; could rise if a longer span or more elaborate border yard is required.
Electrification overlay: USD 2.5M/km (Base).	OECD/IEA freight-electrification literature for 25 kV AC catenary on new-build infrastructure. [111][112]	Reasonable mid-range value; substation count and corridor power supply will be the main variance drivers at the next stage.
Contingency: 25 % (Base).	World Bank and EIB pre-feasibility practice for early-stage estimates without detailed engineering. [109][110]	Appropriate for this stage; should reduce to 10–15 % after surveyed alignment and competitive procurement.
NIS/USD exchange rate: 3.70.	Indicative 2026 reference rate.	Foreign exchange and inflation sensitivity are out of scope at this stage; all figures are presented in both currencies for clarity. FX risk should be modeled

		explicitly at the financing structuring stage.
Optional Sahab/local connector excluded from base CAPEX.	Connector is contingent on the precise Jordanian network tie-in point.	If required, would add approximately USD 130 million, including contingency, or about NIS 0.48 billion.
Gaza Port, additional rolling stock, land acquisition, utility diversions, security/ICT systems, and connected logistics zones are excluded from the financial perimeter.	These are separately assessed (Gaza Port under EcoPeace [7]) or are adjacent investments outside the rail corridor proper.	Must be included in any consolidated corridor financing plan. See Box 4.1 for the full list of exclusions.

Table B.6b. OPEX assumptions.

Assumption	Basis	Defense/limitation
Traction energy: approximately 80 kWh/train-km for heavy double-stack freight on this terrain.	International benchmarks for heavy double-stack freight on rolling and partly mountainous terrain, drawing on IEA evidence and the demand model's operating-day convention (300/313/340 days). [111][112]	Sensitive to actual gradient profile, train length, regenerative braking, and electricity-mix carbon intensity. Should be validated against simulation-based traction modeling at the next stage.
Regional electricity price: approximately USD 0.075/kWh.	Indicative blended regional industrial-tariff price for rail traction.	Material to the traction-energy line; should be tested against actual procured tariffs and the renewable-procurement strategy.
Renewals reserve: 1.5 % of CAPEX/yr.	International asset-management practice for new-build heavy-haul rail. [109][111]	Standard convention for early-stage modeling; a refined renewal plan is needed at the investment-grade stage.
Crew, terminal, and administration scaling linearly in train paths.	Standard OPEX scaling convention for freight rail OPEX modeling. [113]	Assumes labor-market parity and standard shift patterns; should be tested against the actual corridor labor environment.
Infrastructure maintenance scales linearly with route length.	Standard convention for pre-feasibility OPEX modeling. [113]	Appropriate for order-of-magnitude comparison between options; non-linear effects (tunnels, structures) will require explicit modeling at the next stage.

Table B.6c. Scenario and limitation assumptions.

Assumption	Basis	Defense/limitation
Political-delay scenario: 5-year delay, +10 % real cost escalation, +15 % rework on 60 % of pre-contingency direct construction.	Historical experience from the Saudi Landbridge delay and rework cycle. [28][29]	Plausible central case for a delay scenario in a corridor of this complexity; the 60 % share is a transparent modeling convention for part-completed works and should be replaced by a construction schedule at the next stage.
Optimistic-IMEC integration: -25 % on electrification, terminals/depot and ETCS package, with contingency reduced to 20 %.	Plausible cost reduction achievable through joint procurement of electrification, ETCS, terminals and control systems under an IMEC umbrella.	Conservative systems-focused reduction; larger savings would require broader market efficiencies and civil works procurement savings similar to the Low scenario.
FX and inflation sensitivity are outside the scope of this assessment.	Strategic-feasibility scope; macroeconomic sensitivity deferred to investment-grade financial structuring.	Political-delay scenarios capture real cost escalation; full FX/inflation sensitivity (including currency mix of construction inputs) to be added at the next stage.
No demand-side cost recovery modeled (tariffs or access charges).	Pre-feasibility scope; revenue modeling deferred to investment-grade stage.	Critical limitation: full financial feasibility requires revenue and tariff modeling against demand layers in Annex A. The strategic title of this section ("Strategic CAPEX/OPEX and Financing Envelope") reflects this scope limitation.
No NPV/IRR computation or real-options valuation.	Strategic-feasibility scope; project-finance modeling deferred.	Standard for pre-feasibility; NPV/IRR analysis will be needed once tariff structure and financing terms are defined.
No carbon pricing or externality monetization in the financial cash flow.	Carbon and environmental benefits are assessed qualitatively in section 5 and Annex C.	A monetized externality layer could materially improve project economics, particularly under EU CBAM exposure of cargo.

B.8 Conclusion

The CAPEX/OPEX assessment confirms that the proposed Gulf–West Bank–Gaza electric railway corridor is a large but tractable investment by regional standards, with a Base-case CAPEX of NIS 12.93 billion (Option 1) or NIS 16.62 billion (Option 2) at constant 2026 prices. Operating expenditure rises from approximately NIS 570 to 690 million per year at opening to approximately NIS 1.20 to 1.37 billion per year by year 15, depending on route option, under the Base demand case.

Option 1 is preferred on CAPEX and OPEX grounds across all scenarios, but route selection remains conditional on an analysis of environmental, heritage, and geopolitical risks. The

single largest source of high-end cost uncertainty identified in the analysis is political delay, which dominates the upper scenarios and is policy-actionable rather than market-driven. A material cost-saving opportunity is integration with the wider IMEC procurement architecture, particularly for electrification, terminals/depot and ETCS packages. Both findings reinforce the broader argument of this study that the corridor's financial viability is structurally tied to the political and diplomatic architecture in which it is delivered.

Finally, the exclusions summarised in Box 4.1 must be read alongside the headline numbers above. The figures presented in this section and annex cover the electric rail corridor proper. Gaza Port, additional rolling stock, the optional Sahab connector, land acquisition, utility diversions, comprehensive security and ICT systems, and connected logistics zones are not included; they are adjacent investments to be added at the consolidated corridor financing stage. Likewise, revenue and tariff modeling, NPV/IRR, and carbon-pricing benefits are not included and are deferred to the investment-grade financial feasibility appraisal.

Annex C. Environmental Analysis

This annex provides the calculation framework and supporting screening tables for the general environmental screening of Option 1 and Option 2.

C.1 Methodology and source studies

The annex applies a route-comparison method. Quantitative calculations are used when route length supports screening estimates, including land take, construction disturbance, and operational emissions. Qualitative and semi-quantitative scoring is used for protected areas, heritage, wadi, and permitting risk because no surveyed alignment is available.

Table C.1. Source studies and plans underpinning the environmental build.

Source/plan	What it provides	Use in the calculation or scoring
Jordan Green Growth, climate policy, NAP, environmental licensing regulation, and Jordan CCDR.	Low-carbon transport, adaptation, water scarcity, and ESIA requirements.	Used to define Jordan-side ESIA, climate resilience, and construction management requirements. [85][86][87][88][89]
Jordan River Valley Master Plan, UNESCO Al-Maghtas listing, Protected Planet Swaimeh and Homret Maeen, and Jordan Biodiversity protected-area portal.	Jordan Valley sensitive areas, heritage constraints, protected-area records, and northern reserve context.	Used to score Jordan-side protected area and heritage risk for Options 1 and 2. [90][91][92][93]
Palestinian NAP, Updated NDC, biodiversity strategy action plans, Environmental Law, Palestinian Environmental Assessment Policy, NSDP 2050, and Road and Transportation Master Plan.	Palestinian environmental policy, protected-area planning, route-planning, and EIA screening context.	Used to identify required screening for the Jordan River-to-NS-spine connector and common West Bank/Gaza sections. [94][95][96][97][98][48][46]
State of Palestine Biological Diversity Portal and Qumsiyeh et al. updated PAN review.	Revised 28-area Protected Area Network and relevant protected-area names, locations, areas, and categories.	Used to score protected-area interface risk for the Palestinian connector sections. [99][100]
World Bank CCDR, UNEP Gaza assessment, Gaza RDNA, Wadi Gaza sources, IEA rail evidence, UK GHG factors.	Climate resilience, post-conflict environmental risk, modal shift, and emissions factors.	Used for Gaza/common-segment risk and operational GHG calculations. [101][102][103][104][105][106][107][108]

C.2 Route and scope assumptions

The route lengths are taken from section 3.3. Calculations include only the new route sections being compared. They exclude terminals, border yards, substations, access roads, borrow pits, spoil disposal areas, worker camps, construction compounds, and port works. Those elements may materially increase the actual footprint and must be assessed during ESIA.

Table C.2. Route length assumptions.

Route component	Option 1 length (km)	Option 2 length (km)	Notes
Jordanian approach	40	40	Option 1: Sahab to King Hussein/Karamah-Allenby. Option 2: planned Amman-Mafraq rail link to Damia.
Jordan River crossing to the Palestinian NS spine	35	35	Both start in the Jordan Valley flat zone and climb toward the West Bank hill range.
Central ridge and westward approach to Tarqumia	25	80	Main length differentiator. Option 2 runs farther along the ridge before turning west.
Tarqumia / Safe Passage	40	40	Common section.
Gaza border to Gaza Port	10	10	Common Gaza access section.
Indicative total	150	205	Option 1 core length, excluding possible local Sahab connector.
Indicative total including possible Sahab/local connector	160	205	Used for sensitivity testing.

C.3 Land-take and construction-disturbance calculation

Two screening widths are used: 25 m for the permanent linear rail corridor and 40 m for temporary construction disturbance. These are planning assumptions only and exclude stations, yards, access roads, bridges, tunnels, cut/fill slopes, spoil disposal areas, and utility diversions.

Permanent footprint (ha)[5] = route length (km) x permanent corridor width (m) / 10

Construction disturbance footprint (ha) = route length (km) x construction disturbance width (m) / 10

Table C.3. Screening land-take calculation.

Scenario	Length (km)	Permanent width (m)	Permanent footprint (ha)	Construction width (m)	Construction disturbance (ha)
Option 1 core	150	25	375.0	40	600.0
Option 1, including a possible Sahab connector	160	25	400.0	40	640.0
Option 2	205	25	512.5	40	820.0
Option 2 increment vs Option 1 core	+55	25	+137.5	40	+220.0
Option 2 increment vs Option 1 with connector	+45	25	+112.5	40	+180.0

The footprint calculation favors Option 1.

C.4 Operational GHG route-length calculation

The calculation uses the Base-case demand results from section 3.1 and an average load proxy of 7.5 t/TEU. The electric rail emissions factor is set at 15 gCO2e/tkm as a screening proxy. Actual emissions will depend on traction energy, gradients, train utilization, braking, electricity mix, renewable procurement, terminal operations, and delays at border crossings. [106][107][108]

Tonnes/year = TEU/year x 7.5

Tonne-km/year = tonnes/year x route length

Emissions (tCO2e/year) = tonne-km/year x emissions factor (gCO2e/tkm) / 1,000,000

Table C.4. Base-case demand converted to tonnes.

Horizon	Base TEU/year	Assumed tonnes/TEU	Estimated tonnes/year
Opening	361,100	7.5	2,708,250
Year 5	758,600	7.5	5,689,500
Year 15	1,433,700	7.5	10,752,750

[5] 1 hectare (ha) = 10 dunums

Table C.5. Electric rail operating emissions by route length.

Horizon	Option 1 length (km)	Option 1 rail emissions (tCO2e/yr)	Option 2 length (km)	Option 2 rail emissions (tCO2e/yr)	Option 2 increment (tCO2e/yr)
Opening	150	6,094	205	8,329	+2,235
Year 5	150	12,801	205	17,494	+4,692
Year 15	150	24,193	205	33,065	+8,872

Table C.6. Indicative modal-shift saving against road freight over the Option 1 core route length.

Horizon	Road emissions over 150 km (tCO2e/yr)	Electric rail emissions over 150 km (tCO2e/yr)	Indicative annual saving (tCO2e/yr)
Opening	25,187	6,094	19,093
Year 5	52,913	12,801	40,112
Year 15	99,999	24,193	75,806

The GHG calculation favors Option 1 because of the shorter distance. However, both options provide substantial rail-versus-road emissions benefits under the screening assumptions.

C.5 Protected-area and sensitive-area screening

Protected-area screening uses a five-point risk scale: 1 = low/no known interface; 2 = low-to-moderate; 3 = moderate; 4 = moderate-to-high; 5 = high/likely interface with protected, proposed protected, heritage, wadi, spring, or sensitive landscape features. The score is a planning screen and must be replaced by a GIS overlay and field verification.

Table C.7. Protected-area and sensitive-area screening score.

Segment	Option 1 risk score	Option 2 risk score	Reason
Jordanian approach	4	3	Option 1 approaches King Hussein/Karamah-Allenby, Wadi Al-Kharrar/Baptism Site, Swaimeh and Homret Maeen, and northern Dead Sea sensitive landscapes. Option 2 has no confirmed Damia-protected-area crossing but requires riparian and northern-reserve screening. [90][91][92][93]
Palestinian connector:	5	4	Option 1 likely interfaces with Al Aghwar, Wadi el Qilt, Qarn Sartaba, El Katar, and Jerusalem Wilderness. Option 2 must avoid

Jordan River to NS spine			Wadi Fasayil, Qarn Sartaba, Al Aghwar, Al Muzawqa, Ras Jadir and related eastern-slope areas. [99][100]
Central ridge and Tarqumia approach	3	4	Option 2 has longer ridge exposure and therefore higher community, agricultural, wadi, and construction-disturbance risk.
Safe Passage and Gaza Port access	4	4	Common segment: risk driven by post-conflict debris, contamination, UXO[6], coastal drainage, Wadi Gaza interface, and port construction. [102][103][104][105]

Table C.8. Relevant protected areas and sensitive receptors for GIS overlay.

Jurisdiction/connector	Option 1: Priority screening features	Option 2: Priority screening features
Jordanian side	Wadi Al-Kharrar/Baptism Site/Al-Maghtas landscape; Swaimeh and Homret Maeen; northern Dead Sea edge; King Hussein/Karamah-Allenby approach; wadis, springs, floodplains, and visual/heritage buffers. [90][91][92]	Damia/Jordan Valley riparian and wadi corridors; possible Ajloun, Dibeen, Yarmouk or special conservation area interfaces if shifted north; wadis, springs, floodplains, and agricultural land. [93]
Palestinian side: Jordan River to NS spine	Al Aghwar (Jordan Valley), Wadi el Qilt, Qarn Sartaba, El Katar, Jerusalem Wilderness, Jericho/eastern-slope wadis and springs. [99][100]	Wadi Fasayil, Qarn Sartaba, AlAghwar, Al Muzawqa, Ras Jadir, Tubas/Jericho eastern-slope habitats, wadis and springs. [99][100]
Common sections	Tarqumia approach, Safe Passage, Beit Hanoon (Erez)/Gaza access, Wadi Gaza coastal wetland, contaminated/debris areas.	Same as Option 1.

[6] Unexploded ordnance

C.6 Assumption register

Table C.9a. Route and footprint assumptions.

Assumption	Basis	Defense/limitation
Option 1 length is 150 km core and 160 km including possible Sahab/local connector.	Section 3.3 route definition.	Used for pre-feasibility comparison only; must be replaced by surveyed alignment length.
Option 2 length is 205 km.	Section 3.3 route definition.	Used for pre-feasibility comparison only.
Permanent corridor width is 25 m.	Screening proxy for single-track rail corridor.	Excludes yards, stations, access roads, substations, slope works, and structures.
Construction disturbance width is 40 m.	Screening proxy for construction working width.	Intended to compare alternatives only, not to define contractor limits.

Table C.9b. GHG assumptions.

Assumption	Basis	Defense/limitation
Average load is 7.5 t/TEU.	Derived from the section 3 demand and tonnage cross-check logic.	Appropriate for order-of-magnitude comparison; actual cargo mix will vary.
Electric rail factor is 15 gCO2e/tkm.	International screening proxy informed by rail emissions literature.	The actual value depends on the electricity mix, gradient, utilization, train length, traction technology, and operations.
The road freight factor used for the modal-shift illustration is 62 gCO2e/tkm.	International screening proxy for heavy road freight.	Used only to show the indicative modal-shift benefit.
Embodied carbon excluded.	No design quantities available.	Must be included at ESIA/investment-grade feasibility stage.

Table C.9c. Environmental data limitations.

Limitation	Implication	Required next step
No surveyed alignment.	Exact protected-area, community, agricultural, and heritage impacts cannot be confirmed.	GIS route-alternatives analysis and field verification.
No protected-area polygon overlay.	The analysis can identify screening risk but not confirm direct crossings.	Overlay both route corridors against Jordanian protected areas, WDPA, UNESCO

		boundaries, Palestinian PAN, KBAs/IBAs, and NSDP layers.
No seasonal biodiversity baseline.	Sensitive species, migration routes, and habitats cannot be confirmed.	Spring/autumn biodiversity surveys and habitat mapping.
No hydrological model.	Flood, erosion, drainage, and sediment impacts are uncertain.	Wadi-by-wadi hydrology and hydraulic design.
No Gaza contamination or UXO survey.	Debris, asbestos, hazardous waste, UXO, and contaminated land risk cannot be quantified.	Gaza-specific contaminated land and UXO assessment.

C.9 Environmental conclusion from the calculations

Both options have environmental strengths and weaknesses, yet, given the assessment's strategic level, defining the more environmentally feasible alternative requires a more detailed environmental assessment.

Annex D. Economic Impact: Supporting Material

This annex provides supporting material for Section 6. It contains an indicative employment build (Table D.1) and a brief discussion of the methodology used to derive the employment ranges reported in section 6.4. The figures are illustrative and are anchored in international benchmarks. They are not investment-grade labor-market estimates.

D.1 Methodology in brief

Construction employment is estimated using an order-of-magnitude benchmark of 6 to 8 pers-years per million US dollars of CAPEX. These are the consultant's order-of-magnitude assumptions, informed by international infrastructure employment-intensity literature. [125][106] The benchmark is intended to capture direct civil works, electromechanical works, and project management. The numbers exclude indirect and induced employment in the wider supply chain. The Base-case CAPEX from section 4 (USD 3.49 billion for Option 1 and USD 4.49 billion for Option 2) is applied directly. Applying the 6–8 jobs per USD million range to those CAPEX figures gives approximately 21,000–28,000 person-years for Option 1 and approximately 27,000–36,000 person-years for Option 2.

The person-year figures express total labor input over the construction period; they are not a snapshot of the workforce at any single point in time. To make the order of magnitude more accessible, Table D.1 also reports an indicative average annual workforce, calculated by dividing the person-year totals by an assumed five-year construction period. On that basis, Option 1 would imply an average annual workforce of approximately 4,200–5,600 workers, and Option 2 an average annual workforce of approximately 5,400–7,200 workers. The peak workforce in any given year would typically exceed the average and depend on the construction schedule.

Operating employment is estimated by combining three components: (i) train crew and operations control, scaled to year-15 train paths from the Base-case demand build in section 3.1; (ii) infrastructure maintenance, signaling, and electrification, scaled to route length; and (iii) terminal and border-yard operations, scaled to TEU throughput. Indicative unit-staffing levels are drawn from European freight rail and OECD/IEA evidence, adjusted downward to reflect the smaller, leaner corridor envisaged here. [106][107][113][123]

Indirect and induced employment is reported as a multiplier range of 1.5 to 2.5 times direct rail-sector employment, consistent with international evidence on infrastructure-sector economic linkages. [125] The lower end of the range corresponds to procurement and supply chains dominated by imports; the higher end corresponds to procurement and supply chains with strong local-content provisions.

D.2 Indicative employment build

The employment estimates are derived from a small number of planning coefficients. These coefficients are not presented as investment-grade labor forecasts or as exact source-reported values for this specific corridor. Rather, they are consultant-calibrated benchmark inputs informed by international infrastructure-employment literature, rail-sector operating evidence, and the demand and CAPEX outputs of this study. The calculation values used in the employment build are summarized in Table D.1a.

Table D.1a. Employment benchmark inputs and calculation values used in the indicative employment build.

Employment component	Source/benchmark basis	Calculation value used in this study	Calculation logic
Construction employment intensity	ILO employment-intensive infrastructure literature and consultant calibration for mixed civil, electromechanical, and project-management works. [125]	6–8 person-years per USD million of CAPEX	Applied to Base-case CAPEX of USD 3,494 million for Option 1 and USD 4,491 million for Option 2.
Option 1: Construction employment	Same as above.	USD 3,494M × 6–8 person-years/USD M	Produces 20,964–27,952 person-years, rounded to 21,000–28,000 person-years.
Option 2: Construction employment	Same as above.	USD 4,491M × 6–8 person-years/USD M	Produces 26,946–35,928 person-years, rounded to 27,000–36,000 person-years.
Average annual construction workforce	Consultant calculation.	5-year illustrative construction period	Person-years divided by five years. Option 1: 4,200–5,600 workers/year. Option 2: 5,400–7,200 workers/year. The peak workforce would normally be higher than the average.
Year-15 Base operating volume	Demand model, Annex A/section 3.1.	24.8 double-stack train paths/day; 340 operating days/year	Equivalent to approximately 8,432 train paths/year in the Base year-15 case.
Option 1: Year-15 train-km	Consultant calculation from route length and train paths.	150 km × 8,432 train paths/year	Approximately 1.26 million train-km/year.
Option 2: Year-15 train-km	Consultant calculation from route length and train paths.	205 km × 8,432 train paths/year	Approximately 1.73 million train-km/year.
Direct rail operations staff — train crew and control	European freight-rail / ORR train-operating-company benchmarking, adjusted for cross-border operations. [106][113][123]	Option 1: 350–550 staff; Option 2: 400–600 staff	Covers drivers, shunters, dispatch, control-room staff, and operating supervision. Option 2 is higher because of longer route-km and longer operating cycles.
Direct rail operations staff — infrastructure, signaling, and electrification maintenance	European freight-rail and OECD/IEA rail-system evidence, adjusted for route length and asset complexity. [106][107][123]	Option 1: 350–500 staff; Option 2: 450–650 staff	Covers track, structures, drainage, signaling, ETCS, telecoms, and overhead-line maintenance. Scales mainly with route length.

Direct rail operations staff — rail terminal and border-yard operations	Freight-terminal and rail-yard operating benchmarks, adjusted for cross-border inspection and customs interfaces. [113][123]	Option 1: 300–450 staff; Option 2: 300–450 staff	Volume-driven rather than route-length-driven; both options carry the same Base-case throughput.
Direct rail operations staff — administration, security, and regulatory functions	Operator-overhead benchmarks plus corridor-specific Safe Passage and multi-jurisdictional security allowance. [113][123]	Option 1: 200–300 staff; Option 2: 250–300 staff	Covers administration, safety, security coordination, regulatory compliance, insurance, and corridor management.
Total direct rail operations staff	Sum of the four direct rail operations blocks above.	Option 1: 1,200–1,800 staff; Option 2: 1,400–2,000 staff	Rounded strategic estimate for year-15 operations under the Base demand case.
Logistics and intermodal-node employment	International infrastructure and logistics employment-intensity evidence, adjusted for corridor terminal, dry-port, customs, and intermodal functions. [123][125]	1.7–2.8 staff per 1,000 annual TEU	Applied to Base year-15 throughput of approximately 1.43 million TEU/year, producing approximately 2,400–4,000 staff, rounded to 2,500–4,000 staff.
Indirect and induced employment multiplier	International infrastructure-sector employment-linkage literature. [125]	1.5–2.5× direct rail operations and logistics employment	Applied to the combined direct operations and logistics employment base. Magnitude depends on local content levels and the depth of domestic suppliers.

Based on this analysis, Table D.1b presents the potential employment opportunities that could be created by the link for both options, by phase or category.

Table D.1b. Indicative employment build for the proposed corridor, by phase and category.

Phase/category	Option 1 (150 km)	Option 2 (205 km)	Basis/assumption
Construction employment, person-years over construction.	Approx. 21,000–28,000 person-years.	Approx. 27,000–36,000 person-years.	Order-of-magnitude estimate using a 6–8 jobs per USD million CAPEX benchmark for civil and electromechanical works in new-build infrastructure, applied to Base-case CAPEX (USD 3.49 / 4.49 billion).
Indicative average annual workforce, over an illustrative 5-year construction period	Approx. 4,200–5,600 workers/year (average).	Approx. 5,400–7,200 workers/year (average).	Person-years divided by an illustrative 5-year construction period; the peak workforce in any given year would typically be higher than the average.
Direct rail operations (year 15)	Approx. 1,200–1,800 staff.	Approx. 1,400–2,000 staff.	Train crew, operations control, terminal and border-yard staff,

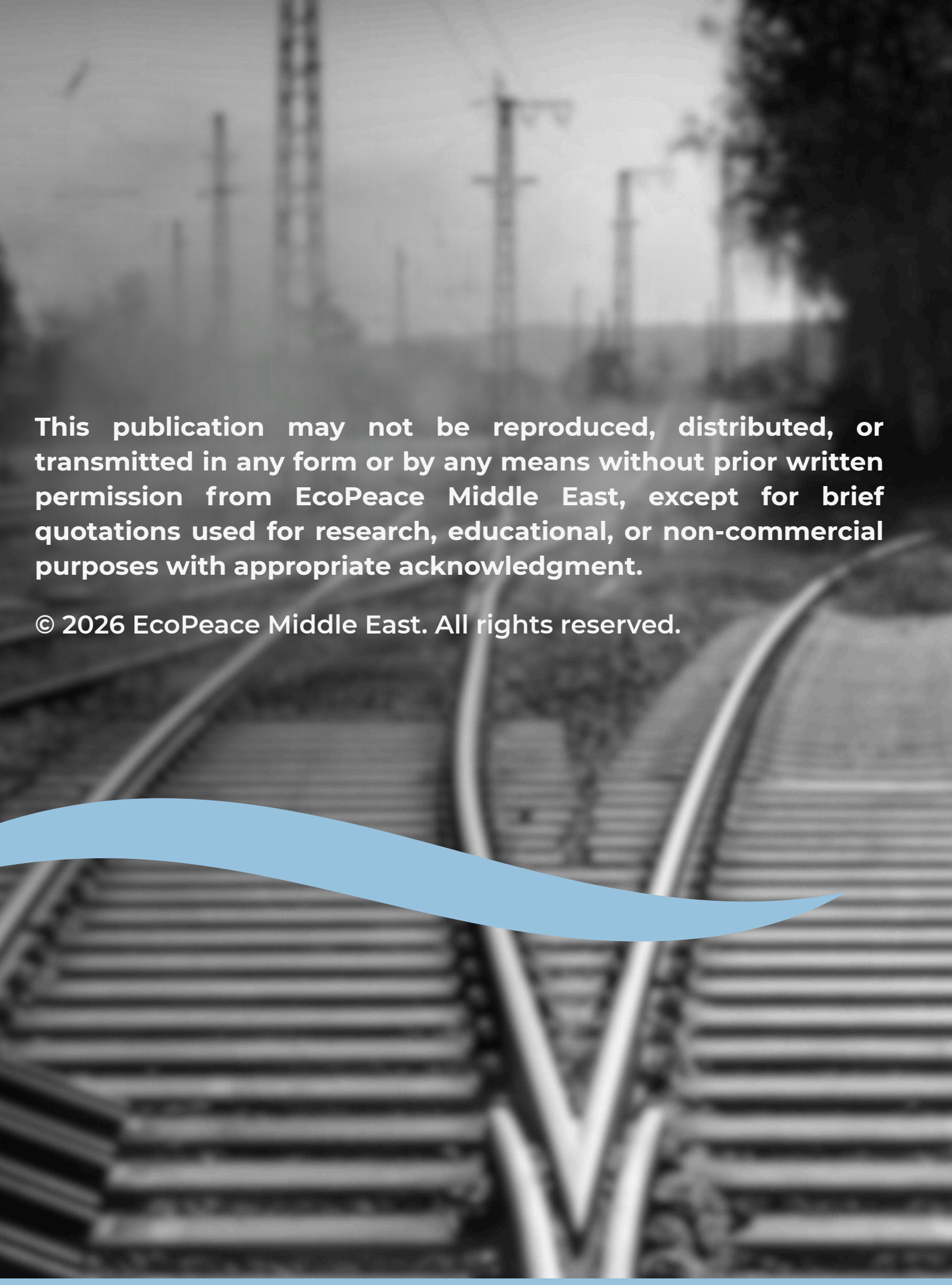
			infrastructure maintenance, signaling and electrification maintenance, and administration, scaled to year-15 train paths and route length.
Logistics and intermodal nodes (year 15)	Approx. 2,500–4,000 staff across corridor terminals, dry ports, and customs.	Same order of magnitude as Option 1.	Terminal-side employment is volume-driven rather than route-length-driven and scales with TEU throughput; both options share the same Base-case throughput envelope.
Indirect and induced employment	Approx. 1.5–2.5x direct rail operations and logistics employment.	Approx. 1.5–2.5x direct rail operations and logistics employment.	Indirect/induced multipliers from international infrastructure-sector employment studies; magnitude depends on local-content levels and the depth of domestic supplier industries.

Source: Consultant's calculation. Construction person-years derived from Base-case CAPEX in section 4 and a 6–8 jobs per USD million benchmark for new-build infrastructure construction. [125] Operating-staff estimates derived from the year-15 Base-case demand build in section 3.1, route length, and European freight-rail and OECD/IEA staffing benchmarks. [106][107][113][123] Indirect and induced employment is reported as a 1.5–2.5x multiplier on direct rail and logistics employment.

The following can be observed from Table D.1.b First, construction-phase employment dominates in absolute terms, reflecting the labor intensity of civil works for new-build rail. This is the principal short-term economic benefit most directly due to local-content procurement design. Second, direct operating employment is modest in absolute terms but durable, providing several thousand long-term skilled and semi-skilled jobs across the corridor. Third, the corridor-wide employment footprint, including indirect and induced employment, is substantive relative to the size of the Jordanian and Palestinian economies, particularly if procurement is structured to maximize local content.

D.3 Limitations of the indicative estimates

The estimates in Table D.1b are subject to some limitations. First, the CAPEX figures from section 4 are themselves order-of-magnitude planning estimates; the construction person-year estimates therefore carry the full uncertainty of those CAPEX figures. Second, the operating-staff benchmarks are drawn from European and OECD rail systems and may overstate or understate the staffing intensity appropriate to a Middle East corridor with different labor-cost structures, automation levels, and operating regimes. Third, the indirect and induced multipliers depend on the depth of domestic supplier industries, which in Jordan and Palestine is currently shallow but could deepen materially if the corridor is delivered with strong local-content provisions. Investment-grade estimation will require national input-output tables, primary procurement-strategy assumptions, and shipper-side trade flow data, none of which are within the pre-feasibility scope of this study.



This publication may not be reproduced, distributed, or transmitted in any form or by any means without prior written permission from EcoPeace Middle East, except for brief quotations used for research, educational, or non-commercial purposes with appropriate acknowledgment.

© 2026 EcoPeace Middle East. All rights reserved.